New era. New plan.

EUROPE

A FISCAL STRATEGY FOR AN INCLUSIVE, CIRCULAR ECONOMY

The Ex'tax Project

in cooperation with

Cambridge Econometrics, Trucost, Deloitte, EY, KPMG Meijburg and PwC

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“The difference between what we do
and what we are capable of doing
would suffice to solve most of
the world's problem.”

- Mahatma Gandhi

Preface

In the past, the way we organized our world used to be quite simple, with clear-cut roles for different types of organizations. Governments were to take care of our collective interests, including education, safety and health. Companies were expected to sell products and services to the public, focusing on financial gains and shareholders' interests, running the economy and creating jobs. International institutions were addressing supra-national issues.

Today, the world has become much more complicated and the distribution of responsibilities has become more blurred. Through their global supply chains, for example, companies have a growing impact on people's lives and on natural capital. There are companies today with revenues more than the GDP of countries. Companies have much more -global- impact than 50 or 100 years ago. And with this increasing impact comes a bigger responsibility, not just for financial but also for social and environmental issues. Since often governments haven't the solutions (and innovative power) in hand to address on itself the global issues we are facing. This shift in responsibilities means that companies, governments and international institutions have to work together and broaden their scope of interests.

Together we should develop solutions that incorporate the three dimensions of value creation simultaneously: for people (societal), planet (environmental) and profit (economic). I strongly believe that people today, and generations to come, would benefit from this. In this respect, we should transition from a linear to a circular economy, by re-designing how resources are being utilized. Shifting from (over-)consumption to (re-)use of materials and the use of bio-based materials. And from fossil dependency to low-carbon solutions.

The Stone Age didn't end because of a shortage of stones. We left the Stone Age behind because we had better alternatives available. The same is true for the Fossil Age; the alternatives are here, let's move fast into the (Bio-) Renewable Age.

Fiscal incentives play a key role in this transition. We should realize that the main area of income for governments is related to taxing labour and much less to the use of scarce resources. We can ask whether we put the correct incentives and focus. Do we want to burden labour and employability and not so much the consumption of scarce materials? When we would have a pricing system for externalities, like carbon emissions, we can reduce other taxes, like those on labour. Why would any country be against the fact that people want to find a job? We should tax the things that we don't want to be used abundantly.

The report *New era. New Plan. Europe* shows us the possibilities and opportunities a fundamental shift in taxes has to offer. It is a valuable study for policy- and decision makers in businesses and governments who are looking for solutions to address the challenges of our time: climate change, pollution, inequality, unemployment and resource scarcity.

We need to develop economic-, cost- and tax-models, which stimulate value creation on the three mentioned dimensions simultaneously. By giving thoughts to the above, we need to redesign our economic system. Since we cannot be successful, nor call ourselves successful, in a society that fails. We need to create sustainable value on all of these dimensions to ensure brighter lives for people today and generations to come.

Feike Sijbesma

CEO Royal DSM, Co-chair Carbon Pricing Leadership Coalition (CPLC) convened by the World Bank

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Abstract

This study by The Ex'tax Project in cooperation with Deloitte, EY, KPMG Meijburg and PwC examines the impact of a tax shift from labour to consumption and natural resource use. Cambridge Econometrics has modelled the impacts of a tax shift scenario in the period 2016-2020 in 27 Member States of the European Union using the E3ME macro-econometric model.

The GDP and employment results are positive in each of the 27 countries. In 2020, GDP levels are on average 2.0% higher and employment levels are 2.9% higher than business as usual. This means that 6.6 million more people are in employment.

Based on the modelling results, Trucost assessed the integrated impact of the scenario on financial capital, natural capital and social capital. The *Ex'tax Integrated Value Added Statement* includes the financial capital value (economic growth), as well as the external benefits to society in terms of social capital (the health impacts of employment versus unemployment) and natural capital (health impacts of lower carbon emissions, reduced pollution levels because of lower energy resource use and water savings).

These findings suggest that a tax shift from labour to natural resource use and consumption is a viable strategy to align tax systems with the *Europe 2020 Strategy* and the *Sustainable Development Goals*.

Executive Summary

The European Union is facing global challenges
The European Union has entered an era of global and regional turmoil and challenges that include low economic growth, labour market challenges and widespread unemployment, climate change and materials supply risks. International strategies to address these challenges (such as the *Europe 2020 Strategy* and the *Sustainable Development Goals*) focus on the eradication of poverty and unemployment, and on reducing carbon emissions, energy use, air pollution and water consumption. These are issues that nations cannot solve on their own. The cohesion and long-term success of the EU will depend on the Union's capability to make EU-economies more inclusive, fair and resilient.

A central role for fiscal systems
An update of our fiscal systems will be key to match the challenges of the 21st century, as taxes steer the economy, by their direct and indirect influence on consumption and investment decisions. Historically, fiscal systems in Western nations have evolved to lean on labour taxes (all taxes paid by employers and employees that are linked to wages, such as payroll taxes, personal income taxes and social security contributions). In 2012, 51.0% of tax revenues (EU-28 weighted average) were derived from labour. Taxes on natural resources and consumption provide a much smaller fraction of total tax receipts (6% weighted average in 2012). This seems illogic, as high labour taxes incentivize businesses to make people redundant, while low resource taxes facilitate overconsumption.

Fossil fuel subsidies act as a 'negative price on carbon'
At the same time, almost all nations apply direct and indirect *subsidies* for environmentally damaging activities. Tax credits - defined as a subsidy by the WTO - are a key route of support for the fossil fuel industry. Such tax concessions are now generally being referred to as *Environmentally Harmful Subsidies* (EHS).

On a global scale, the IEA estimates that fossil fuel consumption subsidies were € 387 billion in 2014. According to the World Bank, this is "likely to be an underestimate". OECD data suggest that fossil fuel support measures (including tax expenditures and budgetary transfers) in the European Union were over € 24 billion in 2014.

Although there are methodological issues of measuring fossil fuel subsidies, the OECD, the World Bank and the IMF have called for lower fossil fuel subsidies as these support measures act as a 'negative price on carbon'. They hold back investments in cleaner emerging technologies and crowd out scarce fiscal resources.

According to the IEA, global fossil fuel subsidies are "over four-times the value of subsidies to renewable energy".

Updating the tax systems is key to address global challenges
The architecture of modern European tax systems stems from a time when globalisation had not yet materialized and jobs could not be moved around the globe. In the past, computers and robots could not substitute employees, and labour provided a stable and reliable source of income for governments. Natural resources seemed available indefinitely, and linear (take-make-waste) consumption did not yet show its harmful effects.

Times have changed. The environmental and social megatrends underline the need for EU Member States to move towards inclusive, 'circular' economies that provide meaningful employment while making clever use of natural resources. In such economies, consumption shifts away from the prevailing, linear system. Natural resources are brought in closed loops, while businesses can add value over and over again by applying principles such as resource efficiency, Cradle-to-Cradle and biomimicry. Such economic system requires labour-intensive business models including repair and maintenance services, remanufacturing, refurbishment, spare parts harvesting and the redesign of products.

A coherent tax strategy is needed to support the transition

Full employment and social cohesion are basic EU objectives. The European Commission has adopted the transition towards a more circular economy as an official goal of the Union as well. Unfortunately, the prevailing tax systems are not yet aligned with these goals.

In the EU, tax policy is a national competence and a topic of much debate. The question remains, though, *how to develop a coherent tax strategy that matches (rather than inhibits) the sustainable and inclusive growth agenda?* Such a strategic approach would allow the EU to become much more effective on the international stage and maximise the economic potential of the EU frontrunners in the sustainability transition.

Growing support for a tax shift

According to the European Commission, a tax shift from labour to things like pollution is "a winning strategy":

> *"One of the biggest tax policy challenges in Europe is that governments tend to rely too much on labour taxes. But overdependence on labour taxes can be a disadvantage when they make it too expensive to employ people. Passing some of the taxes to other things, such as pollution, could help to accelerate employment and economic growth. Smart taxation is a winning strategy."*[1]

The proposal to shift taxes from labour to natural resource use (herein referred to as *Ex'tax*, an abbreviation of *Value Extracted Tax*) has been around for years, and many institutions such as the OECD, the IMF, the World Bank, the European Parliament, the Eurogroup and the ILO have called for such a tax shift. A list of quotes is provided in this study.

The Ex'tax concept

According to the Commission, environment-related taxes are amongst the taxes *"least detrimental to growth".* The administrative costs and transaction costs of green taxes are lower than other taxes (notably income taxes) and their efficiency losses are far smaller than for labour taxes. MIT's *Global Change* program has found that higher gas taxes are at least six to fourteen

[1] European Commission (2015), Smart Taxation: a Winning Strategy. Video.

times more cost-effective than stricter fuel-economy standards at reducing gasoline consumption.

The relation between high labour costs and unemployment has been documented extensively.

Based on economic theory, based on economic modelling work and based on empirical evidence so far, there is ample support for the assumption that a shift in taxation can have a positive impact on employment, economic growth and the environment.

Gaining momentum

The concept of a tax shift is gaining momentum for a number of reasons. Firstly, there is an increasing knowledge base on the external costs of economic activities. Secondly, the world has seen a surge in support for climate action and, thirdly, the role of business is changing.

1. Increasing knowledge base on external costs

There is increasing awareness on the external costs of economic activities. The OECD, for example, estimates that by 2060, climate change will curb global GDP by 1.5% on average. Citi GPS estimates the cumulative GDP 'lost' because of climate change at $ 44 trillion (€ 41 trillion)[2] by 2060. In Europe, in 2010 alone, air pollution caused over 400,000 premature deaths and €330-940 billion in external costs. Such insights demonstrate the great costs of inaction.

2. A surge in carbon pricing systems

The world has seen a surge in support for climate action, which resulted in the *Paris Climate Agreement* being adopted by more than 190 countries. Carbon pricing systems are being implemented across the globe, which sensitizes governments to the role of taxes in society. In 2015, governments raised about $ 26 billion (€ 24.4 billion) in revenues through carbon pricing mechanisms, representing a 60% increase from 2014. The total value of such mechanisms is currently estimated at just below $ 50 billion (€ 46.9 billion).

3. Businesses are applying integrated reporting and shadow pricing

Thirdly, the role of business is changing. Business leaders are now engaging actively in sustainability, embracing the concept of pricing externalities and the circular economy. Currently, 92% of the world's largest 250 corporations report on their sustainability performance. This development is driven in part by investors demanding disclosure of risk information. The proverb 'what gets measured gets managed' certainly applies, as the data are making companies aware of the impact of their activities and enable them to assess the risks across their value-chain. At the same time, the data help to identify opportunities to serve the global marketplace with smarter, cleaner and inclusive business models.

In practice, however, introducing sustainable products and services is often an uphill battle, as business cases of sustainable and inclusive solutions need to compete with options based on 'tax-free' primary resources and subsidized fossil fuels. High labour costs are holding back labour-intensive R&D efforts and activities such as repair and maintenance services, needed for a circular economy. The last few years, more and more business leaders are calling for carbon pricing to fix these failing market mechanisms.

In anticipation of effective pricing of carbon by governments, hundreds of multinationals around the globe are even taking unilateral action. In their accounts, they apply a shadow price on

[2] Throughout this document, exchange rates are derived from the U.S. Internal Revenue Service website and based on the date of each publication.

carbon, in order to improve long-term investment decision-making. In 2015, 435 companies reported to CDP that they used an internal price on carbon - almost a threefold increase from the previous year. In 2016, 517 companies disclosed their practice of pricing carbon emissions. An additional 732 disclosed plans to implement such price by 2018.

These developments illustrate the changing perspective on the role of taxes and other pricing mechanisms.

The Ex'tax Project and partners contributing to this 'winning strategy'
To contribute to the advanced understanding of the tax shift concept, in 2014, The Ex'tax Project (a Dutch think tank) joined forces with international tax thought leaders Deloitte, EY, KPMG Meijburg and PwC. The group published a study called *New era. New plan. Fiscal reforms for an inclusive, circular economy. Case study the Netherlands.* This study explored the rationale for taxing natural resource use rather than labour, contained a Policy Toolkit and a tax shift scenario for the Netherlands. In 2016, with its partners, The Ex'tax Project has updated and internationalized this research. A tax shift scenario was developed that matches EU aspirations to simplify tax systems and relieve the tax burden on labour in each of the 27 EU Member States under review.

The renowned institute Cambridge Econometrics was assigned to model the macro-economic effects of the scenario across the European Union using the E3ME model. This is a global E3 (energy, environment and economy) econometric model that covers each EU Member State individually. The key advantage of using the E3ME model lies in its strong empirical grounding and non-optimisation properties, meaning that it simulates real-world behaviour. E3ME has previously been applied by national governments and the European Commission to investigate various climate, energy and environment-related policies.

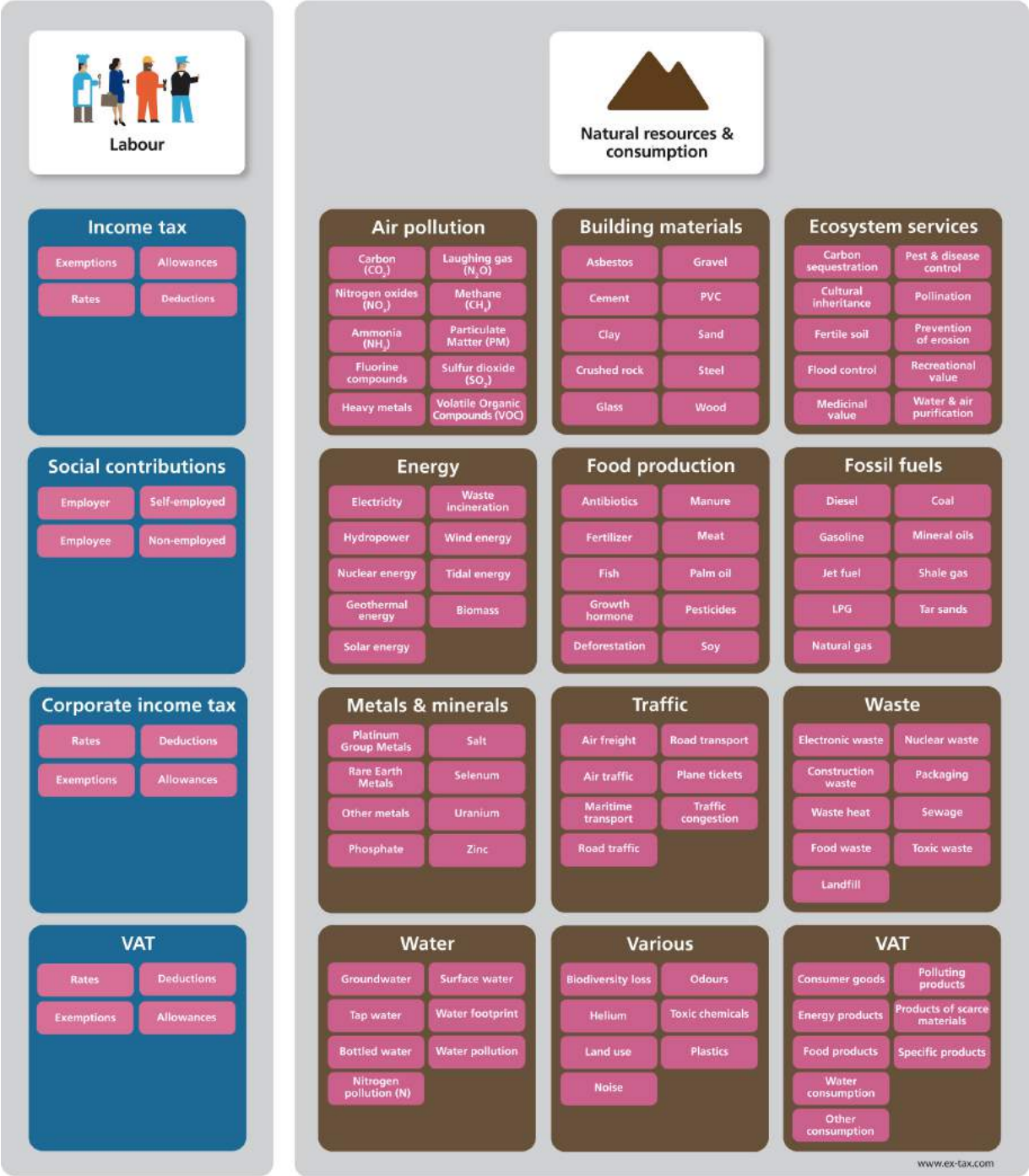
Trucost, the global expert on quantifying and valuing externalities, was asked to build the first 'Integrated Value Added Statement' for this macro-economic study. Based on the Cambridge Econometrics modelling results, this statement includes the external benefits (the added value) of the scenario on social capital and natural capital.

An update of our tax systems requires a long-term vision on the role of taxation in facilitating growth based on human capital, skills and knowledge, rather than the extraction of natural resources. Also, a pragmatic roadmap for implementation is needed. This report contributes to both these purposes.

Constructing a tax shift scenario
The Ex'tax Policy Toolkit below provides an inventory of tax base options for the implementation of Ex'tax principles. These are the 'buttons' governments can 'push' to shift taxation from labour to natural resources. In many studies, the primary focus of researchers is an increase in environmental taxes, while opportunities to lower labour taxes are considered a secondary side effect. This study values both sides of the coin equally; both a major decrease in labour taxes and an increase taxation of natural resources and consumption are necessary for a systems change.

In the Toolkit, on the left (in blue), are the tax base options with regard to labour and on the right (in brown) those with regard to natural resources and consumption.

The Ex'tax Policy Toolkit for shifting the tax base from labour to natural resources & consumption



Based on this inventory, a tax shift scenario was developed. The scenario applies 'the polluter pays' principles by introducing additional excise duties on fossil fuels and taxes on carbon, water and electricity (for bulk users rather than households). The scenario also includes measures to raise VAT rates. The combined revenues are used to lower the tax burden on labour. Personal income tax and social contributions paid by employees and employers are reduced (without changing the social protection base). Also, an investment in employment is made through a payroll tax credit for companies that effectively increase employment. An investment is made in jobs in innovative sectors through a payroll tax credit for circular innovation. Finally, a zero percent VAT rate is assumed for labour-intensive services (maintenance and repair).

The scenario is designed to be revenue neutral. This means that there are no direct stimulus or austerity effects in the scenario. In E3ME the measures are introduced in 2016 and are scaled up linearly to full value by 2020. Implementation is not likely to take place as of 2016, however, for modelling purposes this short time frame provides the most valuable impact analysis.

EU-27 scenario for a tax shift from labour to natural resources & consumption (2020, difference from baseline)

(2016) The Ex'tax Project & Cambridge Econometrics

Notes
Reflects the situation in the year 2020 in 2015 prices. In the modelling, the measures are phased in over a five-year period, reaching full force in 2020. Croatia is not included. All tax rates are indexed in line with inflation.
(a) Labour-intensive services (maintenance & repair).
(b) Secondary effect (€ 0.09 billion) due to change in labour costs and economic impacts. There are no direct stimulus or austerity effects in the scenario.

It should be emphasized that the scenario is not a blue print. It is meant to explore a viable pathway to achieve the ambitious common goals in the *Europe 2020* strategy and other goals as targeted by national and international policy. It's a potential common path that enables individual action; much like traveling a road across different landscapes, EU Member States can choose their own path and speed, while still traveling in the same direction. The ultimate 'point on the horizon' being: tax systems that enable circular and inclusive societies.

The impact of the scenario on labour taxes

In its fifth year (2020), on average throughout the EU-27, the scenario:

- **Shifts 13% of labour taxes** onto natural resources and consumption.
- **Reduces personal income tax revenues** by € 367.9 billion* compared to baseline, which represents 16.5% of the projected total EU-27 personal income tax revenues in the baseline in 2020. The results are particularly remarkable in the case of Romania, Bulgaria, Slovakia, Poland and Lithuania, where the revenues from resource taxes in the scenario are more than 100% of personal income tax revenues. In the model, these surpluses are treated as income subsidies.
- **Reduces the average personal income tax rate** (total income tax revenues divided by total wage and salaries) by 5.6 percentage points in 2020. In some countries, personal income tax rates can fall considerably more – up to 20 percentage points difference from baseline.
- **Reduces social security contributions paid by employers** by € 29.2 billion*, which compares to 2.5% of total EU-27 employers' social contributions in the baseline in 2020. The average social contribution *rate* paid by employers goes down from 18.2% to 17.4%.
- **Reduces, in addition, employer's labour costs** through the payroll tax credit for new employment (€ 125.9 billion)* and the payroll tax credit for circular innovation (€ 23.3 billion).* These credits are modelled separate from the employer's social security rate.

*2015 prices

Over the course of five years (2016-2020) the scenario shifts a cumulative € 1,716 billion of tax revenues from labour to natural resources and consumption (2015 prices).

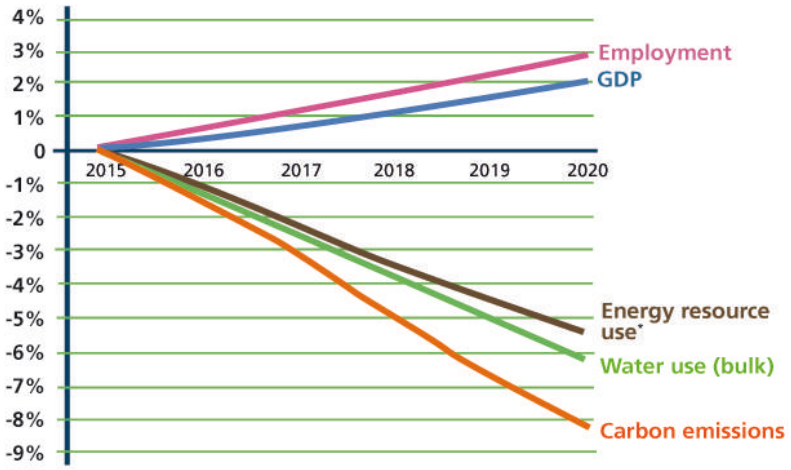
It's important to note that the way social security is financed changes; the social protection base does not change.

Key results of the tax shift scenario

- **GDP and employment levels.** In 2020, EU-27 average employment levels in the scenario are up by around 2.9% and GDP levels by 2.0% compared to baseline, as the positive effects of the reduced labour taxes and the associated increased employment offset any negative effects of the price increases.
- **Number of people in employment.** 6.6 Million more people can be in employment by 2020, contributing to the basic EU objectives of full employment and social cohesion.
- **CO2 emissions.** Another impact observed is a reduction in CO2 emissions by 8.2% in 2020 compared to baseline.
- **Natural resource use.** During the 2016-2020 period, compared to baseline, the scenario saves 1,038.2 million tonnes of carbon, 219 billion cubic meters of water, 194 million tonnes of oil equivalents of energy resources (12 types of energy sources combined); and € 27.7 billion on the EU energy import bill.

Below is a graph with the key results per year, demonstrating the effective decoupling of GDP and resource use. The key message from the results is that it is possible to design policies that reduce resource use and carbon emissions, while at the same time stimulating the economy and creating jobs.

Key modelling results (EU-27, 2015-2020, % difference from baseline)



(2016) Cambridge Econometrics

Notes
** Final energy consumption of twelve energy sources (including gasoline, diesel, aviation fuel, natural gas) by households, businesses and industry. Energy demand by the power generation sector is excluded in order to avoid double counting.*

Other results

- **Member States results.** All Member States manage to lower carbon emissions while increasing economic growth and employment. GDP levels increase roughly between 0.5% and 8% (by 2020 compared to baseline) and employment levels rise by 1.7-4.8%. Significant carbon emission reductions (4.9-16.3%) are achieved. Final energy consumption of 12 types of energy sources is reduced by rates between 1.7% and 16.9%.
- **Sectoral output.** Output falls in the energy and utilities sectors but increases in all other sectors. Governments could opt for an additional innovation subsidy for electricity and utilities to help them innovate. Such measures would erode the overall budget to reduce employment costs.
- **Sectoral employment.** Energy and Utilities are the only sectors showing a negative employment growth. This effect is relatively small, though, as these sectors provide just 1.5% of total employment in the EU. The model shows a loss of 25,000 jobs in the Energy and Utilities sectors, while increasing employment by 6.6 million in other sectors.
- **Real incomes.** In all socio-economic groups real income increases, although slightly less in lower income groups than those in higher income groups; the difference between the first the fifth quintile is only 0.12%. Tax reform requires extensive safeguards to avoid regressive effects on vulnerable groups. In practice, undesirable impacts can be alleviated, for example, by targeting labour tax reductions towards specific income groups or by providing means-tested benefits or allowances. There are numerous policy options available to address the differences between socio-economic groups, and a few practical examples from EU Member States are provided.

These findings suggest that a tax shift from labour to natural resource use is a viable strategy to align tax systems with the goals of the Europe 2020 Strategy and the Sustainable Development Goals (SDGs) to increase employment, alleviate poverty, reduce emissions and energy use and stimulate R&D.

Pricing of externalities through raising taxes on natural resource use and pollution particularly serves Sustainable Development Goal 3 (Good health and wellbeing), Goal 6 (Clean water and sanitation), Goal 7 (Affordable and Clean Energy), Goal 11 (Sustainable Cities and Communities), Goal 12 (Responsible Consumption and Production) and Goal 13 (Climate Action). Using the revenues of these taxes to lower labour taxes and social security contributions most strongly supports Goal 1 (No Poverty), Goal 8 (Decent Work and Economic Growth), Goal 9 (Industry, Innovation and Infrastructure) and Goal 10 (Reduced Inequalities).

The first Integrated Value Added Statement (IVA)

With the help of Trucost, the first *Integrated Value Added Statement* (IVA) was created for this international macro-economic study. The IVA Statement presents best estimates of the impact of the scenario on European Union's stock and flows of financial, natural and social capital over the period 2016-2020. While it is not possible to capture the complete effect of the policy shift on all aspects of these three capitals, the IVA Statement is a starting point from which future evaluations of policy can develop and improve. As such, not all possible externalities could be included in the statement. Trucost focused on the externalities that are robustly supported by data and evidence and those likely to have the greatest material impact.

The IVA Statement draws upon two key modelling analyses: macroeconomic modelling of direct and indirect financial flows, energy and water use, and employment by Cambridge Econometrics using the E3ME model; and extension modelling by Trucost of the natural and social capital impacts (or avoided impacts) arising from these changes.

The total value added of the tax shift scenario for the EU-27 is estimated at more than € 1.100 billion over five years (at 2015 prices). In addition to the increase of € 842 billion in GDP across the EU-27 countries (representing an increase in financial capital), € 260 billion in natural capital value will be added over five years. This includes € 49 billion due to avoided air pollution impacts on health, € 113 billion due to avoided greenhouse gas emissions, € 94 billion due to avoided health and ecosystem impacts of land and water pollution, and € 4 billion due to the health and ecosystem benefits of water conservation.

Over € 17 billion in social capital value is added through improvements to health associated with reduced unemployment. In the 2016-2020 period, 19.6 million more 'person years of employment' are created. The full benefits of reduced unemployment are likely to be much larger, including improvements in education and skills, income security, economic equality, poverty risk reduction, social stability and cohesion.

The Ex'tax Scenario Integrated Value Added Statement
(Cumulative value added 2016-2020 for the EU-27, compared to baseline)

Impact	Description	Value Added (€ billion)	Share of total (%)
Financial Capital		**842.2**	**75%**
- National Income Growth	Net change in GDP	842.2	
Natural Capital		**259.5**	**23%**
- Climate Change	Avoided costs to society of future impacts of climate change	112.6	
- Air Pollution	Avoided costs to society due to illness and premature deaths associated with air pollution exposure	49.5	
- Land and Water Pollutants	Avoided costs to society due to human and ecosystem health damage associated with pollution of land and water with toxic chemicals and metals	93.8	
- Water Depletion	Avoided costs to society due to human and ecosystem health damage associated with depletion of freshwater resources	3.6	
- Other value (not yet included)**	Avoided costs to society due to less extraction of metals, land use, eutrophication etcetera	pm	
Social Capital		**17.4**	**2%**
- Health Benefits of Employment	Value of healthy years of life gained due to reduced unemployment experienced	17.4	
- Other value (not yet included)**	Value of education/skills, income security, economic equality, social stability and cohesion, productivity, reduced poverty risk, etcetera	pm	
Total Value Added		**1,119.2**	**100%**

(2016) The Ex'tax Project (scenario & design), Cambridge Econometrics (macro-economic modelling), Trucost (Integrated Value Added Statement).

Notes
- In € billion 2015. Croatia is not (yet) included.
*** This analysis is based on the available literature. As such, not all externalities could be included.*

Although limited because of data constraints, the IVA Statement represent an ambitious attempt to value the broader impacts of a fundamental policy change across various forms of capital. Taking these limitations in consideration, the externality benefits presented in the statement are likely to underestimate the true natural and social capital value added by the scenario. Key recommended focus areas for future development are to invest in better understanding of the social value of employment, to collect more scientific data on the health benefits of work, and to build reliable data sets on water use.

Four case studies
For the sake of brevity, four EU countries have been selected as case studies. Germany, Poland, Spain and the Netherlands were chosen on the basis of their economic and fiscal characteristics as well as the available consulting expertise in the analysis. Each of these countries is reviewed in terms of their economic structure, labour market and social issues and natural resource use, and fiscal structure, as well as how the scenario works out in each country. Without fully validating the scenario, from each national perspective, areas are identified that require special attention in implementation.

Clearly, tax systems cannot be static; they will evolve with new circumstances. When the updated system works properly, the tax base can be extended to other categories within the Toolkit, in order to guarantee a stable government income. Rates and tariffs can be raised or lowered too; just like the current system of labour taxes, the future system will also be adapted periodically. Current levels of taxation are not carved in stone and there is no reason why a system based on 'extracted value' should be either.

Recommendations and next steps

Five recommendations and actions for next steps towards updating the tax systems are:

1: Improve knowledge on the metabolism of economies

Action: Extending and standardizing integrated reporting in order to have the appropriate information in place to take effective measures.

2: Improve collaboration between Ministries and DGs; interdisciplinary research

Action: Studying the connections between economic, environmental, health and social concerns, by organising interdisciplinary research programs.

3: Research impact from a business perspective

Action: Develop a methodology to help business leaders and sectors analyse the impact of a tax shift, including business cases to illustrate its effects. Such a tool helps a well-informed discussion between policy makers and businesses.

4: Develop a coherent EU-level sustainable and inclusive tax strategy

Action: Develop a coherent EU-level sustainable and inclusive tax strategy connected with the Europe 2020 growth agenda, to allow the EU to be more effective on the international stage and maximise the economic potential of the EU frontrunners in the sustainability transition. Possibly, through mobilizing a coalition of countries that are willing to advance exploration and implementation of the tax shift.

5: Research macro-economic impact of a tax shift on larger international scale

Action: Analyse the impacts on a broader international scale (for example OECD (plus key partners), Latin-America and/or Asia). Such global scale would enable the analysis of global trade flows, labour market impacts, for instance, as well as specific national and regional characteristics and preferences in tax reform.

In conclusion

We've entered a new era; one that requires an inclusive circular economy, as targeted by national and EU strategies. Tax systems play a fundamental role in this transition.

Updating the tax system is not a simple task. But considering the megatrends that we are facing, doing nothing is no longer an option. 'New era. New plan. Europe.' shows that a tax shift from labour to consumption and the use of natural resources enables the EU-27 economies and employment to grow, while natural resources are saved. This means our society and economies can flourish by saving natural resources and tapping into the abundance of human talents and capacities instead. This transformation requires a long-term vision on the tax system, combined with a pragmatic pathway and a realistic timeframe.

The contributing partners of this research recognize the tension between vision and pragmatism, between long-term and short-term interests. It may be clear that many details and complications

still need to be elaborated on. The question is whether to resolve these issues or allow them to immobilize our current system that was built for the era of the linear economy.

We therefore call upon businesses, governments and NGOs to analyse the opportunities and risks of a tax shift, and to take the necessary steps towards a robust and sustainable tax system that enables current and future generations to develop prosperity based on human capital rather than natural resources. We hope that *New era. New plan. Europe* is a source of inspiration.

The Ex'tax Project, Deloitte, EY, KPMG Meijburg, PwC, Cambridge Econometrics and Trucost invite all interested parties to contribute to any of the recommended steps and help expand knowledge on and/or increase support for this fundamental update of the tax systems.

The world has moved on; tax systems need to do the same.

Introduction

The European Union has entered an era of global and regional turmoil and challenges that include low economic growth, labour market challenges and widespread unemployment, climate change and materials supply risks (**chapter 1** provides a brief overview). International strategies to address these challenges (such as the *Sustainable Development Goals* and the *Europe 2020 Strategy)* focus both on the eradication of poverty and unemployment, and on reducing carbon emissions, energy use, air pollution and water consumption.

These are the type of issues that nations cannot solve on their own. The cohesion and long-term success of the EU will depend on the Union's capability to address its key challenges and to make EU-economies more inclusive, fair and resilient.

Tax systems in need of an update

As taxes play a fundamental role in the economy, an update of our fiscal systems will be key to match 21st century challenges. Taxes have a direct and indirect influence on consumption and investment decisions. Historically, fiscal systems in Western nations have evolved to lean on labour taxes (taxes paid by employers and employees linked to wages, such as payroll taxes, personal income taxes and social security contributions) for most of their revenues.

Taxes on natural resources and consumption provide a much smaller fraction of total tax receipts (see **chapter 2**). This seems illogic, as high labour taxes incentivize businesses to make people redundant, while low resource taxes facilitate overconsumption. According to the European Commission, shifting taxes away from labour is a "winning strategy":

> *"One of the biggest tax policy challenges in Europe is that governments tend to rely too much on labour taxes. But overdependence on labour taxes can be a disadvantage when they make it too expensive to employ people. Passing some of the taxes to other things, such as pollution, could help to accelerate employment and economic growth. Smart taxation is a winning strategy."*[3]

Growing support for a tax shift

The proposal to shift taxes from labour to natural resource use (herein referred to as *Ex'tax*, an abbreviation of *Value Extracted Tax*) has been around for years, and it has gained the support of many institutions (see **chapter 3**). For a number of reasons, the idea is gaining momentum. First, there is an increasing knowledge base on the external costs of economic activities, which reveals failures in market mechanisms. Secondly, the world has seen a surge in support for climate action, both by business and governments, which has resulted in the *Paris Climate Agreement,* signed by more than 190 countries. Carbon pricing systems are being implemented across the globe, which sensitizes governments to the role of taxes in society. Third, the role of business is changing. Business leaders are now engaging actively in sustainability, embracing the concept of the circular economy and of pricing externalities (see **chapter 4**).

To contribute to the advanced understanding of the tax shift concept, in 2014, the Ex'tax Project[4] joined forces with international tax thought leaders Deloitte, EY, KPMG Meijburg and PwC.

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[3] European Commission (2015), Smart Taxation: a Winning Strategy. Video.

[4] The Ex'tax Project is a Dutch think tank on the role of taxes in the transition to an inclusive, circular economy. The foundation develops tools and material to gain insights in the dynamics of a tax shift and its impact on society.

Jointly, the group published a study called *New era. New plan. Fiscal reforms for an inclusive, circular economy. Case study the Netherlands.*[5] This study explores the rationale for taxing natural resource use rather than labour, and provides an overview of the international literature. The report also contains a Policy Toolkit and a tax shift scenario worth € 34 billion for the Netherlands.

With its partners, The Ex'tax Project has now updated and internationalized this research. **Chapter 5** explains the approach that has been taken. The renowned institute Cambridge Econometrics was assigned to model the macro-economic effects of a tax shift scenario across the European Union, using the E3ME model (introduced in **chapter 6**), which has often been used to model EU Policy impacts.

Chapter 7 describes how a scenario was developed, matching EU aspirations to simplify tax systems and relieve the tax burden on labour in each of the 27 EU Member States under review. **Chapter 8** provides the key findings of Cambridge Econometrics' modelling.

It should be emphasized that the scenario is not a blue print. It is meant to explore a possible pathway to achieve the ambitious common goals in the *Europe 2020 strategy* and other goals as targeted by national and EU policy. It's a potential common path that enables individual action; much like traveling a road across different landscapes, EU Member States can choose their own path and speed, while still traveling in the same direction. The ultimate 'point on the horizon' being: tax systems that enable circular and inclusive societies.

Trucost, the global expert on externalities, was asked to build the first *Integrated Value Added Statement.* Based on the Cambridge Econometrics modelling results, this statement includes the *external* benefits of the scenario on social capital and natural capital (**chapter 9**). **Chapters 10 and 11** provided more detailed information as well as four case studies and finally, **chapter 12** includes recommendations for continued research.

Obviously, a fundamental change of our tax systems will not happen overnight, and will likely evolve over time. As the Chinese philosopher Lao Tse once wrote: '*A journey of a thousand miles starts with one step.*' Understanding the dynamics of a tax shift is step one. An update of our tax systems requires a long-term vision on the role of taxation in facilitating growth based human capital, skills and knowledge, rather than the extraction of natural resources. Also, a pragmatic roadmap for implementation is needed. This report contributes to both these purposes.

To understand why a system change is needed, we will first take a look at some of the greatest challenges the EU is facing.

[5] The Ex'tax Project, et al. (2014), New era. New plan. Fiscal reforms for an inclusive, circular economy. Case study the Netherlands.

1. Europe faces global challenges

"A cynic man knows the price of everything and the value of nothing"
- Oscar Wilde

Socio-economic megatrends (such as a lack of economic growth and mass unemployment) and global environmental megatrends (such as climate change and water scarcity) are causing major challenges to our societies. The European Union is the second largest economy in the world[6] and Europe is the continent with the largest net imports of resources and energy.[7] Therefore, its economies are particularly vulnerable to global threats.

The cohesion and long-term success of the EU will depend on the Union's capability to address its key challenges and to make EU-economies more inclusive, fair and resilient. Below, we briefly discuss some of the major issues and their impact on business and society.

1.1. Mass unemployment

The economic crisis has severely hit the 28 countries of the European Union (EU-28). Between 2008 and 2013, ten million Europeans lost their jobs.[8] The number of long-term unemployed doubled between 2007 and 2014, reaching 12.4 million people.[9] By October 2016, still 20.5 million men and women were unemployed of whom 4.2 million young persons (under 25 years old).[10]

Unemployment causes poverty and health problems. It undermines human dignity. It denies people the opportunity to participate in society and to develop their full potential. From an economic perspective, unemployment means that human capital is underutilized. Unemployment -especially youth unemployment- is a massive waste of resources.

In 2015, the global number of unemployed people reached 197.1 million – over 27 million higher than pre-crisis levels.[11]

It is important to note that unemployment statistics do not tell the full story of the excess capacity of human potential. Many groups are not represented in unemployment statistics, such as those who have given up searching for a job. In 2015, 9.3 million Europeans, for example, were available to work, but not seeking. Another 10.0 million part-time workers were *underemployed*, meaning they wished to work more hours and were available to do so.[12] Also, in times of economic downturn, the self-employed tend to lower their hourly rates, and as they are offered fewer job opportunities, their income decreases. This effect is not represented in unemployment statistics either.

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[6] CIA (Accessed Sept 2016), The World Factbook.
[7] SERI (2012), Green economies around the world? Implications of resource use for development and the environment.
[8] ILO (April 8, 2013), Ten million more unemployed in Europe than in 2008.
[9] European Commission (Jan 28, 2016), The long-term unemployed: the people that the economic recovery forgot?
[10] Eurostat (Data up to October 2016), Unemployment Statistics.
[11] ILO (2016), World Employment and Social Outlook.
[12] Eurostat (July 14, 2016), Supplementary indicators to unemployment - annual data.

Full employment and social cohesion are basic EU objectives. Europe's *2020 Strategy for smart, sustainable and inclusive growth* set a target of 75% of 20-64 year olds in employment by 2020.[13] This target leaves a huge challenge to create more than 16 million jobs over the next four years.[14]

Aging populations

Ageing is another social and economic challenge of the 21st century. By 2025, more than twenty percent of Europeans will be 65 or over.[15] An increasing 'grey pressure' means that fewer workers need to support the health and financial needs of a growing group of elderly. This drives up the costs of employment, which in turn may push businesses to outsource employment outside of Europe. In our ageing societies, it is therefore key to create jobs suitable for the elderly to enable them to stay active in the labour market and to supplement their pensions. More and more elderly will find they can't afford not to work. Already, across the 34 OECD countries[16] 12.6% of people aged 65 and over are living in relative income poverty.[17]

Part-time work

Part-time employment has been accounting for a disproportionate share of employment creation, increasing its share in total employment to over 22% in 2015.[18] Part-time work is often involuntary and can have costs beyond the loss of earnings compared to full-time working:

> *"part-time jobs are often of lower quality with lower hourly wages, provide poorer training and career opportunities, and, in the long run, reduce pension entitlements."*[19]

On average in OECD countries, 40% of 15-29 year-olds working part-time would like to work more.[20] This group generally does not show in unemployment statistics.

Jobless growth and automation

According to the OECD, almost all countries are experiencing "jobless growth", as growth in GDP is not being matched by a similar rise in employment:

> *"This trend has been especially pronounced since the 2000s, reflecting the unemployment and problems experienced by a number of countries, as well as significant productivity and technology innovations that release people from repetitive tasks. In addition, working conditions and job security remain precarious for many, especially women."*[21]

The *World Economic Forum* (WEF) estimates that disruptive labour market changes, including the rise of robots and artificial intelligence, will result in a net loss of 5.1 million jobs over the next five years in 15 leading countries. The projection assumes a total loss of 7.1 million jobs, offset by a gain of 2 million new positions.[22]

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[13] European Commission (2010), Europe 2020. A strategy for smart, sustainable and inclusive growth.
[14] 15-64 Year olds, estimate based on Eurostat (Accessed Sept 2016), Main scenario - Population on 1st January by age and sex, and Cambridge projections.
[15] European Commission (Accessed July, 2014), Ageing, Policy.
[16] Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States.
[17] OECD (2015), Pensions at a Glance 2015: OECD and G20 indicators.
[18] ILO (2016), World Employment and Social Outlook.
[19] European Commission (Accessed May 2016), Part-time work: A divided Europe.
[20] OECD (2014), Education at a Glance 2014: Highlights.
[21] OECD (2015), Securing livelihoods for all: foresight for action.
[22] WEF (2016), The Future of Jobs. Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution.

According to a draft EU Parliament report, the application of technology may result in "a large part of the work now done by humans being taken over by robots", which raises concerns about the future of employment and "the viability of social security systems if the current basis of taxation is maintained". The draft even proposes to classify robot workers as 'electronic persons', with their owners liable to pay insurances and possibly even tax and social security for them.[23]

Illegal employment

Illegal employment is a major threat to a well-functioning labour market. The shadow economy in the EU is estimated to be worth € 1.87 trillion. In general, two thirds of the shadow economy consists of wages that workers and businesses do not declare.[24] This means that in Europe, each year, € 1.25 trillion worth of labour remains undeclared. This work takes place outside the social, fiscal and legal system where workers derive social protection, pension and child benefits and the like.

Poverty

In 2014, a quarter of the EU population (about 122 million people) was at risk of poverty or social exclusion.[25] Almost twenty million children in Europe, more than 1 child in 5, live below the poverty threshold:

> *"Living in poverty often means limited access to health care, higher risk of school drop-out and later unemployment and poverty, and not reaching one's full potential in general."*[26]

Moving from low to medium work intensity (e.g. one of the two parents working) reduces the risk of poverty of children in the EU from 67.2% to 27.5%.

> *"This means that work can play an important role in preventing or lifting people out of poverty. (…) However, even very high work intensity is not always enough to support the incomes of families with children and eliminate child poverty (…)*
>
> *While work as 'the best form of social protection' has been given more and more prominence in many countries, welfare systems should also protect children living in households excluded from the labour market and help those who despite working cannot make ends meet."*[27]

On a global scale, over 600 million new jobs need to be created by 2030, just to keep pace with the growth of the working-age population.[28] If we fail, many people will miss out on opportunities to participate in society, to fulfil their basic needs and to develop their full potential. This is obviously a social drama as well as a huge economic problem.

The refugee crisis

Global and EU economies have entered an era full of disruption with an unprecedented 65.3 million people around the world having been forced from home. Among them are nearly

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[23] Between 2010 and 2014 the average increase in sales of robots stood at 17% per year and in 2014 sales rose by 29%, the highest year-on-year increase ever. European Parliament Committee on Legal Affairs (May 31, 2016), Draft report with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL))

[24] Excluding Cyprus, Luxembourg and Malta. The shadow economy ranges from 7% of GDP in Austria to more than 25% in some Central and Eastern European countries. Schneider, Friedrich (2013), The Shadow Economy in Europe, 2013.

[25] European Commission (Jan 22, 2016), How's Europe? Employment and social developments in 2015.

[26] European Commission (March 29, 2016), Working parents the best protection against child poverty.

[27] European Commission (March 29, 2016), Working parents the best protection against child poverty.

[28] ILO (Accessed Nov 2016), Decent work and the 2030 Agenda for sustainable development.

21.3 million refugees, over half of whom are under the age of 18.[29] The European Union is certainly not immune from this crisis. An estimated 238,220 migrants and refugees entered Europe by sea in 2016 through July 10, arriving mostly in Italy and Greece.[30] Refugees represent one of the most vulnerable groups of migrants on the labour market. On average, it takes refugees up to 20 years to have a similar employment rate as the native born.[31]

The refugee crisis, unemployment, underemployment and illegal employment cause social unrest, poverty and health problems. The major challenge ahead is to develop economies that include as many people as possible in the (official) labour process.

1.2. Water supply risks

Fresh water scarcity and the associated food supply risks are among the main problems to be faced by many societies in the 21st century. Two-thirds of the world population (4.0 billion people) lives under conditions of severe water scarcity at least one month of the year. Half a billion people in the world face severe water scarcity all year round.[32] By 2025, two-thirds of the world population could live under conditions of water-stress.[33] This will have a huge impact on economic growth:

> *"Some regions could see their growth rates decline by as much as 6 percent of GDP by 2050 as a result of water-related losses in agriculture, health, income, and property—sending them into sustained negative growth."*[34]

Changes in water availability and variability can induce migration and ignite civil conflict.[35]

Although public perception is that Europe has adequate water resources, the European Environment Agency reports that water quality and quantity of European waters remain "a cause for concern".[36] Water scarcity, including the depletion of water resources through pollution, is an increasingly frequent phenomenon in Europe:

> *"Between 1976 and 2006 the number of areas and people affected by droughts went up by almost 20% and the total costs of droughts amounted to 100 billion €. In 2007 at least 11% of the EU population and 17% of its territory had experienced water scarcity and the phenomena is getting worse; currently an important share of river basins can be considered as under water stress all year round. During summer months water scarcity is more pronounced in Southern Europe but is also becoming increasingly important in Northern basins, including UK and Germany."*[37]

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[29] UNHCR (June 20, 2016), Figures at a Glance.
[30] IOM (July 12, 2016), Mediterranean Migrant Arrivals in 2016: 238,220; Deaths: 2,942.
[31] OECD, European Commission (2016), How are refugees faring on the labour market in Europe? A first evaluation based on the 2014 EU Labour Force Survey ad hoc module Working Paper 1/2016.
[32] Mekonnen, Mesfin, Hoekstra, Arjen (2016), Four billion people facing severe water scarcity. Science advances, 2(2), e1500323.
[33] FAO (2007), Coping with water scarcity. Challenge of the twenty-first century.
[34] The World Bank (2016), High and Dry Climate Change, Water, and the Economy.
[35] World Bank Group (2016), High and Dry : Climate Change, Water, and the Economy.
[36] European Commission (June 8, 2016), A Water Blueprint – taking stock, moving forward.
[37] European Commission (2012), Report on the Review of the European Water Scarcity and Droughts Policy.

Damages from *excesses* of water, through flooding, between 2002 and 2013 across the EU are estimated at another € 150 billion.[38] The European Commission expects further deterioration of the water situation in Europe if extreme weather conditions continue to increase in frequency due to global warming:

> *"Water is no longer the problem of a few regions, but now concerns all 500 million Europeans."*[39]

Many European enterprises are reliant on supply chains located in water-stressed or water scarce regions.[40] Water scarcity is already severely impacting global supply chains. In 2015, almost two-thirds of the companies that responded to investor information requests reported exposure to substantive water risk, with reported financial impacts in 2015 totalling more than $ 2.5 billion (€ 2.3 billion). Companies face constraints to growth from water scarcity, and changing patterns of consumer behaviour are leading to reassessments of corporate strategy.[41]

Lowering the water footprint of consumption in Europe is key to long-term sustainable prosperity.

1.3. Fossil fuels and materials supply risks

In mining, the low-hanging fruit has been harvested

The vast majority (89%) of all materials used in the EU are non-renewables; resources that do not regenerate after extraction from nature, such as fuels, metals and minerals.[42] Global material extraction has grown by almost eighty percent over the past thirty years and is around seventy billion tons per year today.[43] Worldwide demand is still growing steeply due to high population growth and increased consumption. Since the 1990s, however, there is a clear downward trend in the discovery rate of major mineral deposits, even though exploration expenses have increased significantly.[44] Ore grades of existing mines are declining,[45] meaning that there is less metal per ton of rubble to be found. Mining is taking place under increasingly difficult circumstances, at remote locations, requiring more and more energy per ton of ore.[46] Already, mining strips more of the earth's surface than natural erosion does.[47]

In the past, new technologies have helped push the limits of mining towards deeper and hasher

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[38] RPA/HKV (2014), Study on Economic and Social Benefits of Environmental Protection and Resource Efficiency Related to the European Semester.
[39] European Commission (Accessed April, 2014), Water Scarcity & Droughts in the European Union.
[40] CDP (2014), Safeguarding Europe's water resources CDP Policy Briefing 2014.
[41] 405 Companies responded to the water information request sent out on behalf of 617 institutional investors, managing US$63 trillion in assets. CDP (2015), Accelerating action CDP Global Water Report 2015.
[42] Wuppertal Institute (2004), Globalisation and the shifting environmental burden. Material trade flows of the European Union.
[43] SERI (2012), Green economies around the world? Implications of resource use for development and the environment.
[44] Materials Innovation Institute (2009), Material Scarcity.
[45] UNEP (2011), Decoupling natural resource use and environmental impacts from economic growth. A Report of the Working Group on Decoupling to the International Resource Panel.
[46] Raw Materials Group (2010), Global mining towards 2030.
[47] UNEP (2004), Vital Waste Graphics, Waste from Consumption and Production - A threat to natural resources.

conditions, but past performance is no guarantee for future results. When oil first began to flow, for example, drillers had to invest one barrel of oil to extract a hundred barrels from the ground. Today, it takes about one barrel of oil to produce the equivalent of four barrels of oil from shale and tar sands.[48] In general, in mining, despite large quantities of remaining mineral reserves, the low-hanging fruit has been picked.[49]

Fossil fuels

In 2014, more than half of the EU's energy use came from imported sources. The highest import dependency rates are recorded for crude oil (88%) and for natural gas (67%).[50] In 2014, the EU's net import bill for fossil fuels amounted to € 335 billion, meaning that the EU spent almost a billion euro per day on importing energy.[51] Current energy prices in the European Union are primarily determined by the global price of fossil fuels, over which the EU has very little control. Import routes are limited in number and exposed to an increased geopolitical risk, with impacts on both availability and price of fossil fuels.[52]

> *"(…) the overexposure of several Member States to fossil fuel imports from single providers and dependency on single import routes create several risks, including price volatility and sudden disruptions of supply."*[53]

Metals

The EU is self-sufficient in construction minerals, but highly dependent on imports of metallic minerals.[54] In 2010, the European Commission earmarked 35 critical raw materials with a high supply risk. This risk is mainly caused by the fact that Europe is fully dependent on imports of these metals, and a high share of the worldwide production comes from only a handful of countries. This production concentration, in many cases, is compounded by low substitutability and low recycling rates.[55] Presently, for example, less than one percent of the so-called Rare Earth Metals (needed for technologies such as medical scanners, smart phones, hybrid cars and wind turbines) are recycled.[56]

Minerals for agriculture

Europe is also highly dependent on imports of minerals for agriculture. Per annum, for example, Europe imports 7.5 million tons of phosphorus rock.[57] Phosphorus is an essential raw material in fertilizers and therefore agricultural production. It is a non-renewable resource for which there is as yet no substitute. It's largely extracted from phosphate ore, reserves of which are only found

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[48] Leeb, Stephen (May 6, 2013), Dangerous Times As Energy Sources Get Costlier To Extract. Forbes.
[49] Diederen, André (2009), Metal minerals scarcity: A call for managed austerity and the elements of hope; Bardi, Ugo (2014), Extracted: How the Quest for Mineral Wealth is Plundering the Planet. Club of Rome.
[50] Eurostat (data July 2016), Energy production and imports. Accessed Sept 2016.
[51] Eurostat (April 1, 2014), International trade of EU, the euro area and the Member States by SITC product group.
[52] Acciona, Alstom, Dong Energy, et al. (2013) Industry statement on a 2030 EU climate and energy framework.
[53] European Commission (2014), Commission Staff Working Document Impact Assessment Accompanying the document Communication from the Commission to the European Parliament and the Council Energy Efficiency and its contribution to energy security and the 2030 Framework for climate and energy policy.
[54] European Commission (2008), The raw materials initiative - meeting our critical needs for growth and jobs in Europe.
[55] The materials with a high supply risk are: Antimony, Beryllium, Cobalt, Fluorspar, Gallium, Germanium, Graphite, Indium, Magnesium, Niobium, Tantalum, Tungsten, Platinum Group Metals (Platinum, Palladium, Iridium, Rhodium, Ruthenium, Osmium) and Rare Earth Metals (Yttrium, Scandium and Lanthanides (Lanthanum, Cerium, Praseodymium, Neodymium, Promethium, Samarium, Europium, Gadolinium, Terbium, Dysprosium, Holmium, Erbium, Thulium, Ytterbium, Lutetium)). European Commission (2010), Critical raw materials for the EU. Report of the Ad-hoc Working Group on defining critical raw materials.
[56] UNEP (2011), Recycling rates of metals. A status report. A report of the Working Group on the Global Metal Flows to the International Resource Panel.
[57] HCSS (2012), Risks and Opportunities in the Global Phosphate Rock Market.

in a small number of countries, primarily Morocco, China, South Africa and the United States.[58]

In general, with regard to materials such as fuels, metals and minerals, physical scarcity is compounded by geopolitical restraints. Efficiency measures and urban mining (mining from waste streams) could significantly reduce Europe's dependency on imports.

1.4. Climate change

Climate change is probably the biggest threat facing mankind. The *Intergovernmental Panel on Climate Change* (IPCC) has warned that a 'business as usual scenario' in carbon emissions means that these emissions will likely cause global average temperatures to rise beyond 2°C.[59] This may sound insignificant, but in the past, a one-degree drop in temperature was all it took to plunge the earth into the Little Ice Age.[60] Two degrees of global warming means catastrophic events will be inevitable, including Arctic melting, sea level rise, disruptive storms, droughts and flooding.[61] The *US National Climate Assessment*, a report compiled by 300 leading scientists and experts states:

> *"Human-induced climate change means much more than just hotter weather. Increases in ocean and freshwater temperatures, frost-free days, and heavy downpours have all been documented. Global sea level has risen, and there have been large reductions in snow-cover extent, glaciers, and sea ice. These changes and other climatic changes have affected and will continue to affect human health, water supply, agriculture, transportation, energy, coastal areas, and many other sectors of society".*[62]

According to the *World Health Organization* (WHO), already, 150,000 deaths worldwide were caused by climate change in 2000, and this number is projected to increase to 250,000 deaths per year worldwide by 2040. Extreme weather events are among the top climate-change impacts that affect public health. In addition, mortality related to heat waves and flooding is expected to increase, in particular in Europe. By 2050, heat waves are projected to cause 120,000 excess deaths per year in the European Union.[63]

The European Commission estimates that the overall EU damages are € 120 billion (1.2% of GDP) in a 2 degrees scenario, due to, amongst others, falling crop yields, flood damages, and increased mortality. The geographical distribution of the climate damages is very asymmetric with a clear bias towards the southern European regions.[64]
Estimates are that $ 2.5-24.2 trillion (€ 2.3-22.7 trillion) of the worlds' financial assets at risk from the impacts of climate change.[65] And for the world to succeed in keeping global warming below 2°C up to 2050, approximately 35% of known oil reserves, 52% of gas reserves and 88% of coal

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[58] PBL (2011), Scarcity in a sea of plenty.
[59] IPCC (2013), Climate Change 2013; The Physical Science Basis, Working Group I contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.
[60] Carlowicz, M. (2010), World of Change: Global Temperatures, NASA Earth Observatory.
[61] IPCC (2013-2014), The Fifth Assessment Report (AR5); European Commission, Joint Research Centre (2014) Climate Impacts in Europe. The JRC PESETA II Project.
[62] U.S. Global Change Research Program (2014), The National Climate Assessment.
[63] EEA (Modified Aug 31, 2016), Climate change and human health. Interview Bettina Menne (WHO Europe).
[64] European Commission (2014), Climate Impacts in Europe. The JRC PESETA II Project.
[65] Dietz, Simon, et al. (2016), 'Climate value at risk' of global financial assets, Nature Climate Change.

reserves are unburnable, which makes the assets of oil and gas companies worth less or even worthless.[66]

Global warming is a transnational problem; a single country is not capable of solving it, and unilateral action may hurt economies that are ahead of others. This prisoner's dilemma causes governments to wait until regional or global agreement is reached. As of yet, only 13 per cent of annual global greenhouse gas (GHG) emissions are formally priced and typically at levels below $ 10 per tonne (€ 9.4),

> *"which is considerably lower than the price that economic models have estimated is needed to meet the 2°C climate stabilization goal recommended by scientists."*[67]

The Paris Agreement that was signed by 197 countries[68] hopefully marks a tipping point in public action on climate change.

1.5. External costs and benefits

'External costs' occur when the production or consumption of a good or service imposes a cost upon a third party. These costs are then borne by society or individuals, rather than the polluter:

> *"the indirect effects have an impact on the consumption and production opportunities of others, but the price of the product does not take those externalities into account. As a result, there are differences between private returns or costs and the returns or costs to society as a whole."*[69]

A classic example of an external cost (or a 'negative externality') is the air pollution caused by burning fossil fuels to produce electricity. Air pollution is damaging to the health of communities living nearby, creating increased healthcare costs, reduced life expectancy due to poor health and lost employment opportunities, but the electricity producer may not fully compensate communities for these costs. The health damage caused by air pollution represents an externality cost of electricity generation.

The WHO estimates that outdoor air pollution was responsible for 3.7 million deaths, or 5.4% of all deaths, globally in 2012, contributing to a range of diseases including lung cancer, chronic obstructive pulmonary disease, heart disease and respiratory infections.[70]

In the European Union:

> *"(…) air pollution is the number one environmental cause of death in the EU, with over 400 000 premature deaths in 2010. More than 10 times the deaths from traffic accidents! This is a huge cost to citizens' health and the economy. The external costs were between €330-940 billion per year in 2010. Among these are significant direct*

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[66] McGlade, Christophe, Ekins Paul (2015), The geographical distribution of fossil fuels unused when limiting global warming to 2 [deg] C. Nature, *517*(7533), 187-190.
[67] World Bank (2015), State and Trends of Carbon Pricing.
[68] United Nations (Update Dec 11, 2016), Paris Agreement - Status of Ratification.
[69] IMF (2010), What Are Externalities?
[70] WHO (2014), Mortality and burden of disease from ambient air pollution.

impacts on the economy: 100 million lost workdays each year, with a direct cost of about €15 billion in lost productivity. Bad air also adds €4 billion to our healthcare costs because of hospitalisation."[71]

Internalisation of external costs means that the full economic, social, health and environmental costs are covered by the price of a product or service, applying the 'polluter pays' principle. As Mark Garney, Governor of the Bank of England, has stated with regard to carbon pricing:

"Even if the initial indicative price is set far below the "true" cost of carbon, the price signal itself holds great power. It would link climate exposures to a monetary value and provide a perspective on the potential impacts of future policy changes on asset values and business models."[72]

In recent years, many studies have been conducted that provide quantifications of external costs. Below are some examples:

External costs of air pollution

- Outdoor air pollution will cause 6-9 million premature deaths annually by 2060; equivalent to a person dying every 4-5 seconds. Cumulatively, more than 200 million people will die prematurely in the next 45 years as a result of air pollution. By 2060, 3.75 billion working days per year could be lost due to the adverse health effects of dirty air – what economists call the "disutility of illness." The direct market impact of this pollution in terms of lower worker productivity, higher health spending, and lower crop yields, could exceed 1% of GDP, or $ 2.6 trillion (€ 2,4 trillion) annually by 2060 **(OECD)**.[73]

- Productivity losses in the global labour force due to death and disability from air pollution topped $ 161 billion (€ 126 billion) in 2010, including $ 89 billion (€ 70 billion) in low and middle-income countries **(World Bank)**.[74]

- The cost to human health and the environment from emissions of regional air pollutants across all sectors of the EU-25 economy equalled € 280-794 billion in the year 2000 **(EEA)**.[75]

- The 10,000 largest polluting facilities in Europe cause between € 102 and 169 billion in damage in 2009 **(EEA)**.[76]

[71] Potočnik, Janez (Oct 15, 2013), Launch of the EEA's Report on Air Quality 2013. Speech 13/822.
[72] Carney, Mark (Sept 29, 2015) Breaking the tragedy of the horizon - climate change and financial stability.
[73] OECD (2016), The Economic Consequences of Outdoor Air Pollution.
[74] World Bank (2016), Little Green Data Book 2015.
[75] EEA (2011), Revealing the costs of air pollution from industrial facilities in Europe.
[76] EEA (Nov 24, 2011), Industrial air pollution cost Europe up to €169 billion in 2009, EEA reveals.

External costs of climate change

- By 2060, climate change will curb global GDP by 1.5% on average, with the negative GDP impact in South and South-East Asia being more than 5% **(OECD)**.[77]

- By 2060, the cumulative 'lost' GDP could be 0.7%-2.5% of GDP, or $ 44 trillion (€ 41 trillion) **(Citi GPS)**.[78]

- The social costs of carbon range between € 50-90 per tonne in 2015 to € 80-180 per tonne in 2050**,** depending on the scope of the calculations and the discount rate applied **(EPA)**.[79]

- The social costs of carbon range between $ 70 and $ 400 per tonne (€ 55-314), with a best estimate of over $ 200 (€ 157) **(Stanford)**.[80]

External costs of sectors/industries

- The value of the **global top 100** externalities of business is estimated at $ 4.7 trillion (€ 3.8 trillion) **(Trucost, TEEB)**.[81]

- **Road Transport:** In 2010, in OECD countries plus China and India, road transport was responsible for approximately $ 1 trillion (€ 0.7 trillion) in health costs **(OECD)**.[82]

- **Coal power plants:** Emissions from coal power plants in Europe cause more than 18,200 premature deaths, about 8,500 new cases of chronic bronchitis, and over 4 million lost working days each year. The economic costs of the health impacts from coal combustion in Europe are estimated at up to € 42.8 billion per year **(HEAL)**.[83]

- **Agriculture**: External costs of industrialized farming are $ 3 trillion (€ 2.4 trillion) per year. Livestock farming costs the environment $ 1.81 trillion per year (€ 1.4 trillion), equivalent to 134% of its production value. Crop production costs $ 1.15 trillion (€ 0.9 trillion) per year, equivalent to 170% of its production value **(Trucost)**.[84]

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[77] OECD (2014), Shifting Gear: Policy Challenges for the next 50 Years.
[78] Citi GPS (2015), Energy Darwinism II. Why a Low Carbon Future Doesn't Have to Cost the Earth.
[79] USD 61-116 to USD 104-235, exchange rate July 1, 2014. At the lowest discount rate of 3%. The social cost of carbon in this report "(…) includes, but is not limited to, changes in net agricultural productivity, human health, and property damages from increased flood risk. However, given current modeling and data limitations, it does not include all damages. As noted by the IPCC Fourth Assessment Report, it is 'very likely that [SCC] underestimates' the damages." EPA (United States Environmental Protection Agency) (Accessed July, 2014), The Social Cost of Carbon.
[80] Stanford News website (Jan 12, 2015), Estimated social cost of climate change not accurate, Stanford scientists say.
[81] Trucost, TEEB (2013), Natural Capital at Risk: the Top 100 Externalities of Business.
[82] OECD (2014), The Cost of Air Pollution. Health Impacts of Road Transport.
[83] The Health and Environment Alliance (HEAL) (2013), The unpaid health bill – How coal power plants make us sick.
[84] Trucost (2015), Natural Capital Impacts in Agriculture: Supporting Better Business Decision Making.

These insights demonstrate the great costs of inaction, but as OECD's Simon Upton remarks:

> *"Massive as they are, however, the dollar figures do not reflect the true costs of air pollution. Premature deaths from breathing in small particles and toxic gases, and the pain and suffering from respiratory and cardiovascular diseases, do not have a market price. Nor does the experience of constantly inhaling foul-smelling air, or forcing your child to wear a face mask just to play outside. These burdens weigh far more heavily on people than any price tag can represent. Nonetheless, the truth remains that policymakers tend to respond more to hard figures than to abstract experiences.*[85]

External benefits

An activity or policy measure can also have external *benefits*. One study indicates, for example, that EU legislation introduced between 1970 and 2010 has resulted in technological improvements and new 'end-of-pipe treatment measures' in the energy, industrial and road transport sectors. These have reduced air pollution, which prevented an estimated 80,000 premature deaths from pollution-related illnesses annually across the EU, resulting in a perceived financial benefit to society of $ 232 billion (€ 217 billion) annually (1.4% of 2010 EU GDP).[86] Another example is the Citi GPS computation that acting on climate change by investing in low-carbon energy saves $ 1.8 trillion (€ 1.4 trillion) through 2040.[87]

External costs, as well as benefits, will be looked at in more detail in chapter 9.

1.6. The need for an integrated approach

Over the last few years, awareness has been growing that the above-mentioned megatrends are interrelated and that economic, social and ecological challenges can no longer be approached in isolation:

- **The link between climate change and poverty**: climate change is expected to drive over 100 million more people into poverty by 2030.[88]
- **The link between climate change and water scarcity, and ultimately social disruption**: research by the *American Water Works Association* (AWWA) shows that water scarcity linked to climate change is now playing a direct role in aggravating major conflicts in the Middle East and North Africa.[89] Water shortages have likely contributed to the unrest that stoked Syria's 2011 civil war.[90]
- **The link between water use and carbon emissions**: California's water conservation between June 2015 and February 2016 simultaneously saved enough electricity to power

[85] Upton, Simon (Aug 17, 2016), Outdoor air pollution will cause up to 9 million premature deaths a year by 2060, says the OECD. World Economic website.
[86] Turnock, S.T, Butt, E.W, Richardson, T.B, et al. (Feb 12, 2016), The impact of European legislative and technology measures to reduce air pollutants on air quality, human health and climate. Environmental Research Letters, Volume 11, Number 2.
[87] Citi GPS (2015), Energy Darwinism II. Why a Low Carbon Future Doesn't Have to Cost the Earth.
[88] World Bank (2015), Shock Waves: Managing the Impacts of Climate Change on Poverty. World Bank (2016), Shock Waves; Managing the Impacts of Climate Change on Poverty.
[89] Nafeez, Ahmed (March 19, 2015), New age of water wars portends 'bleak future'. Middleeasteye.net.
[90] Van der Heijden, Kitty, Otto, Betsy, Maddocks, Andrew (Nov 3, 2015), Beyond Conflict, Water Stress Contributed to Europe's Migration Crisis. World Resources Institute.

135,000 houses for a year. This energy saving translated into a reduction in greenhouse gas emissions equivalent of removing 50,000 cars from the road for a year. [91] And finally,

- **The link between climate change and employment**: in the European Union, the 2020 targets for greenhouse gas emissions, renewable energy and energy savings have already driven the employment of more than 4.2 million people in various eco-industries"[92]

Interconnected problems require a fundamental approach. Not surprisingly, over the last few years, calls for systemic change have become louder. More and more groups and institutions are calling for Europe to develop inclusive and 'circular' economies that provide meaningful employment while making clever use of natural resources. In such economies, consumption shifts away from the prevailing, linear, 'take-make-waste' system. In a circular economy, natural resources are brought in closed loops, while businesses can add value over and over again by applying principles such as resource efficiency, Cradle-to-Cradle and biomimicry. Such economic system requires labour-intensive business models including repair and maintenance services, remanufacturing, refurbishment, spare parts harvesting and redesign of products. The Ellen MacArthur Foundation defines a circular economy as:

> *"an industrial system that is restorative or regenerative by intention and design (…). It replaces the 'end-of-life' concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models."*[93]

A number of international strategies have been adopted to address the aforementioned challenges. Some of these strategies will be discussed below.

1.7. International strategies to address the challenges

Below are a few of the formal strategies that have been developed internationally to tackle some of the key challenges. A very brief overview is given of each strategy.

1.7.1. Europe 2020 Strategy

The *Europe 2020 Strategy* is the EU's growth strategy for the 2010-2020 decade:

> *"In a changing world, we want the EU to become a smart, sustainable and inclusive economy. These three mutually reinforcing priorities should help the EU and the Member States deliver high levels of employment, productivity and social cohesion.*

[91] UC Davis Center for Water-Energy Efficiency (Accessed June 2016), website.
[92] European Commission (2014), A policy framework for climate and energy in the period from 2020 to 2030.
[93] Ellen MacArthur Foundation (2012), Towards the circular economy. Economic and business rationale for an accelerated transition.

Concretely, the Union has set five ambitious objectives - on employment, innovation, education, social inclusion and climate/energy - to be reached by 2020. Each Member State has adopted its own national targets in each of these areas. Concrete actions at EU and national levels underpin the strategy." [94]

The headline targets at the EU level are:

1. 75% of the population aged 20 to 64 years to be employed.
2. 3% of GDP to be invested in the research and development (R&D) sector.
3. Climate change and energy targets:
    a. Greenhouse gas emissions to be reduced by 20% compared to 1990;
    b. The share of renewable energy sources in final energy consumption to be increased to 20%.
    c. Energy efficiency to be improved by 20%.
4. Share of early school leavers to be reduced under 10% and at least 40% of 30 to 34 years old to have completed tertiary or equivalent education.
5. Poverty to be reduced by lifting at least 20 million people out of the risk of poverty or social exclusion.

Considering the economic risks of water scarcity (see section 1.2), it is unfortunate that water efficiency is not a headline indicator in the Europe 2020 Strategy.

1.7.2. The Roadmap to a Resource Efficient Europe

The *Roadmap to a Resource Efficient Europe* (part of the *Europe 2020 Strategy*) aims to decouple economic growth from resource use:

"The Roadmap to a Resource Efficient Europe (COM(2011) 571) outlines how we can transform Europe's economy into a sustainable one by 2050. It proposes ways to increase resource productivity and decouple economic growth from resource use and its environmental impact. It illustrates how policies interrelate and build on each other."[95]

In December 2015, the European commission adopted a new *Circular Economy Package* to stimulate Europe's transition towards a circular economy, which, according to the Commission "will boost global competitiveness, foster sustainable economic growth and generate new jobs." First Vice-President Frans Timmermans, responsible for sustainable development, said:

"Our planet and our economy cannot survive if we continue with the 'take, make, use and throw away' approach. We need to retain precious resources and fully exploit all the economic value within them. The circular economy is about reducing waste and protecting the environment, but it is also about a profound transformation of the way

[94] European Commission (Accessed June 2016), Europe 2020.
[95] European Commission (Accessed July 2016), Roadmap to a Resource Efficient Europe.

our entire economy works. By rethinking the way we produce, work and buy we can generate new opportunities and create new jobs."[96]

The package contains actions to "close the loop" of product lifecycles through greater recycling and re-use, amongst which:

- Actions to reduce food waste;
- An *Ecodesign* working plan to promote reparability, durability and recyclability of products, in addition to energy efficiency;
- A revised *Regulation on fertilisers*, to facilitate the recognition of organic and waste-based fertilisers in the single market and support the role of bio-nutrients;
- A strategy on plastics in the circular economy, addressing issues of recyclability, biodegradability, the presence of hazardous substances in plastics, and the *Sustainable Development Goals* (see 1.7.6) target for significantly reducing marine litter;
- A series of actions on water reuse including a legislative proposal on minimum requirements for the reuse of wastewater.
- Revised legislative proposals on waste (including a common EU target for recycling 65% of municipal waste and 75% of packaging waste by 2030; a binding landfill target to reduce landfill to maximum of 10% of municipal waste by 2030; Economic incentives for producers to put greener products on the market and support recovery and recycling schemes (e.g. for packaging, batteries, electric and electronic equipment, vehicles).

The package is supported financially by the *European Structural and Investment Funds* (with a budget of € 454 billion for 2014-20 the European Union's main investment policy tool),[97] € 650 million from *Horizon 2020* (the EU funding programme for research and innovation), € 5.5 billion from structural funds for waste management, and investments at national level.[98]

1.7.3. The Water Blueprint

The Water Blueprint is expected to drive EU water policy over the long term, outlining actions on legislation, policy objectives and water quantity and efficiency. The objective is to ensure that a sufficient quantity of good quality water is available throughout the EU. The Blueprint's time horizon is closely related to the *2020 Strategy* and to the *2011 Resource Efficiency Roadmap*, of which the Blueprint is the water milestone. However, the Blueprint covers a longer time span, up to 2050. Its targets are, amongst others:

- The impacts of droughts and floods are minimized, with adapted crops, increased water retention in soils and efficient irrigation.
- Water abstraction should stay below 20% of available renewable water resources.

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[96] European Commission (Dec 2, 2015), Press release. Closing the loop: Commission adopts ambitious new Circular Economy Package to boost competitiveness, create jobs and generate sustainable growth.
[97] European Commission (Accessed Sept 2016), European Structural & Investment Funds.
[98] European Commission (Dec 2, 2015), Press release. Closing the loop: Commission adopts ambitious new Circular Economy Package to boost competitiveness, create jobs and generate sustainable growth.

- Member States set water efficiency targets for 2020 at River Basin level, with appropriate complementary measures, based on a common EU methodology that takes into account the variety of situations across economic sectors and geographic areas.[99]

1.7.4. The 2030 Energy Strategy

The 2030 Energy Strategy contains targets for 2030:

- A 40% cut in greenhouse gas emissions compared to 1990 levels
- At least a 27% share of renewable energy consumption
- At least 27% energy savings compared with the business-as-usual scenario.

To meet the targets, the European Commission has proposed, amongst others, a reformed EU emissions trading scheme (see 1.7.7), security of the energy system by diversification of supply, and interconnection capacity between EU countries.[100] From the policy framework:

> *"there is a need to continue to drive progress towards a low-carbon economy which ensures competitive and affordable energy for all consumers, creates new opportunities for growth and jobs and provides greater security of energy supplies and reduced import dependence for the Union as a whole."* [101]

1.7.5. The Paris Climate Agreement

At the Paris Climate Conference (COP21) in December 2015, more than 190 countries adopted the first-ever universal, legally binding global climate deal. The agreement sets out a global action plan to put the world on track to avoid dangerous climate change by limiting global warming to well below 2°C. The agreement is due to enter into force in 2020. Governments agreed:

- On a long-term goal of keeping the increase in global average temperature to well below 2°C above pre-industrial levels;
- To aim to limit the increase to 1.5°C, since this would significantly reduce risks and the impacts of climate change;
- On the need for global emissions to peak as soon as possible, recognising that this will take longer for developing countries;
- To undertake rapid reductions thereafter in accordance with the best available science.

Before and during the Paris conference, countries submitted their *Intended Nationally Determined Contributions* (INDCs) outlining their contributions to the necessary emission reductions. The INDCs are not yet enough to keep global warming below 2°C.[102]

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[99] European Commission (2011), Roadmap to a Resource Efficient Europe.
[100] European Commission (Accessed July 2016), 2030 Energy Strategy.
[101] European Commission (2014), A policy framework for climate and energy in the period from 2020 to 2030.
[102] Climate Action Tracking Partners (Update April 7, 2016), Climate Action Tracker.

March 6, 2015, the EU submitted its INDC, formally putting forward a binding, economy-wide target of at least 40% domestic greenhouse gas emissions reductions below 1990 levels by 2030. The overall level of GHG emissions reductions proposed in the INDC is not yet sufficient to fall within the range of 'fair and equitable emission reductions' for the EU-28. Currently implemented policies are projected to reduce domestic emissions by 23–35% below 1990 levels and hence do not yet put the EU on a trajectory towards meeting either its 2030 or 2050 targets.[103]

1.7.6. The 2030 Agenda for Sustainable Development (SDGs)

On 25 September 2015, the 193 countries of the UN General Assembly adopted the 2030 Development Agenda titled *Transforming our world: the 2030 Agenda for Sustainable Development*.[104] The agenda contains 17 *Sustainable Development Goals* (SDGs) with 169 targets focused on improving hunger and poverty, health and education, making cities sustainable, combating climate change and protecting forests and oceans.

The findings of this study (see chapters 8 and 9) are aligned with a number of Sustainable Development Goals. Pricing of externalities through raising taxes on natural resource use particularly serves Goal 3 (Good health and wellbeing), Goal 6 (Clean water and sanitation), Goal 7 (Affordable and Clean Energy), Goal 11 (Sustainable Cities and Communities), Goal 12 (Responsible Consumption and Production) and Goal 13 (Climate Action). Using the revenues of these taxes to lower labour taxes and Social Security Contributions most strongly supports Goal 1 (No Poverty), Goal 8 (Decent Work and Economic Growth), Goal 9 (Industry, Innovation and Infrastructure) and Goal 10 (Reduced Inequalities).

Humanity is facing complicated, multi-dimensional, global issues, which demand solutions that bridge the gap between the social and the environmental. The SDGs are a clear 'to do list'.

1.7.7. The EU Emission Trading System

The EU is home to the first - and still the biggest - international system for trading greenhouse gas emission allowances. *The EU Emissions Trading System* (ETS) covers more than 11,000 power stations and industrial plants in 31 countries (the EU-28 plus Iceland, Liechtenstein and Norway), as well as airlines. The ETS covers 45% of CO2 emissions in the EU, as well as emissions of other greenhouse gases.[105] The 31 countries covered by the ETS account for 20% of global GDP and 11% of the world's energy-related CO2 emissions.[106]

The program has been plagued by price volatility. In January 2005, allowances were € 8/tCO2e (tonne of CO2-equivalent). By early 2006, the price exceeded € 30 and ended in 2007 at € 0.01.[107] This volatility was attributed to:

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[103] Climate Action Tracking Partners (Update April 7, 2016), Climate Action Tracker.
[104] United Nations (2015), Transforming our world: the 2030 Agenda for Sustainable Development.
[105] European Commission (Accessed May 2016), The EU Emissions Trading System (EU ETS).
[106] IETA (2015), European Union: an emissions trading case study.
[107] IETA (2015), European Union: an emissions trading case study.

"the absence of transparent, precise emissions data at the beginning of the program, a surplus of allowances, energy price volatility, and a program feature that prevents banking of allowances from the first phase to the second."[108]

Phase II of the program saw a more stringent cap and higher prices between 2008 and 2010, followed by a huge price drop reflecting the growing imbalance between the supply and demand of allowances. During this trading period, allowance prices reached € 25-30, but decreased to around € 7 by the end of the period. Meanwhile, *Certified Emission Reductions* (credits from approved emission-saving projects around the world) were trading at less than € 1 by the end of 2012.[109]

According to the OECD, the impact of the European ETS on investment behaviour is "limited due to too many emission allowances."[110] In order to address the surplus issue the European Commission has undertaken two main initiatives:

1. **Market Stability Reserve (long term):** The objective of the reserve is to adjust the supply of allowances according to changes in demand.
2. **Backloading (short term):** A measure to postpone the auctioning of 900 million allowances from 2014-16 until 2019-20.[111]

Despite these initiatives, the price per allowance stands at approximately € 6.10 per tonne of CO_2,[112] which is too low to drive clean investments:

"Analysis by the International Energy Agency (IEA) and business groups also shows that for ETS to drive capital investment in power generation, a carbon price of EUR 30 per tonne of CO2 would be needed for onshore wind investments, while the price of EUR 40 per tonne of CO2 would be needed to shift production from coal to gas plants reflecting the threshold for coal-to-gas switching at current commodity prices".[113]

Whereas the vast majority of emission allowances was previously given away for free by governments, from 2013 auctioning is the main method of allocating allowances. This means that businesses have to buy an increasing proportion of their allowances at auction. The EU legislation sets the goal of phasing out free allocation by 2020.[114] More than 40% of the 2013 annual allowances were auctioned. The total revenues generated by the auctioning of ETS allowances in the year 2013 for the EU were € 3.6 billion. Member States are allowed to use fifty percent of the ETS auctioning revenues for non-climate or energy-related purposes.[115]

Research agency CE Delft estimated that European industry received additional profits amounting to over € 8 billion through over-allocation of free emission allowances, between 2008 and 2014.[116]

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[108] Aldy and Stavins (2012) in IETA (2015), European Union: an emissions trading case study.
[109] IETA (2015), European Union: an emissions trading case study.
[110] OECD (2016), OECD Economic Surveys European Union, June 2016 OVERVIEW.
[111] IETA (2015), European Union: an emissions trading case study.
[112] Price Nov 8, 2016. www.eex.com.
[113] OECD (2016), OECD Economic Surveys European Union, June 2016 OVERVIEW.
[114] European Commission (Accessed Nov 2016), The EU Emissions Trading System (EU ETS).
[115] IETA (2015), European Union: an Emissions Trading Case Study.
[116] CE Delft (2016), Calculation of additional profits of sectors and firms from the EU ETS.

Sectors not included under the ETS (transport, heating of buildings, small-scale industry, agriculture and waste) cover 55% of total GHG emissions emitted by EU Member States. There is no set emission reduction target for land use, land-use change and forestry activities.[117]

As highlighted in this chapter, global environmental and social megatrends pose serious challenges to economic development, health and stability in Europe and abroad. A transformation to an inclusive, circular economy will be key to sustain prosperity in future. Several ambitious strategies have been defined on national, EU and global level. Unfortunately, the prevailing tax systems in European countries play a key role in inhibiting the emergence of sustainable and inclusive economies, as will be explained in the next chapter.

[117] IETA (2015), European Union: an emissions trading case study.

2. Fiscal systems in Europe in relation to these challenges

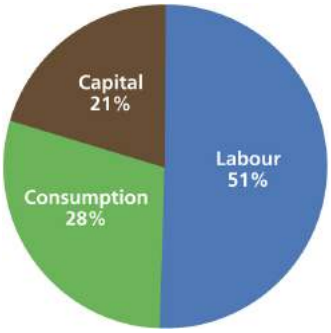
"Taxes are what we pay for civilized society."
- Oliver Wendell Holmes, Jr. (US Supreme Court Justice)

This chapter will explore the role of taxes in Europe, in relation to the environmental and socio-economic challenges mentioned in the previous chapter.

2.1. High labour taxes and social contributions

In 2012 (the latest year for which, presently, complete EU tax data sets are available), Europe's 500 million inhabitants[118] paid € 5,109,446,000,000 (€ 5.1 trillion) in taxes. Historically, tax systems in Western nations have evolved towards relatively high taxes on labour (taxes paid by employers and employees that are linked to wages, such as payroll taxes and personal income taxes as well as social security contributions). In 2012, 51% of all tax revenues (EU-28 weighted average) were derived from labour. Consumption taxes (including Value Added Tax, duties and green taxes) provided 28%. The remaining 21% of total tax revenues were based on capital (including profits, exports and assets) (see Figure 1).

Figure 1: Tax structure by economic function (EU-28, 2012, % of total taxation)[119]



* Weighted average.

Labour taxes were the largest source of tax revenue in 2012 in 24 Member States, and in 13 Member States they accounted for more than half of total tax revenue. The highest shares of taxation from labour were observed in Sweden (58.6%), the Netherlands (57.5%), Austria (57.4%) and Germany (56.6%). Only in Bulgaria (32.9%), Malta (34.6%), Cyprus (37.1%) and the United Kingdom (38.9%) was the share below forty percent (see Figure 2).[120]

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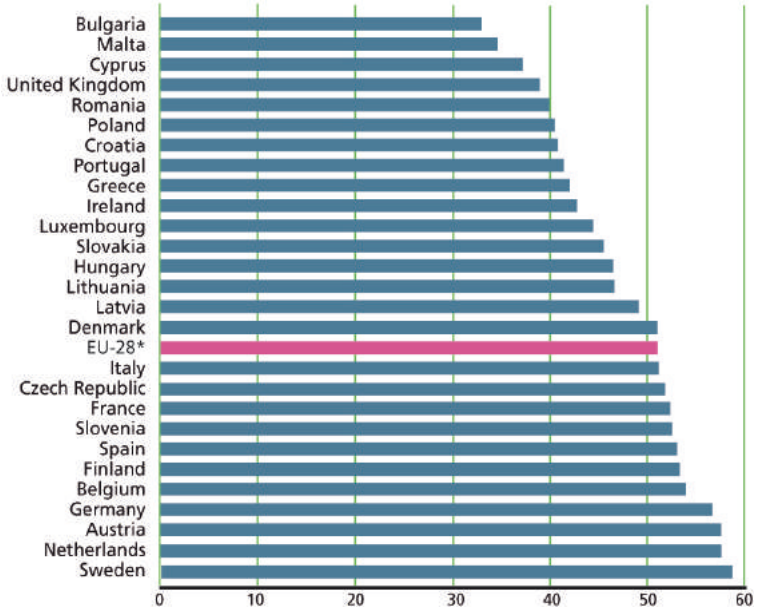
[118] Eurostat (2011), Population on 1 January.
[119] European Commission (2014), Taxation Trends in the European Union.
[120] Eurostat (June 16, 2014), The overall tax-to-GDP ratio in the EU28 up to 39.4% of GDP in 2012.

Figure 2: Tax burden on labour (EU-28, 2012, % of total taxation)[121]



* Weighted average.

The implicit tax rate on labour

The tax burden on labour has increased significantly since 1970.[122] The *Implicit Tax Rate* (ITR) on labour is a measure of the tax burden on labour, calculated as the ratio of taxes and social security contributions on employed labour income to total compensation of employees and payroll taxes. The increase of the ITR on labour was very marked in the 1970s, decelerating slightly in the 1980s. In the first half of the 1990s, further increases were due to the rise in unemployment caused by the recession at the beginning of the decade. Finally, in the second half of the decade, budgetary consolidation forced several Member States to increase the tax burden. Since falling sharply in 2009 and levelling off in 2010, the EU-28 average has climbed back to pre-crisis levels (see Figure 3).[123]

The labour tax wedge

The *labour tax wedge* is another measure of the tax burden on employment incomes, in terms of the difference between labour costs to the employer and the corresponding net take-home pay of the employee.[124] The tax wedge varies between different types of household and income intervals.[125] Between 2010 and 2013, the average labour tax wedge across the OECD increased by 0.8 percent, to 35.9%.[126] This means that, on average, of every euro an employer pays in labour costs, only € 0.64 ends up in the pocket of the employee.

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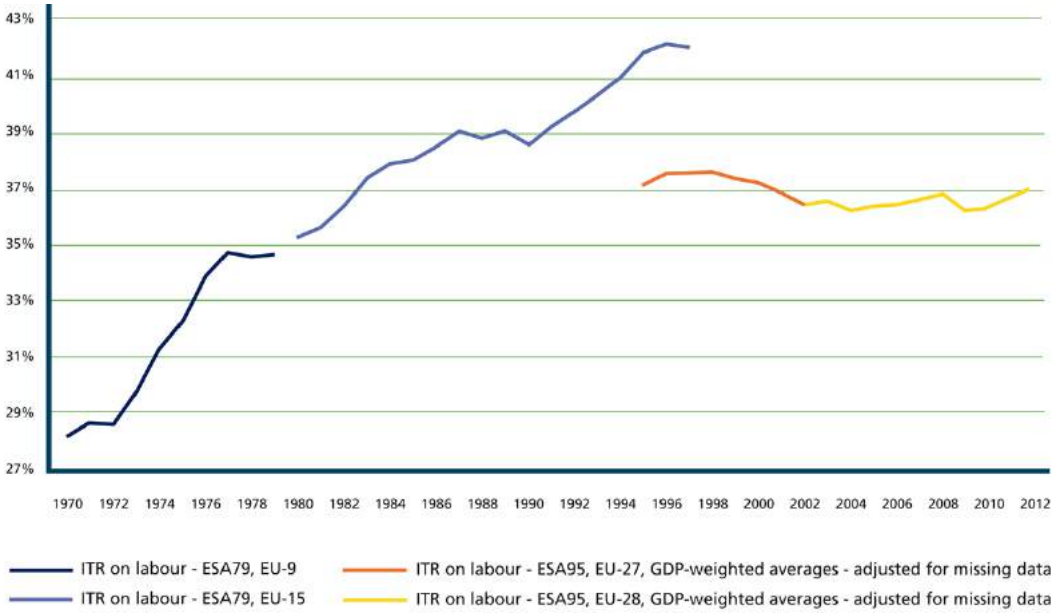
[121] European Commission (2014), Taxation Trends in the European Union.
[122] European Commission (2011), Taxation Trends in the European Union.
[123] European Commission (2014), Taxation Trends in the European Union.
[124] It is calculated by expressing the sum of personal income tax (employee plus employer) social security contributions together with any payroll tax, minus benefits, as a percentage of total labour costs. OECD (2011), Taxing wages 2009-2010. Special issue: Wage income tax reforms and changes in tax burdens.
[125] The OECD mentions: singles without children, single parents with 2 children, one-earner married couples without and with 2 children, two-earner married couples with and without 2 children as well as 7 income levels. OECD (2014), Taxing Wages 2014.
[126] Single individual without children at the income level of the average worker. OECD (April 11, 2014), Tax burdens on labour income continue to rise across the OECD.

Figure 3: Implicit tax rate on labour (EU, 1995–2012)[127]



Labour taxes cause a broad range of distortions

The OECD definition of the labour tax wedge includes the statement:

> *"The average tax wedge as measures the extent to which tax on labour income discourages employment."*[128]

High labour taxes and social contributions give incentives to businesses to gain efficiency by employing as few people as possible, or to outsource to low-income countries. These high costs have also incentivized technological innovation to be focused on making people redundant in production processes. This is a significant problem considering the current mass unemployment (see 1.1). Section 3.4 will expand on this issue.

For businesses in the EU and the *European Free Trade Association* (which includes Iceland, Liechtenstein, Switzerland and Norway), labour taxes and social contributions account for more than 65% of the Total Tax Rate. Labour taxes and social contributions are also the most time-consuming tax obligations for businesses.[129]

In recent years, it has become clear that labour income taxes cause a much broader range of distortions than previously thought (IMF 2016):

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[127] The average ITRs on labour based on ESA79 system of national accounts are weighted by the total compensation of employees in the economy, whereas for ESA95 the GDP-weighted average is used. Data based on ESA79 are only available for the EU-9 and EU-15 Member States (1970-79 and 1980-97, respectively). ESA79 data: European Commission (2011), Taxation Trends in the European Union. ESA95 data: European Commission (2013), Taxation Trends in the European Union.

[128] OECD (Accessed Sept 2016), Tax wedge (indicator).

[129] In the EU and the EFTA, in 2012, it cost an average company 179 hours to comply with its tax obligations. Labour taxes and mandatory contributions are the most time consuming to comply with, at 86 hours per year. PwC, The World Bank Group (2015), Paying Taxes 2016: The Global Picture. A comparison of tax system in 189 economies worldwide.

"for example, they also promote informal markets, excessive compensation in the form of untaxed fringe benefits, and excessive spending on tax-favored goods like housing".[130]

Reducing the shadow economy by moving work to the official economy reduces tax gaps and generates additional revenues for governments.[131] In this respect, the Commission recommends "Reducing the financial attractiveness of undeclared work through better design of tax and benefit systems", "monitoring tax distortions between the status of employee and self-employed" and "the reduction of fiscal burden on low skilled jobs".[132]

2.2. Low environmental taxes

"What we obtain too cheap, we esteem too lightly."
- Thomas Paine

Advantages of environmental taxes

In the definition used by the European Commission, environmental taxes include taxes on energy, transport, pollution and resource extraction.[133] Environmental taxes, or 'green' taxes are considered growth-friendly, as they are less distortive to the economy than taxes on labour and income.[134] The administrative costs and transaction costs of green taxes are lower than other taxes (notably income taxes).[135] In addition, the efficiency losses from green taxes are far smaller than for labour taxes. Considering EU-wide figures, the value for labour taxes of 1.90 implies that to raise an additional euro of revenue, the average efficiency loss would be € 0.90. In contrast, raising an additional euro of revenue from energy taxes, leads to an average efficiency loss of only € 0.08.[136]

Environmental taxes can be very effective in averting environmental damage. In Sweden, for example, in the early 1990s, a tax on fertilizers reduced demand of fertilizers by 15-20% and also reduced financially optimal dosages by about ten percent, thereby effectively "decoupling pesticide use and toxicity".[137] In the Netherlands, in 1989, leaded petrol was taxed, because of

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[130] IMF (2016), After Paris: Fiscal, Macroeconomic, and Financial Implications of Climate Change.
[131] European Parliament (2013), From Shadow to Formal Economy: Levelling the Playing Field in the Single Market.
[132] European Commission (Accessed Sept 2016), Shadow Economy and Undeclared Work. EC website.
[133] *Energy taxes* are taxes on energy products used for both transport and stationary purposes, including petrol and diesel, fuel oils, natural gas, coal and electricity. *Transport fuel taxes (*a subgroup of energy taxes) are levied on the transport use of fuels/energy products. *Transport taxes* (excluding fuel) are related to the ownership and use of motor vehicles. *Pollution taxes* are taxes on emissions to air and water, management of solid waste and noise. *Resource taxes* include taxes linked to extraction or use of a natural resource. This means that licenses paid for hunting, fishing and the like are classified as resource taxes, because these activities deplete natural resources. CO2 taxes are included under energy taxes rather than under pollution taxes, as it is often not possible to identify them separately in tax statistics. Taxes on the extraction of oil or gas are not anymore booked as resource taxes in line with the statistical guideline which excludes taxes on oil and gas extraction from the definition of environmental taxes. European Commission (2013), Taxation Trends in the European Union.
[134] European Commission (2012), The 2013 Annual Growth Survey: Towards fair and competitive tax systems. MEMO/12/915; European Commission (2013), The marginal cost of public funds in the EU: the case of labour versus green taxes; European Commission (2013), Annual Growth Survey 2014. COM(2013) 800 final; European Commission (2015), Tax Reforms in EU Member States 2015. Tax policy challenges for economic growth and fiscal sustainability.
[135] Aarhus University, Eunomia (2014), Study on Environmental Fiscal Reform Potential in 12 EU Member States.
[136] European Commission (2013), The marginal cost of public funds in the EU: the case of labour versus green taxes.
[137] World Bank Group (2003), Fertilizer and Pesticide Taxes for Controlling Non-point Agricultural Pollution.

the heavy pollution it caused. Two months later, leaded petrol was taken off the market.[138]

According to the European Commission, governments can use environment-related taxes to help the country achieve its environmental objectives and as a way of raising revenue:

> *"environmentally-related taxes are amongst the taxes least detrimental to growth and are considered to be a source of revenue that can, for example, be used to help finance a reduction in the tax burden on labour."*[139]

Environmental taxes at lowest level in more than a decade

Despite these advantages, environmental tax revenues are a small part of total tax revenues in the EU. The weighted average in 2012 was 6.1% of total tax revenues. These revenues are mainly based on energy and transportation. A negligible fraction of just 0.3% of total tax revenues comes from pollution and natural resources (see Figure 4 and
Figure 5). Materials/natural resources taxes are in place in eight Member States.[140]

Overall, in Europe, environmental taxes have peaked in the 1990s. As a percentage of total tax revenues, they are at their lowest level in more than a decade, down from 6.9% in 1999 to 6.1% in 2012.[141]

Revenue from environmental taxes as a percentage of GDP has also been declining. Between 1995-2011:

- Nine countries showed an increase in environmental tax revenues as a percentage of GDP (Austria, Bulgaria, Estonia, Finland, Latvia, Malta, the Netherlands, Poland and Romania), with only three countries experiencing increases of more than one percent (Estonia at 1.8%, Latvia at 1.3% and Romania at 1.9%).
- Cyprus is the only country to have stagnated with a zero percent change.
- The remaining seventeen countries have had declining revenues from environmental taxes as a percentage of GDP with the highest decline of 0.8% in Italy.[142]

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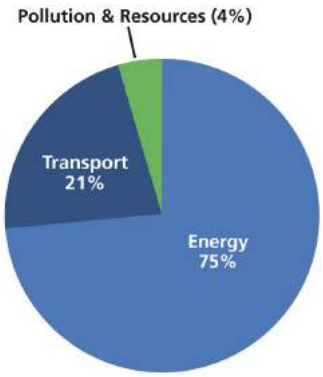
[138] Nieuwsbrief Milieu en Economie (2007), Aan schaarste geen gebrek. 21 jaar milieueconomie in Nederland.
[139] European Commission (2015), Tax Reforms in EU Member States 2015. Tax policy challenges for economic growth and fiscal sustainability.
[140] "Four countries have aggregates-related charges: the Czech Republic has a quarrying charge on sand, gravel and stone, France has a tax on the same materials, Sweden has a natural gravel tax, and the UK has an aggregates levy on rock, sand and gravel. Cyprus has a quarrying charge on mineral extraction, Denmark has a tax on extracted raw materials, Estonia has a mineral resources extraction charge, and Latvia has a far-reaching natural resources tax which covers the extraction of natural resources (of a long list of materials including curative mud, dolomite, lime, cement, stone, soil, sand, gravel, and loam), waste disposal, environmentally hazardous goods, packaging, radioactive substances, end-of-life vehicles and coal, coke and lignite. Fedrigo-Fazio, Doreen, et al. (2013), Steps towards greening in the EU. Monitoring Member States achievements in selected environmental policy areas - EU summary report.
[141] European Commission (2014), Taxation Trends in the European Union.
[142] Fedrigo-Fazio, Doreen, et al. (2013), Steps towards greening in the EU. Monitoring Member States achievements in selected environmental policy areas - EU summary report.

Figure 4: Environmental taxes (EU-28, 2012, % of total taxation)[143]

* Weighted average.

Figure 5: Structure of environmental tax revenues (EU-28, 2012)[144]



* Weighted average

Implementation barriers

One of the most prominent implementation barriers, according to European Commission, is the assumed regressive nature of environmental taxes. There is, however, substantial empirical evidence suggesting that not all environmental taxes have this type of distributional effect:

> *"Taxes on domestic heating fuels are found to be regressive in almost all studies, while transport-related taxes (taxes on fuels and vehicles) are demonstrated to be less regressive, or even progressive, depending on the country considered (see, e.g. Kosonen, 2012, European Commission, 2012 (Box 5.5) and OECD, 2014).*

[143] European Commission (2014), Taxation Trends in the European Union.
[144] European Commission (2014), Taxation Trends in the European Union.

The use of tax reductions or exemptions on domestic heating fuels mitigates the regressive character of these taxes, but reduces their effectiveness in achieving environmental objectives. Giving targeted support to those who genuinely need assistance allows the standard tax rate to be maintained, and is a more efficient solution. It has the advantage of not affecting the influence of the tax on behaviour (i.e. the effect of the higher price paid by consumers), while reducing the negative effect of the tax on household income. "[145]

Another barrier is the concern about potential harmful effects on competitiveness.

"Recent industry-based studies show (…) that a strengthening of environmental legislation does not have a detrimental effect on growth rates in most technologically advanced countries (Albrizio et al., 2014) and that higher energy taxes, compensated for by a reduction in labour taxation, can improve competitiveness (Barrios et al., 2014)."[146]

The third barrier mentioned by the Commission is the potential administrative and enforcement cost. These costs should be taken into account in the design of a tax. Costs are reduced when measures are generic; having as few tax reductions, refund mechanisms and other special provisions as possible.

Strategies for successful implementation are effective public communication, early engagement with those affected and gradual implementation. Also, bundling policy measures (tax and air quality standards, for example) helps:

"In addition to increasing the effectiveness of the measure itself, experience shows that making tax measures part of a broader policy package designed to achieve specific environmental objectives also increases public acceptance."[147]

A recent study commissioned by the European Commission showed a potential € 100 billion increase of environmental tax revenue by 2018, in the 28 European countries combined, rising to € 208 billion in 2030.[148] This study focuses on a potential path to harmonize certain environmental taxes rather than the full potential of environmental taxes.

The potential gain from aligning environmental taxes with external costs

Numerous studies have shown that pollution isn't just 'tax-free', but even *subsidized.*

"German taxpayers for instance gave 2 billion euros to coal producers in 2011. Poland's coal producers got 7 billion euros over 1999-2011. These are just a couple of examples of the 550 measures that support fossil-fuel production or use in the OECD's 34 member countries"[149]

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[145] European Commission (2015), Tax Reforms in EU Member States 2015. Tax policy challenges for economic growth and fiscal sustainability.

[146] European Commission (2015), Tax Reforms in EU Member States 2015. Tax policy challenges for economic growth and fiscal sustainability.

[147] European Commission (2015), Tax Reforms in EU Member States 2015. Tax policy challenges for economic growth and fiscal sustainability.

[148] Eunomia, et al. (2016), Study on Assessing the Environmental Fiscal Reform Potential for the EU28. Final Report.

[149] OECD (February 11, 2013), Fossil fuel subsidies: billions up in smoke? Patrick Love, OECD Insights.

The next section will look into the international literature on the *Environmentally Harmful Subsidies* (EHS). An interesting - yet controversial - concept in this respect is the approach of the IMF with regard to 'pre-tax' and 'post-tax' subsidies. A recent IMF study estimates that in 2015, global fossil energy subsidies (the so-called *pre-tax* subsidies) amounted to $ 333 billion (€ 312 billion). However, when taking into account the negative externalities from energy consumption, the annual total of subsidies (the so-called post-tax subsidies) was a massive $ 5,300 billion (€4,966 billion). According to the IMF:

> *"Eliminating post-tax subsidies in 2015 could raise government revenue by $2.9 trillion (3.6 percent of global GDP), cut global CO2 emissions by more than 20 percent, and cut pre-mature air pollution deaths by more than half. After allowing for the higher energy costs faced by consumers, this action would raise global economic welfare by $1.8 trillion (2.2 percent of global GDP)."*

The IMF estimated the 2015 pre-tax subsidies in the European Union at € 7.95 billion (up € 0.07 billion since 2013) and post-tax subsidies at € 304 billion (up € 32 billion since 2013).[150] Although these estimates are subject to debate, they are indicators of the large potential gains from aligning taxes with marginal external costs.

2.3. Environmentally Harmful Subsidies

Many governments are giving subsidies to fossil fuel production and consumption that encourage greenhouse gas emissions, at the same time they are spending on projects to promote clean energy. This is a wasteful use of scarce budget resources."
- Angel Gurría (OECD Secretary-General)

Almost all nations apply direct and indirect subsidies for environmentally damaging activities. Tax credits - defined as a subsidy by the WTO-[151] are a key route of support for the fossil fuel industry. Such tax concessions are now generally being referred to as *Environmentally Harmful Subsidies* (EHS).[152] These subsidies are typically provided through lower rates, exemptions, or rebates with respect to VAT and excise taxes.[153] They may also include the transfer of risk to government in a particular industry.[154]

Global EHS

On a global scale, the IEA estimates the 2014 fossil fuel consumption subsidies to be $ 493 billion (€ 387 billion).[155] According to the World Bank, this is "likely to be an underestimate". [156] The IEA

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[150] Eunomia, et al. (2016), Study on Assessing the Environmental Fiscal Reform Potential for the EU28. Final Report.
[150] IMF (2015), How Large Are Global Energy Subsidies? David Coady ; Ian W.H. Parry ; Louis Sears ; Baoping Shang.
[151] "The most direct form of subsidization is cash subsidies referring to money transfers from the government to the recipient. Alternatively, governments can provide subsidies through tax concessions. Indeed, when a government provides a tax exemption, credit, deferral or other forms of preferential tax treatment to an individual or group, its budget is affected in much the same way as if it had spent some of its own money. A third form of subsidization consists in the assumption of contingent liabilities." WTO (2006), World Trade Report.
[152] The IEA, the IMF and the OECD take different approaches as to methodologies to measure EHS. See for example European Commission (March 2015), Measuring Fossil Fuel Subsidies. ECFIN Economic Brief. Ambrus Bárány and Dalia Grigonytė.
[153] OECD (2015), OECD Companion to the Inventory of Support Measures for Fossil Fuels 2015.
[154] OECD (2013), Inventory of Estimated Budgetary Support and Tax Expenditures for Fossil Fuels 2013.
[155] IEA, OECD (2015), World Energy Outlook.

has stated that global fossil fuel subsidies are "over four-times the value of subsidies to renewable energy".[157]

The underpricing of water and other natural resources is generally receiving less attention. Calculations by IMF economists, however, suggest that, in 2012, this underpricing resulted in water subsidies totalling about $ 456 billion (€ 369 billion) or 0.6% of global GDP. The study states the IMF should help "to support policies to replace perverse subsidies with targeted social assistance".[158]

EHS in the EU

Based on the *OECD.Stat* database (which includes 21 EU Member States), fossil fuel subsidies in the European Union were over € 24 billion in 2015. These fossil fuel support measures include both tax expenditures and budgetary transfers.[159] Around 60% of all measures identified in the OECD inventory are tax expenditures.[160]

Listed for Germany, for example, is the *Energy Tax Relief for Energy Intensive Processes* (€ 329.7 million in 2015). In Germany, according to OECD's Economic Survey:

> *"Tax exemptions and subsidies which are harmful to the environment have a budgetary cost of about 1,5 percent of GDP (…). Coal is virtually tax-free."*[161]

Another example of a fossil fuel support measure is the Netherlands' *Reduced Energy-Tax Rate in Horticulture* (€ 95.0 million in 2015).[162] In the Netherlands:

> *"regressive rates apply on natural gas and electricity consumption and energy taxes are significantly lower for energy-intensive firms relative to small users, particularly households."*[163]

A study by Ecofys commissioned by the European Commission estimates all public interventions in energy in the EU-28 (excluding transport, including renewables) at € 122 billion. These interventions include tax expenditures such as exemptions from fuel taxes, exemptions from energy taxes, VAT exemptions and investment tax allowances.[164]

The effects of EHS

The OECD refers to fossil fuel subsidies as "lose-lose" subsidies.[165] Fossil fuel subsidies hold back investments in cleaner emerging technologies and act as a "negative price on carbon".[166] According to the European Commission:

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[156] World Bank (2015), Decarbonizing Development. Three Steps to a Zero-Carbon Future.
[157] IEA (2015), World Energy Outlook.
[158] Kochhar, Kalpana, et al. (2015), Is the Glass Half Empty or Half Full? Issues in Managing Water Challenges and Policy Instruments, IMF Staff Discussion Note.
[159] At 2015 exchange rates. Lithuania, Croatia, Cyprus, Malta, Bulgaria, Latvia, Romania are not included. OECD (Accessed December 2016), OECD Inventory of Support Measures for Fossil Fuels. OECD.Stat
[160] OECD (2015), OECD Companion to the Inventory of Support Measures for Fossil Fuels 2015.
[161] OECD (2016), OECD Economic Surveys Germany.
[162] At 2015 exchange rates. Lithuania, Croatia, Cyprus, Malta, Bulgaria, Latvia, Romania are not included. OECD (Accessed December 2016), OECD Inventory of Support Measures for Fossil Fuels. OECD.Stat
[163] OECD (2016), OECD Economic Surveys: Netherlands overview.
[164] Ecofys (2014), Subsidies and costs of EU energy. Final report. By order of the European Commission.
[165] OECD (2015), OECD Companion to the Inventory of Support Measures for Fossil Fuels 2015.
[166] OECD (2015), Towards Green Growth. Tracking Progress.

"EHS lead to higher levels of waste, emissions, resource extraction, or to negative impacts on biodiversity. They can lock in inefficient practices and hinder businesses from investing in green technologies."[167]

The IMF adds to these effects:

"Subsidy expenditures aggravate fiscal imbalances, and crowd out priority public spending and private investment, including in the energy sector. Underpriced energy distorts resource allocation by encouraging excessive energy consumption, artificially promoting capital-intensive industries (thus discouraging employment creation), reducing incentives for investment in renewable energy, and accelerating the depletion of natural resources.[168]

In developing countries, fuel subsidies have proven to be an ineffective approach to protecting the poor, due to substantial benefit leakage to higher income groups. In absolute terms, the top income quintile captures six times more in subsidies than the bottom.[169]

International support for lower fossil subsidies

Although there are methodological issues of measuring fossil fuel subsidies, the OECD,[170] the European Commission,[171] the World Bank[172] and the IMF[173] have called for lower fossil fuel subsidies. Subsidy reform is more relevant than ever, according to the OECD:

"Fiscal positions continue posing a challenge to policy makers in many countries as they struggle to identify opportunities for cutting spending and raising more revenues, and this without adding to alarmingly high levels of unemployment. In this context, the reform of measures supporting fossil fuels appears more relevant than ever." [174]

The current low oil price presents a window of opportunity, in the words of Paul Polman (CEO of Unilever):

"World leaders should take advantage of low oil prices to ditch fossil fuel subsidies." [175]

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[167] European Commission (2011), Roadmap to a Resource Efficient Europe.
[168] IMF (2013), Energy Subsidy Reform: Lessons And Implications.
[169] IMF (2010), The Unequal Benefits of Fuel Subsidies: A Review of Evidence for Developing Countries.
[170] "(…) subsidies can have negative effects on the environment that are unforeseen, undervalued or ignored in the policy process. For example, fuel tax rebates and low energy prices stimulate the use of fossil fuels and greenhouse gas emissions and subsidies for road transport increase congestion and pollution." OECD (2005), Environmentally Harmful Subsidies. Challenges for Reform; OECD (2013), Climate and Carbon. Aligning Prices and Policies.
[171] European Commission (2011), Roadmap to a Resource Efficient Europe.
[172] World Bank (2012), Implementing Energy Subsidy Reforms. An Overview of the Key Issues.
[173] IMF (2013), Energy subsidy reform: lessons and implications; IMF (2015), How Large Are Global Energy Subsidies? David Coady, Ian W.H. Parry, Louis Sears, Baoping Shang.
[174] OECD (2015), OECD Companion to the Inventory of Support Measures for Fossil Fuels 2015.
[175] Paul Polman (Feb 12, 2015), World leaders should take advantage of low oil prices to ditch fossil fuel subsidies. The Guardian.

2.4. Value Added Tax in the EU

Value Added Tax (VAT) plays a special role as a factor in consumption patterns. Legally, VAT is a consumption tax, but in practice, consumers pay VAT both on products (such as cans of paint) and services (the work of a painter). The current VAT system in the EU is organized by the Council VAT Directive 2006/112/EC. Member States have to subject the supplies of goods and services to a standard rate of at least fifteen percent. Also, they have the possibility to apply one or two reduced rates – of no less than five percent - to a list of supplies of goods and services included in the VAT Directive.[176] The zero rate is limited to international trade and some 'temporary derogations' in the United Kingdom and Ireland.[177]

Trend: rising VAT rates

Since 2009, VAT standard rates have been on a rising trend in most Member States. The EU average VAT standard rate increased by two percent - from 19.5% in 2008 to 21.5% in 2014. Over this period, twenty Member States registered a standard rate rise. In 2012, the highest VAT standard rate was found in Hungary (27%), followed by Croatia, Denmark and Sweden (25%). The lowest standard rate was found in Luxembourg (15%).[178] In 2016, Luxembourg still has the lowest standard rate at 17%. [179]

The reduced VAT rate is on a rising trend as well, increasing from 8.0% (simple average) in 2000 to 8.9% in 2014.[180] According to the Commission there is a broad consensus in the economic literature that the use of progressive income taxation is more suitable for redistribution purposes than differentiated commodity tax rates (e.g. reduced VAT rates).[181]

The weighted average revenue of VAT as a percentage of total tax revenues in the EU was 18.1% in 2012. The arithmetic average was 22.3%, which can be explained by the fact that the new Member States tend to have a higher proportion of revenue raised from consumption taxes, and a somewhat lower proportion from taxes on labour (see Figure 6).

The *tax burden on consumption* may include VAT, taxes and duties on imports and taxes on products (including excise duties), international transactions and pollution. The *Implicit Tax Rate on consumption* as a measure of the tax burden on consumption has not evolved significantly since 1995.[182]

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[176] Supply and construction of all housing; services related to the housing sector (including renovation, maintenance, cleaning); restaurants and catering services; minor repair of tangible movable goods (including bikes but excluding other means of transport. Examples include shoes, clothes, computers, watches) and cleaning and maintenance services of all these goods; domestic care services (e.g. home help and care of the young, elderly, sick or disabled); all personal care services (including hairdressing, beauty services); gardening services; renovation and maintenance services provided to places of worship, cultural heritage and historical monuments. European Commission (2013), Summary report of the outcome of the public consultation on the review of existing legislation on VAT reduced rates. 8 October 2012 – 4 January 2013.

[177] Council of the European Union (2006), Council Directive 2006/112/EC on the common system of value added tax.

[178] European Commission (Accessed 2016), Data on taxation, Statutory tax rates.

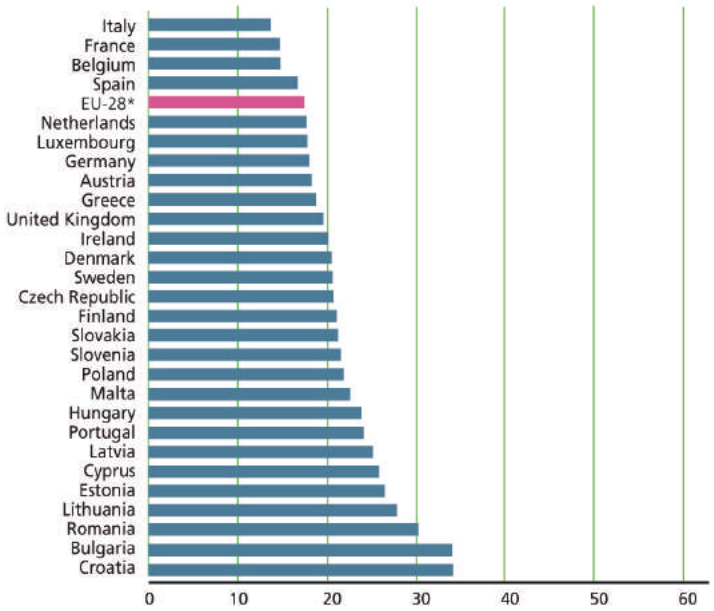
[179] European Commission, VAT Rates Applied in the Member States of the European Union Situation at 1st January 2016.

[180] European Commission (2016), VAT Rates Applied in the Member States of the European Union.

[181] European Commission (2013), Recent Reforms of Tax Systems in the EU: Good and Bad News.

[182] European Commission (2014), Taxation Trends in the European Union.

Figure 6: VAT (EU-28, 2012, % of total taxation)[183]



* Weighted average.

VAT fraud

In 2013, the 'VAT gap', which is the difference between the expected VAT revenue and VAT actually collected in Member States, was almost € 170 billion. The VAT Gap rate ranged from a high of 37.9% of uncollected VAT in Romania to a low of only 1.2% in Sweden. The European Commission has recently presented an *Action Plan* to make VAT rules "simpler, more fraud-proof and business-friendly", concluding that the current VAT system is fragmented and creates significant administrative burdens, especially for SMEs and online companies.[184]

> *"The VAT system is a major and growing source of revenue in the EU, raising almost EUR 1 trillion in 2014. But the VAT system has been unable to keep pace with the challenges of today's global, digital and mobile economy. It needs to be modernised because it is too complex for the growing number of EU businesses operating cross-border and leaves the door open to fraud."*[185]

Up to now, harmonisation of VAT rates has proven to be very complicated, as adaptation of the VAT Directive requires general consensus. The only major legislative change that occurred since 1995 is the introduction of reduced VAT rates for labour-intensive services (which is discussed below).

Reduced VAT rates for labour-intensive services

In 1998, the Commission made a proposal allowing Member States to experiment with:

> *"reduced VAT rates on labour-intensive services which are not exposed to cross-border competition, in order to test their impact in terms of job creation and in combating the*

[183] European Commission (2014), Taxation Trends in the European Union.
[184] European Commission (April 7, 2016), Press release. VAT Action Plan: Commission presents measures to modernise VAT in the EU.
[185] European Commission (April 7, 2016), Fact Sheet Action Plan on VAT: Questions and Answers.

black economy. The experiment started in 2000 for a period of 3 years and was extended 4 times. Finally in 2009 (…) the optional use of reduced rates of VAT for certain labour-intensive local services, including restaurant services, became permanent and open to all Member States."[186]

Studies on the employment effects of VAT reductions have come to varying conclusions. In the Netherlands, for example, in 2002, no demonstrable effect was found on the number of employees, but in two out of five sectors, a definite conclusion on the effect on the employment could not be drawn because of a lack of historical data.[187] A counter-expertise by the Dutch *Central Planning Bureau* (CPB) found that in practice, the temporary VAT reduction on labour-intensive services had been passed on to consumers by 70-80%, that the measure had contributed to an increased turnover in those sectors, and that employment had increased substantially.[188] Other studies also confirmed a positive impact on employment.[189] Copenhagen Economics concluded in 2007:

"We find that labour intensive services to households, such as hairdressers, minor repairs, and domestic care see a relative high effect on employment from lower VAT rates. For domestic care, a reduction in the VAT rate equal to one percent of prices increases long term employment in that industry with nearly 1 percent. By contrast, the effect in petroleum production and electricity use is much smaller, just over 0.2 percent."[190]

In 2008 the Commission published proposals to extend reduced VAT rates to labour-intensive sectors whose services are easily substituted for do-it-yourself or underground work, such as locally supplied services and some parts of the hospitality sector. These activities were, however, not included in the 2009 decision.[191]

VAT and resource efficiency

Moving away from reduced VAT rates could be a vital instrument to incentivize resource efficiency and the reduction of food waste. In the EU, food waste has been estimated at approximately 89 million tons (or 180 kilograms per capita) per year, and is expected to rise to about 126 million tons a year by 2020.[192] European Parliament explicitly advised Member States to eliminate the reduced VAT rate on food, "in order to remove all incentives that may encourage the generation of food waste."[193] Also, the European Commission has proposed to bring energy under the standard VAT rate.[194]

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[186] European Commission (2013), Summary report of the outcome of the public consultation on the review of existing legislation on VAT reduced rates. 8 October 2012 – 4 January 2013.

[187] Research voor Beleid (2002), Effects of the lowering of VAT rates on labour-intensive services. Survey carried out for the Ministry of Finance.

[188] CPB (2003), Contra-expertise effecten BTW-verlaging arbeidsintensieve diensten.

[189] Copenhagen Economics (2007), Study on reduced VAT applied to goods and services in the Member States of the European Union; Hotrec (2008), Reduced VAT rates: A must for a sustainable European hospitality industry.

[190] Copenhagen Economics (2007), Study on reduced VAT applied to goods and services in the Member States of the European Union.

[191] Seely, Antony (2011), VAT on 'labour-intensive' services.

[192] Households produce the largest share of EU food waste (42%), followed by agriculture/ food processing (39%), food service/catering (14%), and retail/wholesale (5%). European Parliamentary Research Service (EPRS) (January 22, 2014) Tackling food waste. The EU's contribution to a global issue.

[193] European Parliament (2013), Technology options for feeding 10 billion people. Options for Cutting Food Waste.

[194] European Commission (2013), Tax reforms in EU Member States. Tax policy challenges for economic growth and fiscal sustainability; European Commission (2013) Recent Reforms of Tax Systems in the EU: Good and Bad News.

2.5. Updating our tax systems

The architecture of modern European tax systems stems from a time when globalisation had not yet materialized and jobs could not be moved around the globe. In the past, computers and robots could not substitute employees, and labour provided a stable and reliable source of income for governments. Natural resources seemed available indefinitely and linear (take-make-waste) consumption did not yet show its harmful effects.

Times have changed. The environmental and social megatrends described in chapter 1 underline the need for EU Member States to move to an inclusive, circular economy. It is legitimate to ask how our economic system could become better equipped for todays and tomorrows challenges. As taxes play such an important role in steering the economy (both intentionally and unintentionally) it is common sense to start there.

In the EU, tax policy is a national competence and a topic of much debate. The question remains, though, *how to develop a coherent sustainable tax strategy that matches (rather than inhibits) the sustainable and inclusive growth agenda of the EU Member States?*

A coherent EU-level sustainable and inclusive tax strategy should be connected with the Europe 2020 growth agenda. Such a strategic approach would allow the EU to become much more effective on the international stage and maximise the economic potential of the EU frontrunners in the sustainability transition. This report focuses on the potential of a fundamental shift in taxation from labour to natural resources as a first step towards updating the tax system to 21st century challenges, as will be explained in the next sections.

3. Shifting taxation from labour to natural resource use

"Passing some of the [labour] taxes to other things, such as pollution, could help to accelerate employment and economic growth. Smart taxation is a winning strategy."
- European Commission[195]

This chapter explores the concept of a tax shift from labour to natural resources and consumption. It maps the international support for a tax shift and the global trend towards applying the 'polluter pays' principle, especially with regard to greenhouse gas emissions. Then it explores how lower labour costs can help combat unemployment, and the potential 'dividends' of a tax shift.

3.1. Introduction to Ex'tax

Ex'tax (short for *Value Extracted Tax*) is the proposal to update tax systems to effectively respond to the challenges of the 21st century, by shifting the tax burden from labour to natural resource use and consumption. Such a tax shift creates incentives to save natural resources and to bring materials in a closed loop, empowering the circular economy. Lower taxes on labour would make it possible to tap into the abundance of talents and capacities of people, boosting employment, services and innovation. Although budget neutral for governments, a tax shift fundamentally changes the margins within which business, consumers and governments operate. The concept (visualized below) has gained support over the last few years amongst academics, international institutions and business organizations as well as in politics.

Figure 7: The Ex'tax concept

Raising taxes on natural resource use (such as water, harmful emissions, metals and minerals) causes both challenges and opportunities for businesses. On the one hand, it will be challenging to reduce water consumption and carbon footprints. On the other hand, when costs of natural resources go up, the business case of resource efficient technologies improves. This boosts activities that 'close the loop' or apply renewable materials.

When taxes on labour go down, human resources (manpower, craftsmanship and ingenuity) become more affordable. This will bring major business opportunities. Business models can then shift to labour-intensive business models, including 'urban mining', repair and maintenance

[195] European Commission (2015), Smart Taxation: a Winning Strategy. Video.

services, remanufacturing of products and R&D. A lower tax burden on labour also benefits sectors such as healthcare, education and scientific research.

This tax shift has a fundamental impact on consumption patterns, as pricing of products and services better reflects the external costs (the costs that an activity or product imposes on the community, see section 1.5). Sustainable products will no longer be the more expensive option.

The concept of shifting taxation has been known as *Environmental Tax Reform* (ETR), *Environmental Fiscal Reform* (EFR), *Green Fiscal Reform* (GFR) or *Green Tax Swaps* (GTS). The term 'Value Extracted Tax' was coined in 1994 by the Dutch entrepreneur Eckart Wintzen in a more integrated approach, focussing on the role of taxes in enabling sustainable prosperity.[196]

Due to the aforementioned megatrends, over the last few years, the concept has gained traction. Economists across the political spectrum have referred to such tax reform as an 'economic no-brainer'[197] and international institutions – including the European Commission and European Parliament, the OECD, the ILO, the IMF and the *World Business Council for Sustainable Development* (WBCSD) - support the principle, as will be explained in more detail below.

3.2. Support for a tax shift

Over the years, numerous academics, governmental organizations and NGOs have published about the need for a tax shift (see Appendix 2). The European Commission has recommended Member States to apply the Ex'tax principles since as early as 1993:

> *"The tax burden must be redistributed so as to lighten the burden on labour and increase the burden on the use of natural resources."*[198]

For more than twenty years, the European Commission has repeated the message that a permanent shift of taxes from wages to consumption has positive GDP effects.[199] The Commission stated in the *Annual Growth Survey 2015*:

> *"it is important to ensure an efficient and growth-friendly tax system. Employment and growth can be stimulated by shifting the tax burden away from labour towards other types of taxes which are less detrimental to growth, such as recurrent property, environment and consumption taxes, taking into account the potential distributional impact of such a shift."*[200]

And in 2016 the Commission stated:

> *"Shifting taxes away from labour should be a priority for several EU Member States, in view of its positive impacts on labour supply and demand. EU Member States may want*

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[196] Wintzen, Eckart (1994), Re-engineering the Planet. Three Steps to a Sustainable Free Market Economy.
[197] NPR (July 18, 2012), Episode 387: The No-Brainer Economic Platform.
[198] European Commission (1993), Growth, competitiveness and employment. Challenges and the ways forward into the 21th century.
[199] European Commission (2013), Tax reforms in EU Member States. Tax policy challenges for economic growth and fiscal sustainability.
[200] European Commission (2014), Annual Growth Survey 2015, COM(2014) 902 Final.

to reduce their level of labour income taxation in a budget neutral way, implying a shift towards tax bases that are less harmful to growth while taking into account redistributive effects and impacts on social security systems. At the macroeconomic level, recurrent property taxes, consumption taxes, and environmental taxes are found to be the least detrimental to growth."[201]

Appendix 1 provides an inventory of quotes of European institutions (1993-2016) on the tax shift. The concept appeared, amongst others, in the European Commission's *Roadmap to a Resource Efficient Europe,*[202] the *Europe 2020*[203] strategy and the *Country Specific Recommendations 2013,*[204] *2014*[205] and *2015.*[206] A priority objective of the EU *Environment Action Plan to 2020* is to:

"put in place the right conditions to ensure that environmental externalities are adequately addressed, including by ensuring that the right market signals are sent to the private sector, with due regard to any adverse social impacts. This will involve applying the polluter-pays principle more systematically, in particular through phasing out environmentally harmful subsidies (…) and considering fiscal measures in support of sustainable resource use such as shifting taxation away from labour towards pollution."[207]

Below are relevant excerpts from the European Commissions' recommendations in 2016:

Table 1: Relevant fiscal advise in the EU 2016 Country Specific Recommendations[208]

Country/area	Country-specific recommendation 2016
Euro Area	**Reduce the tax wedge on labour**, particularly on low-earners, in a budgetary-neutral way to foster job creation.
Germany	**Reduce the high tax wedge** for low wage earners and facilitate the transition from mini jobs to standard employment.
Ireland	Reduce vulnerability to economic fluctuations and shocks, *inter alia* by **broadening the tax base**.
France	Take action to reduce the taxes on production and the corporate income statutory rate while **broadening the tax base on consumption**, in particular as regards VAT.
Italy	**Shift the tax burden from productive factors onto consumption** and property. Reduce the number and scope of tax expenditures (…).
Latvia	**Reduce the tax wedge for low-income earners by exploiting a growth-friendly tax shift towards environmental** and property taxes and improving tax compliance.
Lithuania	**Reduce the tax burden** on low-income earners by shifting the tax burden to other sources less detrimental to growth and improve tax compliance, in particular in the area of VAT.
Hungary	Further reduce sector-specific taxes and **reduce the tax wedge** for low-income earners
Poland	Improve tax collection by ensuring better VAT compliance, and **limit the extensive use of reduced VAT rates**.

[201] European Commission (2016), European Semester Thematic Fiche; Taxation.
[202] European Commission (2011), Roadmap to a Resource Efficient Europe.
[203] European Commission (2010), Europe 2020. A strategy for smart, sustainable and inclusive growth.
[204] European Commission (2014), Q&A: Country-specific recommendations 2014.
[205] European Commission (2014), 2014 European Semester: Country-Specific Recommendations. Building Growth
[206] European Commission (2015), Country-specific recommendations, Brussels, 13.5.2015 COM(2015) 250 final
[207] European Commission (2015), Environment Action Programme to 2020.
[208] European Commission (Accessed June 2016), European Semester.

The OECD mentions the need for a tax shift in *Towards Green Growth*[209] and in a specific advice to Portugal.[210] The IMF,[211] the World Bank,[212] the European Parliament,[213] the Eurogroup[214] and the *International Labour Organization* (ILO) have also called for a tax shift. The ILO has stated for example:

> *"Taxing polluters generates revenues that can be leveraged to reduce other (distortionary) taxes, for example taxes on labour. These reductions can lead to higher labour demand and higher employment, while using less energy."*[215]

Despite these calls for action, however, as mentioned before, environmental tax revenues as a proportion of overall tax revenues in the EU are at their lowest level in more than a decade and labour taxes remain high across OECD countries.[216] Section 5.1 will touch upon some of the barriers for the implementation of a tax shift. But first, the worldwide support for 'internalisation of external costs' will be discussed.

3.3. Internalisation of external costs: carbon pricing on the rise

"We strongly urge people to prepare for the carbon pricing that is to come."
- Jim Yong Kim (World Bank President)[217]

Support for 'the polluter pays' principles

Governments worldwide have been struggling with internalisation of external costs, as they are hesitant to change legislation that may have a negative impact on some businesses. Over the last few years, however, taxation based on 'the polluter pays' principles has gained more and more support. Carbon emissions are attracting most attention, with major international institutions such as the OECD,[218] the IMF,[219] the United Nations,[220] the World Bank[221] as well as the European

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[209] OECD (2011), Towards Green Growth.
[210] OECD (2013), Portugal Reforming The State To Promote Growth.
[211] IMF (2012), Back to Rio—the Road to a Sustainable Economic Future, Speech by Christine Lagarde, 12th June 2012. IMF (2012), Fiscal Policy to Mitigate Climate Change. A Guide for Policymakers. Pre-publication copy. IMF (2015) Kingdom of the Netherlands: Staff Concluding Statement of the 2015 Article IV Mission. D. Heine et al (2012) Environmental Tax Reform: Principles from Theory and Practice to Date, IMF Working Paper WP/12/180.
[212] World Bank (2015), Decarbonizing Development. Three Steps to a Zero-Carbon Future.
[213] European Parliament (2013), Decision of the European Parliament and of the Council on a general union Environment Action Programme to 2020 "Living well, within the limits of our planet". European Parliament (2012) European Parliament resolution of 24 May 2012 on a resource-efficient Europe (2011/2068(INI)).
[214] The finance ministers of countries whose currency is the euro. Eurogroup (July 8, 2014), Structural reform agenda - thematic discussions on growth and jobs - Reduction of the tax wedge.
[215] ILO (2012), Working towards sustainable development. Opportunities for decent work and social inclusion in a green economy.
[216] "Across OECD countries, the average tax and social security burden on employment incomes remained at 35.9% for a second consecutive year in 2015. This followed a rise totalling 0.9 percentage points between 2010 and 2014." OECD (April 12, 2016), OECD tax rates on labour income stabilise in 2015.
[217] Davenport, Carol (Accessed May 2016), Carbon Pricing Becomes a Cause for the World Bank and IMF, NY Times.
[218] OECD (2013), Climate and Carbon. Aligning Prices and Policies.
[219] IMF (2013), Fact Sheet: Climate, Environment and the IMF.
[220] UN (July 5, 2012), UN calls for international tax to raise $400 billion to finance development needs.
[221] World Bank (2012), Fiscal Implications of Climate Change. Policy Research Working Paper 5956.

Commission[222] arguing in favour of putting a price on carbon (either through taxation, cap-and-trade, or auctioning of emission trading allowances). The OECD, for example states:

> *"If governments are serious in their fight against climate change, the core message of this reform must be that the cost of CO2 emissions will gradually increase, creating a strong economic incentive to reduce the carbon entanglement and to shift towards a zero carbon trajectory. A central feature of such an approach is placing a price on carbon."*[223]

Carbon pricing is introduced across the globe

Momentum to take action to price carbon is clearly growing. Forty countries and over twenty sub-national jurisdictions - including seven of the ten largest economies - have put a price on carbon. Together, these instruments cover about thirteen percent of annual global greenhouse gas emissions, a three-fold increase over the past decade. In 2015, governments raised about $26 billion (€ 24.4 billion) in revenues through carbon pricing mechanisms, representing a 60% increase from 2014. The total value of such mechanisms is currently estimated at just below $ 50 billion (€ 46.9 billion).[224]

Since 2015, four new carbon-pricing initiatives were launched, in the Republic of Korea, Portugal, Canada's British Columbia province and Australia. China has announced plans to launch a national emissions trading scheme in 2017, which could potentially double the global value of carbon pricing initiatives to $ 100 billion (€ 88 billion).[225]

Prices remain modest

Carbon prices between schemes occupy a significant range, from under $ 1 (€ 0.9) per tonne of CO2 in the Mexican carbon tax, up to $ 137 (€ 120) in the Swedish carbon tax. Prices in emissions trading schemes tend to be lower, at $ 2-31 (€ 1.8-27) per tonne.[226]

> *"The majority of emissions (85 percent) are priced at less than US$10/tCO2e, which is considerably lower than the price that economic models have estimated is needed to meet the 2°C climate stabilization goal recommended by scientists."*[227]

According to the World Bank, estimates of appropriate charges are in some respects only moderately daunting:

> *"(…) a charge of US$20 per ton is equivalent to around US$8 per barrel of oil, or 20 cents per gallon of gasoline—well within commonplace fluctuations. For coal, however—which accounts for around 44 percent of all emissions from fossil fuels (compared to 37 percent for gasoline)—this is in the order of a doubling of the price."*[228]

The main reason for the low prices currently seen in carbon pricing schemes seems to be that industry is often exempt and the schemes put the tax burden on private households thereby

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[222] European Commission (2013), Tax reforms in EU Member States. Tax policy challenges for economic growth and fiscal sustainability. Working Paper n.38.
[223] OECD (2013), Climate and Carbon. Aligning Prices and Policies.
[224] World Bank Group, Ecofys, (2016), Carbon Pricing Watch 2016.
[225] World Bank (May 25, 2016), Continuing Momentum for Putting a Price on Carbon Pollution. Exchange rate: US Department of the Treasury, March 31, 2016.
[226] World Bank Group, Ecofys, (2016), Carbon Pricing Watch 2016. Exchange rate: US Department of the Treasury, March 31, 2016.
[227] World Bank (2015), State and Trends of Carbon Pricing.
[228] The World Bank (2012), Fiscal Implications of Climate Change. Policy Research Working Paper 5956.

avoiding issues of competitiveness and carbon leakage. Increased ambition in these emissions trading schemes could lead to higher prices.[229]

National carbon pricing schemes in EU countries

Over the years, ten EU Member States have taken unilateral action on carbon pricing: Poland (implemented in 1990), Sweden (1991), Denmark (1992), Latvia (1995), Slovenia (1996), Estonia (2000), Ireland (2010), the UK (carbon price floor, 2013), France (2014) and Portugal (2015).[230] National schemes differ widely with regard to price, reach and development. For example:

- The 2013 UK carbon price floor was set at approximately € 13 per tonne of CO2 emissions, and was applied to thermal utilities on top of their obligations under the EU ETS. By 2015, the UK's power sector emissions had fallen 37% compared to 2012. The price floor is set to gradually increase to € 25 by 2020 and to € 59 per tonne by 2030.[231]
- The carbon tax in France puts a price on the use of fossil fuels not covered by the EU ETS, such as in the residential, service and transport sectors. The carbon tax rate increased from € 14.5 to € 22 per tonne from January 2016, following the trajectory to reach € 100 in 2030.[232]
- Sweden applies the highest value globally on half of its carbon dioxide emissions,[233] the revenues of which contribute 1- 2% of the national government budget.[234]

Fiscal instruments are favoured over other instruments

According to the OECD, market-based approaches like taxes and trading systems consistently reduce CO_2 at a lower cost than other instruments. Capital subsidies and feed-in tariffs are among the most expensive methods for reducing emissions.[235] The IMF also supports fiscal instruments over other instruments:

> *"Fiscal instruments (carbon taxes or similar) are the most effective policies for reflecting environmental costs in energy prices and promoting development of cleaner technologies, while also providing a valuable source of revenue. Fiscal policies also have an important role to play in addressing other major environmental challenges, like poor air quality and urban congestion."*
>
> *"Carbon taxes can also raise substantial amounts of government revenue. Fiscal challenges created by current economic difficulties present an opportunity to consider these types of innovative environmental charges."*[236]

Technically, carbon pricing offers a good tax base because it is difficult to evade (World Bank, 2015):

> *"First, carbon sources are concentrated, making it easy to measure and monitor physical units of energy at the supplier level. In the United States, tax collection covering 80 percent of U.S. GHG emissions, and nearly all CO2 emissions, could be*

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[229] World Bank, Ecofys (2014), State and Trends of Carbon Pricing.
[230] World Bank Group, Ecofys, (2016), Carbon Pricing Watch 2016.
[231] Carbon Pulse (April, 26, 2016), France to impose carbon price floor on utilities from Jan. 2017.
[232] World Bank Group, Ecofys, (2016), Carbon Pricing Watch 2016.
[233] Wagner, Gernot, Kåberger, Tomas, Olai, Susanna, et al. (September 2, 2015), Energy policy: Push renewables to spur carbon pricing. Nature.com.
[234] World Bank (2015), Decarbonizing Development. Three Steps to a Zero-Carbon Future.
[235] OECD (2013), Effective carbon pricing.
[236] IMF (2013), Fact Sheet: Climate, Environment and the IMF.

accomplished by monitoring fewer than 3,000 points: 146 oil refineries, 1,438 coal mines, and 500 natural gas fields (Metcalf and Weisbach 2009). As a result, monitoring a carbon-pricing scheme is much easier than monitoring other tax bases, such as hours worked, profits earned, or personal income.

Second, an entire infrastructure of meters, bills, and storage tanks are already available to objectively measure how much energy is consumed. Third, commercial users have powerful incentives to deduct their energy expenditures, making it easy to catch cheating suppliers. Fourth, the price of energy is typically well established, occurring in transparent marketplaces, which makes it more difficult to report inflated prices as a mean to evade taxes (Liu 2013)."[237]

MIT's *Global Change* program has found that higher gas taxes are "at least six to fourteen times" more cost-effective than stricter fuel-economy standards at reducing gasoline consumption.[238]

Some contend that since the objective of a carbon tax is to reduce GHG emissions, its very purpose is to erode its own base. According to the World Bank:

"That argument is valid over the long term: by the end of the century, once the final objective of carbon neutrality is achieved, carbon taxes should no longer be a source of revenue. But in the short and middle term, carbon prices are a good source of revenue.

(…) the best design for a carbon price is to make it grow exponentially over time. Over the first few decades, the growing tax rate can thus offset the decreasing base of GHG emissions."[239]

The need for higher water prices

With regard to water, similar positions are presented. Although water incentives and penalties have not traditionally been widely regulated through government tax legislation, increasing levels of water scarcity will prompt more governments to use their tax codes to modify behaviour in the future.[240] The European Commission,[241] the European Parliament,[242] the IMF,[243] The World Bank,[244] the United Nations,[245] the OECD[246] and the *European Environment Agency* (EEA)[247] have called for a rise in water prices to help manage water as a finite resource.

The KPMG Green Tax Index 2013 studied 21 countries and found over 200 individual tax incentives and penalties of relevance to corporate sustainability. At least 30 of those had been

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[237] World Bank (2015), Decarbonizing Development. Three Steps to a Zero-Carbon Future.
[238] Karplus, V. J., Paltsev, S., Babiker, M., et al. (2013), Should a vehicle fuel economy standard be combined with an economy-wide greenhouse gas emissions constraint? Implications for energy and climate policy in the United States. Energy *Economics*, *36*, 322-333. MIT Joint Program on Science and Policy of Global Change.
[239] World Bank (2015), Decarbonizing Development. Three Steps to a Zero-Carbon Future.
[240] KPMG (2013), The KPMG Green Tax Index 2013. An exploration of green tax incentives and penalties.
[241] European Commission (2012), A Blueprint to Safeguard Europe's Water Resources.
[242] European Parliament (2000), The EU Water Framework Directive (Directive 2000/60/EC).
[243] Kochhar, Kalpana, et al. (2015), Is the Glass Half Empty or Half Full? Issues in Managing Water Challenges and Policy Instruments. IMF Staff Discussion Note.
[244] The World Bank (2016), High and Dry Climate Change, Water, and the Economy.
[245] United Nations World Water Assessment Programme (2014), The United Nations World Water Development Report 2014: Water and Energy.
[246] OECD (2013) Water security for better lives. OECD studies on water; OECD (2012), OECD Environmental Outlook to 2050: The Consequences of Inaction.
[247] EEA (2013) Assessment of cost recovery through water pricing. EEA (2012), Towards efficient use of water resources in Europe.

introduced since January 2011, illustrating the changing landscape of green taxes in the world.[248]

3.4. Lowering the tax burden on labour to help solve unemployment

The relation between high labour costs and unemployment has been documented extensively; high labour costs drive businesses to minimize the number of staff. There is a general consensus that a lower tax burden on labour creates employment opportunities. See for example Nickell & Layard (1999),[249] ECB (2008),[250] Vermeend et al. (2008),[251] Dolenc & Laporsek (2010)[252] and Brys (2011).[253] According to the OECD, especially low-income workers, single parents, second earners and older workers are responsive to changes in labour income taxation. The retirement decision of older workers is also highly responsive to tax incentives. The same is true for international mobility of high-skilled workers.[254] In general, both the decision to enter the labour force and the hours worked are affected by labour taxes.[255]

The impact of a reduction in labour taxes on employment has been documented in many studies. The European Commission stated in 1993:

> *"Studies have been carried out in several countries with very high levels of security contributions. These studies show that a reduction of 30 to 40% in social security contributions for low-paid workers would increase employment by 2%."*[256]

Bassanini and Duval (2006) investigated the influence of taxation on employment and unemployment on the sample of 21 OECD countries between 1983 and 2003 and found that:

> *"(…) a 10 percentage points reduction of the tax wedge in an average OECD country would reduce equilibrium unemployment by 2.8 percentage points and increase the employment rate by a larger 3.7 percentage points (due to the positive impact on participation)."*[257]

Other researchers found an even stronger correlation between a tax wedge and an employment increase. Not surprisingly, institutions such as the World Bank,[258] the IMF,[259] the European

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[248] KPMG (2013), The KPMG Green Tax Index 2013. An exploration of green tax incentives and penalties.
[249] Nickell & Layard (1999), cited in Dolenc, Primož, Laporšek, Suzana (2010), Tax wedge on labour and its effect on employment growth in the European Union.
[250] ECB (2008), Labour cost and employment across euro area countries and sectors. Working Paper Series no 912.
[251] Vermeend, Willem, van der Ploeg, Rick, Timmer, Jan (2008), Taxes and the Economy. A Survey on the Impact of Taxes on Growth, Employment, Investment, Consumption and the Environment.
[252] Primož Dolenc, Suzana Laporšek (2010), Tax wedge on labour and its effect on employment growth in the European Union.
[253] Brys, Bert (2011), Making Fundamental Tax Reform Happen, OECD Taxation Working Papers, No. 3.
[254] OECD (2011), Taxation and Employment. Tax Policy Studies No21.
[255] Bocconi (2011), The role and impact of labour taxation policies.
[256] European Commission (1993), Growth, competitiveness and employment. Challenges and the ways forward into the 21th century.
[257] Bassanini & Duval (2006), cited in Primož Dolenc, Suzana Laporšek (2010), Tax wedge on labour and its effect on employment growth in the European Union.
[258] The World Bank (2007), Fiscal policy and economic growth. Lessons for Eastern Europe and Central Asia.

Commission,[260] the Eurogroup[261] and the European Council[262] have called for lower labour costs to solve unemployment.

Raising taxes on external costs and lowering labour taxes are proven principles. The effects of combining the two, however, has been subject of debate, as will be explained below.

3.5. The 'double dividend' discussion

In this section we will look at the effects of a tax shift both in theory (section 3.5.1) and in practice (section 3.5.2).

3.5.1. Impact of a tax shift - in theory

Economic theory
There has been much discussion amongst economists on the net employment effect of a tax shift from labour to consumption, as the OECD states:

> *"While taxes on labour income have the clearest and most direct impact on employment, almost all taxes can have some effect on employment, indirectly, by distorting economic decisions, and thus leading to an inefficient allocation of resources and reduced labour demand."*[263]

An increased tax burden on environmentally harmful consumption could indeed decrease consumption of particular products. Also, employment in resource- and energy-intensive sectors might decrease, thereby counterbalancing the positive impacts of lower labour tax rates in general. In the literature, especially dating from the 1990s, scholars have warned, based on economic theory, not to be too optimistic about the 'double dividend' effect of both improving the environment and creating jobs. See for example Bovenberg (1999)[264] and Kosonen & Gaëtan (2009).[265] Other studies did find positive effects of ETR on employment; see for example Majocchi & Missaglia (2002),[266] Dresner (2004),[267] EEA (2011),[268] Bocconi (2011)[269] and European

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[259] IMF (March 31, 2014), The IMF's Advice on Labor Market Issues.
[260] European Commission (2013), Tax reforms in EU Member States. Tax policy challenges for economic growth and fiscal sustainability.
[261] The finance ministers of countries whose currency is the euro. Eurogroup (July 8, 2014), Structural reform agenda - thematic discussions on growth and jobs - Reduction of the tax wedge.
[262] European Council (March 24/25, 2011), Conclusions. EUCO 10/1/11 REV 1.
[263] OECD (2011), Taxation and Employment. Tax Policy Studies No21.
[264] Bovenberg, Lans (1999), Green Tax Reforms and the Double Dividend: an Updated Reader's Guide. International Tax and Public Finance, 6, 421–443.
[265] Kosonen, Katri, Nicodème, Gaëtan (2009), The role of fiscal instruments in environmental policy.
[266] Majocchi Alberto, Missaglia Marco (2002), Environmental taxes and border tax adjustments: An economic assessment.
[267] Dresner, Simon, et al. (2004), Social and political responses to ecological tax reform in Europe: an introduction to the special issue. Energy Policy 34 (2006) 895–904.
[268] EEA (2011), Environmental tax reform in Europe: opportunities for eco-innovation.
[269] Bocconi (2011), The role and impact of labour taxation policies.

Commission (2013).[270] The attractiveness of a shift to a consumption tax stems from the fact that consumption is a broader base than labour income, according to Bocconi:

> *"Consumption is financed also by a number of sources other than labour income, including government transfers, corporate income, previously accumulated wealth, etc. A higher base obviously means a lower rate, and this reduces the distortionary effect on labour supply and possibly, given that the distortion increases more than proportionally with the rate, the overall distortionary effect of the tax system."*
>
> *"This redistribution is expected to have positive effects on growth, as the lower cost of labour will induce an increase in investments. Note that we have a positive effect on employment and growth even if the joint final effect of the change in wages and prices offset each other."*[271]

In a recent study, the IMF concludes:

> *"Early literature (for example, Bovenberg and Goulder 1996) suggested that swapping a carbon tax for a tax that distorts only labor markets has a positive economic cost (leaving aside environmental benefits). However, in reality labor income taxes cause a much broader range of distortions (…). Accounting for the full range of distortions, the economic efficiency benefits from cutting broader taxes are larger, and the overall costs of carbon tax shifts smaller, than previously thought, and perhaps even negative over some range (for example, Parry and Bento 2000, Bento, Jacobsen, and Liu 2012)."*[272]

Macro-economic modelling

Over the last few decades a growing body of literature has emerged which has looked at the relationship between a tax shift and employment by modelling different policy scenarios. The UK *Green Fiscal Commission*, for example modelled an ambitious tax shift in the UK, largely based on energy taxes and some taxes on water and materials:

> *"over the period 2006 to 2020 through this means, environmental tax revenues in the ETR scenario rose from around 6% to 15% of total tax revenues, allowing income tax to be cut by 10% and National Insurance Contributions by around a third. Other impacts were that carbon dioxide (CO2) emissions fell by 16% in 2020, employment was up by around 1.5% (450,000 jobs) and the effect on GDP was negligible, as the negative effects of the energy price increase were almost completely offset by the positive effects of the increased employment and reduced labour taxes".*[273]

In 2011, the UK Mirrlees review looked at the consequences of increasing VAT rates in the UK, and spending the associated increase in revenues (£ 24 billion, approximately € 28.4 billion) on a range of direct tax cuts and benefit increases. The simulations point to "an increase in employment of about 157,000 (or 0.6% of the workforce) and an increase in aggregate annual earnings of just under £ 2 billion" (€ 2.4 billion).[274]

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[270] European Commission (2013), Tax reforms in EU Member States. Tax policy challenges for economic growth and fiscal sustainability.
[271] Bocconi (2011), The role and impact of labour taxation policies.
[272] MF (2016), After Paris: Fiscal, Macroeconomic, and Financial Implications of Climate Change.
[273] Ekins (2009), in Ekins, Paul (2015), An Economy That Works. Better Growth beyond GDP.
[274] Mirrlees, James, et al. (2011), Tax by Design. Institute for Fiscal Studies.

An extensive study by Aarhus & Eunomia (2014), commissioned by the European Commission, also concluded that a tax shift could stimulate employment. The degree to which this occurs depends on the specifics of the environmental tax being considered, how the revenues are spent, and the employment and economic dynamics within a country (e.g. the size of the informal sector, the extent of unemployment, and the flexibility of the labour force). The report states that the findings of detailed modelling work appear to be relatively consistent and suggest that gains in employment may be achieved under certain circumstances; typically, when revenues derived from the taxes are used to offset social security taxes:

> *"(…) some studies have suggested that unemployment may rise as a result of environmental tax reform, but these are certainly more limited than those which suggest net positive gains in employment."*[275]

In 2000, a review looked at 139 model simulations coming from a total of 59 studies. Seventy-five of the 108 simulations that were reviewed for employment impacts (i.e. 73%) predicted that Environmental Tax Reform would result in net job creation. A review in 2005 updated the findings from the above-mentioned study:

> *"This work looked at a total of 186 model simulations from 61 separate studies. (…) on average, all of the different groupings of studies predicted net job creation with significant reductions in CO2 emissions."*[276]

The effects of tax reform are most well-documented in relation to energy and carbon taxes. Other forms of environmental taxes, such as resource taxes, or taxes on pollution, have received less attention. According to Aarhus & Eunomia (2014), a reason for this is that:

> *"modelling studies have tended to address effects at the level of the macro-economy, whilst the level of revenue generation by some pollution and resource taxes is rather low (so that the net effects estimated by models are likely to lie within, or close to, their limits of resolution."*[277]

It is important to note that the European Commission considers the green economy as a major area for employment expansion, with a potential of twenty million new jobs between 2014 and 2020. Also, it has been estimated that full compliance with EU policy on waste management could create an additional 400,000 jobs and an extra annual turnover of € 42 billion. The potential benefits of resource efficiency could reach € 2.1 trillion of annual savings by 2030. And finally, every percentage point reduction in resource use is worth around € 23 billion to business and could result in 100,000 to 200,000 new jobs.[278]

More than two dividends

The term 'double dividend' (or 'double edged sword') is rather misleading as it suggests that fiscal reform is about a single measure automatically having a double effect. In practice, a shift in taxation covers multiple policy measures, and therefore, by nature, multiple effects. According to the EEA (an agency of the European Union) a tax shift can produce at least four different types of impacts:

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[275] Aarhus University, Eunomia (2014), Study on Environmental Fiscal Reform Potential in 12 EU Member States.
[276] Aarhus University, Eunomia (2014), Study on Environmental Fiscal Reform Potential in 12 EU Member States.
[277] Eunomia, et al. (2016), Study on assessing the environmental fiscal reform potential for the EU28. Final report.
[278] European Commission (2014), Boosting growth and jobs. Success stories from EU Environment Policy.

"(1) the direct consequences of increasing taxes (e.g. higher prices for certain goods); (2) the consequences of recycling (e.g. direct transfers or alleviation of taxes); (3) the broader economic impacts of ETR (e.g. job creation or inflation); and (4) the environmental effects of ETR (e.g. a cleaner environment).[279]

In other words, the EEA argues that fiscal reform can deliver much more than two 'dividends'; not just increased resource productivity, eco-innovation and increased employment but also improved health of environments and people and a more efficient tax system. A fifth dividend could be that the financial burdens of an ageing population are distributed more fairly as these burdens are shared according to consumption.[280]

Finally, the European Commission mentions:

"The results obtained by Barrios, Nicodeme and Sanchez-Fuentes suggest that tax-shifting could lead to significant efficiency gains, as it reduces the total marginal cost of production, and could thus bring about an increase in productive efficiency. Environmentally friendly tax reforms also, therefore, have the potential to reduce the cost of doing business, in addition to offering the benefits for employment and for the environment traditionally discussed in the literature." [281]

3.5.2. Impact of a tax shift - in practice

Practical experiences have generally shown a positive impact on employment, although this again depends on how revenues are used as well as the nature of the wider tax reform, including what other taxes or charges are reduced (e.g. labour taxes).[282]

Energy and carbon-based tax shifts

In the 1990s, six European countries took steps to shift the tax burden from labour to energy and transportation: Sweden (initial year of the reforms: 1990), Denmark (1993), the Netherlands (1996), Finland (1997), Slovenia (1997) and Germany (1999). The UK followed in 2001. In total, these tax reforms shifted tax revenues for more than € 25 billion annually. The revenues were used to lower taxes on labour. The impact of these tax shifts have been analysed and the associated reductions of carbon emissions have been documented in several studies. The burden for specific energy-intensive industries remained modest (1-2% increase in energy costs) and the tax shifts generally had a positive effect on economic activity, depending on how the revenues from the environmental taxes were recycled. Also, ETR caused employment in some of the countries to increase by as much as 0.5%.[283]

In Germany, energy taxes were used to lower pension contributions, which stabilized and even cut pension contributions (which were previously climbing steadily). It also created an estimated

[279] EEA (2012), Environmental tax reform in Europe: implications for income distribution.
[280] EEA (2013), Environmental Fiscal reform – illustrative potential in Portugal.
[281] European Commission (2015), Tax Reforms in EU Member States 2015. Tax policy challenges for economic growth and fiscal sustainability.
[282] Withana, Sirina, et al. (2013), Evaluation of environmental tax reforms: International experiences.
[283] Andersen, Mikael Skou, et al. (2007), Competitiveness Effects of Environmental Tax Reforms (COMETR). Final report to the European Commission.

250,000 new jobs in 2003, which corresponds to employment levels 0.75% above the reference scenario.[284] In Denmark and Sweden, employment went up by 0.5%.[285]

In 2008, the Canadian province British Columbia began to tax fossil fuel users, ranging from utility companies to car drivers. Since then:

> *"the economy has grown by an average of nearly 2 percent a year, despite a big national recession through 2009, outpacing the rest of Canada. The use of gasoline, coal and other carbon-based fuels has dropped 16 percent during the same period, reducing greenhouse gas pollution. Today the carbon levy is $30 (Canadian) per metric ton; in exchange, both companies and individuals get income tax cuts and other savings."*[286]

In short, air pollution dwindled while the economy grew. The recycling of carbon revenue through tax cuts on both labour and capital, as well as through higher transfers to the population, has made the carbon tax progressive.[287]

Other tax shifts have occurred in the UK (1996),[288] Germany (2007),[289] and Colombia (2012)[290] and are planned in the Czech Republic[291] and Belgium.[292]

In conclusion

Based on economic theory, based on economic modelling work and based on empirical evidence so far, it can be concluded that there is ample support for the assumption that a shift in taxation can have a positive impact on employment, economic growth and the environment. The impact of a tax shift depends, amongst others, on the effective level of environmental taxation, the applied measures to lower costs of labour, price elasticity and substitutability of products and services.

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[284] EEA (European Environment Agency) (2011), Environmental tax reform in Europe: implications for income distribution.

[285] Andersen, et al. (2007) in Withana, Sirina, et al. (2013), Evaluation of environmental tax reforms: International experiences.

[286] Scientific American (Dec 1, 2015), A Tax on Carbon Pollution Can Benefit Business. Low oil and gas prices make this the right time to tax fossil fuels.

[287] Beck, et al. (2014), in World Bank (2015), Decarbonizing Development. Three Steps to a Zero-Carbon Future.

[288] In 1996, the UK introduced a landfill tax designed to be revenue neutral through a reduction in employers' national insurance contributions. In 2010 the revenues raised from the tax were € 1.2 billion. The amount of waste going to landfill almost halved since the tax was introduced. Cambridge Econometrics (2013), Modeling Milestones for Achieving Resource Efficiency: Economic Analysis of Waste Taxes. Draft Report for the European Commission.

[289] In 2007 Germany increased the VAT rate by three percentage points accompanied by a simultaneous cut in the unemployment insurance rate. European Commission (2014), Taxation Trends in the European Union.

[290] "In late 2012, Colombia approved a tax reform (Law 1607), which reduced the tax burden on the labor factor, or payroll taxes, in order to stimulate formal employment and enhance productivity. The loss in revenues resulting from these measures was neutralized with an adjustment to the corporate income tax and a simplification of VAT rates. The reform increased formal employment and reduced the unemployment rate, while increasing revenues as a result of enhanced growth." IDB (2015), Fiscal Policy and Management Sector Framework Document.

[291] In the Czech Republic, the government produced a 2008-2017 reform plan with the intention to introduce three stages of revenue neutral environmental tax reforms. The first stage resulted in a change to the single personal income tax following a number of environmental tax reforms. Eunomia, et al. (2016), Study on assessing the environmental fiscal reform potential for the EU28. Final report.

[292] The 2015 Belgian tax reform involves increases in excise duties on diesel, increased VAT on electricity and reductions in employers' healthcare contributions. Torfs, Michaël (July 23, 2015), Tax shift deal reached: how will this impact on you? Flandersnews.be.

Updating the tax system is not a simple undertaking; tax systems and their interaction with the economy, prosperity and wellbeing are complicated. One thing is clear, though, as major international institutions recognize: we have entered an era of rapid change and great social and environmental challenges, and the current tax system is not structured to cope with these challenges.

Over the last few years, the business community has also become aware of the economic impact of global environmental megatrends. Also, the social impact of business activities is gaining more and more attention. The following chapter addresses the changing role businesses play in achieving the goals of sustainable and inclusive economies and their changing position on pricing of externalities.

4. The role of business is changing

"We need business models to drive new forms of long-term capitalism - mindful, responsible and inclusive."
Paul Polman (CEO of Unilever)[293]

"Our role in sustainable development does not begin and end at the factory gate"
José Lopez (Former COO of Nestlé)[294]

4.1. Businesses are measuring & disclosing impact

Over the years, sustainability has become an increasingly important topic in the boardroom.[295] Companies are gaining more insights in their impact by integrating environmental issues in their reporting.[296] The field of integrated reporting has been growing fast. Currently, 92% of the world's largest 250 corporations report on their sustainability performance.[297] This development is driven in part by investors demanding disclosure of risk information.

Investors demand information
Heinz, for example, has disclosed to investors that climate change poses a threat to their products and bottom lines, harming business through crop shortages, pest infestations, and other unforeseen circumstances.[298] This kind of information is increasingly of interest to investors. CDP (formerly know as *the Carbon Disclosure Project)* is a UK-based organization that works with shareholders and corporations to disclose the Greenhouse Gas emissions of major corporations. On behalf of more than 800 institutional investors representing over $ 95 trillion (€ 89 trillion) in assets, CDP sends out information requests to the largest global companies. Since 2010, there has been a 54% rise in the number of institutional investors requesting disclosure of climate change, energy and emissions data through CDP. In 2015, over 5,600 companies, representing 55% of global market capitalization, disclosed information through CDP.[299]

Organizations such as the *Climate Disclosure Standards Board* (CDSB),[300] the *International Integrated Reporting Council* (IIRC),[301] the *Sustainability Accounting Standards Board* (SASB),[302]

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[293] Paul Polman (June 24, 2015), Why the Role of Business Can No Longer Be Just Business. The Huffington Post.
[294] José Lopez (Nov 28, 2008), The Nestlé approach to Sustainability: Creating Shared Value. Speech.
[295] EY (2014), Sustainability reporting — the time is now.
[296] KPMG (2013), The KPMG Survey of Corporate Responsibility Reporting 2013.
[297] GRI (Accessed Sept 2016), About GRI.
[298] Atkin, Emily (September 15, 2014), Coca Cola, Heinz And Other Major Food Companies Warn Climate Change Threatens Business. Thinkprogress.org website.
[299] CDP (2015), CDP Global Climate Change Report 2015 At the tipping point?
[300] cdsb.net
[301] integratedreporting.org
[302] SASB standards are designed for the disclosure of material sustainability information in mandatory SEC filings. sasb.org

the *Global Reporting Initiative* (GRI)[303] and the *Natural Capital Protocol* offer additional frameworks for reporting environmental information.[304]

The first integrated environmental report

Few people are aware that already in 1990, the Dutch entrepreneur Eckart Wintzen published a fully integrated annual report for his IT service company BSO/Origin.[305] This groundbreaking report included information on the company's financial performance as well as the natural resources (clean air, water, etcetera) used over the year. The report even expressed the intrinsic value that was extracted from the environment by this pollution and resource use. Without taking these 'costs' into account, a profit and loss account shows only one side of the coin, according to Wintzen (1991):

> *"What good, after all, is a profit and loss account that fails to take account of the costs of our own survival? And one that passes on the bills to future generations, without even an apology?"*[306]

The BSO/Origin Annual Report 1990 offered a rough calculation of the value lost in terms of atmospheric emissions, water use and produced waste and deducted this 'Value Lost' from it's operating profit ('Value Added'), to arrive at a 'Net Value Added'. The report was intended to boost the discussion, as Wintzen was well aware that his calculations were rudimentary. The process was repeated and improved throughout the 1990-1996 period.

Wintzen was convinced that environmental reporting is crucial for sustainable growth, as it would provide the basis for a fiscal system that taxes the use of natural resources (extracted value) instead of labour (adding value). He called this system change *Value Extracted Tax* (later abbreviated to *Ex'tax*). Ultimately, according to Wintzen, full cost accounting should lead to a single tax on extracted value, weighing the impact of various activities. This could simplify taxation by replacing a range of different environmental taxes.[307]

The 2011 integrated environmental report by PUMA

In 2011, together with PwC and Trucost, PUMA created a methodology to measure the "true" costs of its impacts on nature. The PUMA 2010 Annual Accounts contain detailed information on the impact of their operations. In a side-letter, PUMA announced that this impact should theoretically be valued at € 145 million.[308] This approach has rightfully attracted the attention of the global business community and is still exceptional as environmental effects are usually only published in terms of tonnes (carbon) or cubic meters (water), rather than in monetary terms.

Reporting on social issues

In a review of the 2014 Annual Reports, CSR Reports and Environmental Reports of approximately 140 multinationals, The Ex'tax Project found that reporting on social issues is generally still rudimentary, focusing on information with regard to gender balance or health and safety in the workplace. In general, limited or no information is provided with regard to impact on (regional and supply-chain) employment, impact on poverty (such as living wage payments to workers), social contributions and pensions fees paid for employees, expenditures on education etcetera.

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[303] globalreporting.org
[304] naturalcapitalcoalition.org/protocol.
[305] BSO/Origin (1991), Annual Report 1990.
[306] BSO/Origin (1991), Annual Report 1990.
[307] Wintzen, Eckart (1994), Re-engineering the Planet. Three Steps to a Sustainable Free Market Economy.
[308] PUMA (2011), PUMA: Environmental Profit and Loss Account.

Integrated reporting helps business leaders and investors gain insights in environmental and social impact. In practice, however, CFOs are struggling to make the business case for sustainability[309] and social impact investments. Introducing sustainable products and services is often an uphill battle, as business cases of sustainable and inclusive solutions need to compete with options based on 'tax-free' primary resources and subsidized fossil fuels. High labour costs are also holding back labour-intensive R&D efforts and activities such as repair and maintenance services and recycling,[310] needed for a circular economy. The last few years, more and more business leaders are calling for carbon pricing to fix these failing market mechanisms.

4.2. Business leaders are calling for carbon pricing

Ahead of the 2015 Paris climate talks, business leaders took the lead in remarkable initiatives to focus global attention on climate change and carbon pricing. A few of the most powerful initiatives are presented below:

- **Carbon Price Communiqué**
  Since 2012, Royal Dutch Shell, Unilever and more than 150 other major corporations signed the *Carbon Price Communiqué*, calling for lawmakers worldwide to put a 'clear' price on carbon emissions in order to contain global warming.[311]

- **Put a Price on Carbon Statement**
  Ahead of the 2014 UN Climate Summit, seventy-four countries, 23 subnational jurisdictions and more than 1,000 companies and investors expressed support for a price on carbon. The *Put a Price on Carbon Statement* voices the message that "pricing carbon is inevitable." [312]

- **Carbon Pricing Leadership Coalition and Carbon Pricing Panel**
  The Carbon Pricing Leadership Coalition (CPLC) was officially launched at the 2015 Climate Conference, with the support of 21 governments and more than 90 businesses and strategic civil society partners. One of the work areas of the Coalition is to mobilize business support in the use of corporate carbon pricing and in actively supporting carbon pricing policies.[313]

  In order to provide political momentum to complement the Coalition, World Bank Group President Jim Yong Kim, IMF Managing Director Christine Lagarde and OECD Secretary General Ángel Gurría convened the *Carbon Pricing Panel*, calling on their peers to put a price on carbon. Members of the Carbon Pricing Panel include German Chancellor Merkel, French President Hollande, as well as the Prime Ministers or Presidents of Canada, Ethiopia, Chile, the Philippines and Mexico. [314]

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[309] Accenture, UN Global Compact (2013), The UN Global Compact-Accenture CEO Study on Sustainability 2013. Architects of a Better World.
[310] The operating costs of recycling depend strongly on the labour cost at the location of the dismantling plant. In China, a worker costs about twenty times less than a worker in Europe. In countries where the labour cost is low, manual dismantling can be deployed to prevent large losses due to shredding. Meskers, Christina, Hagelüken, Christian (2009), The Impact of different pre-processing routes on the metal recovery from PCs.
[311] Carbon Price Communiqué (Accessed April, 2014), website Climatecommuniques.com.
[312] World Bank (2014), We support putting a price on carbon.
[313] World Bank (January 29, 2016), Carbon Pricing Leadership Coalition: Release of Official Work Plan.
[314] Carbon Pricing Leadership website Carbonpricingleadership.org. Accessed September 2016.

- **Global Investor Statement on Climate Change**
  Institutional investors are actively engaging with governments on the risks of weak climate policy and the need for a carbon price through the *Global Investor Statement on Climate Change*. More than 400 institutional investors representing over $ 25 trillion (€ 23 trillion) in assets have signed the statement.[315]

In anticipation of effective pricing of carbon by governments, hundreds of multinationals around the globe are taking action by applying a 'shadow price' on carbon, as will be explained below.

4.3. Businesses are applying 'shadow pricing'

Increasing use of internal carbon pricing
In anticipation of effective pricing of carbon by governments, multinationals around the globe are taking unilateral action. In their accounts, they apply a shadow price on carbon in order to improve long-term investment decision-making. In 2015, 435 companies reported to CDP that they used an internal price on carbon—almost a threefold increase from the previous year.[316] In 2016, 517 companies disclosed their practice of pricing carbon emissions. An additional 732 disclosed plans to implement such price by 2018. The corporate carbon price range reported spans from less than $ 1 to more than $ 800 (<€ 0.94 to >€ 750) per tonne of CO2 equivalent.[317]

> *"(…) companies cite use of a carbon price as a planning tool to help identify revenue opportunities, risks, and as an incentive to drive maximum energy efficiencies to reduce costs and guide capital investment decisions."*[318]

The *United Nations Global Compact* (UNGC) - the world's largest corporate sustainability initiative with 13,000 corporate participants and other stakeholders over 170 countries - has called for a minimum internal carbon price level of $ 100 (€ 94) per tonne of CO2e by 2020 in order to be consistent with a 1.5–2°C pathway.[319]

Royal Dutch Shell has stated:

> *"A strong, stable price on CO2 within a comprehensive policy framework is needed to achieve significant reductions in the long term. (…) But we are not waiting for government policy to develop; we already consider a potential screening value of CO2 emissions at $40 a tonne."*[320]

And Royal DSM:

> *"Putting a price on carbon makes alternative energy solutions, such as solar, the wind and advanced biofuels more competitive while creating opportunities to pursue*

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[315] Investor Platform for Climate Actions website Investorsonclimatechange.org. Accessed Sept 2016. Exchange rate: US Department of the Treasury, Average exchange rate 2015.
[316] CDP (2015), Putting a Price on Risk: Carbon Pricing in the Corporate World.
[317] CDP (2016), Embedding a carbon price into business strategy.
[318] CDP (2013), Use of internal carbon price by companies as incentive and strategic planning tool. A review of findings from CDP 2013 disclosure.
[319] United Nations Global Compact (April 22, 2016), UN Global Compact Calls on Companies to Set $100 Minimum Internal Price on Carbon.
[320] Royal Dutch Shell (2014), Sustainability Report 2013.

additional low-fossil-carbon alternatives and charging the — currently cheap — fossil resources the right pollution price. (…) At Royal DSM, we apply an internal carbon price of €50 per ton CO2 equivalent when reviewing large investments." [321]

Corporations use internal carbon pricing to offset the costs and risks of greenhouse gas production, and to finance the transition to secure sources of low carbon energy.[322] Microsoft, for example states:

"With the funds collected through the carbon fee, we have purchased more than 10 billion kilowatt-hours (kWh) of green power, reduced our emissions by 7.5 million metric tons of carbon dioxide equivalent (mtCO2e), had an impact on more than 3.2 million people in emerging nations through carbon offset community projects, and saved more than $10 million per year."[323]

Applying internal water pricing

With regard to water supplies, similar issues arise. Corporations are anticipating higher water costs, as GIZ (a company that specializes in international development owned by the German government) observes:

"Firms may face higher water costs through regulatory constraints on access to water, higher water tariffs, physical shortages, higher capital expenditure costs or loss of social license to operate. The cost of securing water may rise due to changes in precipitation, urbanisation, competition for water from other firms, from other sectors and civil society. Companies are realising that water can no longer be treated as a free raw material, and that it can damage their credit rating, insurance costs and brand value."[324]

These developments have incentivized businesses to develop methodologies to assess the 'true' value of water throughout their operations and across their value-chain (see for example Holcim,[325] Veolia[326] and WBCSD)[327]. Nestlé has introduced an internal shadow price for water ranging between CHF 1 and CHF 5 per m^3 (€ 0.9-4.6) depending on the water stress of the factory's location.[328]

Integrated reporting and shadow pricing serve as tools for investors and companies to assess the risks of the environmental megatrends. The proverb 'what gets measured gets managed' certainly applies, as the data are making corporations aware of the impact of their activities and enable them to assess the risks across their value-chain. At the same time, the data help to identify opportunities to serve the global marketplace with smarter, cleaner and inclusive business models. The development of new business models will be highlighted next.

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[321] Sijbesma, Feike (Accessed April, 2016), Carbon Pricing: An Inevitable Opportunity.
[322] CDP (2015), Putting a Price on Risk: Carbon Pricing in the Corporate World.
[323] Microsoft (2015), Making an impact with Microsoft's Carbon Fee.
[324] GIZ/NCD/VfU (2015), Integrating Water Stress into Corporate Bond Credit Analysis.
[325] Holcim (2014), Building Ambition, Adding Value. Corporate Sustainable Development Report 2013.
[326] Veolia (Accessed July, 2014), The True Cost of Water.
[327] WBCSD (Accessed July, 2014), The Global Water Tool.
[328] Nestlé (2015), Nestlé in society; Creating Shared Value and meeting our commitments 2015.

4.4. Inclusive, circular business model innovation

The global marketplace is competitive and fast changing. It is vital for business leaders to anticipate issues in the availability of energy resources or materials or the impacts of a changing climate. There are many inspiring examples of businesses transforming towards more circular business models.

- Royal DSM has first evolved from the *Dutch State Mines* to a chemical company and then to a life sciences and material sciences company. Amongst others DSM now provides technologies to produce cellulosic bio-ethanol from agricultural residual and anti-reflective coatings for solar panels.
- Umicore has changed from a mining company into an *urban mining* company specialised in the recycling of precious metals.
- Interface (carpet tiles) is determined to reach Mission Zero (no negative impact) by 2020 and
- Unilever (consumer goods) has pledged to double the size of its business while decreasing its environmental footprint.[329]
- Since 2014, 69 companies (including Coca-Cola, Google, H&M, Microsoft and Tata Motors) have joined the RE100, a group committed to using 100% renewable power.[330]

The Ex'tax Project has reviewed reports of approximately 140 major corporations in 12 sectors and found that in every sector, businesses are redefining their business models. A selection of examples of business model innovations is provided in Table 2.

'Polluter pays' principles change the dynamics of business
When governments systemically start to apply 'the polluter pays' principles, the cost of water, harmful emissions, metals and minerals will likely go up. The business case of resource-efficient technologies, renewable and biobased materials improves compared to resource-intensive and polluting technologies. Lower taxes on labour makes hiring people and applying manpower, craftsmanship and ingenuity, more affordable. Business models can then shift to labour intensive business models, including services, maintenance, production and R&D.

In 2010, the *World Business Council for Sustainable Development* (a CEO-led association of some 200 international companies) published its *Vision 2050* report, which lays out a pathway leading to a global population of some nine billion people living well, within the resource limits of the planet by 2050. This work included a plea for a tax shift:

> *"Increase price levels, via taxes and levies, to influence a shift of consumption toward the offering with the best environmental and social profile (…) Tax strategies [should] shift towards incentivizing job creation and healthier products and discouraging negative external factors like pollution and environmental damage."*[331]

[329] Company websites; Dutch Sustainable Growth Coalition (2012), Towards Sustainable Growth Business Models.
[330] RE100 website (Accessed Nov, 2016), theclimategroup.org/what-we-do/programs/re100/
[331] WBCSD (World Business Council for Sustainable Development) (2010), Vision 2050.

Table 2: Business model innovation, selected examples by sector

Industry	Water	Carbon	Employment
Food & Beverages	FrieslandCampina used purified condensation water from the production process saving 444 m3 of water per day in a Belgian facility	Danone installed cogeneration facilities in order to produce electricity and heat from a single energy source	Nestlé helped more than 11,000 young people in Europe find work or apprenticeship opportunities
Oil & Gas	Shell converts sea water for steam generation at a refinery	With Dupont, BP has developed a second-generation biofuel	Total supported 10,000 scholarship students in 40 countries and 50 professional training programs from high school to professional master's level
Road Vehicles & Tires	Volkswagen Chengdu became the first paint shop in Asia to use technology that reduces water consumption by up to 23% compared with solvent-based processes	BMW is reusing batteries for flexible storage of renewable energy	Michelin is producing ecoresponsible natural rubber in Indonesia. Half of the plots are earmarked for growing crops for the local community, creating 16,000 local jobs
Consumer Goods	Unilever launched an education campaign to help consumers save water in Brazil during the country's water shortage. The brand grew at nearly double the market rate	IKEA offers solar panel purchase and installation services	Philips offers vulnerable groups in the Netherlands work experience and training; 12,500 people have participated so far. Via the program, in 2015, Philips employed 19 people with autism
Transport and communications	AirFrance/KLM uses a method to clean the exterior of aircraft, which uses 100 times less water than the previous system	Deutsche Post/DHL is deploying 116 electric vehicles which make delivery services in Bonn and the surrounding area almost carbon-free	Panalpina Brazil collected e-waste to be donated to an organization that teaches youth about the computer maintenance profession. The recycled equipment was then distributed to public schools
Services & Banking	ISS offers Cleaning Excellence contracts that can achieve reductions in the use of detergents by 75%, water consumption and disposal by 70%	Intercontinental Hotels Group has developed a system that allows hotels to track, measure and report on their carbon footprint and utility consumption	The Santander Group has created 1.1 million intermediate jobs for young people
Pharmaceuticals	Sanofi received accreditation in micro pollutant monitoring	GlaxoSmithKline eliminated chlorinated solvents in antibiotics production, which cut the amount of waste produced and reduced carbon emissions at the site by 40%	Novo Nordisk set up a mobile diabetes clinic which improves the competences of local healthcare professionals and access to screening and care for underserved populations
Cement	Italcementi has developed a special mix for porous and pervious pavements, roads, walkways and parking lots, studied for rain and storm water management	Lafarge has developed cement with a 25-30% smaller carbon footprint	Heidelberg is spending 90% of procurement of goods and services in the immediate vicinity of plants or in the respective countries
Retail	Adidas reduced water consumption per employee by 22.6% through reduced irrigation and the installation of water saving devices	Tesco is using sea and rail transport to bring products from Turkey to the UK, helping to save 4.3 million kilometres per year	Marks and Spencer has offered 3,8000 work placements to people aged 25 of under
Chemicals	DSM reduced water consumption in acidic waste water treatment by 300,000 m3 per year, saving €90,000	AkzoNobel derived 13% of 2015 revenue from eco-premium solutions that avoid emissions	Syngenta reached 17.2 million smallholders in 2015 and began social impact assessments

Source: The Ex'tax Project study of (2014 and 2015) Annual Reports, Sustainability Reports, Progress Reports, Environmental Reports, Corporate Social Responsibility Reports and Strategic Reports.

Impact on small and medium-sized enterprises

It's important to note that in most countries, small and medium-sized enterprises (SMEs) represent more than 95% of all firms. [332] In the European Union, SMEs provide more than 67% of total employment. The impacts of a tax shift can be expected to be even larger for small and medium-sized companies than for multinationals. This is especially true for social enterprises. Whereas conventional businesses provide mainly standardized products or services, social enterprises generally focus on services that are "labour intensive and personalised". [333] The European Parliament recalls in a 2015 resolution that:

> *"SMEs can be expected to play an important role in the circular economy, providing sustainable, yet labour-intensive services such as repair, refurbishing and recycling; considers that a tax shift from labour to natural resource use is a prerequisite for the long-term success of SMEs"*[334]

Businesses are preparing for an era in which 'the polluter pays' principles are applied, and the costs of pollution, climate change and water scarcity are no longer passed on to society. At the same time, lower labour taxes would enable entrepreneurs in every sector to shift to more inclusive business models. What exactly are the impacts of such a fundamental policy change for corporate sectors, government and consumers?

How this works in practice in an international context is the subject of this study, as will be further explained in the next chapter.

[332] OECD (2015), Taxation of SMEs in OECD and G20 Countries. OECD Tax Policy Studies, No. 23.
[333] European Union, OECD (2016), Policy Brief on Scaling the Impact of Social Enterprises Policies for social entrepreneurship.
[334] European Parliament (2015), Resolution on green growth opportunities for SMEs.

5. The Ex'tax Project approach

"I think today everyone agrees with the premise that when you tax something you get less of it, and when you tax something less, you get more of it."
- Arthur Laffer (economist)[335]

While evidence is growing that a tax shift offers an effective response to the economic crisis, as well as the environmental crises, and the business community is increasingly supportive of pricing mechanisms, policy makers are still struggling to put the idea into practice. This chapter describes five main barriers to the implementation of a tax shift, and how The Ex'tax Project addresses these challenges.

5.1. How The Ex'tax Project addresses the challenge of updating the tax system

"*Although many Member States recognize the need to shift taxation away from labour and to eliminate distortions in the tax systems*," the European Commission states, "*progress has been slow.*"[336] Below are five of the main barriers to the implementation of a tax shift and how The Ex'tax Project addresses them.

1) International coordination is essential to achieve a level playing field and to solve transnational problems.

Many environmental problems (such as climate change) are transnational problems. A single country is not capable of solving these issues, and unilateral action may hurt economies that are ahead of others. This prisoner's dilemma causes governments to wait until regional or global agreement is reached. This is especially relevant in Europe, where unanimity is required to change tax directives.

To address the challenges that the European Union is facing, a common, long-term strategy is needed, acknowledging the fundamental role of the tax system. The overall goal of this document is to contribute to the development of such a strategy (see section 5.2).

2) There have been doubts about the stability of environmental taxes.

In general, Environmental Tax Reform research has focused on carbon emissions, which feeds criticism that successful regulation may erode the stability of tax revenues; supposing, that government income erodes when measures effectively reduce carbon emissions. Policy makers have long trusted the labour force as a stable source of income. Of course, this is no longer accurate in a globalized world, in which jobs simply move across the globe. New sources of income for governments are necessary, as high unemployment rates, ageing populations and increasing health costs undermine the stability of tax revenues from labour.

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[335] Moore, Stephen (Dec 26, 2014), The Laffer Curve turns 40: the legacy of a controversial idea.
[336] European Commission (2015), Country-specific recommendations, Brussels, 13.5.2015 COM(2015) 250 final.

The Ex'tax Project contributes to solve this barrier by providing a tool to explore the range of options for environmental tax bases, in order to secure stable tax revenues (see section 7.2).

3) The social benefits of a tax shift have been insufficiently highlighted in the past.

In the available literature, generally, there has been a narrow focus on increasing environmental taxes and a lack of focus on the techniques and benefits of lowering labour taxes. The social effects of a tax shift have been largely ignored.

The Ex'tax Project contributes to solve this barrier by focussing on both sides of the equation (see section 7.2).

4) An interdisciplinary approach is needed.

As economic, environmental and social issues are interconnected; an integrated, systemic approach is needed to solve them. The existing segmentation of government departments (Ministries of Finance, Environment, Economic Affairs and Employment) is a barrier for the development of an interdisciplinary approach.

The Ex'tax Project is convinced that the tax system connects the 'triple p' of people, planet and profit. The project brings together different fields of expertise (see chapter 9) to advance integrated thinking.

5) There is a lack of information on the impact of a tax shift from a business perspective.

An inclusive, circular economy requires a major paradigm shift and risks and opportunities are not evenly distributed among business sectors. In the past, research on the tax shift has focused on modelling the impact on a macro-economic level. There is a general lack of information on the risks and opportunities from a business perspective.

The Ex'tax Project contributes to solve this barrier by bridging the information gap on the effects of a tax shift, focussing on business risks and opportunities, as a follow-up on this report. After an initial analysis of the impact on businesses (in 2013, in collaboration with the WBCSD), The Ex'tax Project has developed a 'Tax Shift Simulator for Business', providing strategic insights in the risks and opportunities of a tax shift for businesses in different sectors. This tool will be finalized early 2017. **Gathering more information on business cases that benefit from the tax shift is key to an informed discussion between policy makers and businesses.**

In the next sections, the approach of this study is further explained.

5.2. Goal of this study

The goal of this study is to help advance knowledge and understanding of the role of taxes in the transition to an inclusive and circular economy. It explores the potential impact of a fundamental tax shift scenario across 27 countries of the European Union,[337] as a stepping-stone for a broader international analysis. This study aims at proposing broad-based, budget-neutral policy measures that incentivize resource-efficiency and employment, while maintaining long-term competitiveness. The overall goal is to help develop a common vision of the tax system of the 21st century in Europe, by providing:

1) **A medium-to long-term tax shift scenario** for 27 countries of the European Union (see chapter 6);
2) **A macro-economic impact analysis** of this scenario (see chapter 7 and 8);
3) **An *Integrated Value Added Statement* (IVA)** that provide a 360° view on the impacts (see chapter 9);
4) **Recommendations** for next steps (see chapter 12).

By sharing their specific tax expertise, Deloitte, EY, KPMG Meijburg and PwC aim to contribute to find solutions for the challenges our societies are facing.

5.3. Limiting the scope

In order to create a workable assignment the scope of the study has been limited in a number of ways:

1. Geographical focus

National governments are fully capable of applying the Ex'tax principles step by step. In order to foster a global level playing field (and prevent border issues), however, a *fundamental tax* shift requires international cooperation. Preferably even global cooperation, which is extremely difficult to achieve. To complicate things even more, there is no global governmental body focusing on tax policy. Therefore, in this research project, the European context is focused on primarily, assuming that ultimately there should be global coordination as well.

2. Long-term vision, medium-term focus

European cooperation will require a long-term negotiation process of at least three to fifteen years, depending on the developments in the international arena and the acceleration of the urgency with regard to environmental problems (such as resource scarcity and climate change) as well as developments in the employment market and changes in public opinion.

The very nature of econometric modelling however, stipulates that the longer in future measures are introduced, the less reliable the results will be. Therefore, the scenario assumes

[337] Due to data restraints, Croatia is not (yet) included in the analysis.

implementation during the period 2016-2020. This is not to say that this period will be a realistic time frame, but it does provide a well-grounded impact analysis.

3. Focus on large-scale measures

The goal of this study is to analyse the impact of a *fundamental* tax shift scenario on employment, GDP and resource use. Therefore, each measure must be able to raise substantial tax revenues or send a clear price signal to discourage environmentally damaging products and activities. Measures with a minor tax base potential have not been included.

There are countless ways to implement a tax shift. The Ex'tax Policy Toolkit (in section 7.2) provides more than a hundred potential tax base options. This large number of options can be considered both a strength and a weakness. It is a strength, as it means that implementation can be adapted to national circumstances. At the same time, the versatility of a tax shift solution is a weakness as discussions on 'green tax reform' usually end up complicated and focused on measures without significant budgetary impact. The complexity of some environmental taxes can undermine their feasibility. This study therefore focuses on the big picture focusing on measures that bring significant tax revenues. This way, the upside (lower labour cost) can also be demonstrated.

4. Focus on employment and positive social impact

In many studies, the primary focus of researchers is an increase in environmental taxes, while opportunities to lower labour taxes are considered a secondary side effect. This study values both sides of the coin equally; both a major decrease in labour taxes and an increase taxation of natural resources and consumption are necessary for a systems change.

For obvious reasons, the tax system of the future must be fair and social, fostering safety for vulnerable groups in society. European fiscal systems are sophisticated structures with numerous technical options to facilitate a fair equilibrium between income groups. Defining how exactly to compensate for effects on specific income groups and business sectors is a challenge, though, as compensating one group or sectors will come at the expense of another group or interest in society. Any package of measures can and will not be budget-neutral for each and every sector and for consumers with different consumption quota. The goal, however, is to reach a reasonable and fair effect. As noted in a review chaired by Nobel laureate Professor Sir James Mirrlees:

> *"(…) it is important to consider all taxes (and transfer payments) together as a system. It is the redistributive impact of the system as a whole which needs to be measured and judged. (…) not all taxes need be progressive as long as the overall system is."*[338]

The global macro-economic model used in this study (E3ME, see chapter 6) does not allow for the modelling of policy measures targeted towards specific income groups. This type of household-level analysis needs to be done on a country-by-country basis based on national income data.

[338] Mirrlees, James, et al. (2011), Tax by Design. Institute for Fiscal Studies.

5. Focus on a single scenario

For the sake of simplicity, and to facilitate easy dissemination, this study focuses on a single scenario alone. As mentioned before, this is not meant as a blueprint, but as a possible pathway.

6. Focus group of tax bases

The categories 'natural resource use' and 'consumption' allow for measures covering the full spectrum of natural resources, including but not limited to metals, minerals and fossil fuels, irrespective of the form of these materials (as a primary material, in semi-finished products and used in (parts of) products). Pollution of clean air and water usage are also taken into account. In order to simplify this study, a focus group of tax bases has been chosen. Natural resources use such as fishing, deforestation and the use of ecosystem services are not yet been elaborated on. The Ex'tax principles do however envision pricing of these environmental factors in due time (see section 7.2 for an overview).

With regard to labour taxes, all taxes paid by employers and employees that are linked to wages (such as payroll taxes, personal income taxes and social security contributions) are taken into account.

7. General criteria

Each measure is supposed to:

1) **Encourage employment or discourage the use of natural resources**

   and

2) **Raise substantial tax revenues or send a clear price signal to discourage environmentally damaging products and activities**

   and, preferably:

3) **Contribute to a simplification of the tax regime.** As much as possible, the measures should simplify the tax system in order to lower administrative burdens and minimize economic distortions. The focus is as much as possible on *generic* measures rather than specific measures, exemptions and subsidies, based on the following principle:

> *"A tax system that treats similar economic activities in similar ways for tax purposes will tend to be simpler, avoid unjustifiable discrimination between people and economic activities, and help to minimize economic distortions."*[339]

[339] Mirrlees, James, et al. (2011), Tax by Design. Institute for Fiscal Studies.

5.4. Methodology

The Ex'tax Methodology below offers a step-by-step approach to analyse the options of a tax shift from labour to natural resources and consumption. It consists of five steps or phases:

Figure 8: The Ex'tax Methodology

In step one, data are collected with regard to the geographic area under review; exploring the economic and fiscal landscape with regard to environmental and labour issues. Then, the Ex'tax Policy Toolkit is introduced showing the range of options, or 'building blocks', available for governments to apply the Ex'tax principles. Thirdly, based on the Toolkit, a focus group of tax bases is identified, in order to create a workable scope.

The fourth step entails choosing a focus group of policy options; 'high potential' measures, based on criteria such as urgency, potential benefits and (mid- to long-term) attainability. This step involves the identification of specific measures that could (a) broaden the tax *base* of environmental taxes, (b) increase the *rates* of environmental tax, (c) terminate Environmentally Harmful Subsidies, and (d) lower labour taxes and social contributions.

Finally, as far as possible, the proposed measures are elaborated on in terms of the object, rates and exemptions, purpose, expected impact, EU context, challenges and possible solutions.

Based on this methodology, a mid-to long-term tax shift policy scenario for the European Union is developed (see chapter 7). Cambridge Econometrics then modelled the impacts of this policy scenario (using the E3ME model, introduced in chapter 6) on tax revenues and on macro-economic and environmental indicators (see chapter 8). Chapter 9 builds on these results to create an Integrated Value Added Statement. Finally, the methodology is again used to validate the scenario from the national perspective of four case studies (see chapter 10).

6. The E3ME model

"It is far better to foresee even without certainty than not to foresee at all."
- Henri Poincaré (mathematician, philosopher of science, theoretical physicist)

This chapter introduces the model that was chosen for this study, E3ME, exploring how the model is built up, how it compares to other models and some of its limitations. Also, the baseline ('business as usual') projections are explained.

6.1. Introducing the E3ME Model

In the economy, there are many interdependencies and unpredictable developments, so predicting the impact of policy measures is not straightforward. However, it is possible to estimate effects of policy measures based on historic data and proven linkages. E3ME[340] is a computer-based model of global economies, used for analysing the detailed linkages between the economy, materials, environment and energy. The model was originally developed through the European Commission's research framework programs[341] and is now widely used in collaboration with a range of European institutions for policy assessment, for forecasting and for research purposes (see Ekins et al,[342] studies for DG Environment,[343] and a recent book on Low-Carbon and Sustainable growth in East Asia).[344]

The advantage that E3ME offers over the input-output approach of other models is its dynamic nature. Rates of material intensity are allowed to change over time and in response to price and other economic factors, rather than following a fixed input-output structure. The model can capture direct, indirect, induced and other effects (e.g. price and technological changes) of a policy. This allows the model to assess *ex ante* (forward looking) policies for reducing material consumption within a full macroeconomic framework. This will be explained further below.

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[340] www.e3me.com
[341] www.matisse-project.net documented in Pollitt, Hector (2008), Combining Economic and Material Flows Analysis at the Sectoral level: Development of the E3ME Model and Application in the MATISSE Case Studies. Deliverable 8.6.1, Work Package 8, MATISSE, European Commission project No 004059 (GOCE).
[342] Ekins, Paul, Pollitt, Hector, Summerton, Phillip, Chewpreecha, Unnada (2012), Increasing Carbon and Material Productivity through Environmental Tax Reform, Energy Policy, 42 (3): 365-376.
[343] Pollitt, Hector, Chewpreecha, Unnada (2011), Macroeconomic modelling of sustainable development and the links between the economy and the environment. DG Environment, European Commission. European Commission (2014), Study on modelling of the economic and environmental impacts of raw material consumption. Cambridge Econometrics (2013), Modelling Milestones for Achieving Resource Efficiency: Economic Analysis of Waste Taxes Draft Report for the European Commission (DG Environment). European Commission (Accessed July 2016), 2030 Energy Strategy.
[344] Lee, Soocheol, Pollitt, Hector, Seung-Joon, Park (editors) (2016), Low-carbon, Sustainable Future in East Asia: improving energy systems, taxation and policy cooperation, Routledge Studies in the Modern World Economy.

6.2. How the model works

The economic structure of E3ME is based on the system of national accounts, as defined by the European Commission's ESA 2010,[345] with further linkages to materials, energy and environmental emissions. The labour market is also covered in detail, with sets of equations for labour demand, supply, wages and working hours. International trade is modelled at sector level.

Relationships in the E3ME model are estimated empirically; based on real data, as opposed to theoretical assumptions. In total there are 33 sets of econometrically estimated equations, also including the components of GDP (consumption, investment, and international trade), prices, energy and material demands. Each equation set is disaggregated by country and by sector. The main dimensions of E3ME are:

- 59 countries.
- 69 (European) industry sectors.
- 43 (European) categories of household expenditures
- 13 types of household, including income quintiles and socio-economic groups such as the unemployed, inactive and retired, plus an urban/rural split.
- 7 materials (Food, Feed, Forestry, Construction Minerals, Industrial Minerals, Ferrous Ores, Non-ferrous ores).
- 22 different users of 12 energy resources (Hard coal, Other coal etc., Crude oil etc., Heavy fuel oil, Middle distillates, Other gas, Natural gas, Electricity, Heat, Combustible waste, Biofuels and Hydrogen).
- 14 types of air-borne emission (where data are available) including the six greenhouse gases monitored under the Kyoto protocol.

The main dimensions covered by the model are listed in the E3ME manual (available online).[346] The manual also explains the theories behind the model as well as econometric specifications for each equation.

The main key strengths of E3ME are:

- The **close integration** of the economy, energy systems and the environment, with two-way linkages between each component.
- The **detailed sector disaggregation** in the model's classifications, allowing for the analysis of similarly detailed scenarios.
- Its **global coverage**, while still allowing for analysis at the national level for large economies and all EU economies.
- The **econometric specification**s of the model, making it suitable for short and medium-term assessment, as well as longer-term trends.
- The **econometric approach**, which provides a strong empirical basis for the model and means it is not reliant on some of the restrictive assumptions common to so-called 'CGE models'. This will be explained in the next section.

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[345] Eurostat (Accessed Sept 2016), About ESA 2010.
[346] E3ME manual: http://www.camecon.com/how/e3me-model/.

6.3. E3ME compared to CGE models

Many similarities

E3ME is often compared to the *Computable General Equilibrium* (CGE) model.[347] In terms of basic structure, purpose and coverage, there are many similarities between econometric models like E3ME and comparable CGE models. Each is a computer-based economic model that considers E3 (energy-environment-economy) interactions at the global level, broken down into sectors and world regions. In addition the regional and sectoral disaggregations are usually broadly similar. Both modelling approaches are based on a consistent national accounting framework and make use of similar national accounts data.

However, underlying this there are important theoretical differences between the modelling approaches. The two types of model come from distinct economic backgrounds; while they are in general consistent in their accounting balances, they differ substantially in their treatment of behavioural relationships. Ultimately this comes down to assumptions about optimisation:

- **CGE models are based on economic theory.**
  CGE models favour fixing behaviour in line with economic theory, for example by assuming that individuals act rationally in their own self-interest and that prices adjust to market clearing rates; in this way aggregate demand automatically adjusts to meet potential supply and output levels are determined by available capacity.

  In short, in a typical CGE model:
  - Optimal behaviour is assumed.
  - Output is determined by supply-side constraints.
  - Prices adjust fully so that all the available capacity is used.

- **E3ME is based on historical data.**
  In contrast, macro-econometric models like E3ME interrogate historical data sets to try to determine behavioural factors on an empirical basis and do not assume optimal behaviour. These models are demand-driven, with the assumption that supply adjusts to meet demand (subject to any constraints), but at a level that is likely to be below maximum capacity.

  In short, in an econometric model:
  - The determination of output comes from a 'post-Keynesian framework' and it is possible to have spare productive capacity such as involuntary unemployment or spare capital.
  - The model is more demand-driven.
  - It is not assumed that prices always adjust to market clearing levels.

These differences have important practical implications for scenario analysis. While the assumptions of optimisation in CGE models mean that all resources are fully utilised, in a constant equilibrium, it is not possible to increase output and employment by adding regulation. However, E3ME allows for the possibility of unused capital and labour resources that may be

[347] Notable examples of CGE models include GTAP (Hertel, 1999), the Monash model (Dixon and Rimmer, 2002) and GEM-E3 (Capros, et al, 2012). Many of these models are based on the GTAP database that is maintained by Purdue University in the US. Hertel, T (1999), 'Global Trade Analysis: Modeling and Applications', Cambridge University Press. Dixon, P B and M T Rimmer (2002), 'Dynamic, General Equilibrium Modelling for Forecasting and Policy: a Practical Guide and Documentation of MONASH', North-Holland. Capros, P, D Van Regemorter, L Paroussos and P Karkatsoulis (2012), 'The GEM-E3 model', IPTS Scientific and Technical report.

utilised under the right policy conditions; it is therefore possible (although certainly not guaranteed) that additional regulation could lead to increases in investment, output and employment.

Many of the assumptions that underpin CGE (and DSGE)[348] models have been increasingly questioned as to whether they provide an adequate representation of complex real-world behaviour. Examples include perfect competition, perfect knowledge and foresight, and optimal rational behaviour and expectations. Some CGE models have been adapted to relax certain assumptions but the underlying philosophy has not changed.

The econometric specification of E3ME gives the model a strong empirical grounding. E3ME uses a system of error correction, allowing short-term dynamic (or transition) outcomes, moving towards a long-term trend. The dynamic specification is important when considering short and medium-term analysis (e.g. up to 2020) and rebound effects,[349] which are included as standard in the model's results.

Reliance on large amounts of data is a drawback
The main drawback of the E3ME approach in comparison is its reliance on having high-quality time-series data, and if these data are unreliable this will be reflected in the model parameters. There is at present no equivalent to the *Global Trade Analysis Project* (GTAP) database for time series, so a large amount of resources must be put into compiling suitable data sets.[350] Since E3ME is an econometric model, there is an underlying assumption that relationships estimated using historical data may be used to predict future behaviour. In particular, where there are large structural changes, historical relationships may break down.

Below we will discuss some of the limitations to modelling in general, as well as specific limitations in terms of availability of data and the level of detail in a model.

6.4. Limitations of modelling a transition

As mentioned before, the transition to a circular economy (as pursued by the European Commission) requires a fundamental redesign of products, production methods and, basically, the metabolism of our economies. Already, new technologies and disruptive innovations are rapidly changing the marketplace. In a fast changing world, the potential of macro-economic modelling is limited. The composition of consumption patterns can be expected to keep on changing over the next decade. If, in future, the 'polluter pays' principle is applied more, the *consumption basket* (a sample of consumption goods and services, used to track purchasing power) will likely contain fewer products (e.g. new TV sets) and more services (such as TV repair, which is labour-intensive).

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[348] Dynamic Stochastic General Equilibrium Model.
[349] Where an initial increase in efficiency reduces demand, but this is negated in the long run as greater efficiency lowers the relative cost and increases consumption. See Barker, T., Dagoumas, A., Rubin, J. (2009), The Macroeconomic Rebound Effect and the World Economy, Energy Efficiency, 2 (4): 411-427.
[350] Some of the differences between modeling approaches in the context of environmental tax reform are described by: Jansen, H, Klaassen, G. (2000), Economic Impacts of the 1997 EU Energy Tax: Simulations with Three EU-Wide Models' Environmental and Resource Economics, Volume 15, Number 2, pp.179-197. Bosetti, V., Gerlagh, R., Schleicher, S.P. (2009), Modelling Sustainable Development: Transitions to a Sustainable Future.

The impact of a tax shift depends, amongst others, on price elasticity and substitutability of products. Substitutability is particularly difficult to model, as it depends on the development of demand by consumers, and the strategic choices of businesses with regard to bringing new products and services to market. One of our recommendations is therefore to gain more insight in the transformational power of businesses and business models in relation with taxes (see chapter 4).

Besides these general limitations to modelling, there are specific data limitations. Taxation of NOx emissions by airplanes, for example, could be not included in the scenario due to lack of data (such as air traffic take-offs and landings). Also, it was not possible in the modelling framework to assess variable VAT rates within product groups, as this is more of a microeconomic issue. Finally, the model doesn't allow for detailed modelling of the effects on purchasing power, or the effects of targeted income allowances. We recommend that parties who have access to the required data and models project the effects at different income levels.

6.5. The baseline projections

Forecasting the impacts of policy changes
Although E3ME can be used for forecasting, the model is more commonly used for evaluating the impacts of an input shock through a scenario-based analysis. The shock may be either a change in policy, a change in economic assumptions or another change to a model variable. The analysis can be either forward looking (ex-ante) or evaluating previous developments in an ex-post manner. Scenarios may be used either to assess policy, or to assess sensitivities to key inputs (e.g. international energy prices).

It is possible to set up a scenario in which any of the model's inputs or variables is changed. In the case of exogenous inputs, such as population or energy prices, this is straightforward. However, it is also possible to add shocks to other model variables. For example, investment is endogenously determined by E3ME, but additional exogenous investment (e.g. through an increase in public investment expenditure) can also be modelled as part of a scenario input.

Business as usual based on projections by international authorities
For ex-ante analysis a baseline forecast up to 2050 is required; E3ME is usually calibrated to match a set of projections that are published by authorities such as the European Commission and the IEA but alternative projections may be used. The scenarios represent alternative versions of the future based on a different set of inputs. By comparing the outcomes to the baseline (usually in percentage terms), the effects of the change in inputs can be determined.

For European regions, the business as usual (baseline) scenario is based on standard projections derived from a variety of European sources that have been updated to take more recent data into account. For example:

- European commission, *The 2015 Ageing Report*, with assumptions on population and economy.[351]

[351] European Commission and the Economic Policy Committee (AWG) (2014), The 2015 Ageing Report: Underlying Assumptions and Projection Methodologies.

- European Commission, *Roadmap to a Resource Efficient Europe*,[352] with regard to raw material use.
- IEA, *World Energy Outlook*,[353] for oil price development.
- DG Energy, *PRIMES model*, for energy projections[354] and economic baseline.[355]

The most important assumptions are the following:

- **GDP.** Beyond 2015 it is assumed that the EU as a whole recovers from recession and GDP grows at an average rate of 1.6% per annum over the period up to 2025.
- **Employment.** Employment also grows in this period but increases in employment are limited by demographic factors and the overall increase is only 0.3% per annum up to 2025. Nevertheless, this growth rate is enough to see unemployment fall back towards pre-crisis levels in most European countries.
- **Energy consumption.** In the baseline, EU energy consumption falls slightly (0.2-0.3% pa) due to improved efficiency in the period up to 2025.
- **CO2 emissions.** CO2 emissions fall a bit more (between 0.6 and 0.7% pa) as the energy sources become less carbon intensive overall (e.g. less coal, more renewables).
- **Water.** It is assumed that water consumption increases broadly in line with economic activity.
- **Non-energy materials.** Consumption of non-energy materials (measured by DMC) increases by around 1.5% per annum over the projection period, only slightly less than GDP.
- **Oil price.** As the baseline projections follow the European Commission's *EU Trends to 2050 Reference Scenario 2013,*[356] they do not include the current drop in oil prices.

Due to a lack of available data when the modelling was carried out, Croatia is not yet included in this modelling exercise.

The way the model works is described extensively in the 136-page E3ME Technical Manual, which is available online.[357]

[352] European Commission (June 8, 2016), Resource Efficiency.
[353] IEA (2016), Energy and Air Pollution 2016 - World Energy Outlook Special Report.
[354] European Commission (2014), EU energy, transport and GHG emissions, trends to 2050; European Commission (2014), EU Energy, Transport And GHG Emissions Trends to 2050 Reference Scenario 2013.
[355] European Commission and the Economic Policy Committee (AWG) (2014), The 2015 Ageing Report: Underlying Assumptions and Projection Methodologies.
[356] European Commission (2014) EU Energy, Transport And GHG Emissions Trends to 2050 Reference Scenario 2013.
[357] www.camecon.com/how/e3me-model/.

7. Building a tax shift scenario

"Planning is bringing the future into the present
so that you can do something about it now."
- Alan Lakein

This chapter explains how The Ex'tax Methodology has been used to build a tax shift scenario for the European Union. For the sake of simplicity, this study focuses on a single scenario across the EU. In practice there will likely be 28 different scenarios, based on national preferences. As mentioned before, this exercise aims to contribute to a common vision on the long-term development of the tax systems in Europe.

This chapter covers the data that served as a basis for the scenario planning, the taxes that are adjusted and other dimensions to the analysis, such as the expected impacts of the measures, their EU context, challenges and solutions.

7.1. Step 1: Data collection

Tax systems vary significantly among Member States. The next pages will provide a series of data, to help put the scenario in perspective. Firstly, an overview is given of the key characteristics of the EU economic block, its labour market and resource use. Secondly, relevant aggregate data on tax systems in the EU are given. Finally, some key tax indicators of the 28 EU Member States are provided (in a 'ranking' perspective).

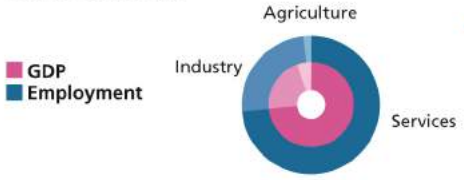
Appendix 3 provides a full list of references used in these files.

European Union: Data sheet

Situation 2012 (unless specified differently)

The economy at a glance

Population	504 million
GDP	€ 12,968 billion
Real GDP growth	0.9% (average 2004–2014)
Sector contribution	



Currency	Euro and 9 other currencies (2015)
Exports	€ 5,726 billion (services 30%, goods 70%)
Main goods	Nuclear reactors, boilers, machinery, vehicles, mineral fuels, oils, distillation products, electronic equipment
Main destinations	USA, China, Switzerland, Russia
Imports	€ 5,467 billion (services 23%, goods 77%)
Main goods	Mineral fuels, oils, distillation products, nuclear reactors
Main origins	China, Russia, USA, Switzerland
R&D expenditure	2.0% of GDP (2020 target: 3.0%)

The world's largest single market

The 2nd largest economy in the world after China (2015 est.)

Growth has gathered pace since mid-2014

The EU accounts for around 16% of the world's trade in goods

The 3rd largest importer in the world

Labour market & social issues

Labour force	330 million
Unemployment	25 million (10.5%)
Youth unemployment	23.3%
Underemployment/ underutilised labour potential	45.8 million (Unemployed + underemployed parttime workers + persons seeking but not immediately available + persons available but not seeking)
Employment rate	68.4% (2020: 75%)
People at risk of poverty/social exclusion	123.8 million (24.7% of population)
Expenditure on social protection	€ 7,320 per inhabitant
Share of population aged > 65 years	17.9% (2060: 27%)

Although unemployment has been declining since 2012, by October 2016, still 20.5 million Europeans were unemployed, including 4.2 million young persons

The lowest youth unemployment rate recorded in Germany (6.9%); the highest in Greece (46.5%) and Spain (43.6%) (Aug/Oct 2016)

Almost 50 million Europeans are 'severely materally deprived', including 10 million children

Hourly labour cost range between € 4.08 in Bulgaria and € 41.31 in Denmark (2015)

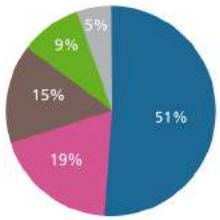
Notes

- Long-term unemployment is one of the main concerns of policymakers. Apart from its financial and social effects on personal life, long-term unemployment negatively affects social cohesion and, ultimately, economic growth. 4.5% of the labour force in the EU-28 in 2015 had been unemployed for more than one year.
- In October 2016, the lowest unemployment rates were recorded in the Czech Republic (3.8%) and Germany (4.1%). The highest rates were observed in Greece (23.4% in August 2016) and Spain (19.2%).
- The inflow of refugees is a major challenge, especially in Germany, Austria, Sweden and Hungary.

Natural resource use

Raw materials

Raw material imports	3,329 million tonnes



Air pollution

Premature deaths attributable to air pollution	491,000 people
Annual cost of pollution from coal	€ 88.5 billion (2013)
GHG emissions *-of which CO2*	4,691 million tonnes 3,119 million tonnes
2020 GHG emission reduction target	20% (compared to 1990)

Energy

Energy consumption	1,685 million toe
Import dependency	53.4%
Fossil fuel net import bill	€ 421 billion (957 million tonnes)
Energy from renewable sources	14.3% (2014:16%)
2020 Renewable energy target	20%

Water

Freshwater withdrawals	Limited data available

Waste

Total waste	2,514,220 million kg (4,982 kg per capita)
of which, amongst others: **Food waste**	93,960 million kg (186 kg per capita)
Electronic waste (WEEE)	No aggregate EU data
Chemical waste	57,880 million kg (115 kg per capita)

A € 33 billion trade balance deficit for raw materials

If everyone on the planet consumed as much as the Europeans, 2 earths would be needed

Each year, air pollution kills almost half a million Europeans

The 3rd largest carbon emitter in the world

The EU spends more than €1 billion every day on importing energy (2013)

In 2015, China spent 2.5 times more on clean energy than the EU

At least 11% of Europe's population is affected by water scarcity, putting the cost of droughts over the past 30 years at € 100 billion (2007 estimate)

The Circular Economy Package (adopted in 2015) includes legislative proposals on waste to stimulate Europe's transition towards a circular economy

Notes

- The EU Emission Trading System (ETS) is the world's largest GHG emissions trading system covering about 45% of the EU's total GHG emissions. Carbon emission allowances trade at less than € 10 per tonne providing only a weak incentive to invest in low-carbon technologies.
- The Europe 2020 strategy and its flagship initiative Roadmap to a Resource Efficient Europe aim to transform EU economies towards decoupling economic growth from resource use.
- The 2030 Framework for Climate and Energy includes a 40% cut in GHG emissions compared to 1990 levels; a 27% share of renewable energy consumption; 27% energy savings; a reformed ETS and a 10% electricity interconnection target.

European Union: Relevant tax features

Situation 2012 (unless specified differently)

"The power to levy taxes is central to the sovereignty of EU Member States, which have assigned only limited competences to the EU in this area.

The development of EU tax provisions is geared towards the smooth running of the single market, with the harmonisation of indirect taxation having been addressed at an earlier stage and in greater depth than that of direct taxation.

Alongside these efforts, the EU is stepping up its fight against tax evasion and avoidance, which constitute a threat to fair competition and are the cause of a major shortfall in tax revenues."

- European Parliament, 2016

Collecting taxes is the competence of each individual EU country

Trends in tax revenues 2002-2012

(% of total tax revenues)

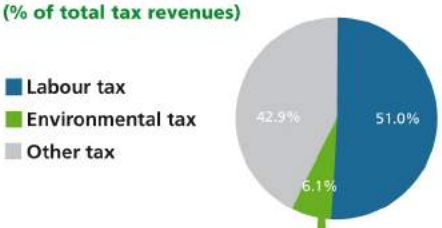
Labour taxes	+ 0.2%
VAT	+ 0.6%
Environmental taxes	- 0.6%

Of every € 1,00 an employer pays to the employee, € 0,40 goes to labour taxes (low-wage earner)

Environmental taxes peaked in 2003

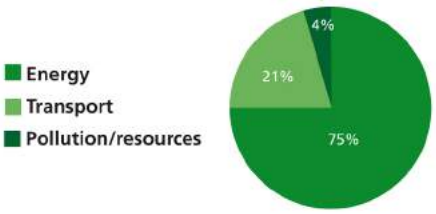
Labour vs environmental taxes

(% of total tax revenues)



Environmental tax revenue: € 312 billion (2.4% of GDP)

Environmental tax composition



The vast majority (75%) of environmental tax revenue came from taxes on energy

Fossil Fuel Subsidies

(Based on OECD.Stat)

Fossil fuel subsidies (tax expenditures + budgetary transfers in 21 Member States, data not available for Lithuania, Croatia, Cyprus, Malta, Bulgaria, Latvia, Romania)	**€ 24 billion (2014)**

Tax revenues structure

	€ mln	% of tax revenues	% of GDP
VAT	926,909	18.1%	7.1%
Excise duties and consumption taxes	349,137	6.8%	2.7%
Other taxes on products (incl. import duties)	188,006	3.7%	2.3%
Other taxes on production	299,051	5.9%	1.4%
Indirect taxes	**1,763,102**	**34.5%**	**13.6%**
Personal income	1,222,596	23.9%	9.4%
Corporate income	322,756	6.3%	2.5%
Other	162,061	3.2%	1.2%
Direct taxes	**1,707,414**	**33.4%**	**13.2%**
Employers' contributions	947,928	18.6%	7.3%
Employees' contributions	506,444	9.9%	3.9%
Self- and non-employed	198,794	3.9%	1.5%
Social contributions	**1,653,166**	**32.4%**	**12.7%**
Total	**5,109,446**	**100.0%**	**39.4%**

Tax revenues by economic function

	€ mln	% of tax revenues	% of GDP
Labour (including social contributions, payroll & earned income taxes)	1,603,336	51.0%	20.1%
Consumption (including VAT, duties & environmental taxes)	1,457,914	28.5%	11.2%
Capital (including taxes on profits, savings, exports & assets)	1,061,752	20.8%	8.2%
Total	**5,109,446**	**100.0%**	**39.4%**

Notes

- According to the Treaty, tax measures must be adopted unanimously by the Member States.
- 26 Member States are using fiscal incentives to encourage investment in R&D. Eight countries also grant tax relief for the social contributions and/or payroll taxes paid on the salaries of employees working in R&D.

Sources

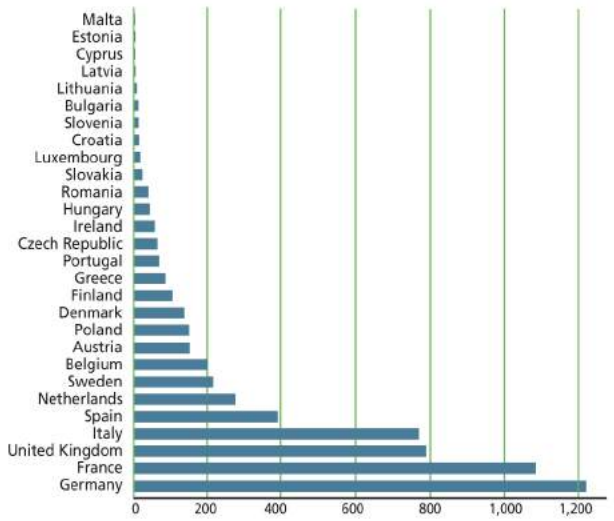
The information in these sheets is mainly drawn from the CIA, EEA, Eunomia, European Commission, European Parliament, Eurostat, Global Footprint Network, IMF, OECD and the UN. A full list of references is provided separately.

European Union: Member State comparison

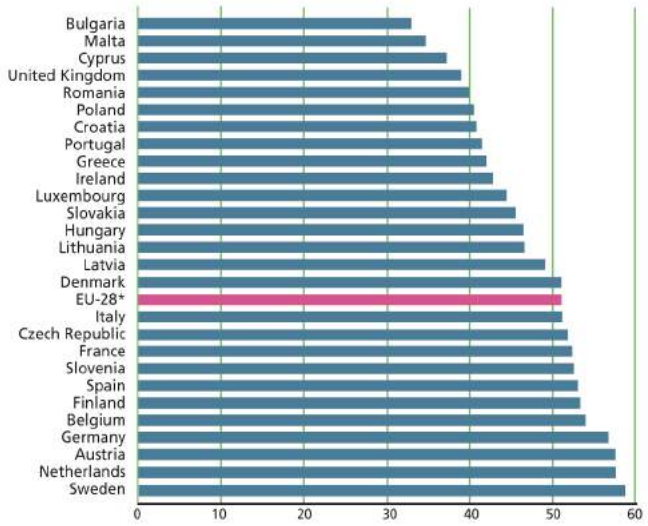
Situation 2012 (unless specified differently)

Tax systems across EU Member States vary significantly.
These graphs illustrate some indicators relevant to a tax shift scenario

Total tax revenues *(€ billion)*



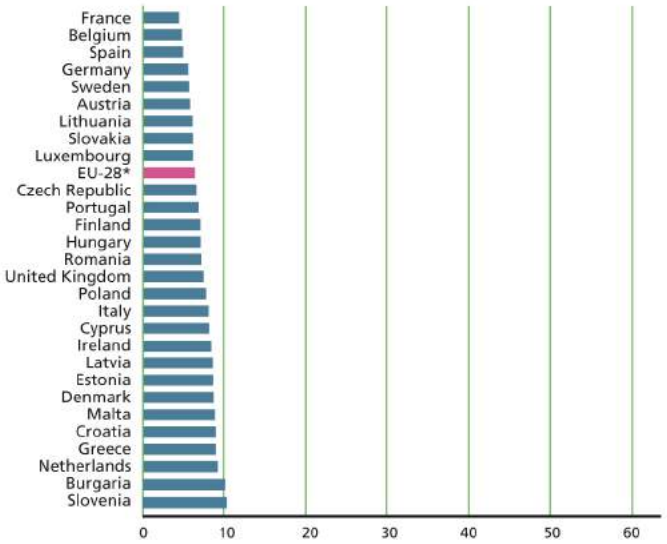
Taxes on labour *(% of total taxation)*



On average, labour taxes provide 51% of tax revenues*

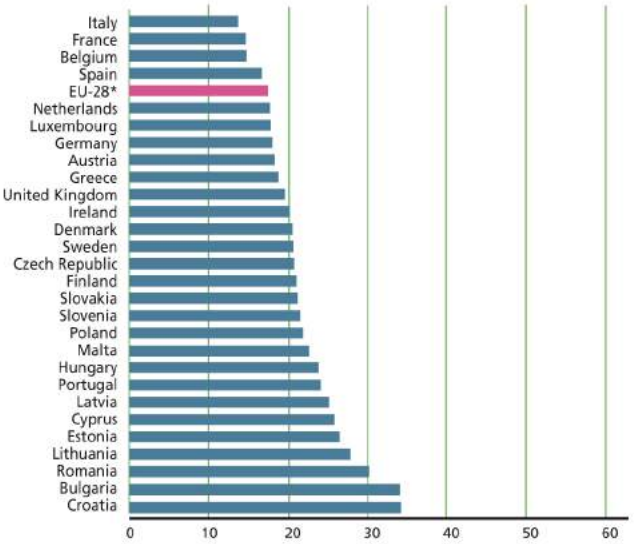
Labour taxes in Eurostat data include Social Contributions

Environmental taxes *(% of total taxation)*



On average, environmental taxes provide 6% of tax revenues*

Value Added Tax (VAT) *(% of total taxation)*



On average, VAT provides 18% of tax revenues *

Standard VAT rates range between 15% (Luxembourg) and 27% (Hungary)

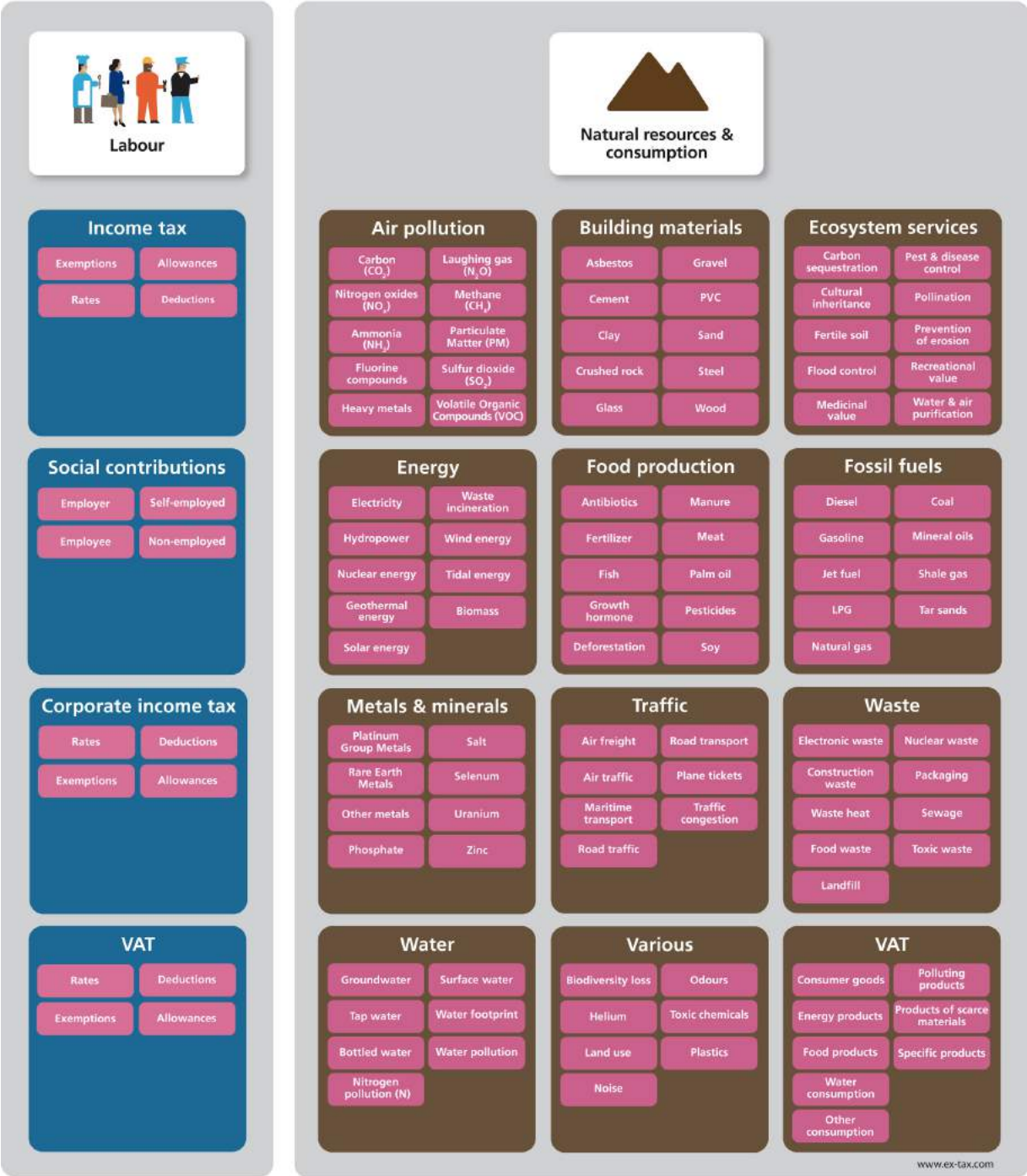
Reduced VAT rates range between 5% (Cyprus, Lithuania, Hungary, Malta, Poland, Romania, UK) and 18% (Hungary)

*** Weighted Average**

7.2. Step 2: Exploring options for shifting the tax base

Figure 9 shows the *Ex'tax Policy Toolkit*; an inventory of tax base options for the implementation of Ex'tax principles. These are the 'buttons' governments can 'push' to shift taxation from labour to natural resources. Studies on green tax shifts often focus on energy and carbon emissions, while ignoring measures to lower labour costs. The Toolkit shows both sides of the equation; on the left (in blue) are the tax base options with regard to labour and on the right (in brown) those with regard to natural resources and consumption.

Figure 9: Policy Toolkit for shifting the tax base from labour to natural resources & consumption



The ‘building blocks’ available to governments to lower labour taxes, and more generally the costs of labour, are: personal income tax, social contributions, corporate income tax and VAT. Each category holds several options, with regard to tax rates, deductions, exemptions and allowances.

Governments have options to increase taxes on resources, and the costs of consumption and pollution in general, by raising taxes on air pollution, building materials, ecosystem services, energy, food production inputs, fossil fuels, metals and minerals, traffic, waste, water, a ‘various’ category and/or VAT. Each category holds several sub-categories. Within the waste category, for example, are electronic waste, sewage, nuclear waste and other types of waste.

VAT plays a special role, as it is relevant for both sides. As mentioned before, although legally, VAT is a consumption tax, in practice consumers pay VAT both on products (such as cans of paint) and services added to those products (the work of a painter).

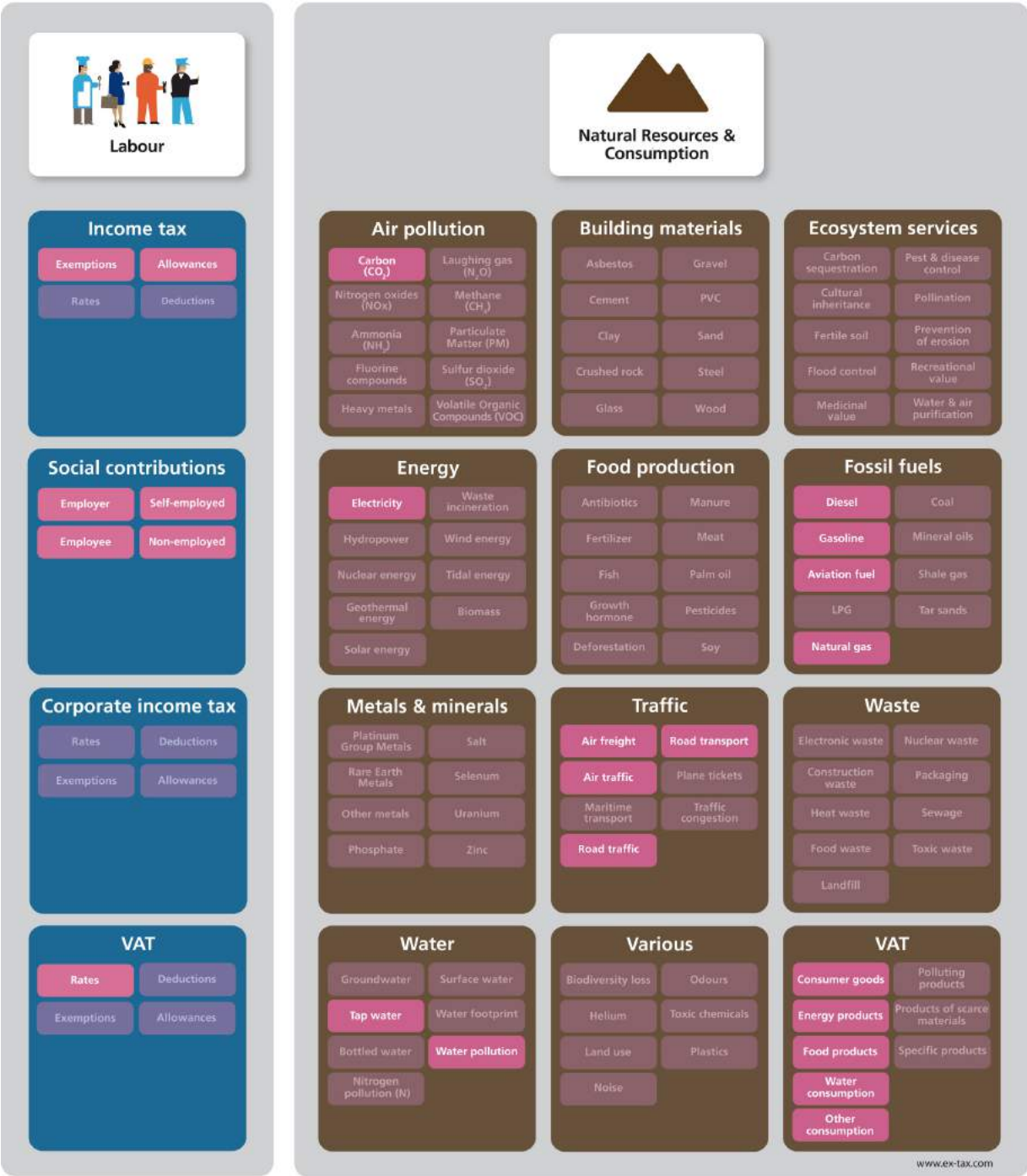
Clearly, tax systems cannot be static; they will evolve with new circumstances. When the updated system works properly, the tax base can be extended to other categories within the Toolkit, in order to guarantee a stable government income. Rates and tariffs can be raised or lowered too; just like the current system of labour taxes, the future system will also be adapted periodically. Current levels of taxation are not carved in stone and there is no reason why a system based on ‘extracted value’ should be either.

The next step is to identify a focus group of tax bases, in order to create a workable scope.

7.3. Step 3: Choosing a focus group of tax bases

Below is an overview of the tax bases this study focuses on, based on criteria such as urgency, potential benefits and (mid- to long-term) attainability. Each tax base is expected to be a major contributor. Also, the options are targeted to contribute to a simplification of EU tax systems. Some options can be put in practice fairly easily (such as increasing energy taxation). Others are expected to play a role in future scenarios (such as taxing metals or food production inputs), as they require more intensive international coordination.

Figure 10: Focus group of tax bases in the Ex'tax scenario



7.4. Step 4: Exploring a focus group of policy measures

The selection of policy measures
Based on the focus group of tax bases, several policy measures were selected to serve as input in the modelling. They include additional excise duties on fossil fuels, a VAT increase, carbon tax, water and electricity tax. The revenues are used to reduce personal income tax and social contributions. A relatively small amount is budgeted for reducing VAT rates on specific labour-intensive services. Cambridge Econometrics has then modelled the impact of the measures on the treasuries in each of the 27 Member States under review.

Figure 11 shows how the measures contribute to a budget-neutral shift from labour to natural resource use, in 2020 (the year in which the measures are assumed to be fully operational). In brown (on the right) are measures that, compared to the baseline, raise an additional € 554 billion of revenues for the treasuries in 27 EU Member States. On the left (in blue) is shown how the costs of labour can potentially be lowered by the same amount.

The largest increase in revenues by some distance is from the taxes on fossil fuels (gasoline, diesel, natural gas and aviation fuel). VAT also raises substantial amounts of revenues even though the increase in the standard rate is only applicable to a handful of EU countries. Carbon and electricity taxes raise important sums as well and the water tax raises a smaller amount. The increases in revenues allow for substantial reductions in personal income tax rates and employers' social contributions.

How the scenario is constructed
A few notes to explain how the scenario has been modelled in E3ME:

- All changes are made on a Member State basis, with the overall package budget-neutral in each country in each year (meaning that all the changes to tax rates plus indirect impacts on tax receipts balance). Budget neutrality includes things such as impacts on receipts from existing excise duties and how changes in GDP will affect VAT and income tax receipts. Income tax rates are adjusted to ensure budget neutrality.
- The measures are introduced in 2016 and are scaled up linearly to full value by 2020. Implementation is not likely to take place as of 2016, however, for modelling purposes this short time frame provides the most valuable impact analysis. Bringing in the changes step-by-step will allow time for companies and households to adapt – the modelling also tends to be more stable if the changes are introduced gradually.
- All tax rates are indexed in line with inflation.
- The model has been run out to 2025 to get the long-run effects although the tax rates stay constant in real terms after 2020.
- Some indirect effects on tax revenues are included. Employees' social contributions, for example, increase slightly because wages increase, rather than a direct change in policy.
- The line item 'secondary effects' includes the change in government expenditure with regard to 1) final consumption on public administration, defence, health and education and 2) benefit payments. The difference in government expenditure essentially depends on whether wages or prices increase faster and how many people need benefit payments. In the modelling, the current assumption is that benefit rates are linked to wages; so faster wage

growth means faster increases in benefit rates. The change in government expenditure is actually an expenditure reduction, as Figure 11 shows impact on government balance.

- There is no change to social protection base.

Figure 11: EU-27 scenario for a tax shift from labour to natural resources & consumption (2020, difference from baseline)

(2016) The Ex'tax Project & Cambridge Econometrics

Notes
Reflects the situation in 2020, in 2015 prices. In the modelling, the measures are phased in over a five-year period, reaching full force in 2020. Croatia is not included. All tax rates are indexed in line with inflation.
(a) Labour-intensive services (maintenance & repair).
(b) Secondary effect (€ 0.09 billion) due to change in labour costs and economic impacts. There are no direct stimulus or austerity effects in the scenario.

In the year 2020, this scenario shifts 13% of labour taxes to environment and consumption. In total, over the period 2016-2020, the package shifts (a cumulative) € 1,716 billion of tax revenues from labour to natural resources and consumption.

A prolonged introduction period allows for monitoring and adjustments
A general point to consider is the political feasibility of the measures. For effective modelling purposes (in order to work with realistic data) the projected period of implementation is 2016-2020 in this study. It should be noted, that in practice, the measures are to be introduced gradually over a prolonged period in order to allow for monitoring and adjusting where necessary. Bringing in the changes step-by-step will allow time for companies and households to adapt. A number of factors, such as early announcement, transitional schemes and lower tax on labour could also be beneficial in the transitional phase.

Impact on purchasing power has yet to be researched
Another point to consider is that some measures may have a negative effect on purchasing power, although that effect is compensated by the reduction in tax on labour. Income distribution effects have not yet been researched in detail. We would recommend that parties who have access to the required national (micro-)models project the effects. As income groups differ widely across Europe, projections with regard to income policies (such as the need for means-tested government benefits) are best researched on a national level.

Metals and mineral supply are not yet addressed directly
The measures do not address metals and minerals efficiency (only indirectly, through higher consumption taxes). Two potential additional measures are mentioned in the Ex'tax (2014) report: 1) a deposit system and 2) tax incentive for top-performing materials use. These measures have not yet been modelled in this research and would require additional research.

Internalizing external costs
It should be noted that many of the tax-revenue raising measures are steps towards internalization of external costs and/or lowering Environmentally Harmful Subsidies (see sections 1.5, 2.2 and 2.3).

The next section will explore the measures in more detail.

7.5. Step 5: Explaining the fiscal policy scenario in more detail

This chapter offers specifications of the proposed measures to increase taxes on natural resources and consumption and to reduce taxes on labour. For each measure, we will briefly address its purpose, expected impact, European context and some areas of concern and potential solutions.

In general, opposition to many of these measures can be expected to be strong. However, in light of the *Europe 2020* goals and the role of taxes in the long run, this scenario is to provide a vision of the direction taxes will develop in future.

7.5.1. VAT increase

This section includes measures to increase the standard and reduced VAT rates.

Measures

- In each country, the standard VAT rate is increased evenly per year until 21% is reached. If the initial rate is higher than 21% this is unchanged.
- In each country, the reduced VAT rate is increased evenly per year until 10% is reached. If the initial rate is higher than 10%, this is unchanged.
- Consumption categories that are currently exempt from VAT or subject to a so-called 'special rates'[358] remain unchanged in the scenario.

Purpose

- To increase tax revenue.
- To increase tax on consumption (and thereby resource use).

Expected impact

Changes in VAT rates will affect consumer prices directly and, ultimately, the consumer price index and aggregate inflation rate. This in turn determines real incomes and the volume of economic consumption. Wage rates may respond, pushing up prices for industry, with further inflationary impacts.

A negative effect on purchasing power is offset (in part) by the reduction in tax on income (see chapter 8) although specific attention should be paid to low-income groups, post-active and inactive persons (more on income distribution in section 8.4). It needs to be noticed, however, that the reduced VAT rate is considered not to be an effective social policy instrument (OECD):

> *"many of the reduced rates introduced to support low-income households, such as reduced rates on food and on energy products, do increase the purchasing power of these households. Nonetheless, it also clearly shows that reduced VAT rates are a poorly targeted and costly way of achieving this aim. At best, rich households receive as much benefit from a reduced rate as do poor households. At worst, rich households benefit much more than poor households. In some cases, the benefit of reduced VAT rates to rich households is so large that they actually have a regressive effect — benefiting the rich more not only in absolute terms, but also as a proportion of expenditure. This is generally the case for most reduced rates introduced to help meet social, cultural and other objectives. (…) support to low-income households can be better achieved through more direct mechanisms such as income-tested cash transfers (i.e. benefits)."*[359]

According to Carter & Mathews (2012):

> *"Raising indirect taxes (…) is often regressive where these taxes fall on the consumption of goods and services that make up a larger share of the budgets of poorer than richer*

---

[358] ""Special rates" refers to the multiple exceptions to the basic rules. Largely for historical reasons and under certain conditions, many EU countries (in some instances, most of them) have been allowed to depart from these rules for a transitional period (…) This enables them to keep "special rates" - reduced rates under 5% (including zero rates) and reduced rates for goods and services other than those listed in the directive (Articles 102-128 *VAT Directive*)." European Taxation and Customs Union (Accessed June 3, 2016), VAT Rates.

[359] OECD (2015) in European Commission (2015), Tax Reforms in EU Member States 2015. Tax policy challenges for economic growth and fiscal sustainability.

households. But the overall impact of a fiscal reform can still be progressive, if these effects are offset by other tax and benefit changes. Income-related benefits, for example, are a much more efficient way of increasing the disposable income of poorer households than reduced rates of VAT."[360]

European context

The proposal is in compliance with the current VAT Directive, as the standard VAT rate must be no less than 15%, but there is no maximum. With regard to the reduced rate, EU countries have the option to apply one or two reduced rates, which must be no less than 5%.[361] Currently, Member States generally have the discretion to increase their VAT rates.[362]

The implications of a VAT increase differ among Member States as current rates vary significantly as shown in Table 3.

Table 3: VAT-rates in the European Union (2016)[363]

Country	Standard VAT rate (%)	Reduced VAT rate (%)	Country	Standard VAT rate (%)	Reduced VAT rate (%)
Hungary	27	5, 18	**Latvia**	21	12
Denmark	25	-	**Lithuania**	21	5, 9
Croatia	25	5, 13	**Netherlands**	21	6
Sweden	25	6, 12	**Bulgaria**	20	9
Finland	24	10, 14	**Estonia**	20	9
Ireland	23	9, 13.5	**France**	20	5.5, 10
Greece	23	6, 13	**Austria**	20	10, 13
Poland	23	5, 8	**Romania**	20	5, 9
Portugal	23	6, 13	**Slovakia**	20	10
Italy	22	5, 10	**United Kingdom**	20	5
Slovenia	22	9.5	**Germany**	19	7
Belgium	21	6, 12	**Cyprus**	19	5,9
Czech Republic	21	10, 15	**Malta**	18	5, 7
Spain	21	10	**Luxembourg**	17	8

The proposed increase in VAT rates ties in with the trend of rising rates in the EU. It also ties in with the EU goal to modernize and simplify the tax system.

[360] Carter, Alan, Matthews, Stephen (2012), How tax can reduce inequality, OECD Observer No 290-291, Q1-Q2 2012.
[361] European Taxation and Customs Union (Accessed June, 2016), VAT Rates.
[362] European Commission (April 7, 2016), Fact Sheet. Action Plan on VAT: Questions and Answers.
[363] European Commission, VAT Rates Applied in the Member States of the European Union Situation at 1st January 2016.

Concerns and solutions

Area of concern	Solution
Political feasibility. For some countries the change will be minor, for others there is a major change in rates.	Countries with a larger VAT rate increase will also raise more funds to reduce labour taxes. By introducing the measures gradually, shocks can be avoided. In case of a smaller adjustment of the VAT structure, tax on labour could not be reduced as much. Alternatively, other forms of consumer tax increases would need to be explored to enable the same labour cost reduction.
Tax revenues fall due to lower consumption.	It should be noted that under the current system, high unemployment rates poses a threat to the stability of tax revenues. The Ex'tax Policy Toolkit demonstrates the options for broadening and increasing tax bases based on consumption and resource use with a view to stabilising tax revenue for the treasury. Under a new tax system, consumption patterns can be expected to shift from goods to services, as the cost of services is likely to drop because of a lower tax burden on labour.
Some businesses will not be able to implement the increase in VAT rate in their prices right away, causing their profit margins to drop.	Such a measure should be announced with ample notice and introduced gradually so that businesses have the chance to prepare for changing market circumstances.
Such an increase would drive up the cost of primary necessities, including food.	A negative effect on purchasing power is to be offset (in part) by a reduction in tax on income with specific focus on low-income groups. The European Parliament (EP) has explicitly advised Member States to eliminate the reduced VAT rate on food, in a bid to "remove all incentives that may encourage the generation of food waste".[364] According to the EP, there is a strong need in the EU to prevent food wastage: *"In the EU, food waste along the supply chain has been estimated at approximately 89 million tons or 180 kg per capita per year, and is expected to rise to about 126 million tons a year by 2020, unless action is taken."* [365] Please note that the UN estimates that cutting global food waste by a quarter could feed all the hungry people in the world.[366] Raising the VAT rate on food may result in a lower consumption of meat, dairy products and eggs in the European Union. This would significantly reduce nitrogen emissions, greenhouse gas emissions and the need for cropland for food production; it would also lower health risks and improve air and water quality in the EU.[367]

[364] European Parliament (2013), Technology options for feeding 10 billion people. Options for Cutting Food Waste.
[365] Households produce the largest share of EU food waste (42%), followed by agriculture/ food processing (39%), food service/catering (14%), and retail/wholesale (5%). At 541 kilograms per capita, the Netherlands is the highest food waste generator in the EU. Next on the list are Belgium (345 kg), Cyprus (327 kg) and Estonia (265 kg); the countries wasting the lowest amounts of food are Slovenia (72 kg), Malta and Romania (both 76 kg), followed by Greece (80 kg) and the Czech Republic (81 kg). European Parliamentary Research Service (EPRS) (January 22, 2014), Tackling food waste. The EU's contribution to a global issue.
[366] FAO (Accessed Sept 2016), Key facts on food loss and waste you should know!
[367] Westhoek, Henk, et al. (2014), Food choices, health and environment: Effects of cutting Europe's meat and dairy intake.

7.5.2. Fossil fuels

This section offers various measures for increased taxation of fossil fuels.

Measures
A gradual increase in excise duties paid for transport fuels. The additional rates of taxation are:
- Motor fuels gasoline and diesel: € 0.60/litre.[368]
- Natural gas: € 7.80 per MWh. [369]
- Aviation fuel: € 0.30/litre.

Both private households and businesses are to pay these additional duties on fossil fuels.

Purpose
- To increase tax revenue.
- To internalise external costs ('the polluter pays').
- To promote sustainable innovation towards fuel efficiency and cleantech.
- To reduce dependency on fossil fuels (imports).

Expected impact
Higher energy taxes in general lead to a loss of real incomes for consumers and a potential loss of competitiveness for industry. For European countries there are also benefits of reduced fuel imports.

The increase in excise duties is a step towards the internalisation of the external costs of fossil fuel combustion, including health hazards, premature deaths, climate change and pollution[370] (see section 1.5). As mentioned before, MIT's *Global Change* program has found that higher gas taxes are "at least six to fourteen times" more cost-effective than stricter fuel-economy standards at reducing gasoline consumption.[371]

Existing instruments could be used to bring about a gradual step-up in duties without a complex new infrastructure having to be developed. Higher consumer prices will make the system transparent. In order to prevent border effects, the increase should ideally be implemented on a Europe-wide basis, perhaps initially by a 'coalition of the willing'.

For the sake of simplicity, differentiation between petrol and diesel is not included in this scenario although it may be applied as the combustion of diesel causes more air pollution than petrol:

> *"In all Member States, excise duty rates on diesel are lower than those on unleaded petrol, despite diesel having a higher carbon and energy content than unleaded petrol. Some Member States offset this advantage by levying a higher registration tax*

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[368] For modeling purposes, each rate is converted to €/tonne of oil equivalent. In the E3ME model, LPG is grouped with crude oil, and therefore excluded.
[369] Based on € 0.10/m3. The calorific value of natural gas (the amount of heat released by the complete combustion of a unit quantity of fuel) varies between regions.
[370] External costs may also be associated with noise, congestion, infrastructure, pressure on public space, ground and water pollution, damage to nature and landscapes, energy security. CE Delft (2014), Externe en infrastructuurkosten van verkeer.
[371] Karplus, V. J., Paltsev, S., Babiker, M., et al. (2013), Should a vehicle fuel economy standard be combined with an economy-wide greenhouse gas emissions constraint? Implications for energy and climate policy in the United States. Energy *Economics*, *36*, 322-333. MIT Joint Program on Science and Policy of Global Change.

(Croatia, Hungary and Slovenia) or circulation tax (Denmark, Germany, Luxembourg, Malta, the Netherlands, Finland and Sweden) on diesel cars. (…)

While a registration tax affects a buyer's decision when purchasing a car, and an annual tax adds to the overall cost of owning the car, neither affects the marginal cost of driving the car. In order to make the tax rates applied to different fuels correspond better to the level of environmental damage they cause, a number of Member States (Denmark, Ireland, Slovenia, Sweden, Finland, France and the UK) also levy a carbon tax on energy products." [372]

Finally, it should be noted that revenues from fuel excise duties would decrease significantly if the trend towards electric cars were set to continue. Traffic and transport will then largely come to fall under the European Emissions Trading Scheme (see section 1.7.7). Preparations for this type of inevitable transitions are crucial to keep government income stable. The Ex'tax Policy Toolkit (5.4) provides guidance for government tax policy in response to such trends.

European context

These measures tie in with the 2030 Energy Strategy (see 1.7.4), the Paris Agreement (1.7.5) and the SDGs (1.7.6) with regard to cutting carbon emissions and keeping global warming below 2 degrees. They also tie in with the Europe 2020 goal to reduce energy consumption (1.7.1) and the 2030 Energy Strategy to become less dependent on fuel imports (1.7.4).

According to the European Commission, the transport sector is facing the massive challenge of slashing air pollution and becoming carbon neutral and pricing mechanisms are necessary:

"Further reduction of emissions from transport will require a gradual transformation of the entire transport system towards a better integration between modes, greater exploitation of the non-road alternatives, improved management of traffic flows through intelligent transport systems, and extensive innovation in and deployment of new propulsion and navigation technologies and alternative fuels. This will need to be supported by a modern and coherent infrastructure design and smarter pricing of infrastructure usage. Member States should also consider how fuel and vehicle taxation can be used to support greenhouse gas reductions in the transport sector in line with the Commission's proposal on the taxation of energy products[18]*."*[373]

The EU *Energy Taxation Directive* establishes the excise duty rates that Member States must apply to energy products for fuel, transport and electricity. EU legislation sets harmonised minimum rates; Member States are free to apply excise duty rates above these rates.[374]

Taxes on energy are considered the type of tax with the greatest effect on carbon reductions:

"Taxes on energy generate the most revenue among environmentally-related taxes (…) and are probably also the type of tax that has the greatest effect in terms of reducing

[372] European Commission (2015), Tax Reforms in EU Member States 2015. Tax policy challenges for economic growth and fiscal sustainability.
[373] European Commission (2014), A policy framework for climate and energy in the period from 2020 to 2030.
[374] European Commission (2016), Excise Duties: Energy Tax Rates. Accessed July 2016.

carbon dioxide emissions. Furthermore, energy taxes stimulate innovation and encourage companies to develop alternative, more energy-efficient processes."[375]

Below, the impact on motor fuels, natural gas and aviation fuel prices will be discussed briefly.

Motor fuels (Euro-super 95 and automotive diesel)
Excise duties on motor fuels differ significantly among EU Member States. Below is an indication of the difference in the price of final consumer prices — as experienced at-the-pump.

The highest price for Euro-super 95 at the end of 2014 was recorded in Italy (€ 1.57 per litre), which was € 0.47 higher than in Romania (where the lowest price was registered). Across the EU-28 as a whole, the price paid at-the-pump by consumers for Euro-super 95 was 2.7 times as high as the price without taxes and duties. The inclusion of taxes and duties in the final price of Euro-super 95 generally resulted in the price being more than doubled: the only exception was Bulgaria. The highest price for automotive diesel was recorded in the United Kingdom (EUR 1.54 per litre) which was € 0.49 higher than in Luxembourg (where the lowest price was registered).[376]

The proposed charge adds € 0,60 to the average at-the pump prices of € 1.38 per litre Euro-super 95 and the average at-the pump price of € 1.26 per litre diesel.[377]

Countries that face a standard VAT increase (as provisioned in section 7.5.1) will also see motor fuel VAT rates increase.

According to the European Environment Agency, the level of internalization of environmental externalities through fuel taxes has not significantly changed since 1980. Between 1980 and December 2015, the real price of transport fuel (including taxes) has fluctuated between € 0.75 and € 1.25 per litre, with an average of € 0.98. At just € 0.96, the average European fuel price in December 2015 was slightly lower than the long-term average.[378]

Road transport is currently not covered by the EU ETS.

Interestingly, in Italy, fuel prices are high in part due to Italy's 22% value-added tax, but mostly due to another type of tax called 'accisa':

"The accisa exists to fund emergency government action, and consists of a tiny, flat addition (not a percentage) to the price of fuel and certain other products. The first accisa was added in 1935, when citizens of the Kingdom of Italy were asked to pay an extra 1.90 lire per liter of fuel (adjusted for inflation, today's equivalent would be a steep €1.7). The money went to finance then-leader Benito Mussolini's war in Ethiopia. As the tax was never lifted, Italians are still paying for that war today. They're also still paying for the next accisa, levied in 1956 (Italy was, by then, a democracy): 14 lire per liter to raise funds to face the Suez crisis. As they're still paying for the accisa imposed seven years later in 1963, when Italy added 10 more lire to finance reconstruction after the devastating Vajont dam collapse in northern Italy. And so on, and so forth (…), to

[375] European Commission (2015), Tax Reforms in EU Member States 2015. Tax policy challenges for economic growth and fiscal sustainability.
[376] Eurostat (Accessed June 2016), Energy price statistics.
[377] Eurostat (Accessed June 2016), Energy price statistics.
[378] This price covers all transport fuels expressed as the equivalent consumption in unleaded petrol, corrected for inflation to 2005 prices and including taxes. European Environment Agency (EEA) (March 15, 2016), Fuel Prices.

the latest accisa: €0.02 for reconstruction after a 2012 earthquake in the Emilia region.[379]

So many *accisa* taxes have been added to the price of fuel over the years that the total cumulative *accisa* accounts for over half the consumer's price for fuel.

Natural gas

Excise duties on natural gas differ significantly among EU Member States. At the end of 2015, the highest price for natural gas was recorded in Portugal (€ 98 per MWh), which was € 64 higher than in Romania (where the lowest price was registered). For industries, the highest price for natural gas was recorded in Slovenia (€ 38 per MWh), which was € 16 higher than in Lithuania (where the lowest price was registered). The EU-28 average price for industrial consumers was € 34 per MWh (including non-recoverable taxes and levies). For households, average price was € 71 per MWh.[380]

The proposed charge adds € 7.80 per MWh to the price of natural gas, which represents 11% of the EU-28 average consumer price and 23% of the EU-28 average industrial price of natural gas in 2015.

Note that countries that face a VAT increase (as provisioned in section 7.5.1) will also see natural gas VAT rates increase.

Aviation fuel

Aviation is one of the fastest-growing sources of greenhouse gas emissions. Someone flying from London to New York and back generates roughly the same level of emissions as the average person in the EU does by heating their home for a whole year. Emissions from aviation account for about three percent of the EU total GHG emissions. The large majority of these emissions come from international flights. By 2020, global international aviation emissions are projected to be around 70% higher than in 2005 even if fuel efficiency improves by two percent per year. The *International Civil Aviation Organization* (ICAO) forecasts that by 2050 they could grow by a further 300-700%.[381] This growth is posing a threat to the battle against climate change.

Any change in aviation fuel tax requires a change of the EU Tax Directive. Although the minimum tax rate for jet fuel in the EU is € 0.33 per litre,[382] aircraft fuel, other than that used in private pleasure-flying, is currently exempt from excise duty.[383] Road transport and rail transport are not exempt from excise duties and VAT in the current constellation. As a result, it is often cheaper to fly than it is to take the train in Europe,[384] despite the fact that air traffic comes with higher external environmental and health costs. The proposed measure is a step towards a level playing field.

In 2013, Dutch research agency CE Delft calculated that, if the existing EU minimum tax of € 0.33 per litre were to apply to all jet fuel in Europe, the "tax bonus" would be nearly € 20 billion.[385] CE

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[379] Merelli, Annalisa (Jan 11, 2016), Italians pay for 80 years of war and disaster every time they fill their tanks, Quartz.
[380] Eurostat (2016), Natural gas prices. Annual consumption by Consumers: 5.6-56 MWh; Industry 2,778-27,778 MWh.
[381] European Commission (Accessed Jun, 2016), Reducing emissions from aviation.
[382] European Commission (Jan 2016), Excise duty tables Part II – Energy products and Electricity.
[383] The exemption is included in the Energy Tax Directive 2003/96/EC (Article 14(1)(b)). However, Member States can tax aviation fuel for domestic flights and, by means of bilateral agreements, also fuel used in intra-EU flights. In such cases, Member States may apply a level of taxation below the minimum level set out in the Energy Tax Directive. European Commission (Accessed June, 2016), Excise Duties: Other Energy Tax Legislation.
[384] In January 2016, a teenage blogger even claimed that flying via Berlin was cheaper than taking a Sheffield to Essex train. Cox, Jordan (Jan 26, 2016), A train from Sheffield to Essex cost £50… So I flew home via BERLIN to save £8.
[385] CE Delft (2013), Estimated revenues of VAT and fuel tax on aviation.

Delft performed an analysis of the impact of such a tax on the demand for flights in 2007. A tax of € 0.33 per litre of jet fuel would result in a 6.1% drop in the number of flights to and from the Netherlands in 2010 and an eight percent fall in the number of passengers travelling from the Netherlands to other EU countries. Obviously, such a fall in demand will also lead to lower emissions.[386]

It is important to note that developments in aviation have not stopped since 2007. Air France/ KLM for instance has the ambition to reduce carbon emissions by twenty percent.[387] KLM has operated a weekly biofuel flight from New York to Amsterdam since 2013**.** The aircrafts fly on 50% jet fuel and 50% biofuel made from processed frying fat.[388] Introducing excise duties on jet fuel will give a boost to these types of innovations as it improves the business case for renewable fuels and energy-efficient technologies.

Concerns and solutions

Area of concern	Solution
Political feasibility.	The measures are consistent with national and international goals to achieve resource efficiency and a circular economy, and to lower air pollution levels and Greenhouse Gas emissions. Early announcement and applying a tax escalator over a prolonged period of time will ease implementation. A step-by-step introduction will allow industries and consumers to gradually adapt and increase their energy efficiency. By reducing tax on labour at the same time, Europe will become more attractive for labour-intensive operations. To ease the transition, some of the proceeds could be transferred to a shared European fund for reducing the dependency on fossil fuels. As a result, however, the reduction in tax on labour will be lower.
The measures will weaken the competitive position of sectors that are heavy users of fossil fuels.	Owing to the dependency on imports, it is not feasible for Europe in the long run to compete on the lowest fossil fuel price, nor is it a tenable option to continue the current considerable subsidy on fossil fuel consumption. By shifting pricing incentives, energy-efficient businesses are creating an edge, which will boost their competitive position in the longer term. A transitional measure could be introduced, in which case the reduction in tax on labour will be lower too. That said, labour-intensive industries are given a boost by the reduction in tax on labour, which will result in some substitution.
These measures will put a brake on mobility.	The business case for renewable energy sources and sustainable mobility improves, thereby facilitating a transition to renewable energy. The measure will provide an impetus to the *New World of Work*, the use of public transport, energy-efficient cars, etc.
Leakage may occur when businesses move their operations	It is possible that energy-intensive industries will relocate their operations. On the other hand, labour-intensive activities are

[386] The researchers found that carbon (CO2) emissions would fall by 1.3%, NO_x emissions by 3.4%, SO_2 emissions by 4.1% and emissions from volatile organic compounds (VOCs) by 7.0%. CE Delft (2007), as presented in Ministry of Infrastructure and the Environment (2010), Belastingen en heffingen in de luchtvaart. KiM Netherlands Institute for Transport Policy Analysis.
[387] Per passenger kilometer compared to 2011. KLM (2015), CSR Report; Environment.
[388] KLM (March 8, 2013), Weekly flight using sustainable biofuel.

Area of concern	Solution
to countries where fossil fuels are cheaper.	expected to be able to return because of the measure ('reshoring'). The energy footprint of imports will also be taxable in due course in other to prevent leakage of environmental effects. According to the World Bank: *"… carbon leakage (…) tends to only affect a limited number of exposed sectors, namely those that are both emissions- and trade intensive. This risk can be effectively managed through policy design components, such as free allocations, exemptions, rebates and border adjustment measures, as well as specific complementary measures, for example, financial assistance.* *The risk of carbon leakage declines as more countries take concrete actions to prevent climate change. International cooperation through carbon pricing instruments and climate finance can help redress the existing asymmetry in carbon pricing signals, reduce concerns about their impact on competitiveness, and eliminate the need for protection of firms."*[389] It is important to note that an OECD study challenges the conventional wisdom that regulations to curb pollution and energy use hurt businesses by creating new costs. International trade flow data demonstrate countries that implement stringent environmental policies do not lose export competitiveness when compared against countries with more moderate regulations. According to the OECD: *"(…) by changing the relative input prices, higher environmental stringency in a country is linked to a comparative disadvantage in "dirty" industries, and a corresponding advantage in "cleaner" industries."*[390] OECD Chief Economist Catherine L. Mann has stated: *"Governments should stop working on the assumption that tighter regulations will hurt their export share and focus on the edge they can get from innovation."*[391]
Implementation of a tax for international flights could be in conflict with legal regulations.	The EU tax exemption of aircraft fuel is based on the international provisions of the 1944 ICAO Chicago Convention, which was most recently updated in 2006. The Convention establishes rules of airspace, aircraft registration and safety, and exempts commercial air fuels from tax.[392] In 2011, in a legal case brought by some US airlines and their trade association against the inclusion of aviation in the EU ETS, the European Court of Justice confirmed that the EU's 2008 legislation on aviation emissions is compatible with international law. The Court stated that the uniform application of the EU ETS to European and non-European airlines alike is consistent with provisions in the EU-US Air Transport

[389] World Bank (2015), State and Trends of Carbon Pricing 2015.
[390] Koźluk, Tomasz, Timiliotis, Christina (2016), Do environmental policies affect global value chains?: A new perspective on the pollution haven hypothesis. OECD Economics Department Working Papers, No. 1282.
[391] FTSE Global Markets (March 10, 2016), Tougher environmental laws does not hurt export competitiveness says OECD study.
[392] European Commission (Accessed June, 2016), Excise Duties: Other Energy Tax Legislation.

Area of concern	Solution
	Agreement prohibiting discriminatory treatment between aircraft operators on nationality grounds. [393] The International Civil Aviation Organization (ICAO) agreed in 2013 to develop a global market-based mechanism to address international aviation emissions by 2016 and apply it by 2020. To allow time for the international negotiations, the EU ETS requirements were suspended for flights in 2012 to and from non-European countries. In the period 2013-2016, only emissions from flights within the European Economic Area fall under the EU ETS. Exemptions for operators with low emissions have also been introduced. [394] The European Commission has since then proposed to continue 'stop the clock' on negotiations until 2017, to give ICAO even more time.[395] In light of the Paris Agreement and the goal to keep runaway climate change at bay, emissions by the aviation sector will have to be reduced. If not through taxes, other forms of internalizing aviation's environmental costs to society might be found: *"As a consequence of the legal barriers to taxing fuel directly and internalising aviation's environmental costs to society in general, a number of European countries have been very creative in levying taxes of an environmental nature upon passengers departing on international flights from their airports. These taxes work as genuine excise duties, where the taxable event constitutes the act of exiting the country by air. Technically speaking it is not a tax imposed directly on the use of aviation fuel. The most renowned example is UK's Air Passenger Duty (APD), which is levied at different rates depending on the distance flown by the passenger.* *Similarly, in 2007 the Netherlands announced a proposal to introduce a ticket tax (DTT) on all passengers departing from Dutch airports. (…) The Dutch government reversed the implementation of the tax in July 2009, fearful of its potential to divert air traffic from Dutch airports to neighbouring locations.* *Similar initiatives have been discussed in France, Germany and Norway. Although the legality of these 'excise' taxes may nonetheless be questioned, for they may conflict with the provisions of the Chicago Convention, in practice, some courts in Europe have already rejected the idea that aviation's Magna Carta prevents States from levying international departure/ embarkation taxes. According to this rationale, States retain the sovereign rights to impose these taxes."*[396] In the absence of agreement on taxation of aviation fuels, countries may resort to introducing a passenger flight tax and a tax on airfreight.

[393] European Commission (Accessed June 6, 2016), Reducing emissions from aviation.
[394] European Commission (Accessed June, 2016), Reducing emissions from aviation.
[395] Transport & Environment (Accessed June, 2016), Aviation.
[396] Piera, Alejandro (March 26, 2015), Why taxes are not an option in addressing international civil aviation's carbon footprint.

7.5.3. Water

This section includes proposals for increased water taxation.

Measure
A tax on water consumption increases water prices by 25% for industrial users,[397] based on the revenues of water companies (including water, refuse and sewage). Sales to consumers are excluded.

Purpose
- To increase tax revenue.
- To internalise external costs ('the polluter pays').
- To promote sustainable innovation towards water efficiency.

Expected impact
There are a number of issues relating to the pricing of water in the EU:
- Prices are very low.
- Prices can vary according to consumption bands.
- Some countries do not have any pricing mechanisms.
- There can be geographic variation within countries.

The following quote illustrates the variety of water pricing across the EU:

> *"The average price of water across many European cities varies from € 0.40 to € 5.75 per 1,000 litres. Within countries huge variation can be seen. In Sweden, for example, citizens in Malmö pay just € 1.03 while those in Gothenberg pay € 4.19 per 1,000 litres."*[398]

Although the E3ME model includes equations for water consumption, the sparsity of the available data meant that it is not possible to estimate econometric equations on water consumption. Based on the available applied econometric literature, Cambridge Econometrics has therefore assumed a water demand price elasticity of -0.25 implying that a 1% increase in unit water prices will result in a reduction in industrial demand for water of around 0.25%.[399]

Higher water prices could potentially lead to a loss of competitiveness for water-intensive sectors

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[397] All business users (non-domestic use), so all sectors including agriculture, manufacturing, construction, retail and services are subject to the water tax.
[398] Public Policy (May 1, 2013), Domestic Water Charges in Europe. See also: EEA (2013) Assessment of cost recovery through pricing of water.
[399] While there is a relatively extensive literature on the estimation of household water demand, estimates of non-household water demand are less common. Furthermore, few studies have been carried out which estimate a price elasticity of demand for water, disaggregated by user-type, using European data (European Commission, 2000). Of those studies, which do, NERA (2007) estimate a price elasticity of -0.24 for non-household water demand using UK data and Reynaud (2003) estimates the price elasticity for industrial water demand in France of -0.29. European Commission (2000b) cites estimates of the industrial price elasticity derived from US data ranging between -0.11 and -0.44 (although these estimates are now quite dated, having been made in 1991). Zetland (2011) suggests the elasticities are non-linear, being close to zero at the level of basic needs, but then much higher beyond that – presumably these estimates (and our modeling) would be for rates of consumption beyond the basic needs. Sources: European Commission (2000), The Application of the Polluter Pays Principle in Cohesion Fund Countries. NERA (2007), Non-residential demand for water in the Bristol water region. Reynaud, A. (2003), An econometric estimation of industrial water demand in France, Environmental and Resource Economics, 25, 213-232. European Commission (2000), The Application of the Polluter Pays Principle in Cohesion Fund Countries. Zetland, D. (2011), The End of Abundance: Economic Solutions to Water Scarcity.

(e.g. food). If price increases would be passed on to consumers, this would lead to a loss of real income in households (and economic consumption).

European context
This measure ties in with the Roadmap to a Resource Efficient Europe (see 1.7.2), the Water Blueprint (1.7.3) and the SDGs (1.7.6).

Concerns and solutions

Area of concern	Solution
Water-intensive industries relocating to countries where water is cheaper (leakage).	Given that there is a global trend towards water scarcity, taxes on water consumption are expected to increase globally. In a world where water scarcity is so widespread, it only makes sense to decouple economic growth and water use. This proposal is based on the 'polluter pays' principle. It does not make allowance for exemptions and lower rates for particular groups of bulk users. Technologically speaking, there are many options for conserving water, but many of them are not economically viable because of the relatively low price of water. To promote efficient use of water, the price of water in Europe will have to be raised significantly – we share this opinion with the European Environment Agency (EEA) – so that external costs of water treatment, transport, pollution and resource depletion are reflected in the price. In the period 1993-2004, Denmark, for example, increased its urban water prices by 54%, which caused daily water use to go down by twenty percent, to 125 litres, one of the lowest levels of any developed country.[400]

7.5.4. Air pollution

This section proposes an increase in the cost of air pollution, focussing on carbon emissions. Other types of air pollution, such as NOx (causing smog and acid rain) and particulate matter are not yet included in detail in the E3ME model. These effects will be included in the analysis by Trucost in chapter 9.

Measure
A carbon tax is levied in addition to the ETS price (as a 'base price').[401] The rate is set at € 12 in 2016 and gradually stepped up to € 30/tCO2 in 2020. It covers both emissions from energy consumption and emissions from industrial processes from non-energy activities. EU ETS allocations are adjusted so that the net increase in carbon prices is the full € 30/tCO2.

Purpose
- To increase tax revenue.
- To internalise external costs ('the polluter pays').
- To reduce carbon emissions.
- To promote sustainable innovation towards cleaner and energy-efficient production.

[400] EEA (2013), Assessment of cost recovery through water pricing.
[401] Covering the following energy users: Energy branch, Iron and steel, Non-ferrous metals, Chemicals, Non-metallic mineral products, Paper & pulp and 'other' industry (includes large mixed-use plants). Road transport is not included in the ETS.

Expected impact

The carbon tax is added to industry's costs, and these costs will at least in part be passed on to customers, creating inflationary effects. Higher prices lead to lower real household incomes and could affect trade performance through competitiveness effects. Higher fuel prices will also lead to reduced fuel consumption rates and lower emissions. For most European countries this will also be reflected in lower import volumes.

European context

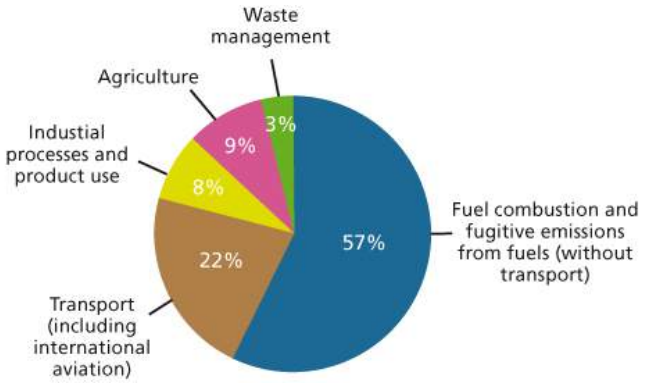
Table 4 provides an overview of the Greenhouse gas (GHG) emissions per Member State. Germany represents the highest share of emissions and Malta the lowest (both in absolute terms and as a share of total EU emissions). The source of GHG emissions is provided in Figure 12.

Table 4: Greenhouse gas emissions by country (EU-28, 2013)[402]

Country	CO2e (mln tonnes)	Share of EU-28 (%)
Germany	976.3	21.2%
United Kingdom	604.3	13.1%
France	506.4	11.0%
Italy	446.6	9.7%
Poland	396.4	8.6%
Spain	335.3	7.3%
Netherlands	206.3	4.5%
Czech Republic	128,0	2.8%
Belgium	123.4	2.7%
Romania	111.4	2.4%
Greece	107.6	2.3%
Austria	81.6	1.8%
Portugal	67.9	1.5%
Finland	65.0	1.4%
Hungary	57.9	1.3%
Ireland	60.6	1.3%
Sweden	58.0	1.3%
Bulgaria	56.4	1.2%
Denmark	57.1	1.2%
Slovakia	43.8	0.9%
Croatia	24.8	0.5%
Estonia	21.8	0.5%
Lithuania	20.2	0.4%
Slovenia	18.2	0.4%
Luxembourg	12.3	0.3%
Cyprus	9.0	0.2%
Latvia	11.3	0.2%
Malta	3.1	0.1%

[402] Eurostat (Accessed June 2016), Greenhouse gas emissions statistics; GHG statistics: tables and figures 2015.

Figure 12: Greenhouse gas emissions by source sector (EU-28, 2013, % of total)[403]



By making use of the existing European Emissions Trading Scheme infrastructure, the measure will not result in a large additional administrative burden. The proposal basically is to introduce a flat carbon tax rate of € 30 per tonne, to be broadened to a hybrid system, e.g. in combination with a trading system with a pre-defined threshold.

The average price for EU emission allowances between 2007 and 2012 was € 20 per tonne. The proposed € 30 per tonne is higher than the average ETS price; what is more, this figure is added to the ETS price (currently € 6.10 per tonne).[404] However, the proposal still falls short of the € 40 per tonne price forecast when the trading system was launched.[405] It is also significantly lower than some of the estimates of the social cost of carbon emissions, including the costs of sea level rises, extreme weather conditions, etcetera. The *United Nations Global Compact* (UNGC, a corporate sustainability initiative with 13,000 corporate participants and other stakeholders over 170 countries) has called for a minimum internal carbon price level of US $ 100 (€ 89) per tonne of CO2-equivalent by 2020 in order to be consistent with a 1.5–2°C pathway.[406]

As mentioned before, according to the World Bank, carbon constitutes an excellent tax base, as carbon sources are concentrated and difficult to evade (see section 3.3).

This measure ties in with the 2020 Strategy (see section 1.7.1), the 2030 Energy Strategy (1.7.4, the Paris Agreement (1.7.5) and the SDGs (1.7.6) with regard to their goals to cut carbon emissions and keep global warming below 2 degrees.

[403] Eurostat (Accessed June 2016), Greenhouse gas emissions statistics; GHG statistics: tables and figures 2015.
[404] Price Nov 8, 2016. www.eex.com.
[405] Ecofys (2010), Prijsbeleid voor een versnelde energietransitie.
[406] United Nations Global Compact (April 22, 2016), UN Global Compact Calls on Companies to Set $100 Minimum Internal Price on Carbon.

Concerns and solutions

Area of concern	Solution
Some industries will experience pressure on profit margins during the transitional phase towards renewable energy.	A major challenge is to pursue an effective carbon policy and not to do too much harm to industries that currently depend on large-scale carbon emissions for their profitability. At the same time, it must be noted that major corporations (including extractive industries) are already preparing for carbon pricing mechanisms by introducing internal tax rates in investment decisions (see section 4.3). Measures are to be announced with ample notice so that businesses can make preparations and develop new bio-based and other types of fuels, more efficient transport methods and business models that tie in with a circular economy. A carbon tax will improve the business case for renewable energy technologies versus fossil fuel-based technologies. A number of factors, such as early announcement, transitional schemes and lower tax on labour could be beneficial in the transitional phase.
Carbon-intensive industries relocating to countries where energy is cheaper (leakage).	Europe-wide introduction and, in due course, taxation of the carbon footprint of imports. Every $ 1,000 (€ 695) worth of exports from China, for example, may correspond to 2-3 tonnes of carbon emissions[407] that are not taxed. To offset this competitive disadvantage for European businesses and prevent carbon leakage, a supplemental border tax adjustment may be needed. According to the OECD, however: *"Such adjustments may (…) be extremely difficult to implement in practice, and, would, in line with the findings of this paper, hamper the counter-balancing comparative advantage of "cleaner" sectors, reduce incentives to invest in cleaner technologies and any potential first-mover advantages." "(…) by changing the relative input prices, higher environmental stringency in a country is linked to a comparative disadvantage in "dirty" industries, and a corresponding advantage in "cleaner" industries."*[408] According to the World Bank: *"… carbon leakage (…) tends to only affect a limited number of exposed sectors, namely those that are both emissions- and trade intensive. This risk can be effectively managed through policy design components, such as free allocations, exemptions, rebates and border adjustment measures, as well as specific complementary measures, for example, financial assistance.* *The risk of carbon leakage declines as more countries take concrete actions to prevent climate change. International cooperation through carbon pricing instruments and climate finance can help redress the existing asymmetry in carbon pricing signals, reduce concerns about their impact on*

[407] Grosz, Daniel (2009), Global welfare implications of carbon border taxes, CEPS Working Document, No. 315.
[408] Koźluk, Tomasz, Timiliotis, Christina (2016), Do environmental policies affect global value chains?: A new perspective on the pollution haven hypothesis, OECD Economics Department Working Papers, No. 1282.

Area of concern	Solution
	competitiveness, and eliminate the need for protection of firms."[409] It must be noted that many countries, including China, are introducing carbon-pricing mechanisms (see section 3.3).
Fewer jobs in sectors that will feel the pressure of higher taxes on carbon emissions.	A significant increase in resource efficiency is one of the main challenges of our time. The available literature (see chapter 3) demonstrates that job creation will benefit on balance from a shift in tax from labour to consumption. This net effect has been identified, for instance, when evaluating shifts in taxes in various European countries since 1990. As taxes on labour are lowered, resource-intensive industries can also start to focus on higher value-added operations and sustainable innovation, as targeted by the Paris Agreement.

7.5.5. Electricity

This section presents a proposal for increasing energy tax on electricity.

Measure
An additional tax on electricity consumption of € 50 per MWh by large plants (defined as those in ETS sectors).[410] The tax is introduced gradually between 2016 and 2020.

Purpose
- To increase tax revenue.
- To internalise external costs ('the polluter pays').
- To promote sustainable innovation towards energy efficiency.

Expected impact
The tax adds to the cost of electricity. It will be at least partially passed on through higher product prices. In the short run elasticity is rather low, typically around -0.1. In the long run it will be slightly higher (around -0.3). They will vary by country/sector. The E3ME model takes into account the phenomenon known as the 'rebound effect' – where improved energy efficiency is used to access more energy services rather than to achieve energy demand reduction.

European context
Energy taxes differ significantly among European countries and between types of users. With regard to households, Bulgarian prices are lowest, at € 96 per MWh; Danish households pay more than three times as much at € 304 per MWh. The EU-28 average price for household consumers is € 211 per MWh.[411]

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[409] World Bank (2015), State and Trends of Carbon Pricing 2015.
[410] The same sectors as those the carbon tax is applied to (see above – the power sector itself will not consume electricity). These sectors are used as a proxy for 'large' plants.
[411] During the second semester of 2015. The EU-28 average price is weighted with the most recent national electricity consumption in the household sector which is data for 2014. For household consumers, the relative amount of tax contribution is the lowest in Malta (4.7 %) and the United Kingdom (4.8 %) where a low VAT rate is applied to the basic price and no other taxes are charged to household consumers. The highest taxes are charged in Denmark where more than two thirds of the final price (69%) is made up of taxes and levies. Eurostat (Accessed June 2016), Electricity prices for household consumers, 2015 semester 2 (EUR kWh).

Unfortunately, data are not available with regard to electricity prices for the largest bandwidths of users.[412] The only data available are for users between 500 and 2,000 MWh. This group of industrial consumers pay least in Finland (€ 17) and most in Italy (€ 160/MWh). The highest taxes in this user group are charged in Germany where 45% is made up of non-recoverable taxes and levies.

The EU-28 average price for this industrial user group was € 119 per MWh,[413] which is less than 60% of the household consumer price. The proposed charge in the scenario adds € 50 to the average electricity price for bulk users (using existing ETS users as proxy for large plants). This group probably pays lower rates than the 500-2,000 MWh group reported on by Eurostat.

Energy efficiency targets

The EU has put forward a greenhouse gas emissions reduction target of 20% below 1990 levels by 2020,[414] and at least 40% by 2030, compared to 1990 emissions levels. Current plans are to achieve this by reducing energy demand by at least 27% and achieving a renewable energy share of at least 27% in gross final energy consumption. However, the agreement reached at the COP21 in Paris stressed the importance of achieving deeper emissions cuts in order to keep global temperature increases below 1.5 °C, whereas the EU's 40% target is in line with 2 – 2.4 °C. According to leading consultancy agency Ecofys it is feasible to achieve emissions cuts of more than 50%, especially by aiming for higher energy efficiency targets.[415]

Scaling down energy subsidies for the largest energy consumers

There is much debate in Europe about the correlation between energy prices and the competitive position of European economies. Reduced rates for bulk users of fossil energy are already being designated as Environmentally Harmful Subsidies in international literature (see section 2.3). Because of major and increasing dependency on imports of fossil fuels, it is clear that subsidising fossil energy is no longer viable in the longer term. The challenge is to scale down these subsidies and give the industry an opportunity to shape the energy transition.

The scaling down of energy subsidies for large-scale users will create an incentive in Europe for energy-efficient production and developing renewable energy sources, which will eventually strengthen the European industry's competitive position. A transitional facility may have to be introduced to help energy-intensive sectors make the transition to renewable energy and energy efficiency. It should be noted, however, that the higher the compensation for bulk use, the lower the amount that will be available for reducing tax on labour, while lowering tax on labour is precisely what will encourage the industry to invest more in innovation and job creation.

What is crucial is that the measure should be introduced gradually, that its introduction is announced early and supported by successive governments (stable government policy).[416]

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[412] Band-IA: annual consumption below 20 MWh; Band-IB: 20-500 MWh; Band-IC: 500-2,000 MWh; Band-ID: 2,000-20,000 MWh; Band-IE: 20,000-70,000 MWh; Band-IF: 70,000-150,000 MWh. Eurostat (2016), Electricity prices components for industrial consumers - annual data (from 2007 onwards). Accessed July 25, 2016.

[413] 'Industrial consumer' in these Eurostat data relate to the medium standard industrial consumption band with an annual consumption of electricity between 500 and 2,000 MWh. The EU-28 average price is weighted with the latest available (2014) national consumption for industrial consumers. Eurostat (Accessed June 2016), Electricity prices for industrial consumers, 2015 semester 2 (EUR kWh).

[414] IETA (2015), European Union: an emissions trading case study.

[415] Ecofys (2016), Higher EU energy efficiency and renewable energy targets enable greenhouse gas emissions reductions of more than 50% in 2030.

[416] After the North Sea flood of 1953, the Netherlands set out to develop an ambitious, long-term coastal defense plan. The Dutch Delta Act provided for regulations that allowed successive governments to work towards achieving the

This measure ties in with the 2020 Strategy (see section 1.7.1), the 2030 Energy Strategy (1.7.4, the Paris Agreement (1.7.5) and the SDGs (1.7.6) with regard to energy efficiency.

Concerns and solutions

Area of concern	Solution
A weaker competitive position of energy-intensive sectors.	To offset this competitive disadvantage for European businesses, a supplemental border tax adjustment may eventually be needed. According to the OECD: *"Such adjustments may however, be extremely difficult to implement in practice, and, would, in line with the findings of this paper, hamper the counter-balancing comparative advantage of "cleaner" sectors, reduce incentives to invest in cleaner technologies and any potential first-mover advantages." "(…) by changing the relative input prices, higher environmental stringency in a country is linked to a comparative disadvantage in "dirty" industries, and a corresponding advantage in "cleaner" industries."*[417] Also, it must be noted that many countries, including China, are introducing carbon-pricing mechanisms (see section 3.3). According to the European Commission, the economic distortions provoked by labour taxes are significantly larger than for green taxes, for that matter. Energy taxes in particular are less distortive than taxes on labour.[418]
Energy-intensive industries relocating to countries where energy is cheaper (leakage).	A step-by-step introduction will allow industries to gradually increase their energy efficiency. By reducing tax on labour at the same time, Europe will become more attractive for the re-shoring of labour-intensive operations.
The energy tax currently also applies to energy generation for renewable sources, which increases the cost of that energy too.	It could be considered exempting energy generation from renewable sources (i.e. solar, wind and possibly biomass), in which case the tax rate on fossil energy generation should increase in proportion to the increase in the share of renewable energy, so that the tax revenue is stable. Note that renewables do have costs in terms of land use, materials depletion and waste streams. Energy efficiency therefore remains necessary.

same end goal of preventing devastating floods. Perhaps this could be a source of inspiration to the EU Member States to create a Delta Plan for energy security and sustainable growth.

[417] Koźluk, Tomasz, Timiliotis, Christina (2016), Do environmental policies affect global value chains?: A new perspective on the pollution haven hypothesis, OECD Economics Department Working Papers, No. 1282.

[418] European Commission (2013), The marginal cost of public funds in the EU: the case of labour versus green taxes.

7.5.6. VAT reduction

This section introduces a reduction of the VAT rate for certain labour-intensive services.

Measure

The long-term goal is to introduce the zero rate for labour-intensive services. As a first step the VAT-rate is gradually decreased to zero in the maintenance and repair sector. No change is made to existing zero rate exemptions and existing rights to deduct input tax.

Purpose

- To reduce the tax burden on labour for employers in labour-intensive sectors.
- To reduce the cost of labour-intensive services for consumers.
- To promote sustainable innovation.

Expected impact

In 2014, in the EU, the maintenance and repair sector accounted for one percent of total consumption (€ 77.8 billion). The sector generated € 16.4 billion in VAT receipts or 1.6% of total VAT receipts in the EU.[419]

In the available literature there is no consensus about the effects on employment of a low VAT. In the Netherlands, for instance, a 2012 evaluation of the temporary reduction in VAT on a number of labour-intensive services did not show a visible increase in employment. However, because of a lack of historical data in two out of five sectors, a definite conclusion on the effect on job creation could not be drawn.[420] Based on the findings of a second survey, the temporary reduction in the Dutch VAT rate did, in fact, create more jobs in terms of man-years.[421] In the construction sector, the temporary reduction in VAT rate on labour also had a positive effect on job creation in man-years, which is why the measure was extended.[422]

In the E3ME model there is no direct link between a decrease in a particular VAT rate and employment, but there is an indirect effect. A cost reduction is likely to simulate demand for this sector, which indirectly has an impact on employment.

A reduced VAT rate should increase the ability of local shops to offer repair and maintenance services (such as electronics repair), which is in line with the goal of achieving resource efficiency and a circular economy in the European Union. The Commissions' Circular Economy Package states:

> *"Price is a key factor affecting purchasing decisions, both in the value chain and for final consumers. Member States are therefore encouraged to provide incentives and use economic instruments, such as taxation, to ensure that product prices better reflect*

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[419] Cambridge Econometrics based on various sources; own calculations, Eurostat and DG Tax data.

[420] Research voor beleid (2002), Effects of the lowering of VAT rates on labour-intensive services. Survey carried out for the Ministry of Finance.

[421] CPB (2003), Contra-expertise effecten Btw-verlaging arbeidsintensieve diensten.

[422] Translated: "The reduction in VAT rate from 21% to 6% will result in an additional construction volume of € 600 million in 2013, which corresponds to nearly 5,000 man-years." EIB (September 10, 2013), Notitie: Effecten van een aantal maatregelen gericht op stimulering van de woningbouw. Translated: "The measure has led to € 2.6 billion extra turnover, which would not have been realized without the VAT-reduction. At least 20,000 jobs have been maintained in the building industry, installation sector and in landscaping." USP Marketing Consultancy (2014), Monitor: wat zijn de effecten van de tijdelijke btw verlaging voor renovatie en onderhoud in de bouw-, installatie- en groenvoorziening? Belangrijkste resultaten Meting 2.

environmental costs. (…) Once a product has been purchased, its lifetime can be extended through reuse and repair, hence avoiding wastage. The reuse and repairs sectors are labour-intensive and therefore contribute to the EU's jobs and social agenda."[423]

European context

This measure ties in with Roadmap to a Resource Efficient Europe with regard to reuse and recycling (see 1.7.2). It also serves the SDGs with regard to responsible consumption (1.7.6).

In 2017, the Commission expects to make a proposal for the definitive VAT system for EU cross-border trade together with a reform of the VAT rates. Two options are being reviewed. Option 1 is to extend the possibility to grant reduced rates and regularly review the list of goods and services. Under this option, all currently existing reduced rates, including derogations (e.g. zero rates) already legally granted to certain countries would be maintained and could be extended to all Member States to ensure equal treatment. The minimum standard VAT rate of 15% would be maintained. Option 2 is to adopt the principle that Member States are free to follow the reduced rates policy they wish, so long as it does not generate tax distortions. Safeguards would be needed to avoid unfair competition and to prevent fraud, such as limits on the number of different rates that Member States could adopt and a prohibition on reduced rates for easily transportable, high value items.[424]

Concerns and solutions

Area of concern	Solution
In accordance with European rules, the zero rate is currently the preserve – in principle – of international trade (plus a number of temporary derogations).[425] Updates are difficult because all decisions in this area have to be taken unanimously. [426]	Member States could advocate amending the directive. If necessary, the reduced VAT rate rather than the zero rate could be applied in a transitional phase. Although reduced VAT rates are a sensitive issue in European negotiations,[427] such a measure would be justifiable because it ties in with the resource efficiency targets of the European Commission.[428] It also ties in with the goal of easing VAT obligations for small and medium-sized enterprises.[429] In 2016, the European Council has welcomed the intention of the Commission to include proposals for increased flexibility for Member States with respect to reduced rates of VAT.[430]

[423] European Commission (2015), Closing the Loop - an EU Action Plan for the Circular Economy. COM/2015/0614 final.
[424] European Commission (April 7, 2016), Fact Sheet. Action Plan on VAT: Questions and Answers.
[425] Council of the European Union (2006), Council Directive 2006/112/EC on the common system of value added tax.
[426] European Commission (April 7, 2016), Press release. VAT Action Plan: Commission presents measures to modernise VAT in the EU. Accessed September 2016.
[427] European Commission (2013), Summary report of the outcome of the public consultation on the review of existing legislation on VAT reduced rates. 8 October 2012-4 January 2013.
[428] European Commission (2010), Europe 2020. A strategy for smart, sustainable and inclusive growth; European Commission (2011), Roadmap to a Resource Efficient Europe.
[429] European Commission (April 7, 2016), Press release. VAT Action Plan: Commission presents measures to modernise VAT in the EU. Accessed September 2016.
[430] The European Council (March 17, 2016), European Council conclusions on jobs, growth and competitiveness and on climate and energy. Press release.

7.5.7. Payroll tax credit for new employment

This section contains proposals for the reduction of labour costs.

Measure

Part of the revenues raised in the measures in sections 7.5.1 through 7.5.5 is used to reduce labour costs for employers. In each Member State (gradually up to) one percent of GDP is invested in a payroll tax credit for new employment. The labour costs decrease is connected to an effective employment increase and benefit employers only as far as labour demand is actually increased structurally. This means that employers only get the above labour cost reduction if they actually increase their work force. Rather than a subsidy, the measure entails an investment based on realized impact, applying principles of 'Pay for Success' or 'Social Impact' bonds.

> *"The concept is simple: pay providers after they have demonstrated success, not based on the promise of success".*[431]

> *"In this public-private partnership, investors are only repaid if and when improved social outcomes are achieved. Social impact bonds have the potential to open new funding sources for prevention-oriented programs that deliver measurable social benefits, saving taxpayer dollars in the process."*[432]

In contrast to these bonds, a payroll tax credit can be executed by government administrations without the use of intermediary funding partners.

The example of Spain

In March 2014, the Spanish Government adopted the Royal Decree-Law (RDL) 3/2014, on urgent measures to promote employment creation and indefinite hiring, which may also serve as an example for implementation. The Spanish decree contains one measure: a cut in employer social security contributions to a flat rate of € 100 per month for two years on all permanent contracts signed until the end of the year. This flat rate is conditional on the upkeep of the labour contract over the three following years by the hiring company. [433] The specifics are as follows:

- It applies to either new indefinite contracts or the conversion of temporary into indefinite contracts.
- Micro firms may benefit of an additional reduction of 50% of the standard social security contribution once the first 2 years of the application of the flat rate expired.
- For part-time contracts, the flat rate will be proportional to the working hours.
- The new regulation does not affect the employer or worker's contribution for other contingencies such as unemployment insurance, professional training, and contribution to the wage guarantee fund (FOGASA).[434]
- The job must be maintained for at least 3 years; otherwise, the amounts saved by the company shall be recovered, totally or partially (recapturing is 100% if the employment

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[431] United States Office of Management and Budget (2012), Paying for Success. The Federal Budget Fiscal Year 2012. This proposed 2012 budget stated that up to $ 100 million would be freed up to run Social impact bond pilot schemes.

[432] Rockefeller Foundation (Accessed June 6, 2016), Social Impact Bonds. Helping State and Local Governments Fund Critical Social Projects.

[433] European Commission (2014), Spain - Post Programme Surveillance Spring 2014 Report. European Economy Occasional Papers 193, Directorate-General for Economic and Financial Affairs.

[434] Contributions for these contingencies will add to the € 100 flat rate, up to EUR 147.4 a month for the lowest salaries and € 316 a month for the highest salaries.

contract is terminated during the first year, 50% if terminated during the second year and 33% if terminated during the third year).

- The new measure will have no impact on the benefits to which workers are entitled, which are calculated applying the full contribution base.
- According to the Ministry of Labour and Social Security, the scheme will reduce by 75% the current total contributions to the Social Security. Indeed, the flat rate replaces the 23.6% contribution to the social security for common contingencies (basically, related to pensions and health and safety.

The downside of this scheme is that the flat rate implies that the higher the salary, the higher the savings on the social security contributions for the company and, consequently, the revenue loss for the social security system. Still, the advisory Commission on this matter states: "While the flat rate implies a greater subsidy for higher paid workers, the higher labour demand and supply elasticities could still lead to a bigger impact on low-skilled jobs."

Another issue may be that the measure could result mainly in a conversion of temporary contracts into permanent ones, thus meeting one of its stated objectives, while its potential to stimulate additional employment creation is more uncertain.[435]

> *"The Government expects a positive impact of 0.3% on GDP and 0.3% on employment on the first year. It also projects that the measure will be budgetary neutral, assuming that the revenue loss derived from the application of the flat rate could be offset by the impact of the creation of additional jobs and the reduction of excessive rotation (thanks to the conversion of temporary contracts), which could lead to an increase of contributions to Social Security, revenues from personal income tax, corporate income tax and indirect taxes, together with a reduction in expenses on unemployment benefits.*[436]

In any case, according to the OECD:

> *"temporary measures cannot be expected to fully stimulate long-term hiring or investment plans. (…) at the heart of the future tax reform should be a permanent cut in employer social security contributions focussed on lower-paid workers, where the need to stimulate labour demand is the most acute and where labour demand elasticity to wage is the highest. This would require funding social security in part from general revenue."*[437]

This scenario provides options to cut employer social security contributions on a permanent basis.

Purpose

- To lower the tax wedge.

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[435] European Commission (2014), Spain - Post Programme Surveillance Spring 2014 Report. European Economy Occasional Papers 193, Directorate-General for Economic and Financial Affairs.
[436] European Commission (2014), Spain - Post Programme Surveillance Spring 2014 Report. European Economy Occasional Papers 193, Directorate-General for Economic and Financial Affairs.
[437] OECD (2014), Economic Surveys Spain Overview.

Expected impact
The payroll tax credit is expected to have a major impact on employment, as there is no 'leakage' (in terms of funds being used for increased profits or investments). Impact will depend on the way it is implemented. The credit could, for example, potentially be targeted specifically towards groups that are more affected by unemployment such as youngsters and the elderly.

The fact that an increase in labour demand also increases productivity/output for employers at no extra cost is considered to be another advantage for employers. This effect remains at the disposal of employers.

European context
Full employment and social cohesion are basic EU objectives. This measure ties in with the Europe 2020 headline targets for employment, poverty and social exclusion (see 1.7.1) as well as the SDGs (1.7.6).

Concerns and solutions

Area of concern	Solution
The question is whether such EU-wide payroll tax credit is administratively doable.	Implementation will be subject to national preferences and circumstances. To avoid misuse, there should be a clear definition of 'new employment', with regard to, for example, short-term contracts, low-wage 'minijobs' etcetera. The case of Spain may provide insights as to how this measure could be implemented.

7.5.8. Payroll tax credit for circular innovation

This section contains a proposal for the reduction of labour costs for circular innovation.

Measure
Part of the revenues raised in the measures in sections 7.5.1 through 7.5.5 is used to reduce costs associated with high-skilled employment in *Research and Development* (R&D), by analogy to the Dutch *Research & Development Promotion Act* (a wage cost reduction for research and development).[438] The facility in this case is targeted at circular resource use, including resource efficiency, closing the loop in supply chains and new (bio-based) materials. The total fund for this tax is amounted to a small percentage of GDP (gradually increasing from 0.03% in 2016 to 0.15% of GDP in 2020). In each Member State the credit is dispersed among sectors based on their share of R&D activities in total national R&D spending.

Purpose
- To reduce the tax burden on labour for R&D employers (and at the same time to promote job creation in innovative sectors).
- To promote sustainable innovation.

[438] In Dutch: Wet Bevordering Speur- en Ontwikkelingswerk (WBSO).

Expected impact
According to the OECD:

> *"R&D personnel costs account for the largest share of intramural R&D costs, and the focus on R&D personnel does in principle incentivise investment in human resources based in the domestic economy."*[439]

The measure enables employers in highly innovative sectors to invest in circular innovation, which in turn speeds up the transition from resource-intensive, polluting technologies towards cleantech and biobased materials.

European context
Eight Member States grant tax relief for the social contributions and/or payroll taxes paid on the salaries of employees working in R&D.[440] In the Netherlands, the *Research & Development Promotion Act* is a measure of about € 0.8 billion (2014) per year aimed at lowering wage costs for research and development. An evaluation commissioned by the Dutch Ministry of Economic Affairs, Agriculture and Innovation showed that, thanks to the Research & Development Promotion Act, private-sector wages paid for R&D effectively went up in the period from 2006 to 2010.[441] In 2014, almost 23,000 Dutch companies, including self-employed entrepreneurs, used the facility.[442]

The proposed measure ties in with the preference of the European Commission to link R&D tax incentives to expenditures rather than results:

> *"R&D tax incentives should be linked to R&D expenditure (i.e. the input) rather than the results of R&D (i.e. income made from intellectual property). Furthermore, tax relief should be granted on R&D expenditure that creates significant knowledge spillovers, such as researchers' salaries. Linking tax incentives to salaries also has the practical advantage of lower administration and compliance costs."*[443]

According to the OECD, reductions in payroll taxes and social contributions related to R&D personnel provide an alternative means of encouraging R&D by firms that have low or no profits. Subsidies for R&D wages are suitable for promoting "riskier" forms of research by small and young firms without the profit-generating capacity to realise income-based incentives.[444]

The measure ties in with the 2020 Strategy (see section 1.7.1), the Roadmap to a Resource Efficient Europe (see 1.7.2) and the SDGs (1.7.6) with regard to fostering innovation and R&D for sustainable development and employment.

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[439] Appelt, S, et al. (2016), R&D Tax Incentives: Evidence on design, incidence and impacts, OECD Science, Technology and Industry Policy Papers, No. 32.
[440] European Commission (2015), Tax Reforms in EU Member States 2015. Tax policy challenges for economic growth and fiscal sustainability.
[441] EIM (2012) Evaluatie WBSO 2006-2010. Effecten, doelgroepbereik en uitvoering.
[442] Dutch Central Planning Bureau (CPB) (2016), Kansrijk innovatiebeleid.
[443] European Commission (2015), Tax Reforms in EU Member States 2015. Tax policy challenges for economic growth and fiscal sustainability.
[444] Appelt, Silvia, et al. (2016), R&D Tax Incentives: Evidence on design, incidence and impacts, OECD Science, Technology and Industry Policy Papers, No. 32.

Concerns and solutions

Area of concern	Solution
It is necessary to determine what type of activities will qualify.	The scope of the measure could be limited at the start (e.g. innovation in the area of recycled or bio-based materials), only to be broadened later.

7.5.9. Income tax and social contributions

This section contains proposals for the reduction of labour costs by lowering income tax and social security contributions.

Measure
The bulk of the net increases in government revenues of the measures in sections 7.5.1 through 7.5.5 are used to reduce income tax and social security contributions. Labour cost reductions are dispersed 85% to employees (through lower income tax rates and employee social contributions) and 15% to employers (through lower employers' social contributions).[445]

In practice, these reductions can take many forms, ranging from benefits and allowances (in tax credits or cash transfers) to adapting income tax rates to obtain the desired fair distribution (section 8.4 provides some policy options for flanking policies). Specific attention needs to go out to the fact that currently, private pensions are deferred wages and are based on gross income. Lowering income tax rates and social contributions should not affect pension rights.

Purpose
- To lower the tax wedge.

Expected impact
By lowering direct income tax and social contributions, households have more disposable income to spend. This leads to higher demands for goods and services in the economy. By lowering social contributions paid by employers, employers can afford to hire more manpower. In general, previous model-based analyses have demonstrated that:

- **Reducing income tax and employees' contributions** gives a larger boost to household expenditure and GDP.
- **Reducing employers' contributions** gives a smaller boost to GDP but sometimes a larger boost to employment.

In practical implementation, the measures will need to suit national preferences.

European context
These measures tie in with the European Semester goal to reduce the tax burden on labour (see section 3.4). They potentially also tie in with the SDGs (section 1.7.6).

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[445] It should be noted that some of the changes allocated to income tax could instead be classified as employees' social contributions, but the model does not make this distinction (i.e. both reduce disposable income). There is no difference between the treatment of income tax and employees' social contributions – they are both subtracted from earned income. However, employers' contributions are treated differently because these are added to the cost of labour for employers. In each case there is a single weighted average rate (total revenues divided by total wages and salaries), which is the imputed rate across all employees (i.e. the average per worker). It could be possible to vary the rate by sector, but not by income group, as the data do not cover this dimension. (Cambridge Econometrics).

Concerns and solutions

Area of concern	Solution
In some countries (like the Netherlands) social insurance contributions are not funded from general resources. This measure requires a major change in the system.	In the Netherlands, social contributions should cover the full insurance costs. However, in practice, a surplus posted in any year is compensated by lower contributions in the next one to two years; the same applies to a deficit. Owing to the crisis and the high unemployment rate, the funds have become inadequate for the required benefits. That is why they are already being supplemented from general resources in the current system. In that sense, the contributions are already being funded from general resources. The proposal to partially fund employed persons' insurance contributions from general resources in some countries requires an adjustment by analogy to Dutch state old-age pension benefits, which are also already partially funded from general resources given that contributions have stayed the same while costs have increased.

8. Modelling results

"My interest is in the future because I am going to spend the rest of my life there."
- Charles Kettering

This chapter provides the key modelling results on an aggregate EU-27 level, on Member State level, on sector level and for different income groups. In chapter 11, four case studies are provided in more detail to illustrate the results in the context of different types of tax systems and economies.

8.1. EU-27 results: decoupling growth & resource use

The table below provides a summary of the projected EU-27 results in 2020.[446]

Table 5: Key modelling results (EU-27, 2020, % difference from baseline)

Type of result	% difference from baseline (2020)
GDP	2.0%
Employment	2.9%
Carbon emissions	-8.2%
Water use	-6.3%
Energy resource use*	-5.4%

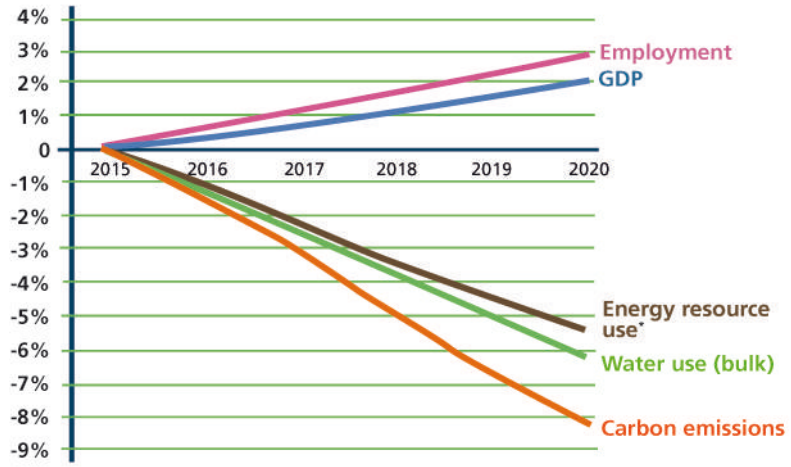
Source: Cambridge Econometrics

** Final energy consumption of twelve energy sources (including gasoline, diesel, aviation fuel, natural gas) by households, businesses and industry. Energy demand by the power generation sector is excluded in order to avoid double counting.*

Below is a graph with the key results per year, demonstrating the effective decoupling of GDP and resource use. The key message from the results is that it is possible to design policy measures that reduce resource use and carbon emissions, while at the same time stimulating the economy and creating jobs.

[446] The terms carbon and CO2 both refer to CO2. Although this is not scientifically sound (carbon dioxide (CO2) is technically another molecule than carbon (C)), this is common practice in public debate.

Figure 13: Key modelling results (EU-27, 2015-2020, % difference from baseline)



Source: Cambridge Econometrics

Notes
** Final energy consumption of twelve energy sources twelve energy sources (including gasoline, diesel, aviation fuel, natural gas) by households, businesses and industry. Energy demand by the power generation sector is excluded in order to avoid double counting.*

The cumulative results during the period 2016 to 2020 are shown below. All euro values are in 2015 prices.

Table 6: Key modelling results (EU-27, 2016-2020, cumulative difference from baseline)

Type of result	Cumulative difference from baseline EU-27 (2016-2020)
GDP	€ 842.2 billion[1]
Employment	19.6 million person years[2]
Carbon emissions	- 1,038.2 million tonnes[3]
Water use	- 218.6 billion m3[4]
Energy resource use	-193.6 million toe[5]

Source: Cambridge Econometrics

Notes
[1] 2015 prices.
[2] 'Person year of employment is the equivalent of a one-person job for one year (part-time, fulltime or seasonal).
[3] 282.9 million tonnes of carbon equals 1,038.2 tonnes of CO2.
[4] Based on Trucost calculations (see chapter 9).
[5] Energy resource use refers to the aggregate result of final energy consumption for twelve energy sources (including gasoline, diesel, aviation fuel, natural gas). Energy consumption by the power generation sector is excluded in order to avoid double counting. Tonnes of oil equivalents (toe).

As mentioned before, the tax shift scenario assumes a gradual introduction of policy measures from 2016 to reach the full measures by 2020 and remain the same beyond 2020. Since the E3ME model doesn't assume return to equilibrium (see section 6.3), GDP and employment continue to increase after 2020 in the scenario, albeit at lower rates than the period between 2016 and 2020.

8.1.1. Economic impact

The aggregate positive GDP impact of 2.0% compared to baseline is the result of a combination of two sets of effects in the scenario: 1) the direct tax reduction and 2) the indirect tax increase:

1) Reduction of direct tax

The tax shift scenario was designed to use the majority of revenues raised from resource and consumption taxation to fund reductions in direct tax (mostly income tax)[447] across EU regions. The reduction in direct tax is a key driver of positive macroeconomic impacts. By lowering direct income tax, households have more disposable income to spend. This leads to higher demands for goods and services in the economy.

Impact on personal income tax revenues
In its fifth year (2020), the tax shift scenario reduces personal income tax revenues by € 367.9 billion (2015 prices) compared to baseline, which represents 16.5% of the projected total EU-27 personal income tax revenues in the baseline in 2020. The results are particularly remarkable in the case of Romania, Bulgaria, Slovakia, Poland and Lithuania, where the revenues from resource taxes in the scenario are more than 100% of personal income tax revenues. In the model, these surpluses are treated as income subsidies.

Impact on personal income tax rates
The scenario reduces the average EU-27 personal income tax *rate* (total income tax revenues divided by total wage and salaries) by 5.6 percentage points in 2020. In some countries, personal income tax rates can fall considerably more – up to 20 percentage points difference from baseline.[448]

Lowering personal income tax rates across EU Member States on average by 5.6 percentage points

At the same time, the budget for new labour input has a positive impact on employment.

> In general, reductions in direct taxes and higher employment result in higher real income and therefore, in a net positive effect on GDP.

2) Increase of indirect tax

In the scenario, average prices increase due to resource and consumption taxes. These increases affect both consumers and industries. For consumers, higher prices mean lower real disposable income (other things being equal) that lead to lower consumer spending. For industries, resource taxations add additional costs, which either get absorbed in profits or get passed on to product

[447] Direct tax in E3ME does not include employee's social contribution. It is treated as a separate tax item in E3ME.
[448] In E3ME, the average personal income tax rate is calculated from total personal income tax revenues divided by total wage and salaries of an economy. The income tax rates in the baseline are held constant from the last year of historical data. In the scenario, the EU-27 average personal income tax rate goes down from 31.5% to 25.9%.

price which, in turn, leads to negative competitiveness impacts. A proportion of this effect is borne by non-European suppliers of energy.

> In general, increases in indirect taxes result in lower real income and therefore a negative effect on GDP.

Modelling results show that in the scenario, the combined result of 1) and 2) demonstrate a net positive impact on GDP. This means that the negative impacts on real income from resource and consumption taxes are offset by the reduction in direct taxes.

It is important to note in this respect that, currently, many economists are expressing the need for new measures for economic growth. GDP fails to take into account important growth factors like the natural assets (such as non-renewable stocks of metals or fossil fuels) present in a particular economy. In this study GDP is still used as an indicator. The aim is, however, for a composition of GDP that effectively decouples economic growth from resource use. A type of GDP built more on human capital (people developing and applying their skills through employment) and less on the depletion of natural capital. In chapter 9, the impact of the scenario will be presented in an *Integrated Value Added Statement,* which takes into account the added values not (yet) included in GDP.

The table below summarizes the modelling results with regards to several other macro-economic indicators.

Table 7: Summary of macro-economic modelling results (EU-27, 2020, % difference from baseline)

Type of result	% difference from baseline (2020)
GDP	2.0%
Consumption	3.1%
Investment	2.0%
Exports	0.0%
Imports	0.7%
Energy Imports	-3.0%
Consumer Prices	3.9%
Real Incomes	3.9%

Source: Cambridge Econometrics

Import demands increase slightly (0.7%, representing € 21.9 billion in 2020) due to higher demand in the economy being met outside the EU domestic market. It should be noted that *energy* imports fall in the scenario by 3.0% in the year 2020, representing a cost reduction of € 9.6 billion. Over the period 2015-2020 the tax shift scenario saves € 27.7 billion on the energy import bill.[449]

Over the course of 5 years the scenario saves € 27.7 billion on the EU energy import bill

[449] 2015 Prices.

In the scenario, exports fall by 0.03% (representing € 1.0 billion in 2020). Increases in export prices are small due to the fact that the additional resource and consumption taxes are compensated by lower labour costs.

8.1.2. Impact on labour cost and employment

In the year 2020, the tax shift scenario reduces social security contributions paid by employers by € 29.2 billion (2015 prices), which compares to 2.5% of total EU-27 employers' social contributions in the baseline in 2020. The average social contribution *rate* paid by employers goes down from 18.2% to 17.4%.

In addition, the payroll tax credit directly reduces employers' labour costs by € 125.9 billion (2015 prices) and by € 23.3 billion (2015 prices) through the payroll tax credit for circular innovation. These credits are modelled separate from the employers' social security rate. It's important to note that the way social security is financed changes; the social protection base does not change.

As a result, by 2020, the tax shift scenario increases the number of persons in employment by 6.6 million.[450] Such an increase in employment would solve almost a third of current unemployment in the EU.[451]

6.6 million more people in employment

Europe's *2020 Strategy for smart, sustainable and inclusive growth* set a target of 75% of 20-64 year olds in employment by 2020.[452] This target leaves a massive challenge to create some 16 million jobs over the next four years.[453] Baseline growth plus the tax shift scenario reaches 96% of the EU employment target (see figure 14).

It may be clear that without structural reform of EU tax systems, there is likely no chance of achieving the 2020 employment target.

Around half of the increase in employment demand in the modelling results is driven by the tax credit for new employment. The remaining share is a direct result of the other employment-related measures and indirect results from higher economic activity. The employment-related measures lower the cost of labour to industries, making labour more attractive as a factor of production, and in turn generating higher employment demand.

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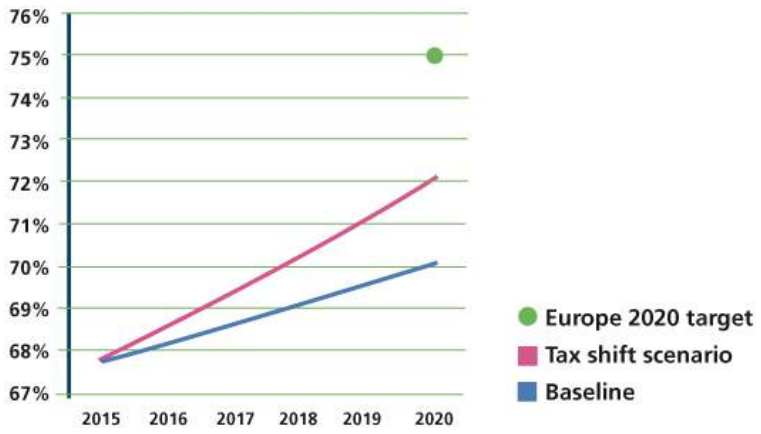
[450] In accordance with the Eurostat definition of employment: 'an employed person is a person aged 15 and over who during the reference week performed work – even if just for one hour a week – for pay, profit of family gain'. Eurostat (Accessed July 2016), Employed person - LFS. In this definition, one 'person in employment' can have more than one 'job' (which can be full-time, part-time and seasonal). Please note the difference with '*Full Time Equivalent*' (FTE), which measures *the combination* of full-time, part-time and seasonal jobs.

[451] Eurostat (2016), Unemployment statistics. Data up to July 2016: 21.063 million unemployed.

[452] European Commission (2010), Europe 2020. A strategy for smart, sustainable and inclusive growth.

[453] 15-64 Year olds, estimate based on Eurostat (Accessed Sept 2016), Main scenario - Population on 1st January by age and sex, and Cambridge projections.

Figure 14: The scenario and the EU 2020 employment target (EU-27, % employed persons)



Source: Cambridge Econometrics

8.1.3. Impact on natural resource use

This section provides the impact of the scenario with regard to carbon emissions, energy resource use and water use.

Carbon emissions

A number of policy measures in the scenario have an impact on carbon emissions. Energy-related taxes lower energy consumption, mostly of road transport and aviation fuels but also consumption of electricity. The additional carbon tax on ETS sectors reduces carbon emissions further. In 2020, the policy measures in the scenario reduce carbon emissions by 8.2% compared to the baseline, mainly due to higher fuel prices.[454]

The EU target reduction of Greenhouse Gas Emissions in 2020 is a 20% reduction compared to 1990.[455] By 2013, emissions of greenhouse gases in the EU had fallen by 19.8%, compared with the levels in 1990. This large decline in greenhouse gas emissions has mainly been attributed to weakened economic activities during the crisis in sectors such as industry, transport and energy. The mild winter of 2010/11 further contributed to the reduction of energy demand and emissions.[456]

If fully implemented and fully effective, the policies and measures implemented and envisaged by the Member States are expected to deliver a 32% reduction in 2030 compared to emission levels in 1990.[457] As the 2030 target is 40%, there is room for improvement.

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[454] Please note that the terms carbon and CO2 both refer to CO2 here. Although this is not scientifically sound (carbon dioxide (CO2) is technically another molecule than carbon (C)), this is common practice in public debate. The current version of the E3ME model does not account for changes in land-use, land-use change and forestry (LULUCF) emissions. In this study we assume that non-CO2 GHG emissions will fall by similar proportions as CO2 emissions. Also it is assumed that other GHG emissions fall by the same rate as CO2 emissions. The European Commission will publish its new baseline in 2016, which will include the latest policies now in place (e.g. on energy efficiency).

[455] European Commission (2014), EU energy, transport and GHG emissions, trends to 2050 Reference scenario 2013.

[456] Eurostat (Accessed July 2016), Europe 2020 indicators, Greenhouse gas emissions, base year 1990.

[457] European Commission (2014), A policy framework for climate and energy in the period from 2020 to 2030.

Over a five-year period, the scenario reduces CO2-emissions by 1,038.2 million tonnes, which is more than the 2012 emissions of Germany and Poland combined.[458] Although the proposed policy measures may seem ambitious from a policy makers' point of view, they are certainly necessary to put the EU on a carbon-free trajectory over the upcoming decades.

1,038 million tonnes of CO2 emission reductions

Energy resource use

E3ME takes twelve energy sources into account. The average energy price consists of raw energy price plus additional taxes (e.g. energy tax, ETS and carbon tax). When taxes are imposed, energy prices increase. The associated energy demand reductions in E3ME are derived from demand price elasticities for each energy users. At the same time, there might be a substitution effect between different types of fuels. As an example, in the power sector, a carbon tax can make fossil fuels plants less attractive to investors and therefore can act as stimulus to renewable energy investments.

The modelling results show that in 2020, compared to baseline, coal consumption is down -15.3%, natural gas -5.0%, electricity -4.2% and motor fuel -8.2%. In total, the scenario saves 194 million tonnes of oil equivalents (of the 12 types of energy sources combined) over a five-year period.

194 million tonnes of oil equivalents saved (12 types of energy sources)

The measures in the scenario mainly target large-scale users, using energy intensive sectors (those who are currently subject to EU-ETS) as proxy. Households would still be affected through higher energy prices, although at 14% the price increases for households are less than those in energy intensive sectors (for whom prices may go up to 57%).

The rebound effect

In practice, energy savings from efficiency are often offset by increased use. This is called the 'rebound effect':

> *"Buy a more fuel-efficient car, drive more. This is perhaps the simplest illustration of what has come to be known as the "rebound effect"—the phenomenon that an increase in energy efficiency may lead to less energy savings than would be expected by simply multiplying the change in energy efficiency by the energy use prior to the change. The existence of the rebound effect has been clear for a long time."*[459]

The scale of the rebound effect varies by sector, location and time period but it can be considerable and should be taken into account by policy makers when estimates are made of the potential savings arising from an intervention. The E3ME model captures the rebound effect through its E3 linkages (energy, environment and economy). The positive impacts on GDP and consumption in the tax shift scenario resulted in a small rebound effect on demand for energy.

Impact on water use

As mentioned before, there is a general lack of data on water use and pricing in the European Union. Therefore, in this study, a fixed price-elasticity coefficient is applied to estimate water demand reduction. Based on available literature, the E3ME model assumes the industrial price

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[458] Eurostat (2016), Air emissions accounts by NACE Rev. 2 activity.

[459] Gillingham, Kenneth, Rapson, David, Wagner, Gernot (2015), The Rebound Effect and Energy Efficiency Policy.

elasticity to be -0.25. This implies that a 1% increase in unit water prices will result in a reduction in industrial demand for water of around 0.25%. As the scenario takes into account that water taxation is to increase by 25%, water consumption is assumed to fall by 6.25%.[460]

Based on these assumptions, Trucost calculated the amount of water saved in the scenario (see section 9.5). The savings over a five-year period are 219 billion cubic metres of water.

219 billion cubic metres of water saved

According to the World Bank:

> *"The experience of several countries and urban regions show that price reform can be a powerful driver of water use efficiency and conservation. (…) these [price reforms] can also go a long way towards incentivizing the creation and adoption of water saving technologies."*[461]

Technologically, the decrease of 6.25% in the tax shift is still relatively modest as a European Commission report states that:

> *"20% to 40% of Europe's water is wasted and water efficiency could be improved by 40% through technological improvements alone".* [462]

8.2. Member States results

This chapter will look into selected key results per Member State. Chapter 11 will show the results in more detail focusing on four country case studies.

8.2.1. Key results per Member State

The overall results per Member State (GDP, employment and carbon emissions, as a proxy of energy resource use) are shown in Figure 15. These are the cumulative results over the 2016-2020 period:

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[460] While there is a relatively extensive literature on the estimation of household water demand, estimates of non-household water demand are less common. Furthermore, few studies have been carried out which estimate a price elasticity of demand for water, disaggregated by user-type, using European data (European Commission, 2000). Of those studies that do, NERA (2007) estimate a price elasticity of -0.24 for non-household water demand using UK data and Reynaud (2003) estimates the price elasticity for industrial water demand in France of -0.29. European Commission (2000) cites estimates of the industrial price elasticity derived from US data ranging between -0.11 and -0.44 (although these estimates are now quite dated, having been made in 1991). On the basis of this limited evidence, for the purpose of this modeling experience industrial price elasticity is assumed to be -0.25. European Commission (2000), The Application of the Polluter Pays Principle in Cohesion Fund Countries. NERA (2007), Non-residential demand for water in the Bristol water region', Report for Bristol Water. Reynaud, A. (2003), An econometric estimation of industrial water demand in France, Environmental and Resource Economics, 25, 213-232.

[461] World Bank Group (2016), High and Dry : Climate Change, Water, and the Economy.

[462] EU Water saving potential, Ecologic (2007), Quoted in European Commission (2011), Roadmap to a Resource Efficient Europe.

Figure 15: Overall results of the tax shift scenario

A tax shift enables 27 EU Member States to increase GDP and employment while decreasing resource use
(EU-27 growth rates between 2016 and 2020 in the scenario)

Each of the 27 Member States experience positive GDP and employment impacts

Country	Change in CO2 emissions	Change in employment	Change in GDP
Austria	-8%	4%	12%
Belgium	-12%	4%	6%
Bulgaria	-12%	2%	13%
Cyprus	-7%	4%	13%
Czech Republic	-12%	7%	9%
Denmark	-9%	4%	6%
Estonia	-4%	2%	13%
Finland	-11%	4%	10%
France	15%	4%	8%
Germany	-9%	4%	4%
Greece	-6%	6%	7%
Hungary	-10%	4%	12%
Ireland	-14%	7%	15%
Italy	-10%	4%	6%
Latvia	-9%	3%	17%
Lithuania	-7%	3%	9%
Luxemburg	0%	18%	0%
Malta	-8%	3%	7%
Netherlands	-10%	4%	9%
Poland	-1%	3%	17%
Portugal	-10%	5%	7%
Romania	-9%	4%	16%
Slovakia	-4%	5%	15%
Slovenia	-9%	4%	11%
Spain	-12%	7%	9%
Sweden	-10%	3%	8%
UK	-13%	5%	10%

Source: Cambridge Econometrics. Visual inspired by Grist.org.

When comparing results at Member State level, it is important to bear in mind that the different measures have different weights in each country. All Member States manage to lower carbon emissions while increasing economic growth and employment. The exact macroeconomic impacts, however, vary by Member State, depending on the following factors:

- Existing VAT structure.
- Energy intensity.
- Carbon intensity.
- Labour intensity.
- Current state of the economy.

In macro-economic terms, for example, Malta shows the least positive results. This can be explained by the fact that it has one of the largest increases in VAT (both standard and reduced rate) in the scenario. Also, until recently, Malta produced all of its electricity by burning heavy fuel oil. Introducing a carbon tax in this case significantly impacts oil demand for power generation (hence electricity demand and since oil has high carbon content – hence CO2). Due to this mechanism, in the scenario Malta is one of the winners in carbon reductions.

It needs to be noticed that Malta is already focusing on the transition to a less polluting energy system, using natural gas and renewables. In 2015, CO2 emissions in the EU rose by 0.7% in 2015. In Malta, however, CO2 emissions were reduced by 26.9% - even though the country's GDP grew by 1.1%.[463] This shows that in principle, every economy has opportunities to develop low-carbon solutions and adapt to new climate needs.

The best performing country in the scenario in terms of GDP and employment is Hungary. As one of the most energy intensive regions, energy and carbon tax in the scenario raise substantial amount of revenues, which in turn get used to reduce other tax rates to stimulate economy and jobs. Moreover, Hungary's existing VAT rates are the highest in the EU.

8.2.2. Economic impact per Member State

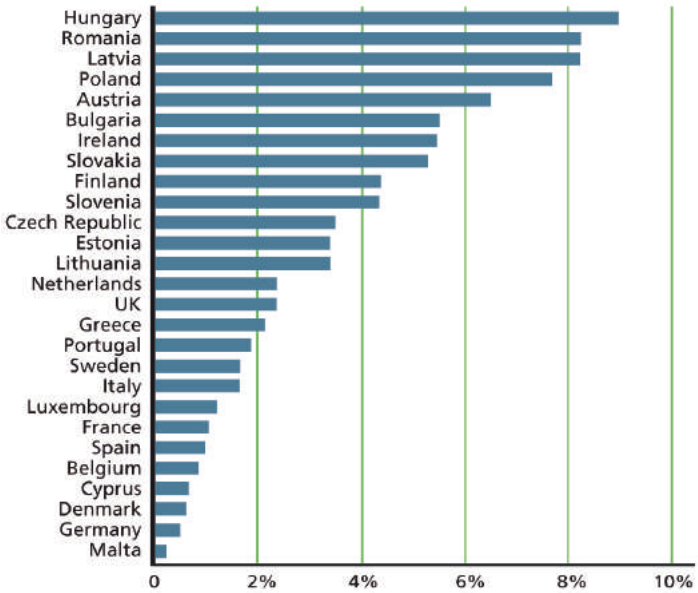
The tax shift scenario increases GDP by 2020 roughly between 0.5% and 8% compared to a business as usual scenario:

- Five countries have positive GDP impacts around 6-8% (in alphabetical order): Austria, Hungary, Latvia, Poland and Romania.
- Five countries have GDP impacts around 4-6%: Bulgaria, Finland, Ireland, Slovakia and Slovenia.
- Eleven countries lie in the range of 1-4%: France, Luxembourg, Sweden, Italy, Portugal, Greece, UK, Netherlands, Lithuania, Estonia, and Czech Republic.
- Six countries have positive impacts on GDP less than 1%: Belgium, Denmark, Cyprus, Germany, Malta and Spain.

[463] Flausch, Manon (Accessed May 2016), Energy interconnection brings big emissions cuts for Malta as the EU loses ground, EurActiv.

The GDP results at Member State level can be explained by a combination of factors described in the previous section. In Germany and Malta for example, positive impacts on GDP were hampered by negative impacts of higher VAT since their existing standard VAT and reduced VAT rates were lower than EU average. GDP increases the most in regions that are relatively more energy intensive (e.g. Hungary, Poland, Latvia and Romania). This means energy and carbon tax could raise substantial amount of revenues, which in turn get used to reduce other tax rates to stimulate economy and jobs. Moreover, this group is exempt from higher VAT since its existing rates are already above the EU average.

Figure 16: Scenario impact on GDP (EU-27, 2020, % difference from baseline)



Source: Cambridge Econometrics

8.2.3. Employment impact

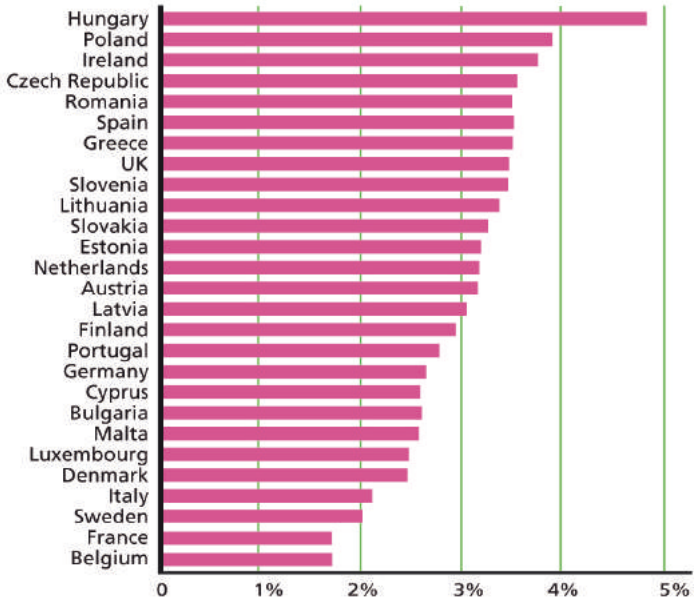
Employment impacts are positive in all regions, with impacts ranging between 1.7% and 4.8% by 2020 (compared to baseline):

- In 24 regions employment increases by 2-4%.
- In 14 regions employment impacts are higher than GDP impacts (e.g. Germany, Malta, Spain and Luxembourg).
- In France and Belgium, impacts on employment are relatively limited (less than 2%). This can be partly explained due to small GDP impacts. These small GDP impacts in turn can be explained by the fact that these two regions are relatively less energy intensive in the baseline; hence their small revenues raised for the tax shift.

Figure 17 provides an overview of these results.

Employment impacts can partly be explained by the GDP results where higher economic activity stimulates demand for labour. In many countries, the employment impacts can be larger than the GDP impacts due to the tax shift that directly stimulates employment demand in the scenario, especially through the payroll tax credit for new employment.

Figure 17: Scenario impact on employment (EU-27, 2020, % compared to baseline)

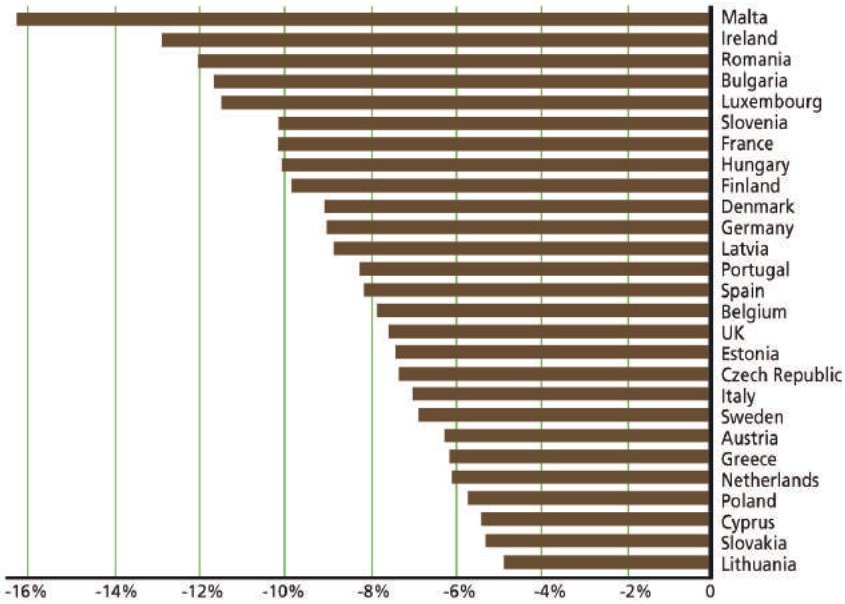


Source: Cambridge Econometrics

Impact on natural resource use

Under the scenario, significant carbon emission reductions, between 4.9% (Lithuania) and 16.3% (Malta) are achieved. Below is an overview of the impacts on carbon emissions by Member State.

Figure 18: Scenario impact on carbon emissions (EU-27, 2020, % difference from baseline)

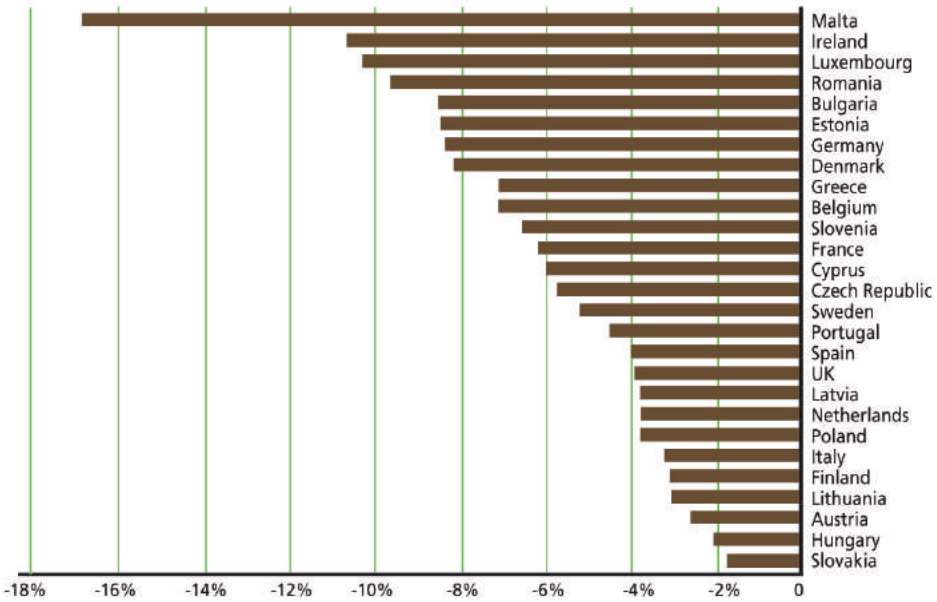


Source: Cambridge Econometrics

The results reflect the carbon intensity of each country. Carbon emission reductions are stronger in countries that currently rely heavily on dirty type fossil fuels. Malta's primary energy supply, for example, relies exclusively on oil. The pollution taxes in the scenario result in a relatively large carbon emission reduction.

Final energy consumption of 12 types of energy sources is reduced by rates between 1.7% (in Slovakia) and 16.9% (in Malta) (see Figure 19).

Figure 19: Scenario impact on energy consumption (EU-27, 2020, % difference from baseline)



Source: Cambridge Econometrics

Water consumption

As explained in section 7.5.3, water consumption is modelled based on a generic elasticity. Industrial water consumption is assumed to fall by 6.25% in each Member State.

8.3. Sector results

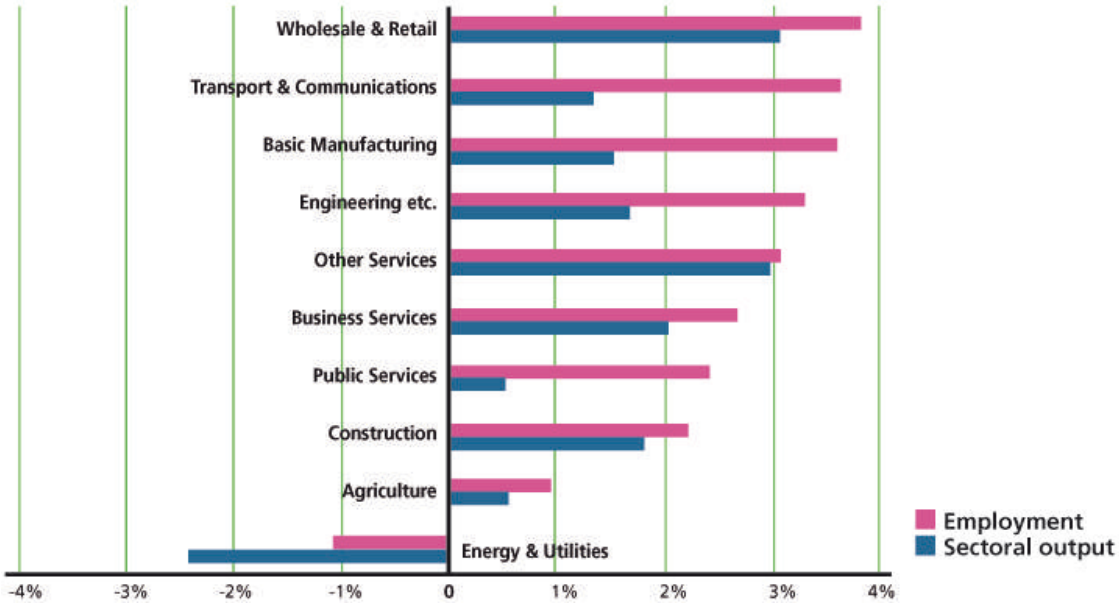
This section provides the impact of the scenario per sector with regard to output and employment. The results from E3ME confirm the findings by OECD that:

> *"(...) by changing the relative input prices, higher environmental stringency in a country is linked to a comparative disadvantage in "dirty" industries, and a corresponding advantage in "cleaner" industries."*[464]

In the tax shift scenario, output falls in the energy and utilities sectors overall but increases in all the other sectors. In wholesale and retail services output increases most (see Figure 20). These sectors are directly linked to consumer demand, which increases due to the lower income tax in the scenario. Output in manufacturing, agriculture and construction benefit from the reduction in labour costs and indirectly benefit from higher demand from consumers. However, these sectors tend to be more energy-intensive and therefore subject to higher energy costs.

[464] Koźluk, Tomasz, Timiliotis, Christina (2016), Do environmental policies affect global value chains?: A new perspective on the pollution haven hypothesis. OECD Economics Department Working Papers, No. 1282.

Figure 20: Scenario impact on sector output, employment (EU-27, 2020, % difference from baseline)



Source: Cambridge Econometrics

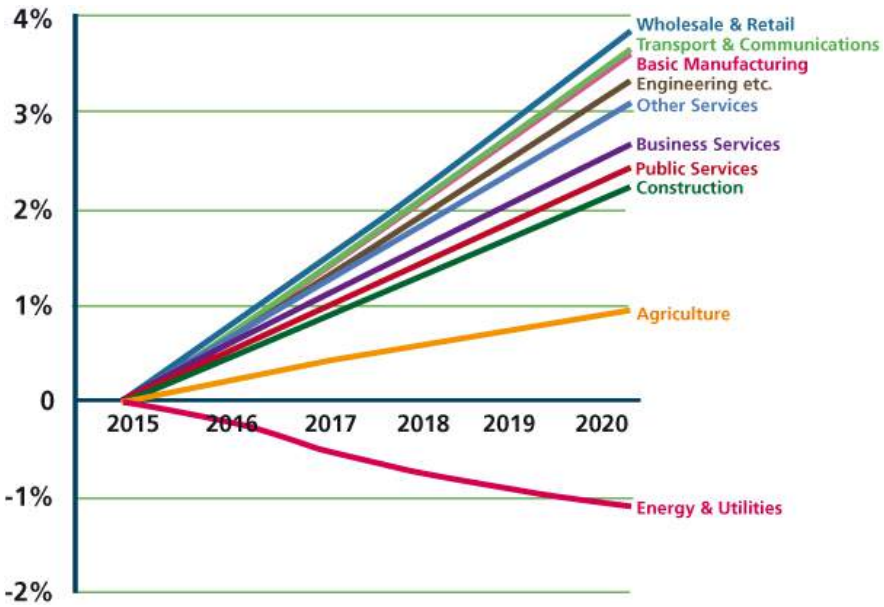
The public sector is set to grow in line with the general economy. The model does not make explicit assumptions about increases in public sector spending and new demand for public sector employment because we assume budget neutrality here.

Governments could opt for an additional innovation subsidy for electricity and utilities to help them innovate. Such measures do however erode the overall budget to reduce employment costs.

Despite being taxed, the transport sector still shows positive output and employment. Freight transport demand is highly associated with consumer spending (i.e. income elastic) but less sensitive to price changes because the tax part is already large. In aviation, tax is a small part of a total flight or holiday costs. Although there is an increase in cost of aviation from tax, overall the price effect is outweighed by income effects.

The employment results by broad sector are shown in Figure 21. The sectors that benefit most in the scenario are those related to consumer demand, such as retail and services sectors. Employment demand impacts are notably high due to the direct boost to employment and lower labour costs in the scenario. Employment increases in services sectors are among the highest, as they tend to be more labour intensive and the sectors directly benefit from higher consumer spending. The impacts on energy and utilities are negative due to the reduction in demand for energy and water.

Figure 21: Scenario impact on sector employment (EU-27, 2016-2020, % difference from baseline)



Source: Cambridge Econometrics

Energy and Utilities are the only sectors showing a negative employment growth. This effect is relatively small, though, as the Energy and Utilities sectors only provide 1.5% of total employment in the EU.[465] The model shows that by 2020, the tax shift causes a 1% job loss in the Energy and Utilities sectors, or 25,000 jobs. At the same time, the scenario increases employment by 6.6 million in other sectors.

Generally, in the E3ME model, employment increases less than output, with around half of output increases coming from employing more workers, and the other half coming from existing workers producing more. In this particular tax shift scenario, though, the measures directly stimulate employment demand. Employment results at sector level therefore can be explained by a combination of factors: sector output, existing labour costs and the sector's labour intensity.

Please note that the effects of the *Payroll Tax Credit for Circular Innovation* are not yet included in the results as the impact of innovation efforts during the period 2016-2020 is expected to occur beyond 2020.

Impact on a business level

Within each sector there probably will be 'winners' and 'losers', as each sector represents corporations that are more and less advanced in their social and environmental agenda. A tax shift will likely be of more benefit to businesses that apply innovative, sustainable and more inclusive business models than their competitors; as their pollution bill will go up less than their competitor's, while inclusive businesses will benefit relatively more from the payroll reduction. It needs to be noticed, however, that even with or without a tax shift, corporations need to adapt to the fast changing circumstances in the world today. The changing business climate is captured by the following observation by Tom Goodwin:

[465] Eurostat (2016), Employment by sex, age and economic activity. Accessed July, 2016. In 2015, EU-27 Employment (from 15-64 years) stood at 214,025,200 jobs, with 1,536,400 in electricity, gas, steam and air conditioning supply and 1,657,100 in water supply, sewerage, waste management and remediation activities. Total: 3,195,157.

"Uber, the world's largest taxi company, owns no vehicles. Facebook, the world's most popular media owner, creates no content. Alibaba, the most valuable retailer, has no inventory. And Airbnb, the world's largest accommodation provider, owns no real estate."[466]

In every sector corporations are reconsidering their business models, in the face of global market challenges, as well as the aforementioned ecological and social megatrends. The tax shift will likely speed up the process of sustainable business model innovation.

The Ex'tax Project has developed a *Tax Shift Simulator* in cooperation with a number of partners, including Nestlé and CDP. The simulator is a practical tool to assess the impact of taxes on the commercial opportunities of sustainable and inclusive business models, based on actual public data. This project builds on the work done in 2013, when the WBCSD Future Leaders Program and Ex'tax partnered to make an initial impact analysis. A publication on the simulator is expected in Q1, 2017.

[466] Goodwin, Tom (March 3, 2015), The Battle Is For The Customer Interface.

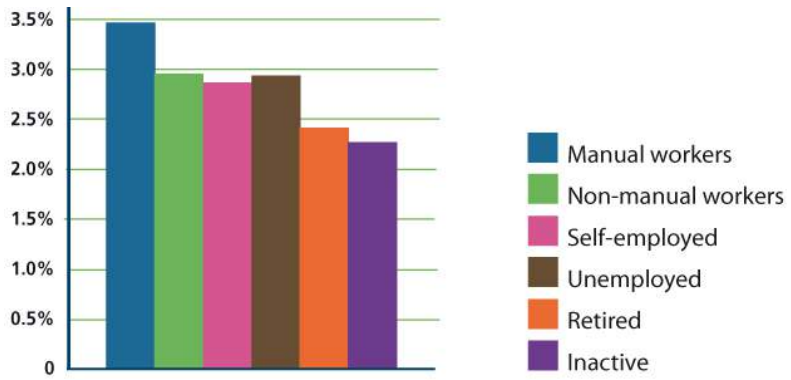
8.4. Distributional results

The E3ME model captures impacts on distribution through both income and government expenditure effects. On the expenditure side, it makes use of detailed sectoral spending data for each socio-economic group from Eurostat. On the income side, national household budget surveys provide information on how each socio-economic group's disposable income is made up (e.g. from wage, benefits, pension, taxes and non-wage incomes). As a result, the model can predict how measures in the tax shift scenario affect different types of households.

The results from E3ME show that real incomes in all groups increase in the tax shift scenario. Real incomes in lower income groups increase slightly less than those in higher income groups; the difference between the first quintile and the fifth quintile is only 0.12%. Without a tax shift, lower income groups tend to come out worse due to their higher share of energy in total expenditure, but in the scenario, the reduction in personal income tax compensates this effect.

Looking at different socio-economic groups, increases in income in the unemployed, retired and inactive groups are less than those in the active population, because these groups do not benefit from lowered personal income tax in the scenario (since they do not pay tax).

Figure 22: Scenario impact on real income (EU-27 average, 2020, % difference from baseline, socio-economic groups by type of activity)



Source: Cambridge Econometrics

Tax reform requires extensive safeguards to avoid regressive effects on the poor. In practice, potentially undesirable regressive impacts can be alleviated, for example, by targeting labour tax reductions towards specific income groups or by providing means-tested benefits or allowances. There are numerous policy options for social inclusion that help address the differences between socio-economic groups. Below are a few practical examples from EU Member States.

Table 8: Policy options for social inclusion; selected examples from EU Member States

Policy option	Example from EU Member States
Tax exemptions, allowances, deductions	- A tax credit for the elderly (Netherlands)[467] - Medical and dental care exempt from VAT (all Member States)[468] - Basic allowance (Spain)[469] - Study expenses tax deductible (Netherlands)[470]
Tax rates changes	- Progressive income tax rates (Germany) [471]
A block tariff or threshold for natural resource taxes based on income level or amount of consumption	- A tax-free amount of water for every citizen (Belgium until Jan 1, 2016)[472]
Means-tested benefits	- A scheme providing energy-efficiency and heating measures, tailored to households (Northern Ireland).[473]
Minimum/living wage	- A national living wage (United Kingdom)[474]
Allowances	- A government contribution to help defray some of the cost of raising children (Germany)[475]
Cheques	- A voucher that enables to pay for housework activities (Belgium)[476] - A subsidized meal ticket (France)[477]
Public transport	- A transportation reimbursement (France)[478]

[467] Sociale Verzekeringsbank (Accessed Aug 2016), Tax and national insurance contributions and tax credits.
[468] Council of the European Union (2006), Council Directive 2006/112/EC on the common system of value added tax.
[469] European Commission (2015), Taxation trends in the European Union.
[470] Belastingdienst (Accessed Aug 2016), Overview of deductible items and tax credits if you are subject to compulsory insurance in the Netherlands.
[471] European Commission (2015), Taxation trends in the European Union.
[472] Until January 1, 2016, the first 15 cubic metre of tap water for each person was exempt from water tax. Agentschap Informatie Vlaanderen (Accessed Aug 2016), Gratis hoeveelheid drinkwater per jaar (tot en met 2015).
[473] Nidirect (Accessed Sept 2016), Affordable Warmth grant scheme.
[474] All workers aged 25 and over are legally entitled to at least £7.20 per hour. HM Government (Accessed Aug 2016), The National Living Wage.
[475] Bundesagentur für Arbeit (Accessed Aug 2016), Child Benefit (Kindergeld).
[476] 'Titres services scheme'. The objective of job creation is associated with other goals, like curbing the incidence of undeclared labour and improving work-life balance. European Commission (2013), Developing personal and household services in the EU - A focus on housework activities.
[477] "Tickets Restaurant". Companies of a certain size are required by law either to have a cafeteria for their employees to eat in or to provide "tickets restaurant," a subsidized meal ticket. These meal tickets, which have a value of around €8 can be purchased for 50% off (the employer pays the other 50%). The tickets can then be used in most restaurants, boulangeries, and even supermarkets. The only restriction is that it must be used to purchase something ready to eat, like a meal or a pre-packaged. Edenred (Accessed Aug 2016), La Carte Ticket Restaurant.
[478] "Indemnité transport région parisienne". For employees living in the Paris area and take public transportation to work, employers must reimburse 50% of the cost. The amount is not taxable. Ministère du Travail, de l'Employ, de la Formation Proffessionelle et du Dialogue Sociale (Accessed Aug 2016), La prise en charge des frais de transport par l'employeur.

9. Integrated Value Added Statement (IVA)

"We need to face it: if we are to make our economic system really sustainable, it is inevitable that we redesign it. This requires an approach in which we will create value on three dimensions simultaneously: People, Planet and Profit."
- Feike Sijbesma[479]

The Ex'tax Project and its partners have created an *Integrated Value Added Statement* (IVA) for this international macro-economic study in an attempt to capture the full impact of the policy proposals. This chapter describes the scope of the IVA, the methodologies and data sources used to value the costs and benefits, and sets out key areas to expand and improve the assessment in the future.

9.1. Introduction

External costs and benefits
As mentioned in chapter 1.5, a classic example of an external cost (or a negative externality) is the air pollution caused by burning fossil fuels to produce electricity. Air pollution is damaging to the health of communities living nearby, creating increased healthcare costs, reduced life expectancy due to poor health and lost employment opportunities, but the electricity producer may not fully compensate communities for these costs. The health damage caused by air pollution represents an externality cost of electricity generation.

Conversely, many activities in the economy create external *benefits* (or *positive* externalities) for members of society. The creation of new employment opportunities, for example, increases wages paid into the community, which, in turn, increases purchasing power and economic growth. Employment has also been shown to contribute to health and wellbeing in net terms across the community.[480] The external benefits of job creation are generally not included in reports by the organizations creating new employment opportunities.

Partnership with Trucost
The *Ex'tax Integrated Value Added Statement* (IVA) seeks to present the impact of the policy proposals, including its impact on externalities. To perform this analysis, Ex'tax sought out the help of Trucost, a firm well-known for its groundbreaking work on quantifying and valuing externalities in monetary terms. Over the past decade Trucost has collected, researched and validated environmental data from organizations around the world. Trucost has worked with the *United Nations Environment Programme Finance Initiative* (UNEP FI),[481] UNEP,[482] the FAO,[483] the

[479] Sijbesma, Feike (Feb 1, 2013), We Need to Redesign Our Economy, Huffington Post.
[480] Waddell, G., Burton, A.K. (2006), Is Work Good for Your Health and Well-Being.
[481] UNEP Finance Initiative (2011), Universal ownership: why environmental externalities matter to institutional investors (full report).
[482] UNEP (2014), Valuing plastic: the business case for measuring, managing and disclosing plastic use in the consumer goods industry.
[483] FAO (2015), Natural Capital Impacts in Agriculture. Supporting better business decision-making.

TEEB for Business Coalition,[484] and Novartis,[485] among many others. In 2011, PUMA commissioned Trucost to assist in developing the *Environmental Profit and Loss Account* (EP&L).[486]

The Ex'tax IVA Statement presents best estimates of the impact of the tax shift scenario on the European Union's stock and flows of financial, natural and social capital over the period 2016-2020. While it is not possible to capture the complete effect of the policy shift on all aspects of these three capitals, the IVA Statement is a starting point from which future evaluations of policy can develop and improve.

[484] TEEB (2013), Natural Capital at Risk: The Top 100 Externalities of Business.
[485] Novartis commissioned Trucost to provide a comprehensive assessment of the carbon, waste and water supply chain footprint and identified areas of greatest impact.
[486] PUMA (2012), PUMA: Environmental Profit and Loss Account.

9.2. Scope

Applying a three-capital model

The IVA is based on two key modelling analyses:

- ***E3ME Macroeconomic Modelling***: Macroeconomic modelling of changes in direct and indirect financial flows in the economies of 27 European Union (EU-27) countries, undertaken by Cambridge Econometrics using the E3ME model. This modelling was used to quantify the changes in financial, social and natural capital with output in terms of changes in Gross Domestic Product (GDP), employment and demand for energy and resources.
- ***Natural and Social Capital Extension Modelling*:** Extension of the macroeconomic modelling to quantify and value positive and negative natural and social capital *externalities* resulting from changes in employment, energy and resource use. This modelling was undertaken by Trucost using the methodologies and data sources described in this chapter.

These modelling exercises combined allow for the analysis of the impact of the scenario on financial, social and natural capital:

1. **Financial Capital** represents the financial wealth of nations, measured as changes in economic growth (GDP) and productivity, including the influence of government tax receipts, social security expenditures, subsidies and investments.
2. **Natural Capital** represents the stock of natural assets (air, water and land) from which goods and services (from pollination to water purification) flow to benefit society and the economy. It is made up of ecosystems (providing renewable resources and services) and non-renewable deposits of fossil fuels and minerals.
3. **Social Capital** represents the opportunities of individuals in society to gain social inclusion, education, skills, employment (fair payment, living wage, income security and social protection as well as equal rights), social security, health, life expectancy and wellbeing.

Although a three-capitals is one of many approaches for measurement and reporting of holistic value,[487] it has been chosen to present the impacts in a clear and concise way.

Limiting the scope

The potential positive and negative externalities that may be created through a major change to the European economy, such as the Ex'tax scenario, are diverse and broad ranging. Trucost adopted the *Impact Pathway Approach*[488](originally developed under the European Union funded External Costs of Energy project) to quantify, value and attribute a range of externalities to the

[487] IIRC, for example, uses a six capitals model: financial, manufactured, intellectual, human, natural and social and relationship capital. IIRC (2013), Capitals Background Paper for Integrated Reporting. UNEP considers manufactured, human and natural capital. UNU-IHDP and UNEP (2014), Inclusive Wealth Report 2014. Measuring progress toward sustainability. WBCSD combines human capital and social capital. WBCSD (2015), Building the Social Capital Protocol: Insights into employment, skills and safety.

[488] Institute for Energy Economics (2014), The Impact Pathway Approach. This is a method of quantifying the externality costs and benefits of an activity by following the pathway from an initial change to business as usual (reduced unemployment), to its physical impacts (changes in measures of health and wellbeing caused by changes in employment) and finally to the monetary value of these impacts to society (willingness to pay for improvements in health or life expectancy).

policy changes. The Impact Pathway Approach is dependent on the availability of robust, timely and relevant data describing the causal links at each stage of a 'pathway' leading to an externality.

As such, not all possible externalities could be included in this IVA. Trucost focused on the externalities robustly supported by data and evidence and those likely to have the greatest material impact. The table below outlines the scope of impacts included in the IVA as well as some of the excluded impacts. Please note that this is not an exhaustive list and rather seeks to highlight aspects of financial, natural and social capital likely to be of relevance.

Table 9: Scope of the Ex'tax Integrated Value Added Statement

Impact category	Description	In E3ME Modelling	In Trucost Modelling
Financial Capital			
Tax Revenues	Net changes in government tax receipts	Yes	No
Social Security	Net changes in social security expenditure	Yes	No
Economic Growth	Net changes in economic output (GDP)	Yes	No
Other Government	Net change in subsidies and investments	Yes	No
Productivity	Net changes in human resource productivity through increased access to ongoing employment	No	No
Natural Capital			
Air Pollution	Human and ecosystem health effects of net changes in emissions of particulate matter, nitrogen oxides, sulphur dioxide and ammonia to air associated with energy use	No	Yes
Land and Water Pollution	Human and ecosystem health effects of net changes in emissions of toxic metals and chemicals to land and water associated with energy use	No	Yes
Climate Change	Social costs of future impacts of climate change associated with greenhouse gas emissions from energy use	No	Yes
Water Consumption	Human and ecosystem health effects of changes in water consumption	No	Yes
Land Use	Ecosystem service losses due to the displacement of natural ecosystems via the conversion of natural land to alternative uses	No	No
Waste	Human and ecosystem health effects associated with changes in waste production associated with energy use	No	Yes*
Nutrient Pollution (Eutrophication)	Human and ecosystem health, and economic effects of changes in nitrogen and phosphorous emissions associated with energy use	No	No
Metal and Mineral Depletion	Human and ecosystem health, and economic effects of the use and depletion of non-renewable deposits of metals and minerals	No	No
Social Capital			
Employment & Salaries	Net changes in employment and salaries paid throughout the economy	Yes	No
Life Expectancy linked to Employment	Net changes in population mortality rates and resulting gain in years of healthy life due to employment	No	Yes
Health and Wellbeing	Healthcare, opportunity and quality of life costs associated with net changes in population health	No	No
Social Inclusion and Poverty Risk	Costs arising the situation of people either at risk of poverty, or materially deprived or living in a household with a low work intensity	No	No
Education and schooling	Economic and intrinsic benefits from gaining skills and improving employment potential	No	No

* Waste impacts associated with changes in energy consumption are captured within other impact categories.

Although limited because of data constraints, the IVA represents an ambitious attempt to value the broader impacts of a fundamental policy change across various forms of capital. Taking these limitations into consideration, the externality benefits presented in the IVA are likely to underestimate the true natural and social capital value added by the scenario.

9.3. The Integrated Value Added Statement

Table 10 presents the integrated statement of the forecast economic social and natural capital value added under the Ex'tax scenario over the period 2016 to 2020 in the EU-27. Value added in each category is presented in monetary terms to enable comparison of the relationship between value added in traditional financial metrics (GDP) and in terms of improvements to environmental, human and social wellbeing. Sections 9.4 through 9.6 will provide an overview of the steps taken to come to these conclusions.

The scenario is expected to deliver significant financial, social and natural capital value compared to the baseline. The total value added under the Ex'tax scenario is estimated at over € 1,100 billion over a five-year period.

Table 10: The Ex'tax Scenario Integrated Value Added Statement

Cumulative value added over the 2016-2020 period for the EU-27
(€ billion, compared to baseline)

Impact	Description	Value Added (€ billion)	Share of total (%)
Financial Capital		**842.2**	**75%**
- National Income Growth	Net change in GDP	842.2	
Natural Capital		**259.5**	**23%**
- Climate Change	Avoided costs to society of future impacts of climate change	112.6	
- Air Pollution	Avoided costs to society due to illness and premature deaths associated with air pollution exposure	49.5	
- Land and Water Pollutants	Avoided costs to society due to human and ecosystem health damage associated with pollution of land and water with toxic chemicals and metals	93.8	
- Water Depletion	Avoided costs to society due to human and ecosystem health damage associated with depletion of freshwater resources	3.6	
- Other value (not yet included)**	Avoided costs to society due to less extraction of metals, land use, eutrophication etcetera	pm	
Social Capital		**17.4**	**2%**
- Health Benefits of Employment	Value of healthy years of life gained due to reduced unemployment experienced	17.4	
- Other value (not yet included)**	Value of education/skills, income security, economic equality, social stability and cohesion, productivity, reduced poverty risk, etcetera	pm	
Total Value Added		**1,119.2**	**100%**

(2016) The Ex'tax Project (scenario & design), Cambridge Econometrics (macro-economic modelling), Trucost (Value Added Statement).

Notes
• 2015 prices. Croatia is not (yet) included.
*** This analysis is based on the available literature. As such, not all externalities could be included.*

Financial and Natural Capital results

As explained in chapter 8, the tax shift scenario is expected to increase GDP across the EU-27 over the five years to 2020 by over € 842 billion compared to the baseline. Going beyond financial capital to include social and natural capital increases the value added under the scenario by a factor 0.33 to more than € 1,100 billion over five years. This is largely driven by significant improvements in natural capital associated with avoided greenhouse gases (€ 113 billion), reduced health impacts associated with air pollution (€ 49 billion), reduced health and ecosystem damages associated with water consumption (€ 4 billion) and reduced land and water pollution (€ 94 billion). In total, the natural capital value added under the Ex'tax scenario is € 260 billion over five years.

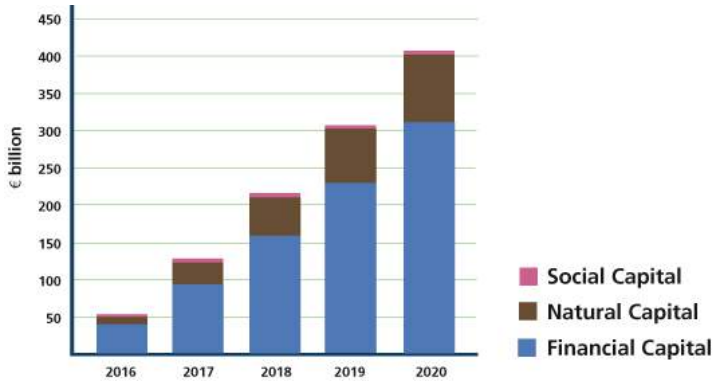
Social Capital results

Along with improvements in the natural environment, increasing employment in the EU-27 is a key focus of the Ex'tax scenario. It is expected that an additional 19.7 million person years of employment will be created across the EU-27 under the scenario. This additional employment will contribute to increased economic output, increased salaries and reductions in government social security payments, all of which are captured in the net change in GDP under the scenario. This does not however account for the extensive health and social benefits associated with reduced unemployment.

Improvements in population health (as represented by changes in life expectancy), just one aspect of the benefits of reduced unemployment, are expected to add over € 17 billion in social value over five years. The full benefits of reduced unemployment are likely to be much larger, including improvements in income security, economic inequality, poverty risk, social stability and cohesion, and the creation, loss and maintenance of human capital, and could be captured in future evaluations of tax shifts and other policies.

Below an overview is provided of the Integrated Added Value per type of capital.

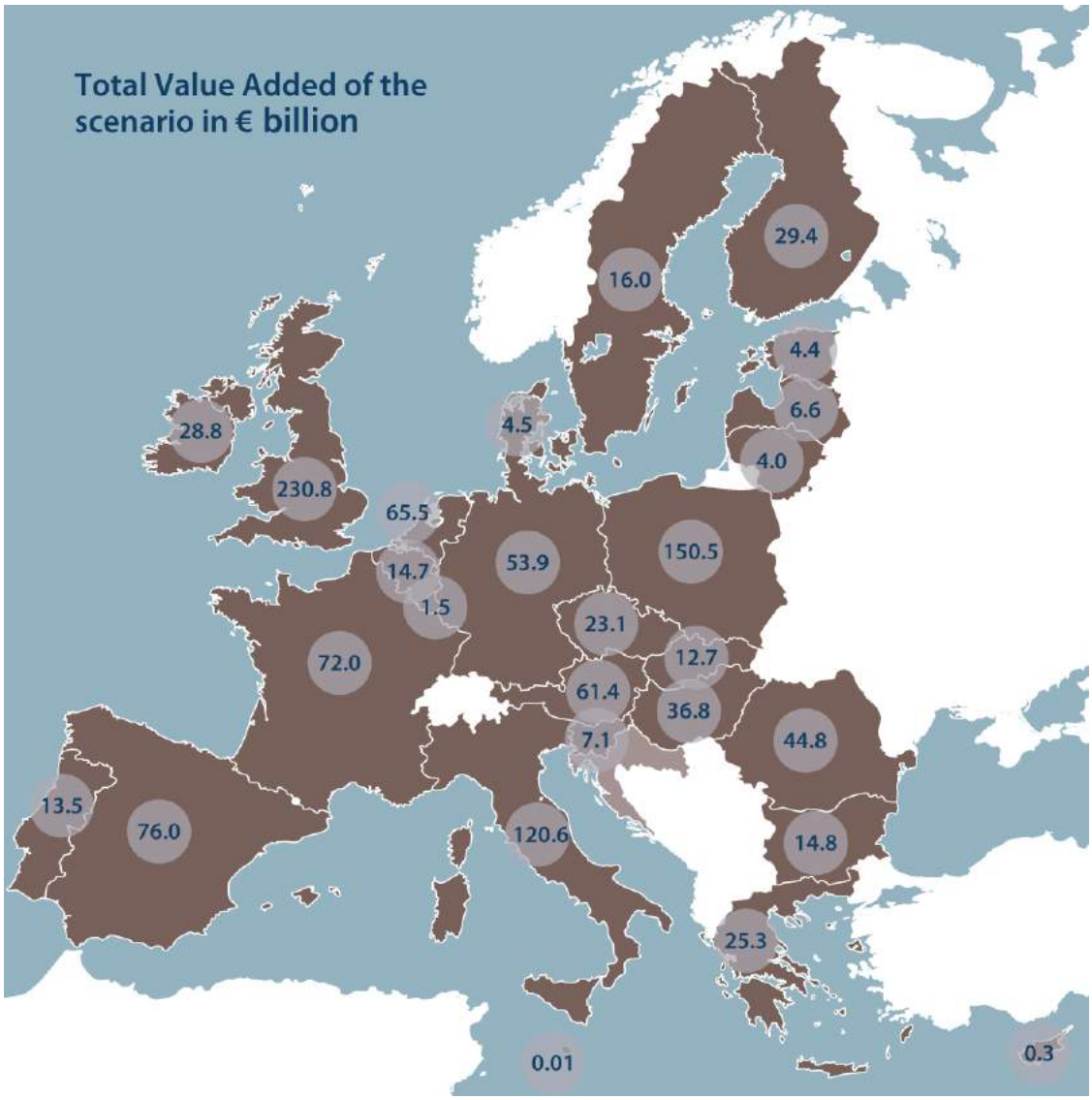
Figure 23: Integrated Value Added of the scenario by type of capital (EU-27, 2016-2020, difference from baseline, € billion)



Source: Trucost
(2015 prices)

The total cumulative added value over the 2016-2020 period is 75% *financial capital*, 23% *natural capital* and only 2% *social capital*. The relative small share of social capital value is due to the fact that the available data are limited and represent just a fraction of the expected health and social benefits of reduced unemployment. Figure 24 provides an overview of the added value found per country.

Figure 24: Integrated Value Added of the scenario by country (EU-27, 2016-2020 cumulative difference from baseline, € billion)



Source: Trucost
- Croatia is not included.

9.4. Key methods, assumptions and data sources

Table 11 describes the key methods, assumptions and data sources utilised to quantify and value changes in financial, natural and social capital under the Ex'tax scenario. As financial capital has been covered in chapter 8, the next sections will explain the methodologies and outcomes with regard to social capital and natural capital in more detail.

Table 11: Methods, assumptions and data sources underpinning the Ex'tax IVA Statement

	Macro-economic impacts (E3ME)	Valuation of External Costs and Benefits (Trucost)			
Impact Type	**Output**	**Biophysical Modelling**		**Valuation**	
		Approach	**Key Sources**	**Included Impacts**	**Key Sources**
Financial Capital					
National Income	GDP	GDP modelled by E3ME			
Natural Capital					
Air Pollution	Energy Consumption by Country/ Sector	- 'Most common uses' (heat, electricity and transport) mapped - Corresponding life cycle inventory datasets** analysed	Ecoinvent Database (Wernet et al, 2016)	**Human Health.** Value of DALYs* gained/lost due to changes in exposure	Desaigues et al (2006, 2011)
Land & Water Pollution	Energy Consumption by Country/ Sector	- 'Most common uses' (heat, electricity and transport) mapped - Corresponding life cycle inventory datasets** analysed	Ecoinvent Database (Wernet et al, 2016)	**Human Health.** Value of DALYs gained/lost due to changes in land and water pollution exposure **Ecosystem Health.** Value of ecosystem services gained/lost due to changes in ecosystem damage	Desaigues et al (2006, 2011) De Groot et al (2012) and Olson et al (2004)
Climate Change	Energy Consumption by Country/ Sector	- 'Most common uses' (heat, electricity and transport) mapped -- Corresponding life cycle inventory datasets** analysed	Ecoinvent Database (Wernet et al, 2016)	**Social Cost of Carbon.** Integrated assessment of future damages to agricultural productivity, human health, property damages from increased flood risk, and a range of other impacts associated with climate change	EPA (2016)
Water Consumption	GDP per Country/ Sector	- Corresponding life cycle inventory datasets** analysed - Estimation of business as usual water consumption (m3) by sector based on water intensity and GDP forecast - Estimation of water savings (m3) based on scenario (staged reduction to 6.25% below baseline by 2020)	Eurostat (2016)	**Human Health.** Value of DALYs gained/lost due to changes in malnutrition and poor sanitation associated with water scarcity **Ecosystem Health.** Value of ecosystem services gained/lost due to changes in water scarcity	Desaigues et al (2006, 2011) De Groot et al (2012) and Olson et al (2004)
Social Capital					
Health Benefits of Employment	Net change in employed persons	- Link unemployment status to change in mortality rate - Calculate change in baseline mortality rate per unemployed person in each EU-27 MS - Calculate change in deaths associated with change in the number of unemployed persons - Calculate years of healthy life gained per avoided death in each EU-27 MS	Roelfs et al (2011) WHO (2015) Eurostat (2014)	**Human Health.** Value of quality adjusted life years gained/lost due to changes in unemployment related mortality	Desaigues et al (2006, 2011)

Source: Trucost

Notes

** Disability Adjusted Life Years (DALY) is an integrated measure of the impact of disease on life expectancy (mortality) and ill health (morbidity) across a population. One DALY can be thought of as one year of lost healthy life across a population.*

*** Life cycle assessment (LCA) is a tool for the systematic evaluation of the resources consumed and emissions created by a specific process or activity, such as the generation of a kilowatt-hour of electricity from coal. Life cycle impact assessment models are used to estimate the effects of these emissions and resource consumption on a set of impact categories, such as human or ecosystem toxicity.*

9.5. Measuring impact on natural capital

Natural capital encompasses a broad range of natural assets, the status of many of which is not well-documented in international statistical data. This analysis focuses on the consumption of energy (particularly fossil energy resources) and water, as these are among the most well-documented drivers of external natural capital impacts. Table 12 summarises the most material natural capital impacts associated with energy and water use that are included in the IVA statement along with the methodologies used to value these impacts on human and ecosystem health. [489]

Table 12: Material external Natural Capital impacts included in the IVA Statement

Impact	Measurement scope	Valuation methodology applied
Impacts Associated with Energy Consumption		
Climate Change	Greenhouse gases that contribute to climate change expressed in units of CO2e	- The *Social Cost of Carbon* estimate by the *USA Interagency Working Group on Social Cost of Carbon* (IWGSCC).
Air Pollution	Air pollutants including ammonia, sulphur dioxide, particulates and nitrogen oxide	- Adaptation of impact studies estimating *Disability Adjusted Life Years* (DALYs) lost per metric ton of air pollutant emitted, weighted for country specific population density. - Valuation of DALYs lost at a global median income elasticity adjusted *Value of a Life Year* (VOLY).
Land and Water Pollution	Human and ecosystem damages caused by toxic metals and organic and inorganic chemicals emitted to land and water	- *Life cycle impact assessment models* were used to quantify the health and ecosystem impacts caused per metric ton of pollutant emitted to air, land and water. - Health impacts are valued at a global median income elasticity adjusted VOLY. - Ecosystem impacts valued based on the value of lost ecosystem services provided by a given ecosystem, drawing on data from the *Ecosystem Service Value Database*.
Impacts Associated with Water Consumption		
Water Consumption	Human health and ecosystem damages associated with restricted water availability	- Trucost developed a methodology linking the environmental services of water to its scarcity in the region where it is abstracted. - Health impacts are valued at a global median income elasticity adjusted VOLY. - Ecosystem impacts valued based on the value of lost ecosystem services provided by a given ecosystem, drawing on data from the *Ecosystem Service Value Database.*

Source: Trucost

[489] Further detail on Trucost's natural capital valuation methodologies is available upon request – please contact info@trucost.com.

9.5.1. Valuing impacts of energy and water use

Trucost quantified the externality benefits associated with reduced fossil energy demand and water consumption in Europe using a three-step process:

Step 1. Quantifying emissions of harmful pollutants and water consumption

Quantifying pollution associated with energy resources

The E3ME model provided the changes in consumption of a range of energy sources (including coal, gas, oil and combustible waste) in each of 22 industrial sectors and in all EU-27 countries under the scenario. In order to quantify the emission of harmful pollutants from the use (or avoided emissions from non-use) of these energy sources, it was necessary to consider how each energy source is most likely to be used in each sector. Trucost mapped each fuel and sector combination to a series of 'most common uses'. For example, consumption of coal, oil and gas in the power generation sectors was assumed to be for electricity production, while the use of these fuels in manufacturing sectors was assumed to be for heat production. The assumption was made that middle distillates (refined oil products) consumed in the road, air, rail and other transport sectors were used in transport, while in other sectors these distillates were used for the operation of machinery and vehicles.

Trucost then mapped the most common use of each energy source to life cycle inventory datasets included in the extensive global Ecoinvent database.[490] For example, coal consumption in the power generation sectors was mapped to Ecoinvent records describing the emissions created by the generation of electricity from coal. Care was taken to select records in the Ecoinvent database that are most representative of production technologies and conditions in Europe.

Finally, Trucost applied the *ReCiPe impact assessment methodology*[491] to estimate the quantity of greenhouse gases, air pollution and land and water pollution emitted (or avoided) due to changes in the consumption of each energy source in each sector and country.

Quantifying water use

The E3ME model did not estimate changes in water consumption (in cubic metres) under the scenario. Trucost estimated this change by first calculating the historical water intensity (water consumption per million Euros of GDP) in each sector and country using data from Eurostat.[492] Consistent data on water consumption is only available from Eurostat for a limited number of EU countries and sectors, so average water intensity was calculated for each sector based on available data for the years 2009 to 2013.

A water intensity trend was then calculated for each sector and used to estimate future water intensity in the years 2016 to 2020. This estimated water intensity was then multiplied by GDP projections by the E3ME model in each sector across the EU-27 countries to estimate the total future baseline water consumption.

This baseline was then reduced in line with water efficiency targets under the scenario and the difference in water consumption calculated for the EU-27 countries.

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[490] Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., and Weidema, B., 2016. The ecoinvent database version 3 (part I): overview and methodology. The International Journal of Life Cycle Assessment, [online] 21(9), pp.1218–1230. Available at: http://link.springer.com/10.1007/s11367-016-1087-8

[491] Goedkoop M.J., Heijungs R, Huijbregts M., et al. (2008), A life cycle impact assessment method which comprises harmonised category indicators at the midpoint and the endpoint level. First edition Report I: Characterisation; 6 January 2009.

[492] Eurostat (2016), Europe 2020 indicators - poverty and social exclusion.

Step 2. Quantifying the impacts on human and ecosystem health

Quantifying the impacts of energy resource use

Trucost utilised biophysical models, drawing on available scientific literature, to model the transfer of pollutants in the air, land and water, along with their interactions with human populations and natural ecosystems.

In the case of air, land and water pollutants, impacts on human health were quantified in terms of the number of Disability Adjusted Life Years (DALY) lost across the population while impacts on natural ecosystems were quantified in terms of the Potentially Affected Fraction (PAF) of species impacted by the pollution emitted. Impacts on species, and the resulting changes in biodiversity, are linked to changes in the capacity of ecosystems to deliver ecosystem services that are valued by society.

The human health and ecosystem impacts of toxic organic chemicals and heavy metals were modelled using the USES-LCA2.0 life cycle impact assessment model (EC;[493] National Institute of Public Health).[494] USES-LCA2.0 is capable of modelling the health and ecosystem damages caused by the emissions of over 3,300 chemicals to various environments such as agricultural land, urban air and freshwater. The health impacts of inorganic air pollutants (including nitrogen oxides, sulphur dioxide, ammonia and particulate matter) were modelled based on a study by Zelm et al.,[495] adjusting for differences in population density between countries.

Quantifying the impacts of water depletion

The human health and ecosystem impacts of depletion (or conservation) of water was quantified in terms of DALYs lost due to water scarcity related malnutrition and poor sanitation, and the proportion of species impacted by water scarcity respectively. Trucost utilised models published by Pfister [496] and Motoshita et al.[497] to estimate the human health and ecosystem impact of water depletion taking account of country specific characteristics such as water scarcity.

Step 3. Valuing the impacts in monetary terms

Valuing the impacts of pollution on human health

Impacts on human health, measured in Disability Adjusted Life Years (DALY), were valued based on the Value of a Life Year (VOLY). The VOLY is an estimate of a population's wiliness to pay for an extra year of life at full health. Trucost uses a VOLY derived from a study by Desaigues et al,[498] which utilised contingent valuation surveys in nine European countries to assess individual willingness to pay for environmental policy changes that would increase life expectancy. Willingness and capacity to pay for life extension is likely to vary based on income, so Trucost adjusted this VOLY estimate for all countries globally based on income per capita and an income elasticity factor of 0.5 and then calculated a global median, which was adopted in this study.

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[493] EC (2004), European Union System for the Evaluation of Substances 2.0 (USES 2.0). Prepared for the European Chemicals Bureau by the National Institute of Public Health and the Environment (RIVM). The Netherlands (RIVM Report no. 601900005).

[494] National Institute of Public Health and the Environment (2004), European Union System for the Evaluation of Substances 2.0 (USES 2.0).

[495] Zelm, R., Huijbregts, M. A. J., den Hollander, H. A., et al. (2008), European characterization factors for human health damage of PM10 and ozone in life cycle impact assessment. Atmospheric Environment. Vol.42, pp.441-453.

[496] Pfister, S. (2011), Environmental evaluation of freshwater consumption within the framework of life cycle assessment. DISS. ETH NO. 19490.

[497] Motoshita, M., Itsubo, N., Inaba, A. (2010), Development of impact factors on damage to health by infectious diseases caused by domestic water scarcity. International Journal of Life Cycle Assessment. Vol. 16, pp. 65-73.

[498] Desaigues, B., et al. (2011), Economic valuation of air pollution mortality: A 9-country contingent valuation survey of value of a life year (VOLY). Ecological Indicators. 11 (3), pp. 902-910. Based on surveys conducted in France, Spain, UK, Denmark, Germany, Switzerland, Czech Republic, Hungary and Poland (1,463 respondents).

Trucost chose to adopt an equal VOLY in all countries to avoid the ethical challenges associated with assigning a different value of life in lower versus higher income countries. The global median VOLY used in this study is € 42,630 per year gained or lost (2015 prices). This VOLY falls within a range of prior estimates identified by Trucost, from € 7,054 to € 183,724, and thus represents a conservative mid-range estimate of the VOLY.

Valuing the impacts of pollution on ecosystem function

Impacts on ecosystem function were valued based on the data provided in the Ecosystem Services Values Database,[499] a collection of over 665 published estimates of the monetary value of ecosystem services provided by a diverse range of natural ecosystems.

Valuing the impact of GHG emissions

Greenhouse gas emissions were valued based on the IWGSCC estimate of the *social cost of carbon* - a comprehensive estimate of the future damages to agricultural productivity, human health, property damages from increased flood risk, and a range of other impacts associated with climate change.[500] Trucost selected the upper range estimate of the social cost of carbon to account for the fact that not all future damaged from climate change can be foreseen, and that the most recent research on climate change has not yet been incorporated within the IWGSCC integrated assessment model. The social cost of carbon used in the IVA is € 111. This is significantly higher than the current value of European Emissions Allowances (EUA) traded on the EU Emissions Trading Scheme which reflect characteristics of the emissions permit market (such as the scarcity of permits and the costs of greenhouse gas abatement) rather than the future damages resulting from the emission of one tonne of greenhouse gas.

Table 13 outlines the average valuations applied to environmental impacts associated with energy resource use and water consumption.

Table 13: Monetary valuations for key environmental impacts

Issue	Key driver	Compound	External cost*
Climate Change	Greenhouse Gases	CO2e	€ 108/tonne
Water	Water	H2O	€ 0.02/m3
Air Pollution	Ammonia	NH3	€ 3,98/tonne
	Nitrogen Oxides	NOx	€ 2,766/tonne
	Sulphur Dioxide	SO2	€ 2,475/tonne
	Particulate Matter	PM10	€ 12,618/tonne
	Volatile Organic Compounds	VOC	€ 4,188/tonne
Land & Water Pollution	Land and Water Pollutants	1,4-DCB Eq	€ 361/tonne

Source: Trucost

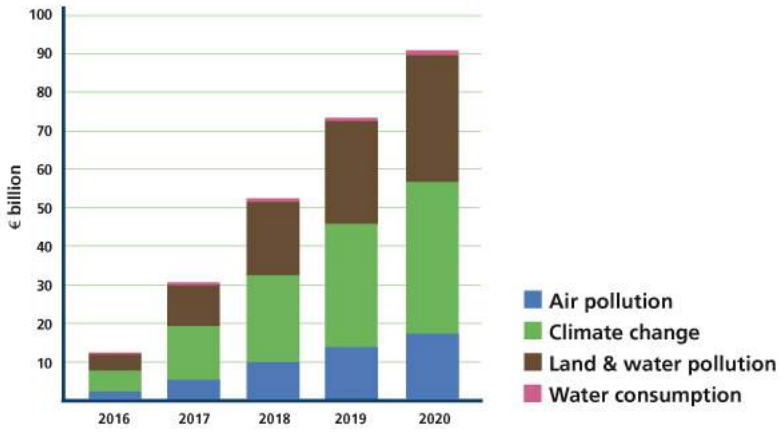
*EU GDP weighted averages in 2015 prices.

Figure 25 summarises the value of natural capital impacts avoided due to changes in energy use and water consumption in the EU-27 countries.

[499] De Groot, R., Brander, L., van der Ploeg, et al. (2012), Global estimates of the value of ecosystems and their services in monetary units. Ecosystem Services. 1, pp.50-61.

[500] EPA (2016), The Social Cost of Carbon.

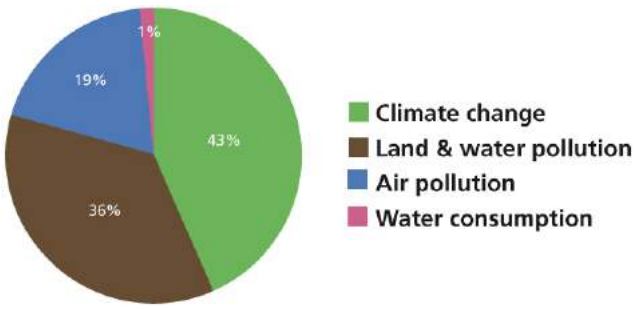
Figure 25: Avoided natural capital impacts in the scenario in € billion (EU-27, 2016-2020, difference from baseline)



Source: Trucost
(2015 prices)

Figure 26 illustrates the contribution of each natural capital impact indicator to the total environmental value added by the scenario over the period 2016 to 2020. Avoided greenhouse gas emissions is the most significant contributor (43% total), followed by land and water pollution (36%), air pollution (19%) and water consumption (1%).

Figure 26: Avoided natural capital impacts in the scenario by impact type (EU-27, 2016-2020 cumulative difference from baseline, % of total)



Source: Trucost

9.5.2. Limitations

Please note the following limitations to this approach:

- In order to model the natural capital impacts of changes in energy consumption, Trucost mapped the most common uses of each energy source in each industrial sector. While this approach is expected to provide a good approximation of energy use patterns across sectors, it is unlikely to completely represent the full diversity of energy uses across the EU-27 economy.

- Life cycle inventory data from the Ecoinvent database were used to estimate the emissions of harmful pollutants from energy consuming processes. While the Ecoinvent database is among the best available sources of life cycle environmental data, it is representative of industry average technologies and may not fully reflect the state of technology or environmental performance in specific sectors and countries.
- Changes in water consumption were calculated based on estimates of historical water intensity in Europe drawing on data from a limited number of European countries. Furthermore, future water consumption was estimated based on the assumption that historical trends in water intensity will persist into the future. Thus the estimates of water consumption underlying the IVA assume that the water intensity of a subset of countries and industries are representative of the entire EU-27, and that trends in historical water intensity are likely to be representative of future water intensity.
- Trucost's natural capital valuation methodologies are subject to a series of assumptions and limitations, which are described in detail in methodology documentation available on request from Trucost (info@trucost.com).

The next section will explain the approach taken to value impact on social capital.

9.6. Measuring impact on social capital

This section explores the methods used to quantify and value the benefits of increased employment to health and wellbeing.

9.6.1. The relationship between work, health & wellbeing

Unemployment can have significant direct impacts on personal income, government tax collection and expenditure on social benefits. Unemployment is a significant risk factor for poverty. Data from Eurostat[501] suggest that unemployed persons in the European Union are more than five times more likely to experience poverty or social exclusion than their working counterparts (at 66.7% compared to 13.1% in 2014). In all world regions, the relative risk of suicide associated with unemployment was elevated by about 20–30% during the period 2000-11.[502]

The impacts of persistent unemployment among the young can be particularly acute, leading to skills attrition, outward migration from a home country in search of employment, and potentially increased chances being unemployed and/or receiving lower wages in the future.[503]

The effects of unemployment-related poverty ripple throughout the economy through changes in consumer spending, impacting on demand for goods and services directly and indirectly, along

[501] Eurostat (2016), Europe 2020 indicators - poverty and social exclusion.
[502] Nordt, Carlos, Warnke, Ingeborg, Seifritz, Erich, et al. (2015), Modelling suicide and unemployment: a longitudinal analysis covering 63 countries, 2000–11.
[503] Banerji, A., Saksonovs, S., Lin, H., Blavy, R. (2014), Youth Unemployment in Advanced Economies in Europe: Searching for Solutions. IMF Staff Discussion Note.

with pressures on public sector expenditure on social benefits and lost revenue from taxes. These effects, associated with changes in wages, demand and government expenditures, have been captured within the macroeconomic modelling presented in chapter 8, demonstrating the positive changes in economic output that result from a tax system that encourages job creation and discourages externalities.

In contrast, the effects on health, wellbeing and societal functioning are more complicated. A review of available literature commissioned by the UK Department of Work and Pensions[504] found that unemployment is strongly associated with:

- Increased mortality.
- Poorer general health and longstanding illnesses.
- Poorer mental health and psychological distress and
- Higher demand for health and medical services, and increased admission to hospital.

Employment, on the other hand, was found to:

- Be the most important means of obtaining adequate economic resources to ensure material wellbeing and enable full participation in society.
- Meet important psychosocial needs in societies where employment is the norm.
- Be central to individual identity, social roles and social status.

These findings were supported by a more recent systematic review, which found that the best available evidence suggests that employment is generally beneficial for health, and in particular for depression and general mental health.[505] It must be noted however, that a range of physical and psychosocial aspects of work can be hazardous to both physical and mental health.[506] The quality of work and the physical and mental strain it causes is obviously very relevant. Workers' rights should be monitored and defended (both legally and morally) in any labour market, and especially during a phase of tax reform.

Based on the available literature, Trucost made an estimate of the value of changes in population health (as represented in mortality rates) associated with having a job, compared to the status of being unemployed. The next section will explain how this was done.

9.6.2. Valuing the impacts of employment

The E3ME model provides estimates of the change in the number of persons employed in each of the study years, but does not provide information on the type of employment (part-time versus full-time) and remuneration, nor does it provide information on the characteristics of the individuals gaining employment. Thus, in order to quantify and value the benefits of employment for health, Trucost sought to draw on the available research evidence to link changes in employment status with a robust measure of population health: mortality risk. Trucost took the following three steps to value this aspect of employment:

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[504] Waddell, G., Burton, A.K. (2006), Is Work Good for Your Health and Well-Being.
[505] van der Noordt, M., IJzelenberg, H., Droomers, M., Proper, K.I. (2014), Health Effects of Employment: A Systematic Review of Prospective Studies. Occup Environ Med. 2014;71(10):730-736.
[506] Waddell, G., Burton, A.K. (2006), Is Work Good for Your Health and Well-Being.

Step 1: Determining the link between unemployment and mortality

Risk of death among the unemployed 63% higher

Numerous studies have demonstrated a strong association between unemployment and all-cause mortality – the baseline rate of death from any cause in a population or group. A recent systematic review by Roelfs (et al)[507] synthesised the results of 42 studies of mortality and unemployment covering over 20 million individuals in 15 countries between 1984 and 2008. The authors found that across all studies the average risk of death among the unemployed, adjusting for age, gender and other covariates, was 63% higher than that of the general population.[508]

One hypothesis suggests that changes in health behaviours such as smoking[509], alcohol consumption[510] and illicit drug use[511] as a means of coping with unemployment are responsible for the increase in mortality risk. This may be further compounded by a lack of disposable income due to unemployment leading to poorer quality diets resulting in obesity[512] or unhealthy weight loss.[513] All of these factors are known to be associated with risk of various diseases and consequently, increased mortality risk.

Estimating mortality risk due to unemployment in the EU-27

Trucost used the findings of Roelfs et al. to estimate the net change in individual annual mortality risk due to unemployment in each EU-27 country based on country-specific baseline mortality rates for individuals aged under 64 years sourced from the WHO *European Health for All Database*.[514] Trucost then estimated the number of healthy years of life that would be lost due to a premature death caused by unemployment in each country based on Eurostat data.[515]

Step 2: Estimating the 'Value of a Life Year' (VOLY, the amount a population is wiling to pay for an extra year of life at full health)

Trucost uses a VOLY derived from a study by Desaigues (et al)[516] and adjusted this for income and income elasticity before calculating a global median value. The global median VOLY used in this study is € 42,630 per year gained or lost (2015 prices).

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[507] Roelfs, D.J., Shor, E., Davidson, K.W., Schwartz, J.E. (2011), Losing Life and Livelihood: A Systematic Review and Meta-Analysis of Unemployment and All-Cause Mortality. Soc Sci Med. 2011 March ; 72(6): 840–854.

[508] (Hazard Ratio: 1.63 (1.49-1.79). Roelfs, D.J., Shor, E., Davidson, K.W., Schwartz, J.E. (2011), Losing Life and Livelihood: A Systematic Review and Meta-Analysis of Unemployment and All-Cause Mortality. Soc Sci Med. 2011 March; 72(6): 840–854

[509] Barnes, MG., Smith, TG. (2009), Tobacco Use as Response to Economic Insecurity: Evidence from the National Longitudinal Survey of Youth. B E Journal of Economic Analysis & Policy. 9(1).

[510] Claussen B. 1999. Alcohol Disorders and Re-employment in a 5-Year Follow-up of Long-term Unemployed. Addiction. 94(1):133–138

[511] Alegria, M., Vera, M., Shrout, P., et al. (2004), Understanding Hard-Core Drug Use Among Puerto Rican Women in High-Risk Neighbourhoods. Addictive Behaviours. 29(4):643–664.

[512] Akil, L., Ahmad, H.A. (2011), Effects of Socioeconomic Factors on Obesity Rates in Four Southern States and Colorado. Ethn Dis. 21(1): 58–62. Laitinen, J., Power, C., Ek, et al. (2002), Unemployment and Obesity Among Young Adults in a Northern Finland 1966 Birth Cohort. International Journal of Obesity. 26(10):1329–1338.

[513] Bolton, KL., Rodriguez, E. (2009), Smoking, Drinking and Body Weight after Re-employment: Does Unemployment Experience and Compensation Make a Difference? BMC Public Health. 9:77.

[514] WHO (2015), European Health for All database.

[515] EUROSTAT (2014), At risk of poverty or social exclusion. Eurostat (2014), Healthy life years and life expectancy at birth, by sex. As the characteristics of the affected individuals are unknown, it was assumed that unemployment related deaths occur in the middle of working life considering country average retirement ages from OECD (2015). Ageing and Employment Policies - Statistics on average effective age of retirement.

[516] Desaigues, B., et al. (2011), Economic valuation of air pollution mortality: A 9-country contingent valuation survey of value of a life year (VOLY). Ecological Indicators. 11 (3), pp. 902-910.

Step 3: Establishing the present value of future life years gained

The present value of future life years gained was calculated by multiplying the estimated number of years lost due to premature death in each country by the value of a life year (€ 42,630, inflated at the long-term consumer price index forecast for Europe),[517] and then discounting to 2015 prices at a rate of 3% per annum.

Based on the three steps described above, total avoided mortality benefits due to increased employment under the Ex'tax scenario are estimated at € 1.16 billion in 2016 rising to € 5.8 billion per annum in 2020. Total cumulative avoided mortality (or life expectancy improvement) benefits are estimated at € 17.4 billion over the period 2016 to 2020 across the EU-27 countries.

Avoided mortality benefits are distributed between the EU-27 countries largely in proportion with the expected increase in employment under the tax shift scenario, but also taking account of varying retirement ages, baseline mortality rates and healthy life expectancy in each country. Benefits are greatest in the most populous and highest national income countries in the European Union: United Kingdom, Poland, Germany, France, Spain and Italy.

9.6.3. Limitations

Please note the following limitations to this approach:

- While the evidence for the association between unemployment and mortality is strong, the question of whether the relationship is causal remains open since poor health could be both a cause, or an outcome of unemployment, or a combination of both. Some studies have concluded that adjusting for prior health state explains part, but not all, of the increase in mortality risk associated with unemployment.[518]
- The health impacts of diseases associated with unemployment, or any other cause, include a combination of reduced life expectancy (relative to the population average) and a loss of quality of life due to illness. Lost quality of life may contribute a greater share of the overall health impact for chronic and non-fatal conditions such as depression or diabetes in contrast to acute conditions such as heart attack, which can arise suddenly resulting in premature death. The valuation of the health benefits of avoided unemployment presented here includes only the lost life expectancy associated with disease, and thus is likely to be an underestimate of the total health benefits of reducing unemployment. It was not feasible to estimate these benefits within the scope of this study. However, future analyses should investigate the benefit of avoided quality of life losses.
- This estimate of the health benefits of reduced unemployment assumes that all unemployment-related premature deaths occur in the middle of working life due to a lack of information about the individual characteristics of those expected to gain employment under the scenario. If these deaths were to occur at a younger age, the avoided mortality benefits would be greater under the tax shift scenario. Conversely, if these deaths were to occur closer to the end of life then the avoided mortality benefits would be less.

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[517] European Central Bank, 2016.

[518] Lundin, A., Lundberg, I., Hallsten, L., et al. (2010), Unemployment and mortality -a longitudinal prospective study on selection and causation in 49321 Swedish middle-aged men. J Epidemiol Community Health 2010; 64:22-28

9.7. Areas to expand and improve the assessment

The Integrated Value Added analysis in this report represents an initial attempt to quantify and value the financial, social and natural capital benefits of a fundamental tax shift scenario based on publically available data and scientific literature. This analysis finds various limitations and omits possible externalities that cannot be reliably quantified or valued based on the current state of knowledge. Future studies may capture these externalities and provide a clearer and more complete picture of the financial, social and natural capital impact of reduced unemployment and more sustainable natural resource management. Key recommended focus areas for future development are:

1. Understanding the social value of employment

While this analysis captures some aspects of the social value of employment such as increased income, reduced social security expenditure and reduced mortality, a diverse range of potential impacts have been omitted due to a lack of reliable data and models. These impacts include, but are not limited to, the impact of employment on income security, economic inequality, poverty risk, social stability and cohesion, and the creation, loss and maintenance of human capital in a society.

We recommend that future integrated value added studies seek to draw upon existing research and where possible, invest in further research and methodological development to value these additional social benefits in monetary terms.

2. Understanding the value of the health benefits of work

This analysis captures the impact of unemployment on population average mortality rates (or life expectancies), but this is likely to represent just part of the impact of work on human health and wellbeing. The best available evidence suggests that employment is generally beneficial for health, and in particular for depression and general mental health. Some unemployment-related diseases such as depression can be chronic, leading to extended periods in which patients live with disease. This results in increased healthcare costs, opportunity costs associated with lost earnings or in-kind contributions to family and community life, and reduced personal quality of life.

The scientific literature on the economic costs of poor health is vast and could be leveraged in future projects to more fully capture the health impacts of reduced unemployment where a strong link to unemployment can be demonstrated.

3. National monitoring of water consumption

Currently available data on the consumption of freshwater at the European level is poor and limited to a sub-set of countries and industry sectors. Better availability of robust water monitoring data is essential for better management of Europe's water resources and in the future targeting of tax measures to incentivize greater water efficiency.

We recommend greater investment in the capacity of statistical bodes to measure and monitor water consumption on a consistent basis over time. As mentioned before, considering the economic risks of water scarcity, it is unfortunate that water efficiency is not a headline indicator in the Europe 2020 Strategy.

The next chapters will present the overall aggregate EU-27 results, and four case studies.

10. Summary of the EU-27 results

The next pages provide an overview of the results on an aggregate EU-27 level:

1. **Data Sheet**
   The data sheet contains information on the economic structure, labour market and social issues as well as natural resource use in the EU-28 (including Croatia).

2. **Relevant Features of the Tax System**
   This sheet contains information on the fiscal structure in the EU-28, as well as trends in tax revenues, the share of labour taxes versus environmental taxes, the composition of environmental taxes and fossil fuel subsidies.

3. **Member States comparison on key tax indicators**
   This sheet compares 28 EU Member States with regard to several indicators (total tax revenue, and the percentages of labour tax, environmental tax and VAT in total tax revenues).

4. **The Scenario**
   This sheet provides a summary of the scenario on an EU-27 basis, as well as recommendations by international organizations in support of such a tax shift.

5. **Results Sheet**
   This sheet provides insight in the EU-27 key modelling results, an Integrated Value Added Statement and conclusions.

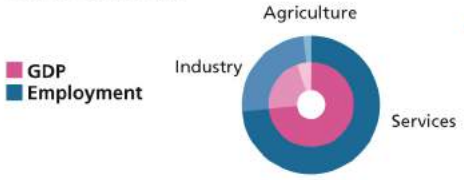
Appendix 3 provides a full list of references used in these files.

European Union: Data sheet

Situation 2012 (unless specified differently)

The economy at a glance

Population	504 million
GDP	€ 12,968 billion
Real GDP growth	0.9% (average 2004–2014)
Sector contribution	



Currency	Euro and 9 other currencies (2015)
Exports	€ 5,726 billion (services 30%, goods 70%)
Main goods	Nuclear reactors, boilers, machinery, vehicles, mineral fuels, oils, distillation products, electronic equipment
Main destinations	USA, China, Switzerland, Russia
Imports	€ 5,467 billion (services 23%, goods 77%)
Main goods	Mineral fuels, oils, distillation products, nuclear reactors
Main origins	China, Russia, USA, Switzerland
R&D expenditure	2.0% of GDP (2020 target: 3.0%)

The world's largest single market

The 2nd largest economy in the world after China (2015 est.)

Growth has gathered pace since mid-2014

The EU accounts for around 16% of the world's trade in goods

The 3rd largest importer in the world

Labour market & social issues

Labour force	330 million
Unemployment	25 million (10.5%)
Youth unemployment	23.3%
Underemployment/ underutilised labour potential	45.8 million (Unemployed + underemployed parttime workers + persons seeking but not immediately available + persons available but not seeking)
Employment rate	68.4% (2020: 75%)
People at risk of poverty/social exclusion	123.8 million (24.7% of population)
Expenditure on social protection	€ 7,320 per inhabitant
Share of population aged > 65 years	17.9% (2060: 27%)

Although unemployment has been declining since 2012, by October 2016, still 20.5 million Europeans were unemployed, including 4.2 million young persons

The lowest youth unemployment rate recorded in Germany (6.9%); the highest in Greece (46.5%) and Spain (43.6%) (Aug/Oct 2016)

Almost 50 million Europeans are 'severely materally deprived', including 10 million children

Hourly labour cost range between € 4.08 in Bulgaria and € 41.31 in Denmark (2015)

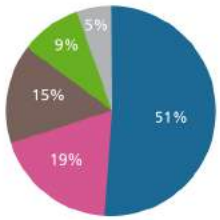
Notes

- Long-term unemployment is one of the main concerns of policymakers. Apart from its financial and social effects on personal life, long-term unemployment negatively affects social cohesion and, ultimately, economic growth. 4.5% of the labour force in the EU-28 in 2015 had been unemployed for more than one year.
- In October 2016, the lowest unemployment rates were recorded in the Czech Republic (3.8%) and Germany (4.1%). The highest rates were observed in Greece (23.4% in August 2016) and Spain (19.2%).
- The inflow of refugees is a major challenge, especially in Germany, Austria, Sweden and Hungary.

Natural resource use

Raw materials

Raw material imports	3,329 million tonnes



Air pollution

Premature deaths attributable to air pollution	491,000 people
Annual cost of pollution from coal	€ 88.5 billion (2013)
GHG emissions *-of which CO2*	4,691 million tonnes 3,119 million tonnes
2020 GHG emission reduction target	20% (compared to 1990)

Energy

Energy consumption	1,685 million toe
Import dependency	53.4%
Fossil fuel net import bill	€ 421 billion (957 million tonnes)
Energy from renewable sources	14.3% (2014:16%)
2020 Renewable energy target	20%

Water

Freshwater withdrawals	Limited data available

Waste

Total waste	2,514,220 million kg (4,982 kg per capita)
of which, amongst others: **Food waste**	93,960 million kg (186 kg per capita)
Electronic waste (WEEE)	No aggregate EU data
Chemical waste	57,880 million kg (115 kg per capita)

A € 33 billion trade balance deficit for raw materials

If everyone on the planet consumed as much as the Europeans, 2 earths would be needed

Each year, air pollution kills almost half a million Europeans

The 3rd largest carbon emitter in the world

The EU spends more than €1 billion every day on importing energy (2013)

In 2015, China spent 2.5 times more on clean energy than the EU

At least 11% of Europe's population is affected by water scarcity, putting the cost of droughts over the past 30 years at € 100 billion (2007 estimate)

The Circular Economy Package (adopted in 2015) includes legislative proposals on waste to stimulate Europe's transition towards a circular economy

Notes

- The EU Emission Trading System (ETS) is the world's largest GHG emissions trading system covering about 45% of the EU's total GHG emissions. Carbon emission allowances trade at less than € 10 per tonne providing only a weak incentive to invest in low-carbon technologies.
- The Europe 2020 strategy and its flagship initiative Roadmap to a Resource Efficient Europe aim to transform EU economies towards decoupling economic growth from resource use.
- The 2030 Framework for Climate and Energy includes a 40% cut in GHG emissions compared to 1990 levels; a 27% share of renewable energy consumption; 27% energy savings; a reformed ETS and a 10% electricity interconnection target.

European Union: Relevant tax features

Situation 2012 (unless specified differently)

"The power to levy taxes is central to the sovereignty of EU Member States, which have assigned only limited competences to the EU in this area.

The development of EU tax provisions is geared towards the smooth running of the single market, with the harmonisation of indirect taxation having been addressed at an earlier stage and in greater depth than that of direct taxation.

Alongside these efforts, the EU is stepping up its fight against tax evasion and avoidance, which constitute a threat to fair competition and are the cause of a major shortfall in tax revenues."

- European Parliament, 2016

Collecting taxes is the competence of each individual EU country

Trends in tax revenues 2002-2012

(% of total tax revenues)

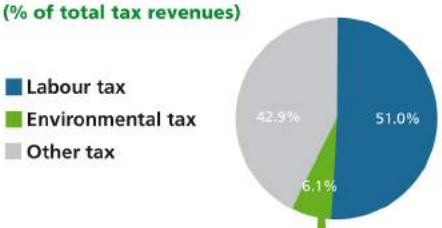
Labour taxes	+ 0.2%
VAT	+ 0.6%
Environmental taxes	- 0.6%

Of every € 1,00 an employer pays to the employee, € 0,40 goes to labour taxes (low-wage earner)

Environmental taxes peaked in 2003

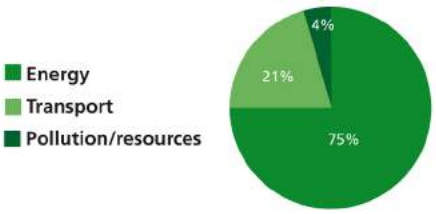
Labour vs environmental taxes

(% of total tax revenues)



Environmental tax revenue: € 312 billion (2.4% of GDP)

Environmental tax composition



The vast majority (75%) of environmental tax revenue came from taxes on energy

Fossil Fuel Subsidies

(Based on OECD.Stat)

Fossil fuel subsidies (tax expenditures + budgetary transfers in 21 Member States, data not available for Lithuania, Croatia, Cyprus, Malta, Bulgaria, Latvia, Romania)	**€ 24 billion (2014)**

Tax revenues structure

	€ mln	% of tax revenues	% of GDP
VAT	926,909	18.1%	7.1%
Excise duties and consumption taxes	349,137	6.8%	2.7%
Other taxes on products (incl. import duties)	188,006	3.7%	2.3%
Other taxes on production	299,051	5.9%	1.4%
Indirect taxes	**1,763,102**	**34.5%**	**13.6%**
Personal income	1,222,596	23.9%	9.4%
Corporate income	322,756	6.3%	2.5%
Other	162,061	3.2%	1.2%
Direct taxes	**1,707,414**	**33.4%**	**13.2%**
Employers' contributions	947,928	18.6%	7.3%
Employees' contributions	506,444	9.9%	3.9%
Self- and non-employed	198,794	3.9%	1.5%
Social contributions	**1,653,166**	**32.4%**	**12.7%**
Total	**5,109,446**	**100.0%**	**39.4%**

Tax revenues by economic function

	€ mln	% of tax revenues	% of GDP
Labour (including social contributions, payroll & earned income taxes)	1,603,336	51.0%	20.1%
Consumption (including VAT, duties & environmental taxes)	1,457,914	28.5%	11.2%
Capital (including taxes on profits, savings, exports & assets)	1,061,752	20.8%	8.2%
Total	**5,109,446**	**100.0%**	**39.4%**

Notes

- According to the Treaty, tax measures must be adopted unanimously by the Member States.
- 26 Member States are using fiscal incentives to encourage investment in R&D. Eight countries also grant tax relief for the social contributions and/or payroll taxes paid on the salaries of employees working in R&D.

Sources

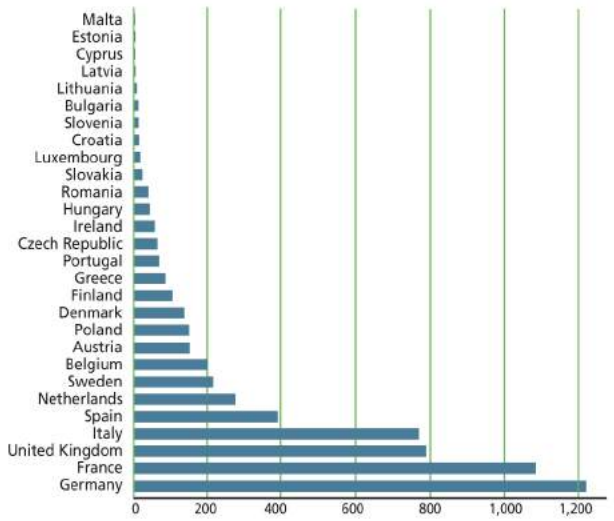
The information in these sheets is mainly drawn from the CIA, EEA, Eunomia, European Commission, European Parliament, Eurostat, Global Footprint Network, IMF, OECD and the UN. A full list of references is provided separately.

European Union: Member State comparison

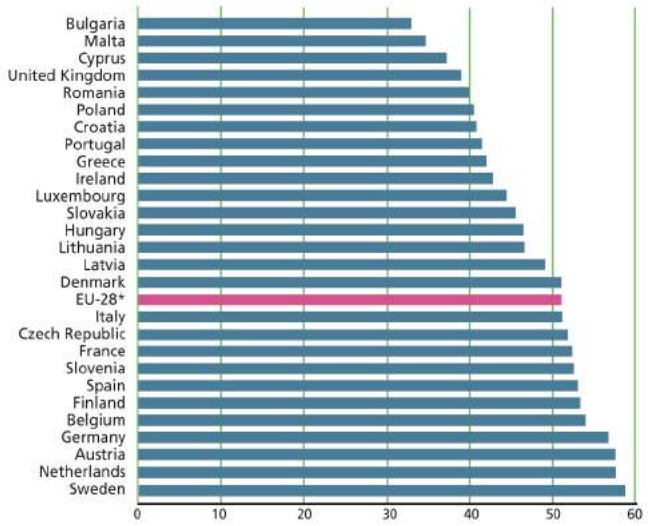
Situation 2012 (unless specified differently)

Tax systems across EU Member States vary significantly.
These graphs illustrate some indicators relevant to a tax shift scenario

Total tax revenues *(€ billion)*



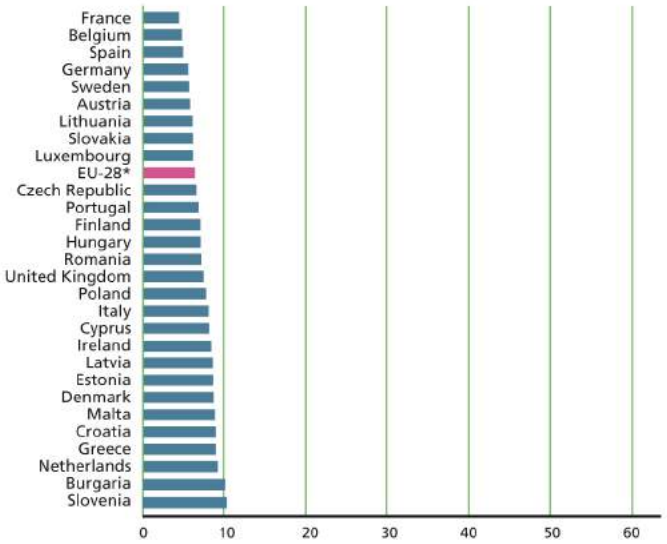
Taxes on labour *(% of total taxation)*



On average, labour taxes provide 51% of tax revenues*

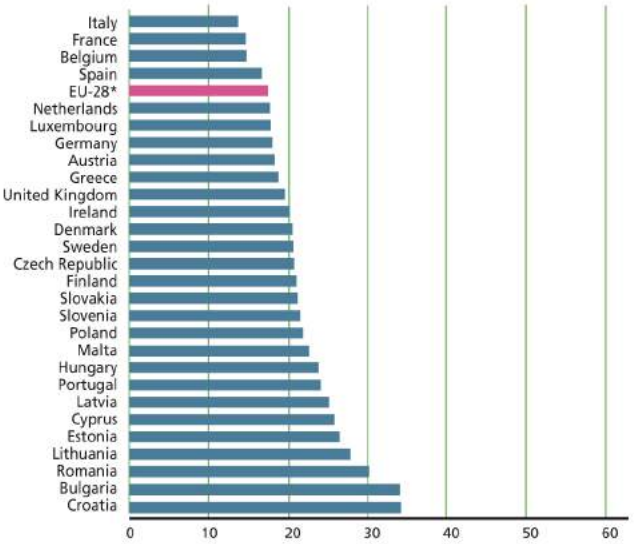
Labour taxes in Eurostat data include Social Contributions

Environmental taxes *(% of total taxation)*



On average, environmental taxes provide 6% of tax revenues*

Value Added Tax (VAT) *(% of total taxation)*



On average, VAT provides 18% of tax revenues *

Standard VAT rates range between 15% (Luxembourg) and 27% (Hungary)

Reduced VAT rates range between 5% (Cyprus, Lithuania, Hungary, Malta, Poland, Romania, UK) and 18% (Hungary)

*** Weighted Average**

European Union: Tax Shift Scenario

Shifting taxes from labour to natural resources & consumption

(Impact on EU-27 government budgets, 2020*, difference from baseline, in 2015 prices)

Labour

€ 554 billion decrease

Shifting 13% of all EU labour taxes to environment and consumption

Lowering personal income tax rates across EU Member States on average by 5.6 percentage points

In some countries, income tax rates can fall up to 20 percentage points

Lowering the costs of labour for employers by € 178.4 billion (without changing the social protection base)

Pension rights are to remain unchanged

Income tax & SC - 535.8

- Reduction of income tax and employee SC - 357.4
- Payroll tax credit for new employment *(1% of GDP, employers benefit only as far as labour demand is increased structurally)* - 125.9
- Reduction of employers' SC - 29.2
- Payroll tax credit for circular innovation *(0.15% of GDP)* - 23.3

VAT *(0% on specific services) (a)* - 18.2

Resource use

€ 554 billion increase

Fossil fuels (b) 290.5

- Excise duty on transport fuels *(gasoline, diesel, € 0.60/l)* 256.4
- Excise duty on aviation fuel *(€ 0.30/l)* 33.2
- Excise duty on natural gas *(€ 8.90/MWh)* 0.9

VAT 143.9

- Standard rate up *(to 21%)* 111.2
- Reduced rate up *(to 10%)* 32.7

Air pollution 66.4

- Carbon tax *(€ 30/ton, in addition to ETS price & auction)* 66.4

Electricity tax *(€ 50/MWh, bulk users) (c)* 32.5

Water *(25% cost increase industrial use)* 20.7

(d)

By applying 'the polluter pays' principles, a tax shift improves the competitiveness of labour-intensive sectors vis-a-vis resource- and pollution- intensive industries

Raising awareness on the benefits would be key. A gradual implementation (beyond 2020) is advisable

The EU-28 (simple) average standard VAT rate was 21.1% in 2012; 21.5% in 2014

The EU-28 (simple) average reduced rate was 8.9% in 2012 and in 2014

The ETS price stands at € 6.10/tCO2 (Nov 8, 2016)

Notes

* In the modelling, the measures are phased in over a five-year period; reaching full force in 2020. Croatia is not included.
(a) Labour-intensive services (maintenance & repair).
(b) In addition to: gasoline: € 1.38/litre; diesel: € 1.26/litre (2014) (including taxes and levies); natural gas: € 71/MWh (consumers, annual consumption 5.6-56 MWh); € 34/MWh (industries, consumption 2,778-27,778 MWh) (2015).
(c) In addition to an EU-28 average price of € 119/MWh (excluding refundable taxes and levies and VAT, annual consumption: 500-2,000 MWh. Eurostat does not publish tarrifs for larger bandwidths) (2015)
(d) Secondary effect (€ 0.09 billion) due to change in labour costs and economic impacts. There are no direct stimulus or austerity effects in the scenario.

(2016) The Ex'tax Project & Cambridge Econometrics

"employment and growth can be stimulated by shifting the tax burden away from labour towards other types of taxes which are less detrimental to growth, such as recurrent property, environment and consumption taxes".

- European Commission, 2014

"Member States should also address the high tax wedge on labour, which weighs on labour costs and reduces the net take-home-pay of employees.

- European Commission, 2016

"While the labour market situation is gradually improving, not least due to reforms implemented in several Member States in recent years, unemployment is still intolerably high (9.6%). Poverty and marginalisation have increased. (...)

Although many Member States recognise the need to shift taxation away from labour and to eliminate distortions in the tax systems, progress has been slow.

High levels of labour taxation, particularly on low income earners, may inhibit job creation and incentives to participate in the labour market."

- European Commission, 2015

"tax wedge reductions need to be compensated (...) through revenue-neutral tax shifts, away from labour to revenue sources that are less detrimental to growth such as consumption taxes, recurrent property taxes and/or environmental taxes (...) A high tax burden on labour is an impediment to the objective of supporting economic activity and increasing employment."

- Eurogroup, 2014

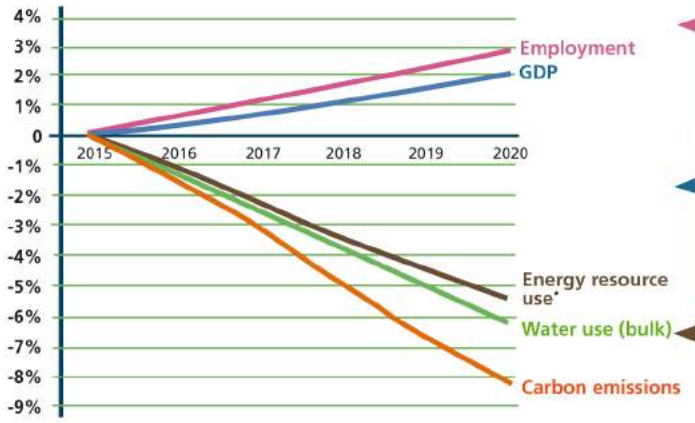
"Reduce the tax wedge on labour, particularly on low-earners, in a budgetary-neutral way to foster job creation."

- Council of the European Union, Euro area recommendation, 2016

European Union: Results sheet

Key Modelling Results

(EU-27, 2016-2020, % difference from baseline)



By 2020: 6.6 million more people in employment, (equivalent to a third of current EU unemployment)

Each of the 27 Member States experience positive GDP and employment impacts

Over the course of 5 years, the scenario saves € 27.7 billion on the EU energy import bill

(2016) The Ex'tax Project & Cambridge Econometrics

Key Modelling Results

(EU-27, 2020, % difference from baseline)

GDP	2.0%
Consumption	3.1%
Investment	2.0%
Imports	0.7%
Exports	0.0%
Employment	2.9%
Carbon emissions	- 8.2%
Water use (bulk)	- 6.3%
Energy resource use*	- 5.4%

* Hard coal, other coal, crude oil, heavy fuel oil, middle distillates, natural gas, other gas, electricity, heat, combustible waste, biofuels, hydrogen.

Integrated Value Added Statement

(EU-27, cumulative added value 2016-2020, € difference to baseline)

Impact	Description	Value Added (€ billion)	Share of total (%)
Financial Capital		**842.2**	**75%**
- National Income Growth	Net change in GDP	842.2	
Natural Capital		**259.5**	**23%**
- Climate Change	Avoided costs to society of future impacts of climate change	112.6	
- Air Pollution	Avoided costs to society due to illness and premature deaths associated with air pollution exposure	49.5	
- Land and Water Pollutants	Avoided costs to society due to human and ecosystem health damage associated with pollution of land and water with toxic chemicals and metals	93.8	
- Water Depletion	Avoided costs to society due to human and ecosystem health damage associated with depletion of freshwater resources	3.6	
- Other value (not yet included)**	Avoided costs to society due to less extraction of metals, land use, eutrophication etcetera	pm	
Social Capital		**17.4**	**2%**
- Health Benefits of Employment	Value of healthy years of life gained due to reduced unemployment experienced	17.4	
- Other value (not yet included)**	Value of education/skills, income security, economic equality, social stability and cohesion, productivity, reduced poverty risk, etcetera	pm	
Total Value Added		**1,119.2**	**100%**

Each of the 27 Member States experience positive GDP and employment impacts

In addition to business as usual

1,038 million tonnes of CO2 emission reductions

194 million tonnes of oil equivalents saved (12 types of energy sources)*

219 billion cubic metres of water saved

19.6 million additional 'person years of employment'

An Integrated Value Added of more than € 1,100 billion

Notes

- 2015 prices.
- Croatia is not included.

** This analysis is based on the available literature and proven and quantified linkages. As such, not all externalities could be included.

(2016) The Ex'tax Project (scenario & design), Cambridge Econometrics (macro-economic modelling), Trucost (Value Added Statement).

It is possible to design policies that reduce resource use and carbon emissions, while stimulating the economy and job creation across the Member States of the European Union.

The total added value of the Ex'tax scenario compared to baseline is more than € 1,100 billion over a five-year period.

A taxs shift aligns EU fiscal systems with the goals of the Europe 2020 Strategy, the Roadmap to a Resource Efficient Europe, the Paris Climate Agreement and the SDGs.

11. Case studies

This chapter provides insights in the impact of the tax shift scenario in different economies. For the sake of brevity, four EU countries have been selected (in alphabetical order): Germany, Poland, Spain and the Netherlands. These countries have been chosen on the basis of their different characteristics as well as the available consulting expertise in the analysis. During a special 'boot camp' in September 2015, a group of international tax experts of Deloitte, EY and PwC helped analyse the different points of view among EU Member States.

Each of the countries is reviewed in terms of its economic structure, fiscal structure, labour market, social issues, and natural resource use, as well as how the scenario works out in each country. Without fully validating the scenario from each national perspective, a few areas are identified that require special attention in implementation.

The following material will be presented on a country-by-country basis:

1. **Data Sheets**
   Data sheets contain information on the economic structure, labour market and social issues as well as natural resource use of each case study.

2. **Relevant Features of the Tax System**
   These sheets contain information on the fiscal structure of each case study, as well as trends in tax revenues, the share of labour taxes versus environmental taxes, the composition of environmental taxes and the fossil fuel subsidies.

3. **Scenario Sheets**
   These sheets provide a summary of the scenario on a country basis, as well as EU and OECD recommendations in support of such a tax shift.

4. **Results Sheets**
   The results sheets provide insight in the key modelling results, an Integrated Value Added Statement and conclusions for each case study.

Appendix 3 provides a full list of references used in these files.

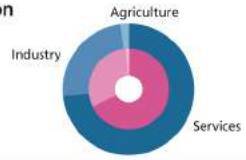
11.1. Germany

Germany: Data sheet

Situation 2012 (unless specified differently)

The economy at a glance

Population	80.3 million
GDP	€ 2,666 billion
Share of EU GDP	21%
Real GDP growth	1.3% (average 2004–2014)
Sector contribution	



Currency	Euro
Exports	€ 1,267 billion (services 15%, goods 85%)
Main goods	Cars, Vehicle Parts, Packaged Medicaments, Planes, Helicopters, Spacecraft, Refined Petroleum
Main destinations	USA, France, UK, China, the Netherlands
Imports	€ 1,099 billion (services 21%, goods 79%)
Main goods	Crude Petroleum, Petroleum Gas, Cars
Main origins	Netherlands, China, France
R&D expenditure	2.9% of GDP (2020 target: 3.0%)

The most populous country of the EU

The 5th largest economy in the world; the largest in the EU

Services provide 68% of GDP; 74% of employment

The 3rd largest exporter in the world

The 3rd largest importer in the world

Labour market & social issues

Labour force	40.5 million
Unemployment	2.2 million (5.4%)
Youth unemployment	8%
Underemployment/ underutilised labour potential	5.0 million (Unemployed + underemployed parttime workers + persons seeking but not immediately available + persons available but not seeking)
Employment target	77% (2020: reached in 2013)
People at risk of poverty/social exclusion	15.9 million (19.6% of population)
Expenditure on social protection	€ 9,390 per inhabitant
Share of population aged > 65 years	20.7% (2060: 31%)

The largest labour force in the EU

One of the lowest unemployment rates in the EU

3.9 million Germans are 'severely materially deprived', including 573,000 children

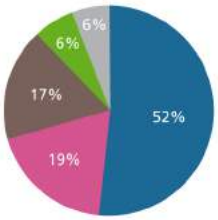
Notes

- In 2015, the statutory minimum wage was introduced. In April 2014 the pay for 5.5 million jobs in the country was lower than the new gross minimum wage of € 8.50/hour.
- The tax burden on household labour income rises strongly when a second person takes up employment. Disincentives to work full-time in the tax system contribute to low earnings of women as many work part-time. 20% of women only work on a minijob and women account for over 60% of all minijobbers. (2014)
- Germany faces the challenge of integrating large numbers of refugees (2016).
- Germany is one of the founders of the EU.

Natural resource use

Raw materials

Raw material imports	622 million tonnes



Air pollution

Premature deaths attributable to air pollution	72,000 people
Annual cost of pollution from coal	€ 21.4 billion (2013)
GHG emissions *-of which CO2*	949.7 million tonnes 698.3 million tonnes
2020 GHG emission reduction target	14% (compared to 1990)

Energy

Energy consumption	318.6 million toe
Import dependency	61%
Fossil fuel net import bill	€ 98 billion (231 million tonnes)
Energy from renewable soures	12% (#17 in EU)
2020 Renewable energy target	18%

Water

Freshwater withdrawals	33 billion m3 (2010) (Industry 84%, domestic 15%, agriculture 1%)

Waste

Total waste	368,022 million kg (4,576 kg per capita)
of which, amongst others: **Food waste**	12,658 million kg (157 kg per capita)
Electronic waste (WEEE)	690 million kg (9 kg per capita) recycling rate: 34.8%
Chemical waste	8,662 million kg (108 kg per capita)

The highest trade deficit for raw materials (€ 17 bln)

If everyone on the planet consumed as much as the Germans, 2.3 earths would be needed

The cost of mortality induced by air pollution from road transport is estimated at 5% of GDP (2010)

The highest GHG emissions (20.6% of the EU-28 total)

One of the highest average emission levels for new passenger cars in the EU-28

Germany has considerable reserves of hard coal and lignite, making these the country's most important indigenous source of energy (2011)

In 2016, the European Commission has announced that it will prosecute Germany in the Court of Justice of the EU for failing to take effective measures against water pollution caused by nitrates

Notes

- Following the March 2011 Fukushima nuclear disaster, Chancellor Angela Merkel announced in May 2011 that eight of the country's 17 nuclear reactors would be shut down immediately and the remaining plants would close by 2022. Germany plans to replace nuclear power largely with renewable energy, which accounted for almost 28% of gross electricity consumption in 2014 (up from 9% in 2000).
- Germany's Renewable Energy Sources Act, adopted in 2000, guaranteed 20 years of grid access and fixed prices for its solar- and windpower producers.

Germany: Relevant features of the tax system

Situation 2012 (unless specified differently)

Trends in tax revenues 2000-2012

(% of total tax revenues)

Labour taxes	- 1.7%
VAT	+ 2.0%
Environmental taxes	- 0.2%

Environmental taxes peaked in 2003

Ranking in EU-28

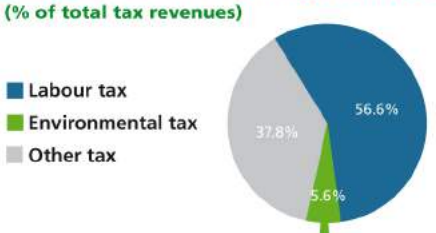
(Based on % of total tax revenues)

Labour taxes	# 4
VAT	# 21
Environmental taxes	# 25

VAT rates are lower than the EU average

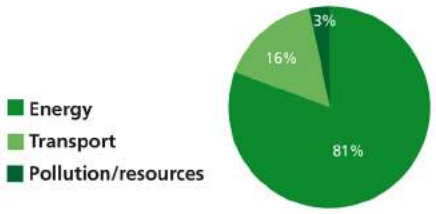
Labour vs environmental taxes

(% of total tax revenues)



Of every € 1,00 an employer pays to the employee, € 0,46 goes to labour taxes (low-wage earner)

Environmental tax composition



The vast majority (81%) of environmental tax revenue came from taxes on energy

Environmental tax revenue: € 58 billion (2.2% of GDP)

Fossil Fuel Subsidies

(Based on OECD.Stat)

Fossil fuel subsidies (tax expenditures plus budgetary transfers)	**€ 2.65 billion (2014)**

Social Security Contributions

(2015)

Total rate	**39.6%**
Base	Employment income, income from business and self-employed activities, benefits in kind, pension income
Employers' contributions	**19.3%** -of which: pensions 9.4%, health-care 7.3%, unemployment 1.5%, other 1.2% (capped contributions)
Employees' contributions	**20,2%** -of which: pensions 9.4%, health-care 8.2%, unemployment 1.5%, other 1.2% (capped contributions)

The German word for tax is *die Steuer* which originates from the Old High German word *stiura* meaning "help"

Social contributions provide the largest part of total tax income

Tax revenues structure

	€ mln	% of tax revenues	% of GDP
VAT	194,000	18.6%	7.3%
Excise duties and consumption taxes	65,800	6.3%	2.5%
Other taxes on products (incl. import duties)	25,800	2.5%	1.0%
Other taxes on production	19,000	1.8%	0.7%
Indirect taxes	**304,660**	**29.2%**	**11.4%**
Personal income	234,600	22.5%	8.8%
Corporate income	72,100	6.9%	2.7%
Other	17,000	1.6%	0.6%
Direct taxes	**323,700**	**31.0%**	**12.1%**
Employers' contributions	180,020	17.3%	6.8%
Employees' contributions	170,080	16.3%	6.4%
Self- and non-employed	64,530	6.2%	6.2%
Social contributions	**414,630**	**39.8%**	**15.6%**
Total	**1,042,990**	**100.0%**	**39.1%**

Tax revenues by economic function

	€ mln	% of tax revenues	% of GDP
Labour (including social contributions, payroll & earned income taxes)	590,332	56.6%	22.1%
Consumption (including VAT, duties & environmental taxes)	287,865	27.6%	10.8%
Capital (including taxes on profits, savings, exports & assets)	165,835	15.9%	6.2%
Total	**1.042,990**	**100.0%**	**39.1%**

Notes

- Germany is a federal republic. Taxes are levied by the federal government (*Bund*), the states (*Länder*) as well as the municipalities (*Städte/Gemeinden*). Water taxation is a state rather than a federal competency.

- Environmental taxes (on petrol and diesel) were strongly increased in the 1999–2003 period as a consequence of the ecological tax reform (from a pre-reform level of 2.1% of GDP to 2.7% in 2003). In the following years, however, their revenue declined again to 2.2% of GDP (in 2012) which is slightly below the EU-28 average (2.4%).

- Germany has an aviation tax (raising € 954 million) and a tax on nuclear fuels (raising € 1.7 billion).

Sources

The information in these sheets is mainly drawn from the CIA, EEA, Eunomia, European Commission, European Parliament, Eurostat, Global Footprint Network, IMF, OECD and the UN. A full list of references is provided separately.

Germany: Tax Shift Scenario

Shifting taxes from labour to natural resources & consumption

(Impact on German government budget, 2020*, difference from baseline, in 2015 prices)

Labour

€ 128 billion decrease

Shifting 14% of labour taxes to environment and consumption

Lowering personal income tax revenues by 21%

Lowering the costs of labour for employers by € 41 billion (without changing the social protection base)

The payrol tax credit for circular innovation would be a new measure for Germany

The measures should be disigned to not affect pension rights

Competitiveness of resource-intensive sectors and border effects should be considered. Germany may opt for targeted tax credits to support pollution-intensive businesses, however, this would come at the expense of more employment-intensive industries

Income tax & SC - 125.2

- Reduction of income tax and employee SC - 84.3
- Payroll tax credit for new employment *(1% of GDP, employers benefit only as far as labour demand is increased structurally)* - 25.5
- Reduction of employers' SC - 10.8
- Payroll tax credit for circular innovation *(0.15% of GDP)* - 4.7

VAT *(0% on specific services)* (a) - 2.7

Resource use

€ 128 billion increase

Fossil fuels (b) 52.6

- Excise duty on transport fuels *(gasoline, diesel, € 0.60/l)* 45.8
- Excise duty on aviation fuel *(€ 0.30/l)* 6.7
- Excise duty on natural gas *(€ 7.80/MWh)* 0.2

VAT 36.3

- Standard rate up *(to 21%)* 26.4
- Reduced rate up *(to 10%)* 9.9

Air pollution 15.7

- Carbon tax *(€ 30/ton, in addition to ETS price & auction)* 15.7

Secondary effect (c) 13.9

Electricity tax *(€ 50/MWh, bulk users)* (d) 6.7

Water *(25% cost increase industrial use)* 2.9

By applying 'the polluter pays' principles, a tax shift improves the competitiveness of labour-intensive sectors vis-a-vis resource- and pollution-intensive industries

Commuting costs might increase substantially where other alternatives are not yet available. The challenge is to update infrastructure to low-carbon transportation

VAT rates are lower than the EU average

Carbon tax is a sensitive topic especially due to worries about employment in Germany's coal mining industry. Chancellor Merkel has stated: *"With a price for carbon and a global carbon market, we can achieve our common goal – staying well below the 2 degree ceiling - in such a way that is technology neutral, promoting innovation, market based and thus cost efficient."*

Notes

* In the modelling, the measures are phased in over a five-year period; reaching full force in 2020.

(a) Labour-intensive services (maintenance & repair).

(b) In addition to gasoline: € 1.36/litre; diesel: € 1.21/litre (2014) (including taxes and levies); natural gas: € 68/MWh (consumers, annual consumption 5.6-56 MWh); € 38/MWh (industries, consumption 2,778-27,778 MWh) (2015).

(c) Due to change in labour costs and economic impacts. There are no direct stimulus or austerity effects in the scenario.

(d) In addition to € 149/MWh (excluding refundable taxes and levies and VAT, annual consumption: 500-2,000 MWh. Eurostat does not publish tarrifs for larger bandwidths) (2015).

(2016) The Ex'tax Project & Cambridge Econometrics

"Take measures to reduce high labour taxes and social security contributions, especially for low-wage earners (...). Revise the fiscal treatment of mini-jobs to facilitate the transition to other forms of employment."

- European Commission, 2014

"Reduce the high tax wedge for low wage earners and facilitate the transition from mini jobs to standard employment."

- European Commission, 2016

"the scope for shifting taxes to more growth-friendly revenue sources appears underused. (...) The tax wedge for workers earning between 50 % and 67 % of the average wage has remained largely unchanged since 2001 and remains among the highest in the EU. The recent reforms to social insurance systems are likely to involve a further rise in contribution rates and increase the tax wedge further. This would have potentially negative effects on labour market participation and disposable income. (...) Take measures to reduce high labour taxes and social security contributions, especially for low-wage earners (...). Revise the fiscal treatment of mini-jobs to facilitate the transition to other forms of employment."

- European Commission, 2015

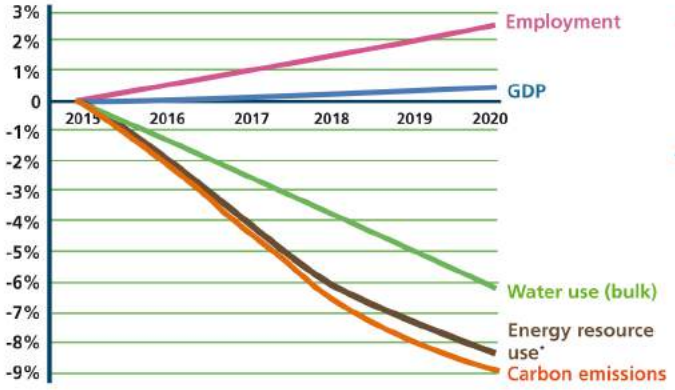
"Tax exemptions and subsidies which are harmful to the environment have a budgetary cost of about 1½ per cent of GDP (...). Achieving environmental objectives in a way that is less costly to the government and taxing environmental externalities more consistently could thus create more fiscal space. Some energy-intensive manufacturing industries (such as chemicals, iron and steel) and agriculture are exempt from energy taxation. The gap between electricity prices paid by households and energy-intensive manufacturing firms is particularly large (...). Coal is virtually tax-free. Tax breaks on business cars and commuting allowances encourage car use. (...) The introduction of stricter pollution standards for cars has not lowered emissions".

- OECD, 2016

Germany: Results sheet

Key Modelling Results

(Germany, 2016-2020, % difference from baseline)



(2016) The Ex'tax Project & Cambridge Econometrics

By 2020: 1.1 million more people in employment

Impact on GDP is limited, partly due to a relatively large VAT increase that restricts increase in household demand. Due to relatively low energy and carbon intensities, the energy & carbon taxes have limited impact. A strict labour market means wages do not increase to match, hence the limited increase in real income

Key Modelling Results

(Germany, 2020, % difference from baseline)

GDP	0.5%
Consumption	0.2%
Investment	0.5%
Imports	0.3%
Exports	0.8%
Employment	2.6%
Carbon emissions	- 9.0%
Water use (bulk)	- 6.3%
Energy resource use*	- 8.4%

* Hard coal, other coal, crude oil, heavy fuel oil, middle distillates, natural gas, other gas, electricity, heat, combustible waste, biofuels, hydrogen.

Integrated Value Added Statement

(Germany, cumulative added value, 2016-2020, € difference from baseline)

Impact	Description	Value Added (€ billion)	Share of total (%)
Financial Capital		**37.9**	**70%**
- National Income Growth	Net change in GDP	37.9	
Natural Capital		**13.9**	**26%**
- Climate Change	Avoided costs to society of future impacts of climate change	5.3	
- Air Pollution	Avoided costs to society due to illness and premature deaths associated with air pollution exposure	3.1	
- Land and Water Pollutants	Avoided costs to society due to human and ecosystem health damage associated with pollution of land and water with toxic chemicals and metals	4.9	
- Water Depletion	Avoided costs to society due to human and ecosystem health damage associated with depletion of freshwater resources	0.7	
- Other value (not yet included)**	Avoided costs to society due to less extraction of metals, land use, eutrophication etcetera	pm	
Social Capital		**2.2**	**4%**
- Health Benefits of Employment	Value of healthy years of life gained due to reduced unemployment experienced	2.2	
- Other value (not yet included)**	Value of education/skills, income security, economic equality, social stability and cohesion, productivity, reduced poverty risk, etcetera	pm	
Total Value Added		**53.9**	**100%**

In addition to business as usual

256 million tonnes of CO_2 emission reductions

60 million tonnes of oil equivalents saved (12 types of energy sources)*

42 billion cubic metres of water saved

3.3 million more 'person years of employment'

An Integrated Value Added of almost € 54 billion

(2016) The Ex'tax Project (scenario & design), Cambridge Econometrics (macro-economic modelling), Trucost (Value Added Statement).

• 2015 prices.
** This analysis is based on the available literature and proven and quantified linkages. As such, not all externalities could be included.

A tax shift benefits the German economy by reducing resource use and carbon emissions, while stimulating the economy and job creation.

The total added value of the Ex'tax scenario compared to baseline is almost € 54 billion over a five-year period.

A tax shift aligns the German fiscal system with the goals of the Europe 2020 Strategy, the Roadmap to a Resource Efficient Europe, the Paris Climate Agreement and the SDGs.

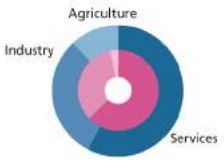
11.2. Poland

Poland: Data sheet

Situation 2012 (unless specified differently)

The economy at a glance

Population	38 million
GDP	€ 381 billion
Share of EU GDP	3%
Real GDP growth	3.9% (average 2004–2014)
Sector contribution	
Currency	Polish zloty
Exports	€ 173 billion (services 18%, goods 82%)
Main goods	Cars, Vehicle Parts, Seats, Refined Petroleum
Main destinations	Germany, United States, Czech Republic
Imports	€ 175 billion (services 15%, goods 85%)
Main goods	Crude Petroleum, Vehicle Parts, Cars
Main origins	Germany, Russia, Italy
R&D expenditure	0.9% of GDP (2020 target: 1.7%)



The 8th largest economy in the EU

The only Member State to avoid a recession through the 2008-09 economic crisis

Growth per capita remains significantly below EU average

Agriculture accounts for 3% of GDP and 12% of total employment

Labour market & social issues

Labour force	17 million
Unemployment	1.7 million (10.1%)
Youth unemployment	27%
Underemployment/ underutilised labour potential	2.8 million (Unemployed + underemployed parttime workers + persons seeking but not immediately available + persons available but not seeking)
Employment rate	65% (2020 target: 71%)
People at risk of poverty/social exclusion	10 million (27% of population)
Expenditure on social protection	€ 1,763 per inhabitant
Share of population aged > 65 years	14% (2060: 32%)

Unemployment went down from 20% in 2002 to 7.5% in 2015

Against the backdrop of the crisis, Poland has continuously reduced the number of people living at risk of poverty or social exclusion since 2008 and in 2013 achieved its 2020 target

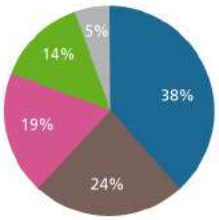
Notes

- The labour market is extremely flexible: most employment gains have taken the form of temporary jobs with limited worker bargaining power. The incidence of temporary contracts is the highest in the EU. In-work poverty is higher than the EU average (OECD 2016).
- Poland has long experienced net emigration, mainly of working-age people.
- The nominal value of the shadow economy is estimated at € 82 billion (19.5% of GDP in 2014; down from 21.1% in 2012).
- Poland joined the European Union in 2004.

Natural resource use

Raw materials

Raw material imports 122 million tonnes



A € 2.3 billion trade balance deficit for raw materials

If everyone on the planet consumed as much as the Polish, 2.1 earths would be needed

Air pollution

Premature deaths attributable to air pollution	47,300 people
Annual cost of pollution from coal	€ 17.4 billion (2013)
GHG emissions	398.5 million tonnes
-of which CO2	284.9 million tonnes
2020 GHG emission reduction target	14% (compared to 1990)

Road transport accounts for 50% of the cost of air pollution

Poland has one of the highest average emission levels for new passenger cars in the EU-28

Energy

Energy consumption	97.6 million toe
Import dependency	30.6%
Fossil fuel net import bill	€ 13 billion (22 million tonnes)
Energy from renewable soures	10.9% (#19 in EU)
2020 Renewable energy target	15%

Energy intensity is far above the EU average

The 10th largest consumer of coal in the world and the 2nd largest in the EU (after Germany)

Water

Freshwater withdrawals	11.5 billion m3 (2010) (industry 73%, domestic 18%, agriculture 10%)

Waste

Total waste	163,377 million kg (4,292 kg per capita)
of which, amongst others:	
Food waste	5,564 million kg (146 kg per capita)
Electronic waste (WEEE)	175 million kg (4,6 kg per capita) recycling rate: 30.4%
Chemical waste	2,511 million kg (66 kg per capita)

Notes

- Although output of hard coal declined since 1997, in 2008, 92% of electricity and 89% of heat in Poland was generated from coal.
- In the period 1990-2006, Economic conditions led to the closure of 37 coal mines and the layoff of 269,000 workers, 54–65% found new jobs outside mining.
- Poland has a carbon tax on sectors not covered by the ETS but the rate is low (€ 0.07/tonne in 2016).

Poland: Relevant features of the tax system

Situation 2012 (unless specified differently)

Trends in tax revenues 2000-2012

(% of total tax revenues)

Labour taxes	- 3.3%
VAT	+ 1.2%
Environmental taxes	+ 1.4%

Poland has seen a significant shift away from labour taxation

Environmental taxes peaked in 2004

Ranking in EU-28

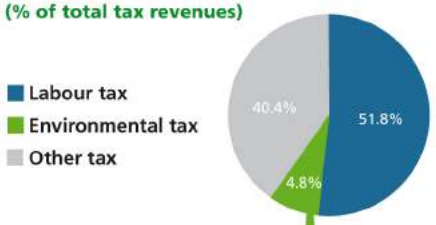
(Based on % of total tax revenues)

Labour taxes	# 23
VAT	# 11
Environmental taxes	# 11

VAT rates are 5%, 8% and 23%. Exemptions and reduced rates imply revenue losses worth more than 2.5% of GDP

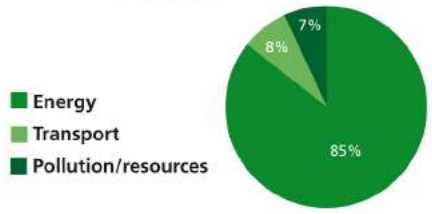
Labour vs environmental taxes

(% of total tax revenues)



Of every € 1,00 an employer pays to the employee, € 0,35 goes to labour taxes (low-wage earner)

Environmental tax composition



Environmental tax revenue: € 9.6 bln (2.5 % of GDP)

The vast majority of environmental tax revenue from taxes on energy

Fossil Fuel Subsidies

(Based on OECD.Stat)

Fossil fuel subsidies (tax expenditures plus budgetary transfers)	€ 0.22 billion (2014)

Social Security Contributions

(2015)

Total rate	30.0%
Base	Employment income, income from business and self-employed activities
Employers' contributions	16.3% -of which: pensions 9.8%, invalidity pension 6.5% (capped contributions)
Employees' contributions	13.7% -of which: pensions 9.8%, maternity 2.5%, invalidity pension 1.5% (capped contributions)

• Employers also pay accident insurance of 0.67-3.86% (with no ceiling).
• Employees pay an obligatory health care contribution of 9%.

Social contributions provide over a third of tax revenues; 5.4% above the EU-27 (32.4%) average

Tax revenues structure

	€ mln	% of tax revenues	% of GDP
VAT	27,881	22.5%	7.3%
Excise duties and consumption taxes	15,408	12.4%	4.0%
Other taxes on products (incl. import duties)	997	0.8%	0.3%
Other taxes on production	5,747	4.6%	1.5%
Indirect taxes	**50,034**	**40.4%**	**13.1%**
Personal income	17,421	14.1%	4.6%
Corporate income	8,125	6.6%	2.1%
Other	2,042	1.6%	0.5%
Direct taxes	**27,588**	**22.3%**	**7.2%**
Employers' contributions	18,840	15.2%	4.9%
Employees' contributions	18,542	15.0%	4.9%
Self- and non-employed	9,382	7.6%	2.5%
Social contributions	**46,764**	**37.7%**	**12.3%**
Total	**123,933**	**100.0%**	**32.5%**

Tax revenues by economic function

	€ mln	% of tax revenues	% of GDP
Labour (including social contributions, payroll & earned income taxes)	50,097	40.4%	13.1%
Consumption (including VAT, duties & environmental taxes)	44,931	36.3%	11.8%
Capital (including taxes on profits, savings, exports & assets)	29,359	23.7%	7.7%
Total	**123,933**	**100.0%**	**32.5%**

Notes

• Overall tax revenue (including social contributions) is low compared to most Member States.

• The government wants to focus on increasing tax compliance to generate extra revenues. VAT evasion has increased significantly to more than a quarter of the total liability (2013).

• Water tax rates differ according to water bodies and the economic sectors of use, but appear quite modest. The highest tax rate is € 0.03 per m3 for groundwater abstracted for non-food production purposes (2013).

Sources

The information in these sheets is mainly drawn from the CIA, EEA, Eunomia, European Commission, European Parliament, Eurostat, Global Footprint Network, IMF, OECD and the UN. A full list of references is provided separately.

Poland: Tax Shift Scenario

Shifting taxes from labour to natural resources & consumption

(Impact on Polish government budget, 2020*, difference from baseline, in 2015 prices)

Labour

€ 38 billion decrease

Shifting 40% of labour taxes to environment and consumption

Lowering personal income tax revenues by 107.1% (the surplus is treated as income subsidy)

Lowering the costs of labour for employers by € 6.2 billion (without changing the social protection base)

Poland may opt for targeted tax credits to support pollution-intensive businesses, however, this would come at the expense of more employment-intensive industries

Raising awareness on the benefits would be key. A gradual implementation (beyond 2020) with diligent monitoring is advisable

IMF, 2016: *"To improve tax compliance set up strong central management for the tax authority, improve coordination, invest in ICTs"*

Income tax & SC - 30.2

- Reduction of income tax and employee SC - 23.9
- Payroll tax credit for new employment - 3.6 *(1% of GDP, employers benefit only as far as labour demand is increased structurally)*
- Reduction of employers' SC - 1.9
- Payroll tax credit for circular innovation - 0.7 *(0.15% of GDP)*

VAT - 5.6

- 0% on labour-intensive services - 5.6 *(Maintenance & repair)*

Secondary effect (a) - 2.3

Resource use

€ 38 billion increase

Fossil fuels (b) 15.5

- Excise duty on transport fuels 15.2 *(gasoline, diesel, € 0.60/l)*
- Excise duty on aviation fuel 0.3 *(€ 0.30/l)*
- Excise duty on natural gas 0 *(€ 7.80/MWh)*

VAT 14

- Standard rate up *(to 21%)* 10.8
- Reduced rate up *(to 10%)* 3.2

Air pollution 6.4

- Carbon tax 6.4 *(€ 30/ton, in addition to ETS price & auction)*

Electricity tax *(€ 50/MWh, bulk users) (c)* 1.7

Water *(25% cost increase industrial use)* 0.5

In Poland the scale of the shift is large, and so are the benefits (see next page)

By applying 'the polluter pays' principles, a tax shift improves the competitiveness of labour-intensive sectors vis-a-vis resource- and polution-intensive industries. Competitiveness of resource-intensive sectors and border effects should be considered

The standard VAT rate is already 23%, so doesn't change

The reduced rate goes up from 5%/8% to 10%

OECD, 2016: *"Part of the benefits of reduced VAT rates accrues to rich individuals, making it an inefficient tool to support the poor compared to targeted transfers or labour tax reductions."*

Notes

* In the modelling, the measures are phased in over a five-year period; reaching full force in 2020.

(a) Secondary effect due to change in labour costs and economic impacts. There are no direct stimulus or austerity effects in the scenario.

(b) In addition to gasoline: € 1.14/litre; diesel: € 1.13/litre (2014) (including taxes and levies); natural gas: € 50/MWh (consumers, annual consumption 5.6-56 MWh); € 34/MWh (industries, consumption 2,778-27,778 MWh) (2015).

(c) In addition to € 86/MWh (excluding refundable taxes and levies and VAT, annual consumption: 500-2,000 MWh. Eurostat does not publish tarrifs for larger bandwidths) (2015).

(2016) The Ex'tax Project & Cambridge Econometrics

"Raise revenues by broadening the VAT base, eliminating reduced rates and exemptions, and by increasing property and environmental taxes. (...) making Poland more attractive for workers would be beneficial. (...) Cutting labour taxes significantly on regular labour-law contracts with low wages would further reduce incentives to use civil-law and other irregular contracts and would make the tax system more progressive."

- OECD, 2016

"Tax revenues could be increased by reducing the extensive use currently made of reduced VAT rates and by increasing the efficiency of the tax administration."

- European Commission, 2015

"Ensure that climate change policies are clear and aligned with European and international objectives. (...) The government should use integrated cost-benefit analysis to take health and environmental impacts more fully into account in the choice and design of infrastructure projects. (...) Green taxes are crucial to internalise the externalities associated with production and consumption, thus setting the right incentives to opt for environmentally friendly infrastructure. They should therefore be an integral part of the government's strategy to reduce CO2 emissions and air pollution. (...) Road pricing could better internalise environmental externalities and take into account maintenance costs, thereby helping to promote public transport."

- OECD, 2016

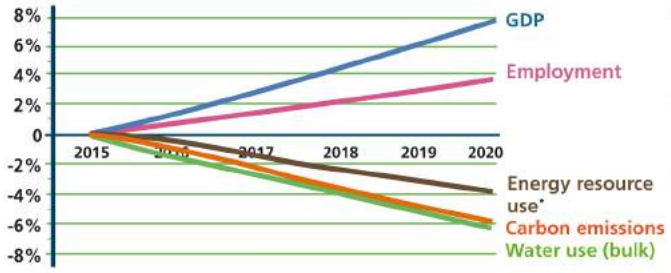
"Poland continues to apply reduced VAT rates to a large number of goods and services. This contributes to lost revenues and reduces the efficiency of the VAT system. Evidence suggests that reduced VAT rates are not an effective social policy instrument, particularly as they are not specifically targeted to vulnerable households. They tend to translate into significant subsidies to rich taxpayers. Social benefits and income tax are considered to be better targeted and thus more suitable for achieving redistributive goals. The potential lost revenue due to reduced VAT rates and optional exemptions is among the highest in the EU."

- European Commission, 2016

Poland: Results sheet

Key Modelling Results

(Poland, 2016-2020, % difference from baseline)



(2016) The Ex'tax Project & Cambridge Econometrics

Impact on GDP is highly positive

By 2020: 0.6 million more people in employment

More employment opportunities potentially lower the outflow of the work force

GDP levels increase the most in regions that are relatively more energy intensive. This means energy and carbon tax could raise substantial amount of revenues, which in turn get used to reduce other tax rates to stimulate economy and jobs.

Key Modelling Results

(Poland, 2020, % difference from baseline)

GDP	7.7%
Consumption	12.5%
Investment	3.0%
Imports	5.4%
Exports	0.4%
Employment	3.9%
Carbon emissions	- 5.7%
Water use (bulk)	- 6.3%
Energy resource use*	- 3.8%

* Hard coal, other coal, crude oil, heavy fuel oil, middle distillates, natural gas, other gas, electricity, heat, combustible waste, biofuels, hydrogen.

Integrated Value Added Statement

(Poland, cumulative added value 2016-2020, € difference from baseline)

Impact	Description	Value Added (€ billion)*	Share of total (%)
Financial Capital		105.9	70%
- National Income Growth	Net change in GDP	105.9	
Natural Capital		42.2	28%
- Climate Change	Avoided costs to society of future impacts of climate change	24.0	
- Air Pollution	Avoided costs to society due to illness and premature deaths associated with air pollution exposure	7.8	
- Land and Water Pollutants	Avoided costs to society due to human and ecosystem health damage associated with pollution of land and water with toxic chemicals and metals	10.2	
- Water Depletion	Avoided costs to society due to human and ecosystem health damage associated with depletion of freshwater resources	0.2	
- Other value (not yet included)**	Avoided costs to society due to less extraction of metals, land use, eutrophication etcetera	pm	
Social Capital		2.4	2%
- Health Benefits of Employment	Value of healthy years of life gained due to reduced unemployment experienced	2.4	
- Other value (not yet included)**	Value of education/skills, income security, economic equality, social stability and cohesion, productivity, reduced poverty risk, etcetera	pm	
Total Value Added		150.5	100%

In addition to business as usual

66 million tonnes of CO_2 emission reductions

8 million tonnes of oil equivalents saved (12 types of energy sources)*

10 billion cubic metres of water saved

1.8 million more 'person years of employment'

Integrated Value Added of more than € 150 billion

Notes

• 2015 prices.

** This analysis is based on the available literature and proven and quantified linkages. As such, not all externalities could be included.

(2016) The Ex'tax Project (scenario & design), Cambridge Econometrics (macro-economic modelling), Trucost (Value Added Statement).

A tax shift benefits the Polish economy by reducing resource use and carbon emissions, while stimulating the economy and job creation.

The total added value of the Ex'tax scenario compared to baseline is more than € 150 billion over a five-year period.

A tax shift aligns the Polish fiscal system with the goals of the Europe 2020 Strategy, the Roadmap to a Resource Efficient Europe, the Paris Climate Agreement and the SDGs.

11.3. Spain

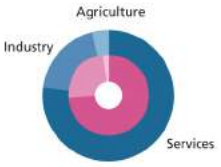
Spain: Data sheet

Situation 2012 (unless specified differently)

The economy at a glance

Population	46.8 million
GDP	€ 1,029 billion
Share of EU GDP	8%
Real GDP growth	0.6% (average 2004–2014)
Sector contribution	
Currency	Euro
Exports	€ 319 billion (services 30%, goods 70%)
Main goods	Cars, Refined Petroleum, Packaged Medicaments, Vehicle Parts, Delivery Trucks
Main destinations	France, Germany, Portugal, UK, Italy
Imports	€ 304 billion (services 17%, goods 83%)
Main goods	Crude Petroleum, Refined Petroleum, Vehicle parts and Petroleum gas
Main origins	Germany, France, China, Italy, UK
R&D expenditure	1.3% of GDP (2020 target: 2.0%)

■ GDP
■ Employment



The 5th largest economy in the EU

Spain experienced a strong impact from the economic crisis; GDP growth crashed from an increase of 3.5% in 2007, to a 3.8% fall in 2009

The most common tourism destination in the EU for non-residents, with 243 million nights spent in tourist accommodation establishments, or 21.5 % of the EU-28 total

Exports are concentrated in EU destinations

Labour market & social issues

Labour force	23.3 million
Unemployment	5.8 million (24.3%)
Youth unemployment	52%
Underemployment/ underutilised labour potential	8.5 million (Unemployed + underemployed parttime workers + persons seeking but not immediately available + persons available but not seeking)
Employment rate	59.6% (2020 target: 74%)
People at risk of poverty/social exclusion	13 million (27.2% of population)
Expenditure on social protection	€ 5,584 per inhabitant
Share of population aged > 65 years	17.4% (2060: 29%)

In 2016: the second highest unemployment and youth unemployment rate, after Greece (August/October)

The crisis has left a legacy of high public and private indebtedness as well as high unemployment rates, increased inequality and poverty

High unemployment levels are driving many people to seek work overseas. Between 2008 and 2014 nearly 2.6 million people left Spain

Notes

• The 2014 OECD Survey of Adult Skills (PIACC) found that Spain had the worst numeracy and second-worst literacy skills of the 23 countries and regions surveyed.

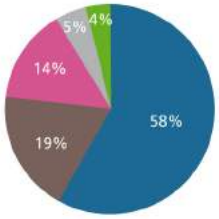
• Spain joined the European Union in 1986.

Natural resource use

Raw materials

Raw material imports	237 million tonnes

■ Fossil energy materials
■ Metal ores
■ Biomass
■ Non-metallic minerals
■ Others



A € 4.2 billion trade balance deficit for raw materials

If everyone on the planet consumed as much as the Spanish, 2.9 earths would be needed

Air pollution

Premature deaths attributable to air pollution	33,200 people
Annual cost of pollution from coal	€ 3.7 billion (2013)
GHG emissions	369.1 million tonnes
-of which CO2	362.4 million tonnes
2020 GHG emission reduction target	10% (compared to 1990)

The cost of mortality induced by air pollution is estimated at 23.0% of GDP (2010)

Spain has one of the lowest GHG emissions intensities in the OECD. Fossil fuels still account for 76% of the country's energy supply

Energy

Energy consumption	128.1 million toe
Import dependency	73.1%
Fossil fuel net import bill	€ 39 billion (96 million tonnes)
Energy from renewable soures	14.3% (#14 in EU)
2020 Renewable energy target	20%

In 2012, GHG emissions increased by 22.5% compared to 1990. Across EU Member states this is one of the largest increases

Water

Freshwater withdrawals	37.3 billion m3 (Industry 21%, domestic 16%, agriculture 64%)

Although parts of Spain are experiencing water shortages, there are insufficient incentives for using water efficiently. Water tarriffs are among the lowest in the EU

Waste

Total waste	118,562 million kg (2,535 kg per capita)
of which, amongst others:	
Food waste	3,938 million kg (84 kg per capita)
Electronic waste (WEEE)	156 million kg (3,4 kg per capita) recycling rate: 19%
Chemical waste	3,181 million kg (68 kg per capita)

Notes

• Spain was the fourth country in the world in terms of installed capacity and produced 48,156 GWh of electricity from wind in 2012.

• The Spanish solar market represents about 5% of the global PV market and in recent years its growth has slowed down significantly compared to rest of Europe. This decrease in growth can be explained by the end of all subsidies to solar energy in 2012 as a result of a wider economic review by the Spanish government. Spain has one of the highest levels of solar irradiance in Europe.

• Spain levies a fee on the use of continental waters for the production of electricity. No air pollution tax is applied at the national level; however, there are several taxes in place in the autonomous communities.

Spain: Relevant features of the tax system

Situation 2012 (unless specified differently)

Trends in tax revenues 2000-2012

(% of total tax revenues)

Labour taxes	+ 6.7%
VAT	- 1.1%
Environmental taxes	- 1.6%

The lowest share of environmental taxes as % of GDP (1.6%, far below the average in the EU-28 of 2.4%)

Ranking in EU-28

(Based on % of total tax revenues)

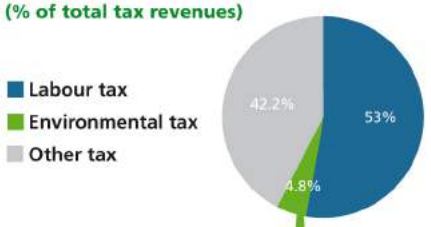
Labour taxes	# 7
VAT	# 25
Environmental taxes	# 26

VAT rates (2012): 4%-8%-18%, (currently): 4%-10%-21%)

Spain has the fifth highest VAT compliance gap (actual VAT revenues are much lower than theoretical VAT revenues)

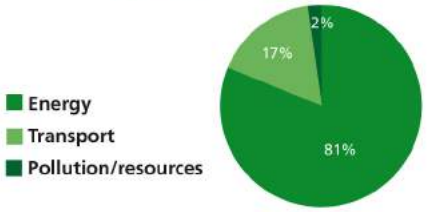
Labour vs environmental taxes

(% of total tax revenues)



Of every € 1,00 an employer pays to the employee, € 0,37 goes to labour taxes (low-wage earner)

Environmental tax composition



The vast majority (81%) of environmental tax revenue came from taxes on energy

Environmental tax revenue: € 16.2 billion (1.6 % of GDP)

Fossil Fuel Subsidies

(Based on OECD.Stat)

Fossil fuel subsidies (tax expenditures plus budgetary transfers)	€ 1.23 billion (2014)

Social Security Contributions

(2015)

Total rate	36.3%
Base	Employment income, income from business and self-employed activities, income from sports/entertainment, benefits in kind, income from occasional activities
Employers' contributions	29.9% -of which: general benefits fund 23.6%, unemployment 5.5%, wage guarantee fund 0.2%, professional training 0.6% (capped contributions)
Employees' contributions	6.4% -of which: general benefits fund 4.7%, unemployment 1.6%, professional training 0.1% (capped contributions)

Social contributions provide the largest part of total tax income

In an urgent bid to promote employment creation, in March 2014, government introduced a cut in employer social security contributions to a flat rate of € 100 per month for two years on all permanent contracts signed until the end of the year

Tax revenues structure

	€ mln	% of tax revenues	% of GDP
VAT	57,057	17.0%	5.5%
Excise duties and consumption taxes	22,187	6.6%	2.2%
Other taxes on products (incl. import duties)	11,496	3.4%	1.1%
Other taxes on production	19,506	5.8%	1.9%
Indirect taxes	**110,246**	**33%**	**11%**
Personal income	79,728	23.8%	7.7%
Corporate income	22,246	6.6%	2.2%
Other	7,305	2.2%	0.7%
Direct taxes	**109,279**	**33%**	**11%**
Employers' contributions	86,520	25.8%	8.4%
Employees' contributions	17,837	5.3%	1.7%
Self- and non-employed	18,849	5.6%	1.8%
Social contributions	**123,206**	**37%**	**12%**
Total	**334,796**	**100.0%**	**33%**

Tax revenues by economic function

	€ mln	% of tax revenues	% of GDP
Labour (including social contributions, payroll & earned income taxes)	117,398	53.0%	17.2%
Consumption (including VAT, duties & environmental taxes)	88,622	26.5%	8.6%
Capital (including taxes on profits, savings, exports & assets)	76,711	22.9%	7.5%
Total	**334,796**	**100.0%**	**33%**

Notes

- Spain has a quasi-federal tax system, with three levels of government. State governments raise 32.4% of tax revenues (the highest share in the EU).
- The tax-to-GDP ratio is almost 7% lower than the EU-28 weighted average.
- In the EU, Spain ranks 27th in terms of indirect taxes collection as a % of GDP, although the standard VAT rate was increased twice in recent years.
- In 2014, a government-appointed Committee of experts on the reform of the Spanish tax system submitted detailed proposals to simplify the tax system and to move the burden of taxation away from direct (in particular on labour) to indirect taxation in a revenue-neutral way. Lowering taxes on labour and offsetting the revenue impact with higher taxes on consumption, environmental taxes and taxes on property, according to the Committee, would have positive growth and employment effects. These recommendations were not followed up on in the tax reform approved in 2014.

Sources

The information in these sheets is mainly drawn from the CIA, EEA, Eunomia, European Commission, European Parliament, Eurostat, Global Footprint Network, IMF, OECD and the UN. A full list of references is provided separately.

Spain: Tax Shift Scenario

Shifting taxes from labour to natural resources & consumption

(Impact on Spanish government budget, 2020*, difference from baseline, in 2015 prices)

Labour

€ 43 billion decrease

Shifting 19% of labour taxes to environment and consumption

Lowering personal income tax revenues by 29.7%

Lowering the costs of labour for employers by € 14.3 billion (without changing the social protection base)

OECD, 2014:
"The tax base is too narrow and over reliant on labour taxes, which are among the most detrimental to activity. (...) Shift the balance from labour to indirect taxes by cutting employer social security contributions for low-skilled workers, increasing environmental and real estate taxes, and narrowing exemptions to value-added tax, corporation and income taxes"

Income tax & SC - 42.2

- Reduction of income tax and employee SC - 27.8
- Payroll tax credit for new employment - 9.3
  (1% of GDP, employers benefit only as far as labour demand is increased structurally)
- Reduction of employers' SC - 3.2
- Payroll tax credit for circular innovation - 1.8
  (0.15% of GDP)

VAT *(0% on specific services) (a)* - 0.7

Resource use

€ 43 billion increase

Fossil fuels (b) 27.4

- Excise duty on transport fuels 24.2
  (gasoline, diesel, € 0.60/l)
- Excise duty on aviation fuel 3.2
  (€ 0.30/l)
- Excise duty on natural gas 0.02
  (€ 7.80/MWh)

Air pollution 4.7

- Carbon tax 4.7
  (€ 30/ton, in addition to ETS price & auction)

VAT 3.3

- Standard rate up *(to 21%)* 1.4
- Reduced rate up *(to 10%)* 2.0

Water *(25% cost increase industrial use)* 2.7

Electricity tax *(€ 50/MWh, bulk users) (c)* 2.4

Secondary effect (d) 2.4

By applying 'the polluter pays' principles, a tax shift improves the competitiveness of labour-intensive sectors vis-a-vis resource- and pollution-intensive industries

OECD 2014:
"Taxes should (...) be raised on environmentally damaging activities and on real estate. Neither of these are very high in Spain, and taxes on energy are relatively low (...). Such taxes are less damaging to growth and in the case of environmental taxation can raise welfare."

Taxtion of fossil fuels should be accompanied by other measures to enable low-carbon means of transportation

In 2012, Spain already raised the standard and reduced VAT rates to these levels

Water tariffs are amongst the lowest in OECD/EU countries

Notes

* In the modelling, the measures are phased in over a five-year period; reaching full force in 2020.
(a) Labour-intensive services (maintenance & repair)
(b) In addition to gasoline: € 1.22/litre; diesel: € 1.16/litre (2014) (including taxes and levies); natural gas: € 93/MWh (consumers, annual consumption 5.6-56 MWh); € 32/MWh (industries, consumption 2,778-27,778 MWh) (2015).
(c) In addition to € 113/MWh (excluding refundable taxes and levies and VAT, annual consumption: 500-2,000 MWh. Eurostat does not publish tarrifs for larger bandwidths) (2015).
(d) Due to change in labour costs and economic impacts. There are no direct stimulus or austerity effects in the scenario.

(2016) The Ex'tax Project & Cambridge Econometrics

"shift revenues towards less distortive taxes, such as consumption, environmental (e.g. on motor fuels) and recurrent property taxes; remove inefficient personal and corporate income tax expenditures; consider lowering employers' social security contributions, in particular for low-wage jobs"

- Council of the European Union, 2014

Raising tax rates in a revenue-neutral way, notably, fuel taxation where tax rates are relatively low by international comparison, can encourage more efficient oil use thus delivering environmental and energy security benefits.

- IEA, 2015

"(...) at the heart of the future tax reform should be a permanent cut in employer social security contributions focussed on lower-paid workers (...). This would require funding social security in part from general revenue."

- OECD, 2014

"A key concern is that eliminating special VAT rates would hurt the important tourism industry vis-à-vis other competitors (Alvarez et al., 2007). However, if at the same time social security contributions were cut this could potentially compensate for the rise in the VAT rate, especially if those cuts were targeted at lower-paid workers, which are heavily employed in the industry."

- OECD, 2014

"Some progress was made in the area of taxation, with a comprehensive tax reform being introduced to make the tax system simpler and more conducive to growth and job creation. (...) Some progress was also made with regard to the fight against tax evasion, but no progress was seen in the area of environmental taxation. (...)

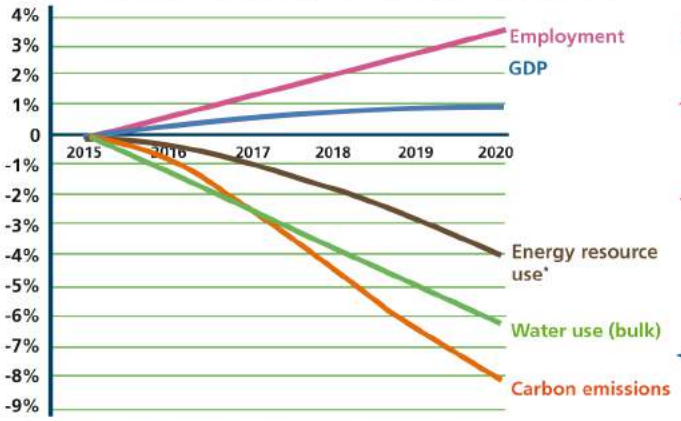
Youth unemployment in Spain remains very high (over 53 %) and the early school leaving rate is one of the highest in the EU. It therefore remains essential to identify new sources of funding, ensure effective and efficient use of resources (...) and promote measures to make the business environment more innovation-friendly."

- European Commission, 2015

Spain: Results sheet

Key Modelling Results

(Spain, 2016-2020, % difference from baseline)



(2016) The Ex'tax Project & Cambridge Econometrics

By 2020: 0.6 million more people in employment

Employment rates grow faster than GDP; an indication of inclusive growth

More employment opportunities potentially lower the outflow of the work force

The tourism sector might be vulnerable to price increases. This however does not show in the results

Key Modelling Results

(Spain, 2020, % difference from baseline)

GDP	1.0%
Consumption	1.8%
Investment	0.8%
Imports	0.5%
Exports	0.2%
Employment	3.5%
Carbon emissions	- 8.1%
Water use (bulk)	- 6.3%
Energy resource use*	- 4.0%

* Hard coal, other coal, crude oil, heavy fuel oil, middle distillates, natural gas, other gas, electricity, heat, combustible waste, biofuels, hydrogen.

Integrated Value Added Statement

(Spain, cumulative added value 2016-2020, € difference from baseline)

Impact	Description	Value Added (€ billion)	Share of total (%)
Financial Capital		**46.0**	**60%**
- National Income Growth	Net change in GDP	46.0	
Natural Capital		**28.5**	**38%**
- Climate Change	Avoided costs to society of future impacts of climate change	11.8	
- Air Pollution	Avoided costs to society due to illness and premature deaths associated with air pollution exposure	2.8	
- Land and Water Pollutants	Avoided costs to society due to human and ecosystem health damage associated with pollution of land and water with toxic chemicals and metals	13.3	
- Water Depletion	Avoided costs to society due to human and ecosystem health damage associated with depletion of freshwater resources	0.6	
- Other value (not yet included)**	Avoided costs to society due to less extraction of metals, land use, eutrophication etcetera	pm	
Social Capital		**1.4**	**2%**
- Health Benefits of Employment	Value of healthy years of life gained due to reduced unemployment experienced	1.4	
- Other value (not yet included)**	Value of education/skills, income security, economic equality, social stability and cohesion, productivity, reduced poverty risk, etcetera	pm	
Total Value Added		**76.0**	**100%**

In addition to business as usual

76 million tonnes of CO_2 emission reductions

9 million tonnes of oil equivalents saved (12 types of energy sources)*

31 billion cubic metres of water saved

1.9 million more 'person years of employment'

An Integrated Value Added of € 76 billion

(2016) The Ex'tax Project (scenario & design), Cambridge Econometrics (macro-economic modelling), Trucost (Value Added Statement).

• 2015 prices.
** This analysis is based on the available literature and proven and quantified linkages. As such, not all externalities could be included.

A tax shift benefits the Spanish economy by reducing resource use and carbon emissions, while stimulating the economy and job creation.

The total added value of the Ex'tax scenario compared to baseline is € 76 billion over a five-year period.

A taxs shift aligns the Spanish fiscal system with the goals of the Europe 2020 Strategy, the Roadmap to a Resource Efficient Europe, the Paris Climate Agreement and the SDGs.

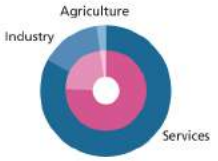
11.4. The Netherlands

Netherlands: Data sheet

Situation 2012 (unless specified differently)

The economy at a glance

Population	16.7 million
GDP	€ 599 billion
Share of EU GDP	5%
Real GDP growth	1% (average 2004–2014)
Sector contribution	
Currency	Euro
Exports	€ 529 billion (services 20%, goods 80%)
Main goods	Refined Petroleum, Crude Petroleum, Computers
Main destinations	Germany, Belgium -Luxembourg, UK
Imports	€ 467 billion (services 24%, goods 76%)
Main goods	Refined Petroleum, Crude Petroleum, Computers
Main origins	Germany, Belgium, Luxembourg, Russia
R&D expenditure	1.9% of GDP (2020 target: 2.5%)



The 6th largest economy in the EU

GDP has recently overtaken its pre-crisis peak

Services provide 76% of GDP and 82% of employment

The 7th largest exporter in the world

Exports of services have grown 40% in the period 2010-2015

Between 2009 and 2014, imports increased at an annualized rate of 8%

Labour market & social issues

Labour force	8.2 million
Unemployment	0.5 million (5.8%)
Youth unemployment	11.7%
Underemployment/ underutilised labour potential	1.1 million (Unemployed + underemployed parttime workers + persons seeking but not immediately available + persons available but not seeking)
Employment rate	76.6% (2020 target: 80%)
People at risk of poverty/social exclusion	2.5 million (15% of population)
Expenditure on social protection	€ 11,117 per inhabitant
Share of population aged > 65 years	16.2% (2060: 26%)

October 2016, the unemployment rate was 5.6%; still well above the Dutch pre-crisis low of nearly 3.5% in late 2008

Since 2012, the number of underemployed parttime workers increased by 415,000

Poverty is among the lowest in the OECD

Notes

"The recent growth in employment can be fully attributed to an increase in the number of people employed on temporary contracts and the number of self-employed. Although the Netherlands has taken measures to address the issue, a more comprehensive approach is needed."
- Council of the European Union, 2016

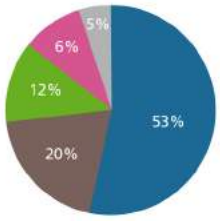
• At nearly 120% of GDP, gross household debt is one of the highest in Europe, owing to high mortgage debt, posing a vulnerability in the event of a financial crisis.

• The Netherlands is one of the founders of the EU.

Natural resource use

Raw materials

Raw material imports 391 million tonnes



A € 5.1 billion trade balance surplus for raw materials

If everyone on the planet consumed as much as the Dutch, 4.4 earths would be needed

Air pollution

Premature deaths attributable to air pollution	13,100 people
Annual cost of pollution from coal	€ 1.5 billion (2013)
GHG emissions *-of which CO2*	205.6 million tonnes 163.0 million tonnes
2020 GHG emission reduction target	16% (compared to 1990)

The cost of mortality induced by air pollution is estimated at € 17.7 billion (2010)

The 7th largest emitter of carbon in the EU

Energy

Energy consumption	80.8 million toe
Import dependency	31%
Fossil fuel net import bill	€ 17 billion (14 million tonnes)
Energy from renewable soures	4.7% (# 25 in EU)
2020 Renewable energy target	14%

The fourth lowest percentage of renewables in 2012, the second lowest in 2014 (after Malta)

Water

Freshwater withdrawals	10.7 billion m3 (Industry 87%, domestic 11%, agriculture 1%)

Over the past decade water prices have decreased in real terms

Waste

Total waste	123,612 million kg (7,378 kg per capita)
of which, amongst others: **Food waste**	11,339 million kg (151 kg per capita)
Electronic waste (WEEE)	123 million kg (7.4 kg per capita) recycling rate: 33.2%
Chemical waste	2,536 million kg (677 kg per capita)

Notes

• The Dutch province Groningen has been one of Europe's richest gas fields for 30 years. The tremors that drilling sets off have damaged thousands of homes. After a class action suit, the Dutch petroleum company NAM - jointly owned by Shell and Exxon Mobil - has received more than 50,000 damage complaints from people seeking compensation. A report commissioned by the Groningen government estimates the cost of repairing properties and protecting them against future earthquakes at € 30 billion during the next 30 years.

• Almost all space heating in the Netherlands is by natural gas, and over 60% of electricity is produced by gas fired generation. The Netherlands imports and exports large volumes of gas, with roughly 40% of the total volume of gas flows used domestically.

As the government has started to reduce gas extraction to limit the risk of earthquakes, exports of natural gas decreased and imports increased, which subtracted around 0.5% from GDP growth per year in 2014 and 2015

Netherlands: Relevant features of the tax system

Situation 2012 (unless specified differently)

Trends in tax revenues 2000-2012

(% of total tax revenues)

Labour taxes	+ 6.0%
VAT	+ 0.5%
Environmental taxes	- 0.3%

The Netherlands has one of the highest levels of environmental taxes although their share has been dropping since 2006. The country also has one of the highest shares of labour taxation in the EU

Ranking in EU-28

(Based on % of total tax revenues)

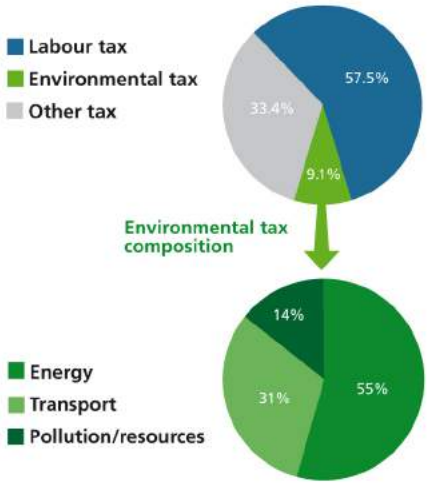
Labour taxes	# 2
VAT	# 23
Environmental taxes	# 3

VAT rates are 6% and 21% (2012: 19%)

By 2014 , the Netherlands has dropped to 7th place with regard to environmental taxes

Labour vs environmental taxes

(% of total tax revenues)



Of every € 1,00 an employer pays to the employee, € 0,34 goes to labour taxes (low-wage earner)

The majority of environmental tax revenue came from taxes on energy

The Netherlands raises significant revenue from transport taxes (excl. fuel taxes) and is one of the few countries in the EU with a non-negligible contribution from pollution taxes, originating from a tax on pollution of surface waters and sewerage charges (0.51 % of GDP, EU-28 average: 0.1 %)

Fossil Fuel Subsidies

(Based on OECD.Stat)

Fossil fuel subsidies (tax expenditures plus budgetary transfers)	€ 0.13 billion (2014)

Social Security Contributions

(2015)

Total rate	46.2%
Base	Employment income, income from business activities
Employers' contributions	18.1% (of max. income € 51,976) -of which: health insurance (ZVW) 7.0% (capped contributions)
Employees' contributions	28.1% (of 10.3% persons over retirement age) -of which: pensions 17.9% (not applied to retired persons) (capped contributions)

Social contributions: The 3rd highest share of total tax revenue in the EU-28

Tax revenues structure

	€ mln	% of tax revenues	% of GDP
VAT	41,699	17.8%	7.0%
Excise duties and consumption taxes	12,956	5.5%	2.2%
Other taxes on products (incl. import duties)	8,933	3.8%	1.5%
Other taxes on production	7,468	3.2%	1.2%
Indirect taxes	**71,056**	**30.4%**	**11.9%**
Personal income	45,900	19.6%	7.7%
Corporate income	12,740	5.4%	2.1%
Other	8,332	3.6%	1.4%
Direct taxes	**66,972**	**28.6%**	**11.2%**
Employers' contributions	32,600	13.9%	5.4%
Employees' contributions	41,726	17.8%	7.0%
Self- and non-employed	21,446	9.2%	3.6%
Social contributions	**95,780**	**41.0%**	**16.0%**
Total	**233,808**	**100.0%**	**39.0%**

Tax revenues by economic function

	€ mln	% of tax revenues	% of GDP
Labour (including social contributions, payroll & earned income taxes)	134,471	57.5%	22.4%
Consumption (including VAT, duties & environmental taxes)	66,071	28.3%	11.0%
Capital (including taxes on profits, savings, exports & assets)	33,266	14.2%	5.6%
Total	**233,808**	**100.0%**	**39%**

Notes

- The tax-to-GDP ratio is 0.4% below the EU-28 average of 39.4%.
- In the Netherlands there is an ongoing drive to simplify and reduce the total number of taxes.
- An aviation tax was introduced in 2008 and removed in 2009 on the basis of economic arguments (competition and cross-border effects). A packaging tax was introduced in 2008 and removed in 2013 as it was deemed too difficult to implement. A planned extention of tapwater tax to quantities above 300 m3 per connection was withdrawn in 2015. A tax on groundwater extraction was abolished in 2011.
- For R&D activities several facilities exist. Income derived from R&D is taxed in a separate 'innovation box', wage costs for R&D activities are decreased by a reduction of the wage tax. The self-employed who carry out R&D activities can deduct an amount from their taxable profits. Finally, a tax facility provides for 60% deduction for current and capital R&D expenses. For environmentally-friendly investments a deduction is granted, depending on the type of investment.

Sources

The information in these sheets is mainly drawn from the CIA, EEA, Eunomia, European Commission, European Parliament, Eurostat, Global Footprint Network, IMF, OECD and the UN. A full list of references is provided separately.

Netherlands: Tax Shift Scenario

Shifting taxes from labour to natural resources & consumption

(Impact on Dutch government budget, 2020*, difference from baseline, in 2015 prices)

Labour

€ 24 billion decrease

Shifting 11% of labour taxes to environment and consumption

Lowering personal income tax revenues by 16.7%

Lowering the costs of labour for employers by € 9.1 billion (without changing the social protection base)

Such a payroll tax credit already exists in the Netherlands

The Netherlands may opt for targeted tax credits to support pollution-intensive businesses, however, this would come at the expense of more employment-intensive industries

Income tax & SC - 23.1

- Reduction of income tax and employee SC - 14.0
- Payroll tax credit for new employment - 6.3
  (1% of GDP, employers benefit only as far as labour demand is increased structurally)
- Reduction of employers' SC - 1.7
- Payroll tax credit for circular innovation - 1.1
  (0.15% of GDP)

VAT *(0% on specific services)* (a) - 0.6

Resource use

€ 24 billion increase

Fossil fuels (b) 12.7

- Excise duty on transport fuels 10.1
  (gasoline, diesel, € 0.60/l)
- Excise duty on aviation fuel 2.5
  (€ 0.30/l)
- Excise duty on natural gas 0.04
  (€ 7.80/MWh)

Air pollution 4.1

- Carbon tax 4.1
  (€ 30/ton, in addition to ETS price & auction)

VAT 3.8

- Standard rate up *(to 21%)* 1.9
- Reduced rate up *(to 10%)* 1.9

Electricity tax *(€ 50/MWh, bulk users) (c)* 1.6

Secondary effect (d) 1.1

Water *(25% cost increase industrial use)* (e) 0.5

By applying 'the polluter pays' principles, a tax shift improves the competitiveness of labour-intensive sectors vis-a-vis resource- and pollution-intensive industries. Competitiveness of resource-intensive sectors and border efffects should be considered

Dutch Environment Minister Dijksma, 2016:
"Carbon pricing is the key to realising the climate agreements made in Paris."

OECD, 2016:
"a 6% rate is applied to a wide range of goods and services and this proportionally benefits the rich more (...) and should be phased out."

The standard VAT rate doesn't change in the scenario. The reduced rate increases from 6% to 10%

Notes

* In the modelling, the measures are phased in over a five-year period; reaching full force in 2020.
(a) Labour-intensive services (maintenance & repair).
(b) In addition to gasoline: € 1.56/litre; diesel: € 1.27/litre (2014) (including taxes and levies); natural gas: € 77/MWh (consumers, annual consumption 5.6-56 MWh); € 32/MWh (industries, consumption 2,778-27,778 MWh) (2015). In the Netherlands, a special rate applies for the use of natural gas in the horticulture sector (greenhouse heating).
(c) In addition to € 84/MWh (excluding refundable taxes and levies and VAT, annual consumption: 500-2,000 MWh. Eurostat does not publish tarrifs for larger bandwidths) (2015).
(d) Due to change in labour costs annd economic impacts. There are no direct stimulus or austerity effects in the scenario.
(e) Tap water is currently only taxed to a maximum quantity of 300 m3 per connection per year

(2016) The Ex'tax Project & Cambridge Econometrics

"Taking into account compulsory non-tax payments, the tax wedge in the Netherlands is significantly higher than the EU average and there is scope to shift taxation to factors less detrimental to growth. The envisaged tax reform would contribute to increasing labour market participation."

- European Commission, 2015

"Take further measures to enhance labour market participation particularly among people at the margin of the labour market and to reduce tax disincentives on labour."

- European Commission, 2014

"regressive rates apply on natural gas and electricity consumption and energy taxes are significantly lower for energy-intensive firms relative to small users, particularly households."

- OECD, 2016

"large efficiency gains could be achieved by shifting the tax burden away from labor, and towards consumption and capital income".

- IMF, 2015

"Step up efforts to strengthen innovation performance by increasing direct public support for R&D."

- OECD, 2016

"expected tax reforms were not achieved.(...) Policies to reform the tax system need to be revived to make it more efficient, equitable and environmentally-friendly.

(...) Accelerating the overdue upgrade of the tax authority's information and communication (ICT) systems would facilitate reform implementation."

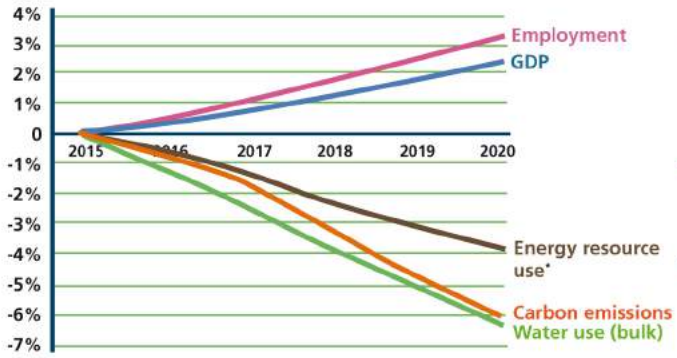
The tax exemption for the use of coal for energy production introduced in 2016 may have harmful environmental impacts which go beyond greenhouse gases"

- OECD, 2016

Netherlands: Results sheet

Key Modelling Results

(Netherlands, 2016-2020, % difference from baseline)



By 2020: 0.6 million more people in employment

Employment rates grows faster than GDP; an indication of inclusive growth

Effective decoupling of resource use and economic growth

(2016) The Ex'tax Project & Cambridge Econometrics

Key Modelling Results

(Netherlands, 2020, % difference from baseline)

GDP	2.4%
Consumption	4.9%
Investment	1.8%
Imports	0.6%
Exports	0.3%
Employment	3.2%
Carbon emissions	- 6.1%
Water use (bulk)	- 6.3%
Energy resource use*	- 3.8%

* Hard coal, other coal, crude oil, heavy fuel oil, middle distillates, natural gas, other gas, electricity, heat, combustible waste, biofuels, hydrogen.

Integrated Value Added Statement

(Netherlands, cumulative added value, 2016-2020, € difference to baseline)

Impact	Description	Value Added (€ billion)	Share of total (%)
Financial Capital		**47.5**	**72%**
- National Income Growth	Net change in GDP	47.5	
Natural Capital		**17.4**	**27%**
- Climate Change	Avoided costs to society of future impacts of climate change	5.4	
- Air Pollution	Avoided costs to society due to illness and premature deaths associated with air pollution exposure	6.8	
- Land and Water Pollutants	Avoided costs to society due to human and ecosystem health damage associated with pollution of land and water with toxic chemicals and metals	5.0	
- Water Depletion	Avoided costs to society due to human and ecosystem health damage associated with depletion of freshwater resources	0.3	
- Other value (not yet included)**	Avoided costs to society due to less extraction of metals, land use, eutrophication etcetera	pm	
Social Capital		**0.6**	**1%**
- Health Benefits of Employment	Value of healthy years of life gained due to reduced unemployment experienced	0.6	
- Other value (not yet included)**	Value of education/skills, income security, economic equality, social stability and cohesion, productivity, reduced poverty risk, etcetera	pm	
Total Value Added		**65.5**	**100%**

In addition to business as usual

36 million tonnes of CO2 emission reductions

7 million tonnes of oil equivalents saved (12 types of energy sources)*

12 billion cubic metres of water saved

Almost 0.8 million more 'person years of employment'

An Integrated Value Added of more than € 65 billion

(2016) The Ex'tax Project (scenario & design), Cambridge Econometrics (macro-economic modelling), Trucost (Value Added Statement).

• 2015 prices.
** This analysis is based on the available literature and proven and quantified linkages. As such, not all externalities could be included.

A tax shift benefits the Dutch economy by reducing resource use and carbon emissions, while stimulating the economy and job creation.

The total added value of the Ex'tax scenario compared to baseline is more than € 65 billion over a five-year period.

A taxs shift aligns the Dutch fiscal system with the goals of the Europe 2020 Strategy, the Roadmap to a Resource Efficient Europe, the Paris Climate Agreement and the SDGs.

12. Recommendations for next steps

Below are five recommendations for next steps towards updating the tax system. For each recommendation, a specific action for business leaders, political leaders and thought leaders is suggested:

1. Improve knowledge on the metabolism of economies

In order to get a better grip on the dependencies and risks with regard to natural resources, governments and businesses should start intensive research on the metabolism of the economies they operate in. A robust and sustainable tax system will require appropriate risk assessments and increasing level of responsiveness to urgent matters, which starts with proper measurement of resource use.

Action: *Extending and standardizing integrated reporting in order to have the appropriate information in place to take effective measures.*

2. Better collaboration between Ministries and DGs; interdisciplinary research

As economic, environmental and social issues are inter-linked; a systemic approach is needed to solve them. The existing segmentation between government and EU departments (Tax, Finance, Environment, Economic Affairs and Employment) is a barrier for the development of an interdisciplinary approach while fostering cooperation between departments will be crucial for the development of effective policies.

Action: *Studying the connections between economic, environmental, health and social concerns, by organising interdisciplinary research programs.*

3. Research impact from a business perspective

There is a substantial lack of knowledge about the risks and opportunities for companies; how does a shift in taxation affect strategic choices concerning products, services and new technologies? Governments need to gain more insight in the transformational power of businesses and business models in relation to taxes.

Action: *Developing a methodology to help business leaders and sectors analyse the impact of a tax shift, including business cases to illustrate its effects. Such a tool helps a well-informed discussion between policy makers and businesses.*

In 2013, The Ex'tax Project has initiated such analysis, together with the Future Leaders Team of the WBCSD. In 2016/2017 this research is extended to include more detailed strategic analyses.

4. Develop a coherent EU-level sustainable and inclusive tax strategy

European countries should collectively develop a scenario for the transformation to a circular economy and the appropriate tax system to reach this goal, by setting specific targets for the short, medium and long-term.

Action: *Develop a coherent EU-level sustainable and inclusive tax strategy connected with the Europe 2020 growth agenda and beyond. Such a strategic approach would allow the EU to become much more effective on the international stage and maximise the economic potential of the EU frontrunners in the sustainability transition. Possibly, through mobilizing a coalition of countries that are willing to advance exploration and implementation of the tax shift.*

5. Research macro-economic impacts of a tax shift on a larger international scale

The next step would be to analyse the impacts on a broader international scale (for example OECD plus key partners, Latin-America, or Asia). The OECD brings around its table 34 Members and 5 Key partners[519] that account for 80% of world trade and investment. Such global scale would enable the analysis of global trade flows, labour market impacts, for instance, as well as specific national and regional characteristics and preferences in tax reform.

Action: *Global/regional scenario development plus modelling, mapping preferences.*

It goes with saying that, since consumers and employers are economic actors and their behaviour might not be as rational as one can expect, proper communication on the measures and the timeframes is essential.

[519] Members: Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States. Key partners: Brazil, India, Indonesia, the People's Republic of China and South Africa.

Closing statement

"It always seems impossible until it's done."
Nelson Mandela

Times have changed. The linear (take-make-waste) economy is past its sell-by date. We've entered a new era; one that requires an inclusive circular economy, as targeted by national and EU strategies. Tax systems play a fundamental role in this transition.

Updating the tax system is not a simple task. But considering the megatrends that we are facing, doing nothing is no longer an option. Our research shows that a tax shift from labour to consumption and the use of natural resources enables the EU-27 economies and employment to grow, while natural resources are saved.

Our societies and economies can flourish by saving natural resources and tapping into the abundance of human talents and capacities instead. This transformation requires a long-term vision on the tax system, combined with a pragmatic pathway and a realistic timeframe. The contributing partners of this research recognize the tension between vision and pragmatism, between long-term and short-term interests. It may be clear that many details and complications still need to be researched. The question is whether to resolve these issues or allow them to immobilize our current system; a system that was built for a different era; the era of the linear economy.

We therefore call upon businesses, governments and NGOs to continue researching the opportunities and risks of a tax shift, and to take the necessary steps towards a 'new plan'; a robust and sustainable tax system that enables current and future generations to develop prosperity based on human capital rather than natural resources. We hope that *New Era. New Plan. Europe* is a source of inspiration.

The Ex'tax Project, Deloitte, EY, KPMG Meijburg, PwC, Cambridge Econometrics and Trucost invite all interested parties to contribute to any of the recommended steps and help expand knowledge on and/or increase support for this fundamental update of the tax systems.

The world has moved on; tax systems need to do the same.

Appendix 1: EU institutions on the tax shift (1993-2016)

2016

Council of the European Union (2016), European Semester 2016: Council Recommendation on the economic policy of the euro area.

> *"Reduce the tax wedge on labour, particularly on low-earners, in a budgetary-neutral way to foster job creation".*

Council of the European Union (2016), Recommendation for a COUNCIL RECOMMENDATION on the 2016 national reform programme of the Netherlands and delivering a Council opinion on the 2016 stability programme of the Netherlands.

> *"The recent growth in employment can be fully attributed to an increase in the number of people employed on temporary contracts and the number of self-employed. Although the Netherlands has taken measures to address the issue, a more comprehensive approach is needed. (…) Self-employed people without employees are more often under-insured against disability, unemployment and old age, which could affect the sustainability of the social security system in the long run."*

European Commission (2016), EUROPEAN SEMESTER THEMATIC FICHE; TAXATION.

> *"Shifting taxes away from labour should be a priority for several EU Member States, in view of its positive impacts on labour supply and demand. EU Member States may want to reduce their level of labour income taxation in a budget neutral way, implying a shift towards tax bases that are less harmful to growth while taking into account redistributive effects and impacts on social security systems. At the macroeconomic level, recurrent property taxes, consumption taxes, and environmental taxes are found to be the least detrimental to growth."*

European Commission (2016), Assessment of progress on structural reforms, prevention and correction of macroeconomic imbalances, and results of in-depth reviews under Regulation (EU) No 1176/2011 {SWD(2016) 71 to SWD(2016) 96} and {SWD(2016) 120}. COM(2016) 95 final/2.

> *"The tax burden on labour should be further lowered. Many Member States have taken measures to reduce labour taxation. For example, Estonia and France took steps to reduce labour taxation on low income earners. Moreover, labour taxation reforms have been implemented in some Member States characterised by high unemployment rates, such as Belgium, Spain and Italy. However, the tax wedge on labour, in particular on low incomes, remains high in several Member States and has even increased in some countries. (…) More progress needs to be made on reducing the tax burden on labour."*

2015

European Commission (2015), Smart Taxation: a Winning Strategy. Video.

"One of the biggest tax policy challenges in Europe is that governments tend to rely too much on labour taxes. But overdependence on labour taxes can be a disadvantage when they make it too expensive to employ people. Passing some of the taxes to other things, such as pollution, could help to accelerate employment and economic growth. Smart taxation is a winning strategy."

European Commission (2015), Environment Action Programme to 2020.

"Priority objective 6: To secure investment for environment and climate policy and address environmental externalities: 76. The Union and its Member States will need to put in place the right conditions to ensure that environmental externalities are adequately addressed, including by ensuring that the right market signals are sent to the private sector, with due regard to any adverse social impacts. This will involve applying the polluter-pays principle more systematically, in particular through phasing out environmentally harmful subsidies at Union and Member State level, guided by the Commission, using an action-based approach, inter alia, via the European Semester, and considering fiscal measures in support of sustainable resource use such as shifting taxation away from labour towards pollution. As natural resources become increasingly scarce, the economic rent and profits associated with their ownership or exclusive use may increase. Public intervention to ensure that such rents are not excessive and that externalities are taken into account will lead to a more efficient use of those resources and will help to avoid market distortions, as well as generate public revenue. (…) Other market-based instruments, such as payments for ecosystem services, should be used more extensively at Union and national level to incentivise private sector involvement and the sustainable management of natural capital."

European Commission (2015), Tax Reforms in EU Member States 2015. Tax policy challenges for economic growth and fiscal sustainability.

"Environmentally-related taxes (92) can be used by governments both as a way of raising revenue and to help the country achieve its environmental objectives. These two aims must therefore be reconciled when designing environmentally-related tax policies. (…) environmentally-related taxes are amongst the taxes least detrimental to growth and are considered to be a source of revenue that can, for example, be used to help finance a reduction in the tax burden on labour."

European Commission (2015), Recommendation for a COUNCIL RECOMMENDATION on the economic policy of the euro area {SWD(2015) 700 final}. COM(2015) 692 final.

"Reduce the tax wedge on labour, particularly on low-earners, in a budgetary-neutral way to foster job creation".

European Commission (2015), Country-specific recommendations, Brussels, 13.5.2015 COM(2015) 250 final.

"While the labour market situation is gradually improving, not least due to reforms implemented in several Member States in recent years, unemployment is still intolerably high (9.6%). Poverty and marginalisation have increased. (…) Although

many Member States recognise the need to shift taxation away from labour and to eliminate distortions in the tax systems, progress has been slow. (…) High levels of labour taxation, particularly on low income earners, may inhibit job creation and incentives to participate in the labour market."

European Commission (2015), Recommendation for a COUNCIL RECOMMENDATION on the 2015 National Reform Programme of Belgium and delivering a Council opinion on the 2015 Stability Programme of Belgium, Brussels, 13.5.2015 COM(2015) 252 final.

"The Belgian tax system is characterised by a high overall tax burden, relatively high rates, and narrow bases. The tax burden is heavily skewed towards labour. This results in high labour costs, which discourage job creation, and large tax wedges, which contribute to unemployment traps. In addition, partly to alleviate the high tax rates, tax bases are generally eroded by numerous specific exemptions, deductions, reduced rates, and tax expenditures, which create efficiency losses and introduce distortions and possible loopholes. Certain features of the tax system are environmentally harmful. Given these weaknesses, Belgium has been repeatedly advised to simplify and redesign its tax system in order to rebalance the tax burden, close tax loopholes, and reduce the sometimes harmful differentiation created by taxation niches. So far, limited progress has been made towards a comprehensive tax reform entailing, in particular, a shift from labour towards less growth-distorting tax bases. Tax bases with scope for broadening include environmental and consumption taxes and certain types of financial income. Combining a shift away from labour with tax-base broadening (reviewing existing tax provisions, subsidies, exemptions, and deductions) could improve the overall balance and fairness of the tax system, support employment, competitiveness and social and environmental objectives, and counter tax evasion and aggressive tax planning."

European Commission (2015), Recommendation for a COUNCIL RECOMMENDATION on the 2015 National Reform Programme of the Netherlands and delivering a Council opinion on the 2015 Stability Programme of the Netherlands, Brussels, 13.5.2015 COM(2015) 268 final.

"Taking into account compulsory non-tax payments, the tax wedge in the Netherlands is significantly higher than the EU average and there is scope to shift taxation to factors less detrimental to growth. The envisaged tax reform would contribute to increasing labour market participation."

European Commission (2015), Recommendation for a COUNCIL RECOMMENDATION on the 2015 National Reform Programme of Germany and delivering a Council opinion on the 2015 Stability Programme of Germany.

"the scope for shifting taxes to more growth-friendly revenue sources appears underused. (…) The tax wedge for workers earning between 50 % and 67 % of the average wage has remained largely unchanged since 2001 and remains among the highest in the EU. The recent reforms to social insurance systems are likely to involve a further rise in contribution rates and increase the tax wedge further. This would have potentially negative effects on labour market participation and disposable income. (…) Increase incentives for later retirement. Take measures to reduce high labour taxes and social security contributions, especially for low-wage earners, and address the impact of fiscal drag. Revise the fiscal treatment of mini-jobs to facilitate the transition to other forms of employment.

European Commission (2015) Recommendation for a COUNCIL RECOMMENDATION on the 2015 National Reform Programme of Poland and delivering a Council opinion on the 2015 Convergence Programme of Poland, Brussels, 13.5.2015 COM(2015) 270 final.

> *"Tax revenues could be increased by reducing the extensive use currently made of reduced VAT rates and by increasing the efficiency of the tax administration. (…) Labour market segmentation persists in Poland. The incidence of temporary contracts is the highest in the EU, while the transition rate from temporary to permanent employment is low and the wage differential the highest in the EU. (…) The social security privileges granted to farmers and miners continue to hamper professional mobility and impose significant costs on public finances. These preferential schemes deter people from moving to more productive sectors, create hidden unemployment and, due to low contributions, are heavily subsidised by taxpayers.*

European Commission (2015), RECOMMENDATION FOR A COUNCIL RECOMMENDATION ON THE 2015 NATIONAL REFORM PROGRAMME OF SPAIN AND DELIVERING A COUNCIL OPINION ON THE 2015 STABILITY PROGRAMME OF SPAIN, BRUSSELS, 13.5.2015 COM(2015) 259 FINAL.

> *"Some progress was made in the area of taxation, with a comprehensive tax reform being introduced to make the tax system simpler and more conducive to growth and job creation. A tax reform was adopted on 20 November 2014, to enter into force in January 2015, and covers personal and corporate income taxation. Some progress was also made with regard to the fight against tax evasion, but no progress was seen in the area of environmental taxation. (…) Youth unemployment in Spain remains very high (over 53 %)and the early school leaving rate is one of the highest in the EU. (…) It therefore remains essential to identify new sources of funding, ensure effective and efficient use of resources, set up the new research agency and promote measures to make the business environment more innovation-friendly."*

2014

Eurogroup (July 8, 2014) Structural reform agenda - thematic discussions on growth and jobs - Reduction of the tax wedge.

> *"A high tax burden on labour is an impediment to the objective of supporting economic activity and increasing employment."*
>
> *"tax wedge reductions need to be compensated (...) through revenue-neutral tax shifts, away from labour to revenue sources that are less detrimental to growth such as consumption taxes, recurrent property taxes and/or environmental taxes."*

European Commission (2014), Annual Growth Survey 2015.

> *"employment and growth can be stimulated by shifting the tax burden away from labour towards other types of taxes which are less detrimental to growth, such as recurrent property, environment and consumption taxes" .*

European Commission (2014), Recommendation for a Council Recommendation on the Netherlands' 2014 national reform programme and delivering a Council opinion on the Netherlands' 2014 stability programme.

"HEREBY RECOMMENDS that the Netherlands take action within the period 2014-2015 to: (…) Take further measures to enhance labour market participation particularly among people at the margin of the labour market and to reduce tax disincentives on labour."

European Commission (2014), Commission Staff Working Document. Assessment of the 2014 national reform programme and stability programme for The Netherlands.

"At 3.9 % of GDP, the Netherlands has the second highest level of environmental taxes as a percentage of GDP in the EU. It raises significant revenues from transport taxes, especially the vehicle registration tax. It is one of the few countries in the EU with a significant proportion of pollution taxes, beginning with a tax on the pollution of surface waters and sewerage charges (0.72 % of GDP, EU-27 0.1 % of GDP). Even though it has one of the highest levels of environmental taxes in the EU, subsidies through lower energy taxes for energy-intensive industry and horticulture remain."

"The 2014 taxation plan contains some measures towards a growth-friendly tax shift, such as increasing charges on tap water and re-introducing the waste tax. However, taxation could be shifted further away from labour towards environmental and other taxes less detrimental to growth (e.g. by reducing the preferential tax treatment of diesel compared to petrol; reducing environmentally harmful subsidies; reducing the scope of the reduced VAT rate, abolishing the deduction for small mortgage debt and reducing mortgage interest more quickly and ambitiously, while considering increasing recurrent property taxation, which are still relatively low)."

European Commission (2014), 2014 European Semester: Country-Specific Recommendations. Building Growth.

"not enough is being done to reduce the high tax wedge on labour, although lower taxes on labour remain crucial for a job-rich recovery."

"The structure of tax systems, and particularly the shifting of the tax base from labour to other sources, is an essential aspect of on-going reforms. A priority for many Member States is to alleviate labour taxation in order to increase incentives to work and to reduce the relatively high cost of labour, in particular for low-skilled workers. While several Member States have taken or started to take tax measures in response to the last year's recommendations in this area (Austria, Belgium, Italy, France, Latvia, Hungary and the Netherlands), progress has been limited overall. Thus most tax challenges identified in the last year's recommendations remain valid also for 2014/2015."

"More generally, progress can still be made to reduce the overall tax burden and/or to make the tax system more efficient and less distortive. (…) Some recommendations thus focus on (…) removing environmentally-harmful subsidies and on further shifting the tax base away from labour to taxation which is less detrimental to growth such as environmental or recurrent property taxes."

European Commission (2014), Q&A: Country-specific recommendations 2014.

"What are the main challenges facing Member States in 2014-15? Shifting to growth-friendlier taxation: Many countries have relied on tax rises rather than spending cuts during the crisis and the overall tax burden has risen. Because there is limited room for manoeuvre when it comes to public finances, a number of recommendations focus on shifting taxation from labour to more recurrent property, consumption and environmental taxes, as they are less detrimental to growth."

"What do the CSRs say about taxation? - Strong emphasis is put on the need to reduce the high tax burden on labour (which, at 46.5% in the euro area, is higher than non-European OECD countries). In total, 12 Member States are asked to put more effort into shifting the tax burden away from labour to other, less distortive taxes such as consumption, pollution and recurrent property taxes: Austria, Belgium, Czech Republic, France, Germany, Hungary, Italy, Latvia, Lithuania, the Netherlands, Romania and Spain."

European Commission (2014), Towards a circular economy: A zero waste programme for Europe.

"Policy has a further role in providing the right signals for investment in resource efficiency by eliminating environmentally harmful subsidies and switching taxation away from labour towards pollution and resources."

2013

European Commission (2013), Taxation. Excerpt from Tax reforms in EU Member States 2013.

"Environmental taxes remain underdeveloped in many Member States and their revenues in percentage of GDP declined during the period 1999-2008, despite efforts to move to a greener society. (…) There is potential to raise revenue through tax increases as well as through reducing tax expenditure in environmental taxation."

European Commission (2013,) Annual Growth Survey 2014.

"Tax systems should be redesigned by broadening tax bases, and shifting the tax burden away from labour on to tax bases linked to consumption, property and pollution."

"Environmentally harmful subsidies should be reduced."

"Tax should be designed to be more growth-friendly, for instance by shifting the tax burden away from labour on to tax bases linked to consumption, property, and combatting pollution."

"To stimulate job creation, action should be taken to reduce the tax wedge on labour, as part of overall efforts to shift the tax burden, in particular for low paid workers and young workers"

"Top personal income rates are at their highest level since 2008. The overall tax burden on labour has increased, but Member States (BE, DK, FI, FR, HU, IT, NL, PT, SE) have decreased labour taxes for specific groups."

European Commission (2013), Tax reforms in EU Member States. Tax policy challenges for economic growth and fiscal sustainability.

"Belgium, Spain, France, Austria, Slovenia, Slovakia, Czech Republic, Latvia, Lithuania, Hungary, Poland and Romania seem to have room for boosting their revenue from environmental taxes. (...) Based on the screening summarised in Table 3.11, Belgium, France (42), Italy, Latvia, Hungary (43) and Romania in particular and, to a lesser extent, Germany, the Netherlands, Austria, Finland, the Czech Republic and Sweden appear to be facing the challenge of reducing the tax burden on labour (either overall or for specific groups) and at the same time appear to have room to increase taxes which are less detrimental to growth."

"The tax experiments presented here assume a 1 % GDP reduction in labour taxes (comprising both social contributions and taxes on personal income) financed by a similarly sized increase in consumption taxes, such that the tax shift is ex- ante budgetary neutral. It is assumed that the tax reforms are carried out simultaneously in all Member States."

"The first scenario investigates the effect of a uniform tax shift from the wages of all skill types to consumption (central scenario). The second examines the effect of a tax shift targeted to alleviate only the tax burden of low-skilled workers, leaving the labour tax burden on medium and high-skilled workers unchanged (targeted scenario)."

"The model simulations suggest that a permanent shift of taxes from wages to consumption has positive GDP effects (see Table 3.13). Reducing labour taxes lowers wage costs and reduces prices. The gain in competitiveness that results from the labour tax reduction leads to an increase in employment and output, and boosts exports. Compared to the 'no-policy change' baseline, EU-wide real GDP increases in the first year by about 0.11 % and rises to 0.48 % in the long run under the central scenario."

"(...) the second scenario, in which only the labour taxes on low skilled earners are reduced in a budgetary neutral way. This targeted tax shift produces much greater effects compared to the central scenario, with EU-27 GDP increasing by 0.18 % in the first year and 1.25 % in the long run."

"Various measures could be taken at national level to improve the design of environmental taxation. These include: (a) adjusting the structure of tax rates on fossil fuels according to their carbon and energy content; (b) indexing environmental taxes; (c) considering the abolition of reduced VAT rates on energy; (d) reducing tax subsidies for company cars; and (e) introducing CO2-related vehicle taxation."

European Commission (2013), The marginal cost of public funds in the EU: the case of labour versus green taxes. Taxation papers.

"This paper uses a computable general equilibrium model to gauge these potential distortions by calculating the marginal cost of public funds (MCF) for EU member states. (...) the economic distortions provoked by labour taxes are significantly larger than for green taxes"

"result is slightly less strong when one considers the spillover effects between countries, which are more pronounced (in relative terms) for green taxes. This suggests that the use of green taxes for fiscal consolidation would be more effective were there to be close coordination across EU countries."

"the efficiency losses from green taxes are far smaller than for labour taxes. Considering EU-wide figures, the value for labour taxes of 1.90 implies that to raise an additional 1 euro of revenue, the average efficiency loss would be 0.90 euros. In contrast, raising an additional 1 euro of revenue from energy taxes, leads to an average efficiency loss of only 8 cents."

"The result is also consistent with economic theory, which suggests that taxing goods with a relatively inelastic demand, such as energy, will result in only small distortions. This is not the case for labour if one is faced with a labour supply curve that is at least somewhat elastic. Furthermore, increased unemployment also requires additional social security payments from the government, (...) countries with high starting level of taxation have also the highest values of the MCF."

"An important point to notice is that in every country, the MCF for labour taxes is higher than for green taxes, suggesting that all countries would see an efficiency gain from switching from labour to green taxes."

"(…) our results suggest overwhelmingly that should tax increases be considered in EU countries, energy taxes represent a better candidate than labour taxes. (...) energy is relatively under-taxed compared to labour taxes, at least in the EU countries considered here."

European Commission (2013), Recent Reforms of Tax Systems in the EU: Good and Bad News. Working paper n.39.

"Country specific recommendations on the tax shift take two forms, which are complementary: 1) a general shift from labour (or capital) taxation to other taxes such as consumption, environmental and property taxation; and 2) a reduction of the labour tax burden for certain groups such as second earners or low-income workers."

"In 2012, eleven countries received a CSR referring to shifting taxation away from labour or reducing the labour tax burden on specific groups. These countries were: Austria, Belgium, Czech Republic, Germany, Estonia, Spain, France, Hungary, Italy, Latvia, and Slovakia. In 2013, the Commission assessed that the majority of the recommendations were not implemented forcefully. Member States usually increased indirect taxes, but this trend was not accompanied by corresponding cuts in labour taxation to reduce the relatively high cost of labour. As a result, for all of the above mentioned countries - except for Estonia and Spain – the recommendations were reiterated in 2013."

"In 2012, 12 countries were issued CSRs referring to environmental taxation (Austria, Belgium, Czech Republic, Estonia, Spain, France, Hungary, Italy, Lithuania, Luxembourg, Latvia and Slovakia). Where measures have been taken, tax reforms appeared to be mostly for consolidation purposes. However, the tax instrument was not always fully exploited to achieve environmental objectives. Examples of (smart)/additional reforms would be addressing the gap between diesel and petrol tax rates, limiting the use of some harmful or inefficient reduced VAT on energy products or natural

resources, reforming more ambitiously company car taxation, increasing taxes on pollution, etc. Therefore, in 2013, most of the CSRs have been maintained. Between 2012 and 2013, the main measures taken were increases of the excise duty on diesel, increases of the tax rates on energy and reforms of car taxation. The scope of action seems to be limited and at the margin (e.g. small increases of excise duties only correcting for inflation) while tax reforms were sometimes ill-designed (e.g. taxing profits of energy companies instead of consumption) or undermined by other tax reform giving the opposite signal (e.g. tax allowances granted to commuters encouraging the use of private cars instead of public transportation)."

"More than one third of the Member States have increased their excise duties on gas oil and other energy products."

"Spain has introduced a nuclear tax on the production of radioactive waste resulting from the generation of nuclear energy. Hungary and Italy now apply a surcharge on the company income tax to companies operating in the energy or public utility sectors. However, these latest measures do not provide direct incentives to reduce energy consumption and may have distortionary effects unlike, for example, energy consumption taxes."

"The limited progress in the field of environmental taxation can be partially explained by competitiveness and social issues. Environmental taxes are considered to be regressive and might aggravate the poverty risk or social exclusion. (...) However, environmental taxation can be designed in a way to reduce social impacts and properly designed environmental taxes can also stimulate the development of new technologies, promote resource efficiency and the creation of 'green' jobs."

European Commission (2013), Recommendation for a Council recommendation on Belgium's 2013 national reform programme and delivering a Council opinion on Belgium's stability programme for 2012-2016.

[The European Commission] "HEREBY RECOMMENDS that Belgium should take action within the period 2013-2014 to: Establish concrete and time-specific proposals for shifting taxes from labour to less growth-distortive tax bases, notably by exploring the potential of environmental taxes, for example on diesel, heating fuels and the taxation of the private use of company cars."

Council of the European Union (2013), Recommendation for a Council Recommendation on the Czech Republic's 2013 national reform programme and delivering a Council opinion on the Czech Republic's convergence programme for 2012-2016.

"HEREBY RECOMMENDS that the Czech Republic should take action within the period 2013-2014 to: (…) Reduce the high level of taxation on labour by shifting taxation to areas less detrimental to growth, such as recurrent taxes on housing and vehicle circulation taxes."

Council of the European Union (2013), Recommendation for a Council Recommendation on France's 2013 national reform programme and delivering a Council opinion on France's stability programme for 2012-2017.

"HEREBY RECOMMENDS that France should take action within the period 2013-2014 to: (…) Take further measures shifting the tax burden from labour to environmental taxation or consumption."

Council of the European Union (2013), Recommendation for a Council Recommendation on Hungary's 2013 national reform programme and delivering a Council opinion on Hungary's convergence programme for 2012-2016.

> *"HEREBY RECOMMENDS that Hungary should take action within the period 2013-2014 to: (…) Continue making taxation of labour more employment friendly by alleviating the tax burden on low-wage earners, inter alia by refining the eligibility criteria for the Job Protection Act, and by shifting taxation away to environmental taxes."*

Council of the European Union (2013), Recommendation for a Council Recommendation on Italy's 2013 national reform programme and delivering a Council opinion on Italy's stability programme for 2012-2017.

> *"The structure of the tax system remains complex and weighs heavily on labour and capital. After the effort undertaken in 2010-2011, additional measures adopted to shift the tax burden from the productive factors onto consumption, property and the environment have been more limited.*
>
> *"HEREBY RECOMMENDS that Italy should take action within the period 2013-2014 to: (…) Shift the tax burden from labour and capital to consumption, property and the environment in a budgetary neutral manner."*

Council of the European Union (2013), Recommendation for a Council Recommendation on Latvia's 2013 national reform programme and delivering a Council opinion on Latvia's convergence programme for 2012-2016.

> *"Latvia has reduced taxes on labour and plans to take further steps in this regard in 2014 and 2015. However, the tax wedge for low-wage earners is still among the highest in the EU, indicating a need for appropriate calibration of tax policy to stimulate employment for the low-skilled. Moreover, shifting taxation from labour to recurrent property taxes and taxes on the use of natural and other resources should improve the structural balance. Environmental taxes remain relatively underdeveloped and are heavily dominated by motor-fuel taxation, while taxation of other energy sources, pollution and the use of natural resources is below the EU average. Further broadening of the tax base to include other sources of environmental taxation would help in achieving environmental goals."*
>
> *"HEREBY RECOMMENDS that Latvia should take action within the period 2013-2014 to: (…) Within this strategy, reduce taxation of low-income earners by shifting taxation to areas such as excise duties, recurrent property taxes and/or environmental taxes."*

Council of the European Union (2013), Recommendation for a Council Recommendation on Lithuania's 2013 national reform programme and delivering a Council opinion on Lithuania's convergence programme for 2012-2016.

> *"Lithuania's revenues from environmental taxes are on a downward trend and were the second lowest in the EU in 2011, also due to the lowest level of transport taxes in the EU; this does not facilitate reductions in the high energy intensity of the Lithuanian economy."*
>
> *"HEREBY RECOMMENDS that Lithuania should take action within the period 2013-2014 to: (…) Review the tax system and consider increasing those taxes that are least*

detrimental to growth, such as recurrent property and environmental taxation, including introducing car taxation".

Council of the European Union (2013), Recommendation for a Council Recommendation on Luxembourg's 2013 national reform programme and delivering a Council opinion on Luxembourg's stability programme for 2012-2016.

"Currently, less than a third of tax revenues are raised from consumption taxes, partially owing to moderate standard and reduced VAT rates."

"Luxembourg is committed to reducing its greenhouse gas emissions in the non-ETS sectors by 20 % in 2020 compared to 2005 but is expected to fail to meet its target by 23 percentage points according to the latest 2020-projections based on existing measures. The transport sector was responsible for 68% of non-ETS emissions in 2011 and represents a key challenge for Luxembourg. Measures currently in place would only contribute to approximately a third of the greenhouse gas emission reduction necessary to meet the target. Consequently, measures need to be significantly stepped up, notably by increasing fuel taxation so as to reduce the taxation gap with neighbouring countries. The vehicle tax reform should also be accelerated. Luxembourg should continue with the implementation of projects, which favour the use of public transport. It should introduce congestion charging on roads to encourage a shift towards public transport."

"HEREBY RECOMMENDS that Luxembourg should take action within the period 2013-2014 to: (…) Step up measures to meet the target for reducing non-ETS greenhouse gas emissions, in particular by increasing taxation on energy products for transport."

Council of the European Union (2013), Recommendation for a Council Recommendation on Romania's 2013 national reform programme and delivering a Council opinion on Romania's convergence programme for 2012-2016.

"HEREBY RECOMMENDS that Romania should take action within the period 2013-2014 to: (…) explore ways to increase reliance on environmental taxes."

Council of the European Union (2013), Recommendation for a Council Recommendation on Spain's 2013 national reform programme and delivering a Council opinion on Spain's stability programme for 2012-2016.

"HEREBY RECOMMENDS that Spain should take action within the period 2013-2014 to: (…) Consider further limiting tax expenditure in direct taxation, explore the scope to further limit the application of the reduced VAT rates and take additional steps in environmental taxation, notably as regards excise duties and fuel taxes."

European Parliament (2013), Decision of the European Parliament and of the Council on a general union Environment Action Programme to 2020 "Living well, within the limits of our planet".

"The Union and its Member States will need to put in place the right conditions to ensure that environmental externalities are adequately addressed, including (…) considering fiscal measures in support of sustainable resource use such as shifting taxation away from labour towards pollution."

2012

European Commission (2012), Annual Growth Survey 2013.

> *"This is why the Commission recommends that: - The tax burden on labour should be substantially reduced in countries where it is comparatively high and hampers job creation. To ensure that reforms are revenue neutral, taxes such as consumption tax, recurrent property tax and environmental taxes could be increased.*
>
> *- Additional revenue should be raised preferably by broadening tax bases rather than by increasing tax rates or creating new taxes. Tax exemptions, reduced VAT rates or exemptions on excise duties should be reduced or eliminated. Environmentally harmful subsidies should be phased out."*
>
> *"To limit the tax burden on labour, notably for the low-paid, as part of broader efforts to shift tax burden away from labour. Temporary reductions in social security contributions or job subsidy schemes for new recruits, notably the low skilled and long-term unemployed, could also be considered to promote job creation, provided they are well targeted."*

European Commission (2012), Recommendation for a Council recommendation on Spain's 2012 national reform programme and delivering a Council opinion on Spain's stability programme for 2012-2015.

> *"Introduce a taxation system consistent with the fiscal consolidation efforts and more supportive to growth, including a shift away from labour towards consumption and environmental taxation."*

European Commission (2012), The 2013 Annual Growth Survey: Towards fair and competitive tax systems. MEMO/12/915.

> *"Economic studies show that certain types of taxes – such as those on labour and income – are more distortive, while others such as consumption and environmental taxes are considered to be more growth-friendly. These latter can also steer certain behaviours in a way that meets wider societal needs and objectives. The Commission therefore advises Member States to shift taxes away from areas that impede growth (labour, corporate taxes) towards more growth-friendly taxes (consumption, environment)."*

European Commission (2012), Towards a job-rich recovery.

> *"The Commission will: (...) 1. Promote a mainstreaming of green employment into National Job Plans (...) by emphasising in the 2013 European Semester the employment dimension of resource efficiency and the implementation of necessary reforms. In particular, Member States will be encouraged to make greater use of environmental taxes and ETS revenues in shifting taxation away from labour."*

European Parliament (2012) European Parliament resolution of 24 May 2012 on a resource-efficient Europe (2011/2068(INI)).

[Parliament] "Urges the Member States to make a shift towards environmental taxation emphasises that this should allow for cuts in other taxes such as those on labour (…)"

2011

European Commission (2011), Annual Growth Survey 2012.

"There is scope for broadening the tax base of certain taxes and thus increasing revenue or reducing distortively high tax rates. (…) Phasing out some hidden tax subsidies could help to widen the tax base. In particular, environmentally harmful subsidies should be eliminated."

"Greater efforts should be made to shift taxation away from labour towards taxation which is less detrimental to growth: for example, increasing consumption, environmental, wealth (for example, high value property) taxation can help to alleviate the tax burden on labour thus making hiring more attractive."

European Commission (2011), A resource-efficient Europe – Flagship initiative under the Europe 2020 Strategy.

"taxes and subsidies on the use of energy or other resources can be used both to steer behavior leading to reduced and more efficient consumption and to help restructure public finances away from labor taxation, which benefits job creation and economic growth."

European Commission (2011), Roadmap to a Resource Efficient Europe.

"Environmental taxation can also align the efforts for fiscal consolidation with facilitating the restructuring towards a resource efficient economy. Nonetheless, the average share of environmental taxation in total tax revenues in the EU has generally been declining since 1999, reaching a level of 6.3% in 2009."

"Milestone: By 2020 a major shift from taxation of labour towards environmental taxation, including through regular adjustments in real rates, will lead to a substantial increase in the share of environmental taxes in public revenues, in line with the best practice of Member States."

"Shifting taxation away from labour to boost employment and economic growth is already emphasized in the Annual Growth Survey for 2011 and in the European Council Conclusions from March 2011 "Green tax reforms", which consist of increasing the share of environmental taxes, while reducing others (…)."

2010

Council of the European Union (December 13, 2010), Sustainable materials management and sustainable production and consumption: key contribution to a resource-efficient Europe. 17495/10.

> *[The Council of the European Union] "INVITES the Commission and Member States to develop a coherent mix of measures to make European materials use more sustainable by further considering: (…) market-based instruments, steering the market towards recycling and waste reduction and recycling certificates; the internalisation of environmental costs, and in particular Member States considering the possibility of shifting the revenue base for national budgets from taxing labour towards taxing energy and resource use".*

European Commission (2010), An agenda for new skills and jobs: a European contribution towards full employment.

> *"(…) achieving the target of spending 3% of EU GDP on R&D by 2020 would induce the creation of 3.7 million jobs by 2020."*
>
> *"Stimulating recruitment through a reduction of non-wage labour costs (e.g. with a shift from labour taxes to energy consumption or pollution) is paramount in times of high unemployment, since the costs of sustaining unemployment insurance systems will most probably outweigh the reduction of revenue for the social security system. This is particularly important for those who experience particular difficulties to find new jobs after a recession, such as the low skilled or the long-term unemployed. Incentives to shift jobs from the informal into the regular economy are also essential; a good case in point is the development of regular employment in domestic, social care and other not-for-profit activities, offering an important entry to the labour market for those furthest away from it."*

European Commission (2010), Annual Growth Survey: advancing the EU's comprehensive response to the crisis.

> *"Shifting taxes away from labour should be a priority for all Member States in order to stimulate demand for labour and create growth."*
>
> *"Progress on taxation also implies reducing taxes on labour to the minimum necessary and adapting the European framework for energy taxation in line with the EU energy and climate objectives."*

European Commission (2010), Europe 2020. A strategy for smart, sustainable and inclusive growth.

> *"For example, raising taxes on labour, as has occurred in the past at great costs to jobs, should be avoided. Rather Member States should seek to shift the tax burden from labour to energy and environmental taxes as part of a "greening" of taxation systems.*

European Commission (2010), Monitoring tax revenues and tax reforms in EU Member States 2010. Tax policy after the crisis.

"simulations using the Quest III model also indicate that a shift from the most distortionary taxes (on labour and capital) to the least distortionary taxes (consumption, housing) could mitigate the output losses associated with fiscal consolidation in the short run and have a positive impact on GDP in the long run. According to these simulations, a consolidation package relying heavily on taxing consumption and housing while reducing income taxes would only lead to a minor and short-lived fall in GDP. Given the rise in potential output entailed by such a tax reform, output would be almost 1 per cent higher than baseline in the long run."

2007

European Commission (2007), Green paper: on market-based instruments for environment and related policy purposes.

"An environmental tax reform (ETR) shifting the tax burden from welfare-negative taxes, (e.g. on labour), to welfare-positive taxes, (e.g. on environmentally damaging activities, such as resource use or pollution) can be a win-win option to address both environmental and employment issues. At the same time, a long term tax shift will require relatively stable revenues from the environment related tax base. ETR can also help to alleviate the possible adverse competitiveness effects of environmental taxes on specific sectors. If the action is closely co-ordinated at the Community level, these impacts can be further reduced compared to unilateral actions by Member States. Reductions in labour taxation or social-security contributions which tend to benefit lower-income households, can counterbalance any possible regressive effect from environmental taxes. Finally, with an ageing population, which increases pressure on public expenditure, and globalisation that makes taxation of capital and labour less viable, the shift of tax burden from direct taxation towards consumption and, in particular, environmentally damaging consumption, may provide considerable benefits from a fiscal perspective"

2005

European Commission (2005), Commission Staff Working Document on the links between employment policies and environment policies.

"The key messages of this Communication were reflected in the 1998 Employment Guidelines [Council Resolution of 15.12.1997], highlighting the need to exploit fully the job creation potential in new activities, such as those in the environment sector, and to reduce the tax burden on labour, e.g. by shifting tax to energy and environmental pollutants."

1997

European Commission (1997), Communication from the Commission on environment and employment. Building a sustainable Europe.

> *[The European Commission proposes to] "Continue the gradual restructuring of tax systems by reducing non-wage labour costs on the one hand and on the other, incorporating environmental and resource costs into market prices of goods and services."*

1993

European Commission (1993), Growth, competitiveness and employment. Challenges and the ways forward into the 21th century.

> *"The serious economic an social problems the Community currently faces are the result of some fundamental inefficiencies: an 'under-use' of the quality and quantity of the labour force, combined with an 'overuse' of natural and environmental resources."*
>
> *"The tax burden must be redistributed so as to lighten the burden on labour and increase the burden on the use of natural resources."*
>
> *"The twin challenge of unemployment/environmental pollution is to be addressed, a trade off can be envisaged between lower labour costs and higher pollution charges." (…) An important dimension of the proposal concerns the widely advocated shift towards a more intensive use of indirect taxation, as well as a widening and balancing of the tax base for energy products. In the Community these proposals enjoy popular support: about 60% of European citizens are in favour of such a tax."*

Appendix 2: Thought leaders in support of a tax shift

Below is a selection of thought leaders' quotes on the tax shift from labour to natural resource use and consumption.

Brown, Lester *(Professor of economics at UCL)* (2008), Plan B 3.0: Mobilising to Save Civilization.

> *"In a troubled world economy, where many governments are facing fiscal deficits, these proposed tax and subsidy shifts can help balance the books, create additional jobs, and save the economy's eco-supports. Tax and subsidy shifting promise energy efficiency, cuts in carbon emissions, and reductions in environmental destruction—a win-win-win situation. (…) Some 2,500 economists, including eight Nobel Prize winners in economics, have endorsed the concept of tax shifts."*

Brown, Lester *(Professor of economics at UCL)* (2001), Eco-Economy: Building an Economy for the Earth.

> *"Tax shifting involves changing the composition of taxes but not the level. It means reducing income taxes and offsetting them with taxes on environmentally destructive activities such as carbon emissions, the generation of toxic waste, the use of virgin raw materials, the use of nonrefillable beverage containers, mercury emissions, the generation of garbage, the use of pesticides, and the use of throwaway products. This is by no means a comprehensive list, but it does include the more important activities that should be discouraged by taxing. There is wide agreement among environmental scientists on the kinds of activities that need to be taxed more."*

Club of Rome (2009), Global Assembly. Climate, Energy and Economic Recovery.

> *"Government and business must realize that climate change mitigation and the protection of oceans and terrestrial ecosystems require drastic changes in the use of natural resources. Targets for resource efficiency must be introduced, supported by tax reform, which should increase taxes on the use of resources and lower taxes on labour."*

Daly, Herman *(Professor of Economics at University of Maryland)* (2009), From a Failed Growth Economy to a Steady-State Economy.

> "Shift the tax base from a tax on value added (labor and capital) to a tax on "that to which value is added", namely the entropic throughput of resources extracted from nature (depletion), and returned to nature (pollution). This internalizes external costs as well as raises revenue more equitably. It prices the scarce but previously un-priced contribution of nature. The value added by labor and capital is something we want to

encourage, so stop taxing it. Depletion and pollution are things we want to discourage, so tax them."

Daly, Herman *(Professor of Economics at University of Maryland)*, Farley, Joshua *(Professor of Economics at University of Vermont)* (2004), Ecological economics: principles and applications.

"In bumper-sticker form, "Tax bads, not goods!". The bads are depletion and pollution (throughput), and the goods are value added by labor and capital, that is, earned income."

Dieren, Wouter van (*Member of the Club of Rome)* (1995), Taking nature into account. A report to the Club of Rome.

"(…) we advocate Von Weizsäcker's proposal for ecological tax reform, which we consider acceptable from the point of view of a society which has adopted employment as its first priority, namely a slow raising of resource prices by some % percent annually over a long period of perhaps some 40 years. This can be achieved first by cutting subsidies on energy (and, likewise, on other ecologically problematic factors). Subsequently, taxes could be levied on nonrenewable sources of energy, on primary raw materials, on water consumption, on certain chemicals such as chlorine or metals, and on certain types of land use. (…) Other taxes, charges, and levies should be reduced by equivalent amounts. And in particular the fiscal burden on human labor should be reduced. Especially in the European fiscal system, taxation on labor is such that incomes suffer, and making labor redundant seems to have become a major incentive for employers. The plea for ecotaxes (or an energy tax) in Europe is therefore counterbalanced by a relief in labor tax."

Ekins, Paul *(Professor of Energy and Environment Policy at UCL)* (June 11, 2010), The Price Mechanism and EcoEfficiency: the Role of Green Fiscal Reform.

"ETR [Environmental Tax Reform] is the shifting of taxation from goods (like income, profits) to 'bads' like resource use and pollution."

Ellen MacArthur Foundation (2012), Towards the circular economy. Economic and business rationale for an accelerated transition.

"Walter Stahel has argued that human labour should fall in that same category: 'Shifting taxation from labour to energy and material consumption would fast-track adoption of more circular business models; it would also make sure that we are putting the efficiency pressure on the true bottleneck of our resource consuming society/economy (there is no shortage of labour and (renewable) energy in the long term)."

''Rules of the game' in the form of better aligned economic incentives from tax authorities and regulators on issues such as cost of landfill and labour costs could potentially speed up adoption of more circular business models. Professor Roland Clift notes on this topic: "Some of the current incentives at systems levels are just perverse—for example, taxing labour instead of material. The one resource is non-renewable and in short supply yet free of taxes and the other is renewable but taxed'."

"Taxation today largely relies on labour income. Resource and labour market economists have long argued that labour as a 'renewable factor input' is currently penalised over material and non-renewable inputs in most developed economies. They promote a shift of the tax burden away from labour/income and towards non-renewable resources."

European Resource Efficiency Platform *(members include European Commissioners, members of the European Parliament, ministers, CEOs, academia and NGOs)* (2014), Manifesto & Policy Recommendations.

"A circular, resource-efficient and resilient economy should be achieved in a socially inclusive and responsible way by: (…) Abolishing environmentally harmful subsidies and tax-breaks that waste public money on obsolete practices, taking care to address affordability for people whose incomes are hardest-pressed. Shifting the tax burden away from jobs to encourage resource-efficiency, and using taxes and charges to stimulate innovation and development of a job-rich, socially cohesive, resource-efficient and climate-resilient economy."

"In the context of the European Semester process, the Commission should monitor and propose recommendations to phase out environmentally harmful subsidies and, without prejudice to the use for which the funds are put, to encourage Member States to shift the tax burden away from jobs to resource use in order to promote resource efficiency."

Gore, Al *(Former Vice President of the United States)* (2006), Speech at New York University.

"For the last fourteen years, I have advocated the elimination of all payroll taxes – including those for social security and unemployment compensation – and the replacement of that revenue in the form of pollution taxes – principally on CO2. The overall level of taxation would remain exactly the same. It would be, in other words, a revenue neutral tax swap. But, instead of discouraging businesses from hiring more employees, it would discourage business from producing more pollution."

Gore, Al *(Former Vice President of the United States)* (2008), TED Talk: New thinking on the climate crisis.

"We need to put a price on carbon. We need CO2 tax, revenue neutral, to replace tax on employment."

Hawken, Paul, Lovins, Amory, Lovins, Hunter (2009), Natural Capitalism. Creating the next industrial revolution.

"Shifting taxes towards resources creates powerful incentives to use fewer of them now. Simultaneously removing personal and employer taxes on labor creates new arenas of employment opportunity, since the cost of employment is reduced without lowering income. (…) This in turn encourages many resource-saving activities, like closing the loops on material flows, disassembling products, and remanufacturing and repairing products, that currently look costlier than virgin resource use. This illusion is caused by keeping labor artificially expensive and raw materials artificially cheap."

Hawken, Paul (1993), The Ecology of Commerce. A declaration of sustainability.

"Moving toward sustainability and not addressing job creation will exacerbate economic hardship and further degrade resources. Asking people to reduce consumption without increasing employment will create a world as destructive as the one they would replace."

ILO (International Labour Organization) (2012), Working towards sustainable development: opportunities for decent work and social inclusion in a green economy.

"Taxing polluters generates revenues that can be leveraged to reduce other (distortionary) taxes, for example taxes on labour. These reductions can lead to higher labour demand and higher employment, while using less energy."

IMF (2015), Kingdom of the Netherlands: Staff Concluding Statement of the 2015 Article IV Mission.

"Tax reforms could increase potential growth, enhance fairness, and improve efficiency. Despite progress in recent years, the Dutch tax and benefit system remains unbalanced; large efficiency gains could be achieved by shifting the tax burden away from labor, and towards consumption and capital income".

D. Heine, et al (2012), Environmental Tax Reform: Principles from Theory and Practice to Date, IMF Working Paper WP/12/180.

"For most environmental problems, well-designed fiscal policies (emissions taxes or their cap- and-trade equivalents with allowance auctions) are the most natural instruments for incorporating environmental damages into the price of products and non-market activities (like driving)."

"Several factors point to continued momentum for environmental tax reform. One is pressure for new revenues to strengthen fiscal positions. Another is growing acceptance among policymakers that emissions pricing instruments are far more effective at exploiting the entire range of emissions reduction opportunities than are regulatory approaches. Swapping environmental taxes (that apply to traded goods) for labor taxes might also be means to improve competitiveness. And environmental problems are of growing concern, from rising greenhouse gas (GHG) concentrations to deteriorating urban air quality in industrializing nations to increasing congestion (a related externality) of transportation systems."

IMF (2013), Factsheet Climate, Environment, and the IMF.

'Fiscal instruments (carbon taxes or similar) are the most effective policies for reflecting environmental costs in energy prices and promoting development of cleaner technologies, while also providing a valuable source of revenue. Fiscal policies also have an important role to play in addressing other major environmental challenges, like poor air quality and urban congestion.'

'Broad-based charges on greenhouse gas emissions, such as a carbon tax, are the most effective instruments for reducing emissions throughout the economy.'

IMF (2012), Fiscal Policy to Mitigate Climate Change. A Guide for Policymakers. Pre-publication copy. Editors: Ruud de Mooij, Ian W.H. Parry, and Michael Keen.

'Ideally, carbon prices are applied in proportion to the carbon content of fuels as they enter the economy (...). The costs of comprehensive carbon pricing is initially modest if revenues are used productively. Productive revenue uses include reducing taxes on work effort'.

IMF (2012), Back to Rio—the Road to a Sustainable Economic Future, Speech by Christine Lagarde, 12th June 2012.

"Getting the prices right means using fiscal policy to make sure that the harm we do is reflected in the prices we pay. I am thinking about environmental taxes or emissions trading systems under which governments issue—and preferably sell—pollution rights. It is basically a variation of the old mantra: "you break it, you buy it"."

"As we move forward, there is much work to be done at the technical level, in terms of the appropriate design of taxes and tax-like instruments to get the prices right. The IMF will play an active role in this. (...) we will be talking about the use of fiscal policy, and reform of energy subsidies, to promote green growth."

IMF (2008), The Fiscal Implications of Climate Change.

'Climate change is a global externality problem, calling for some degree of international fiscal cooperation.'

Mankiw, Gregory *(Professor of Economics at Harvard)* (January 21, 2012), A Better Tax System (Assembly Instructions Included). The New York Times.

"A good rule of thumb is that when you tax something, you get less of it. That means that taxes on hard work, saving and entrepreneurial risk-taking impede these fundamental drivers of economic growth. The alternative is to tax those things we would like to get less of. Consider the tax on gasoline. Driving your car is associated with various adverse side effects, which economists call externalities. These include traffic congestion, accidents, local pollution and global climate change. If the tax on gasoline were higher, people would alter their behavior to drive less. They would be more likely to take public transportation, use car pools or live closer to work. The incentives they face when deciding how much to drive would more closely match the true social costs and benefits. (…) Economists who have added up all the externalities associated with driving conclude that a tax exceeding $2 a gallon makes sense. That would provide substantial revenue that could be used to reduce other taxes. By taxing bad things more, we could tax good things less."

Mankiw, Gregory (*Professor of Economics at Harvard)* (May 24, 1999), Gas Tax Now!, Fortune.

"Cutting income taxes while increasing gasoline taxes would lead to more rapid economic growth, less traffic congestion, safer roads, and reduced risk of global warming --- all without jeopardizing long-term fiscal solvency. This may be the closest thing to a free lunch that economics has to offer."

Metcalf, Gilbert *(Professor of Economics Tufts University)* (2007), A green employment tax swap: using a carbon tax to finance payroll tax relief.

"The GETS (Green Employment Tax Swap) reform uses the revenue to reduce payroll taxes by providing a rebate of the employer and employee payroll taxes on the first $3,660 of earnings per worker. This amounts to a maximum rebate of $560 per covered worker. Given payroll tax collections of approximately $727 billion in 2005,15 a carbon tax of $15 per MT CO2 could lower payroll tax burdens on average by just under 11 percent. (…) The GETS reform benefit is greatest for low-wage workers. For a worker earning $5,000 a year, nearly three-quarters of his or her payroll taxes would be rebated. (…) while a carbon tax may be regressive, a carbon tax reform can be designed to be distributionally neutral. The use of the carbon tax revenue to lower payroll taxes makes this distributional neutrality possible."

Metcalf, Gilbert *(Professor of Economics Tufts University)* (date unknown), Tax Reform and the Environment: Paying for Fundamental Tax Reform.

"I'd like to focus more specifically on revenue neutral tax shifts where environmental taxes are used to finance tax reductions. (…) our failure to avail ourselves of environmental taxes and charges means we are missing revenue opportunities which could help us tackle important fiscal issues in our federal budget. (…) My overall message is that green tax shifts can provide considerable flexibility to policy makers to achieve difficult political and economic goals while contributing to a cleaner environment. (…) Any regressivity in the environmental tax can be offset by progressivity in the tax reductions financed by the new revenues."

Metcalf, Gilbert *(Professor of Economics Tufts University)* (1998), A Distributional Analysis of an Environmental Tax Shift.

"I show that a modest tax reform in which environmental taxes equal to 10 percent of federal receipts are collected has a negligible impact on the income distribution when the funds are rebated to households through reductions in the payroll tax and personal income tax. The degree of income shifting can be adjusted with changes in how the revenues are returned to households and it is possible to increase the progressivity of the tax system with an environmental tax reform. I then compare these reforms to a reform that shifts the tax base from income to consumption.

It appears from this analysis that any distributional concerns about the greater use of environmental taxes can be addressed through a careful menu of tax reductions that are targeted to low income households. While it is true that environmental reforms could be designed that are quite regressive, this analysis indicates that distributionally neutral (or even mildly progressive) reforms are certainly feasible."

OECD (2015), Environment at a Glance 2015: OECD Indicators.

"Countries continue to support fossil fuel production and consumption in many ways. Not all fossil fuels are treated equal. Variations in energy tax rates, uneven price signals, low levels of taxation on fuels with high environmental impacts, and exemptions for fuel used in some sectors impede the transition to a low-carbon economy. Coal is usually the least heavily taxed of all fossil fuels but the most carbon-

intensive fuel available for electricity generation. This suggests important opportunities for reforming countries' tax systems, aligning policies and achieving environmental goals more cost- effectively.

The use of environmentally related taxes is growing but remains limited compared to labour taxes. The revenue they raised represented about 1.6% of GDP in 2013. It is dominated by taxes on energy (69%) and on motor vehicles and transport (28%). Variations in energy tax rates, uneven price signals, low levels of taxation on fuels with high environmental impacts, and exemptions for fuel used in some sectors impede the transition to a low-carbon economy. Many countries still apply higher taxes for petrol than for diesel, and the share of taxes in end-use prices is generally higher for households than for industry.

The level of taxation of energy relative to that of labour can influence the relative price of inputs, affect labour demand and stimulate the use of energy from cleaner sources."

OECD (2011), Towards Green Growth.

"Increased use of environmentally related taxes can play an important role in growth-oriented tax reform by helping to shift part of the tax burden away from more distortive corporate and personal income taxes and social contributions."

OECD (2013), Climate and Carbon. Aligning Prices and Policies.

'If governments are serious in their fight against climate change, the core message of this reform must be that the cost of CO2 emissions will gradually increase, creating a strong economic incentive to reduce the carbon entanglement and to shift towards a zero carbon trajectory. A central feature of such an approach is placing a price on carbon.'

'Extending and improving the use of carbon taxes and emissions trading schemes is a necessary first step. Governments also need to reform the estimated USD 55-90 billion of support provided each year to fossil fuel exploration, production and consumption in OECD countries.'

'(...) most governments tend to recycle the revenue from carbon taxes back to consumers through reductions in income taxes, especially for low-income households most affected by the carbon taxes, or to increase the budget allocation for social services.'

OECD (2013), Water security for better lives. OECD studies on water.

"Water security objectives could be met in a more cost effective manner by using market instruments, such as water taxes (e.g. abstraction taxes, pollution taxes). These taxes provide incentives for polluters and resource users to change their behaviour today. They also provide long term incentives to innovate for a more water secure future tomorrow. (…) The revenue from water taxes can be used to strengthen the budget balance; to finance increased spending or to reduce other, distortionary taxes."

Resource Intelligent Europe MEP/MP network (November 9, 2010), The RIE Declaration.

"(…) new legislation on resource efficiency will need to be paralleled by an Ecological Tax Reform/Value Extracted Tax on Resources: reducing taxes on labour and increasing taxes on use of virgin materials etc; supporting a paradigm shift from labour to resource productivity. (…) We need nothing less than a paradigm shift. Since the 1st industrial revolution, all efforts have been geared towards increasing the productivity of the labour factor, given that labour was scarce and nature abundant. Today, the picture has shifted to a situation, where labour is abundant, while natural resources are becoming scarce. Therefore, the efforts now have to be geared towards increasing resource productivity."

Sarkozy, Nicolas (October 25, 2007), Presentation of the Grenelle Environment Forum conclusions – Speech by M. Nicolas Sarkozy, President of the French Republic.

"Ecological taxation should not be just a series of small taxes. What we need is an in-depth overhaul. The goal is to obtain a higher tax on pollution – especially fossil fuels – a lower tax on labour."

Schmidt-Bleek, Friedrich *(President Factor 10 Institute)* (2004), Approaching and measuring sustainability.

"(…) labour is too expensive when considering its contribution to productivity whereas energy is – relatively speaking – under-priced. Under such conditions it is entirely rational when jobs are being eliminated, in particular because the expenditures for the social security system depend almost entirely on labour."

"The labour market becomes de-coupled from growth with the consequence of decreasing tax revenues while social expenditures rise at the same time. It is thus necessary to adjust the optimal input of natural resources for wealth creation."

"The economically rational mix for the input of labour, capital and material/energy must be shifted toward more work while reducing the input of natural resources."

Shultz, George *(Former US secretary of state)*, Becker, Gary *(1992 Nobel laureate in economics)* (April 7, 2013), Why We Support a Revenue-Neutral Carbon Tax. The Wall Street Journal.

"We propose a measure that could go a long way toward leveling the playing field: a revenue-neutral tax on carbon, a major pollutant. A carbon tax would encourage producers and consumers to shift toward energy sources that emit less carbon—such as toward gas-fired power plants and away from coal-fired plants—and generate greater demand for electric and flex-fuel cars and lesser demand for conventional gasoline-powered cars."

"The right level of the tax for the United States deserves careful study, but the principle of a lower starting rate with scheduled increases to an identified level has proven to be a good one in the five-year experience of a similar carbon tax in British Columbia. This gives time for producers and consumers to get accustomed to a carbon tax, and to discover how they can respond efficiently."

"Clearly, a revenue-neutral carbon tax would benefit all Americans by eliminating the need for costly energy subsidies while promoting a level playing field for energy producers."

Sijbesma, Feike *(CEO of Royal DSM)* (February 1, 2013), We Need to Redesign Our Economy. Huffington Post.

"(…) we should anchor value creation (or destruction) on the People and Planet dimensions in the overall valuation of companies. One approach might be to introduce differentiated tax regimes depending on companies' performance or contribution on the ecological or societal axis. (…) A logical complement to such an approach would be to consider increased taxing on the use of scarce resources, whilst diminishing taxes on labor. This would help to tackle the scourge of unemployment and could make it easier to create jobs for older people as well as in certain services that society wants but that have become almost unaffordable."

Stahel, Walter (*Co-founder Product Life Institute)* (2011), The Virtuous Circle? Sustainable Economics and Taxation in a Time of Austerity.

"In a sustainable economy, taxes on renewable resources including work—human labour—are in fact counterproductive and should be re-thought. The resulting loss of state revenue could be compensated by taxing the consumption of non-renewable resources in the form of materials and energies, and of undesired wastes and emissions. Such a shift in taxation would promote and reward a circular economy with its local low-carbon and low-resource solutions. These are inherently more labour-intensive than manufacturing, because economies of scale in a circular economy are limited." "Changing the tax focus will in itself foster the transition to a more sustainable economy in terms of both energy and materials"

UK Green Fiscal Commission (2009), The Case for Green Fiscal Reform.

"The concept of a green tax shift is simple: taxes on the things that are valued by society; like jobs, incomes and profits; are reduced and the lost revenue is replaced by taxes on things society does not like, such as pollution and environmental degradation. 'Pay as you burn, not pay as you earn' as one political formulation has put it. This shift not only reduces pollution, but is a more economically efficient way of raising necessary tax revenues. Taxes on labour at their current level, for example, distort the economy and reduce its efficiency and output."

UNEP (2013), Metal Recycling: Opportunities, Limits, Infrastructure.

"The balance of costs and benefits from these policies [such as taxation, labour regulation and energy costs] determines whether recycling is more or less profitable than alternative disposal of recyclate materials, or even to what extent individual substances are recovered from complex products. (…) In the context of recycling, differential taxation can play a role, either through energy-price controls or by favouring recycling processes or materials. The balance of taxation between energy, materials and labour cost further affects the viability of the collection of EoL [End of Life] goods."

WBCSD (World Business Council for Sustainable Development*, a CEO-led association of some 200 international companies*) (2010), Vision 2050.

> *"Increase price levels, via taxes and levies, to influence a shift of consumption toward the offering with the best environmental and social profile (…). Tax strategies [should] shift towards incentivizing job creation and healthier products and discouraging negative external factors like pollution and environmental damage."*

World Bank (2015), Decarbonizing Development. Three Steps to a Zero-Carbon Future.

> *"Carbon pricing offers a potential "double dividend" by providing both environmental benefits and the possibility of reducing more distortionary taxes (such as those on labor or capital) by recycling carbon revenues."*
>
> *"(…) resources raised by carbon-pricing schemes can contribute to attracting more jobs and investments by improving more important factors, such as education and workers' skills or infrastructure, and by reducing capital and labor taxes that are more distortive than carbon pricing."*

World Resources Forum (2009), Resource Governance – Managing Growing Demands for Material on a Finite Planet.

> *"… Adjusting the fiscal framework is … the most fundamental and urgent pre-requisite for approaching a sustainable future. Subsidies that increase the consumption of natural resources must be eliminated, and economic instruments should be deployed such as a shift away from overheads on labor and toward taxing raw materials – with the side effect of creating new jobs and redistributing income to developing countries where many of the resources come from – and market creation policies including tradable permits. (…) Instead of applying value added taxation to final goods it may be more effective to tax natural resources at the point at which they are removed from nature or where they enter the industrial metabolism."*

Appendix 3:
List of references

Below is a list of references used in section 7.1, chapter 10 and chapter 11.

The Economy at a glance

- DESA/UN (Accessed Sept 2016), UN Comtrade Database.
- European Commission (Accessed Sept 2016), Data on taxation: Tax main aggregates.
- Eurostat (Jan 21, 2016), Employment growth and activity branches - annual averages.
- Eurostat (Sept 23, 2016), GDP and main components (output, expenditure and income).
- Eurostat (Sept 26, 2016), Gross domestic expenditure on R&D (GERD).
- Eurostat (Sept 23, 2016), National Accounts aggregates by industry (up to NACE A*64).
- Eurostat (Aug 4, 2016), Population change-Demographic balance and crude rates at national level.
- Eurostat (Accessed Sept 2016), Real GDP growth, 2004-14.

Labour market & social issues

- Eurostat (Sept 9, 2016), Expenditure: main results.
- Eurostat (Accessed Sept 2016), Headline indicators: Scoreboard.
- Eurostat (June 25, 2016), Main scenario - Population on 1st January by age and sex.
- Eurostat (Sept 29, 2016), People at risk of poverty or social exclusion.
- Eurostat (Sept 8, 2016), Population by sex, age, citizenship and labour status (1 000).
- Eurostat (Aug 9, 2016), Population: Structure indicators.
- Eurostat (Sept 29, 2016), Severe material deprivation rate by age and sex.
- Eurostat (July 14, 2016), Supplementary indicators to unemployment - annual data.
- Eurostat (Sept 30, 2016), Unemployment by sex and age - annual average.
- Eurostat (Data up to October 2016), Unemployment statistics.

Natural resource use

- Climate Action Network Europe (Accessed April 12, 2016), The coal map of Europe.
- European Environment Agency (2015), Air quality in Europe — 2015 report.
- European Union (June 24, 2016), Europe 2020 Targets.
- Eurostat (July 21, 2016), Air emissions accounts by NACE Rev. 2 activity.
- Eurostat (Sept 19, 2016), Annual freshwater abstraction by source and sector.
- Eurostat (Sept 26, 2016), Energy dependence.
- Eurostat (Sept 6, 2016), Generation of waste by waste category, hazardousness and NACE Rev. 2 activity.
- Eurostat (June 30, 2016), Greenhouse gas emissions by source sector (source: EEA).
- Eurostat (April 1, 2016), International trade of EU, the euro area and the Member States by SITC product group.
- Eurostat (Sept 26, 2016), International trade of raw materials (SITC 2+4), by reporting country.
- Eurostat (Aug 8, 2016), Material flow accounts.
- Eurostat (July 28, 2016), Share of energy from renewable sources.
- Eurostat (June 9, 2016), Simplified energy balances - annual data.
- Global Footprint Network (Accessed Sept 2016), Ecological Wealth of Nations.
- OECD (2014), The Cost of Air Pollution: Health Impacts of Road Transport.

Relevant features of the tax system

- European Commission (Accessed Sept 2016), Data on taxation: Environment & energy taxes.
- European Commission (Accessed Sept 2016), Data on taxation: Indirect taxes.
- European Commission (Accessed Sept 2016), Data on taxation: Taxes on labour.
- European Commission (Accessed Sept 2016), Data on taxation: Tax wedges.
- European Commission (2015), Taxation trends in the European Union. Data for the EU Member States, Iceland and Norway. 2015 edition.
- OECD (Accessed December 2016), OECD Inventory of Support Measures for Fossil Fuels. OECD.Stat.

Tax Shift Scenario

- EEX (Accessed Nov, 2016), European Emission Allowances. Global Environmental Exchange.
- European Commission (Accessed July 2016), Vat rates.
- Eurostat (Accessed July 2016), Consumer prices of petroleum products, end of second half 2014.
- Eurostat (Accessed July 2016), Half-yearly electricity prices.
- Eurostat (Accessed July 2016), Natural gas price statistics.

Member State comparison

- European Commission (Accessed July 2016), Vat rates.
- Eurostat (April 26, 2016), Main national accounts tax aggregates.
- Eurostat (Oct 3, 2016), Shares of environmental and labour taxes in total tax revenues from taxes and social contributions.

Additional notes - EU

- Council of the European Union (2016), European Semester 2016: Council Recommendation on the economic policy of the euro area.
- OECD (2016), OECD Economic Surveys European Union.
- Eurogroup (July 8, 2014), Structural reform agenda - thematic discussions on growth and jobs - Reduction of the tax wedge.
- Eurostat (April 1, 2016), Share of EU in World Trade.
- Eurostat (Accessed July 2016), Unemployment statistics.
- Eurostat (Accessed July 2016), Wages and labour costs.
- European Commission (Accessed July 2016), 2030 Energy Strategy.
- European Commission (2014), Annual Growth Survey 2015.
- European Commission (December 2, 2015), Circular Economy Package: Questions & Answers.
- European Commission (Accessed Sept 2016), Data on taxation: Tax main aggregates.
- European Commission (2015), European Semester: Country-specific recommendations.
- European Commission (May 18, 2016), European Semester 2016 Spring Package explained.
- European Commission (2014), European Energy Security Strategy.
- European Commission (2011), Roadmap to a Resource Efficient Europe.
- European Commission (2015), Tax Reforms in EU Member States 2015. Tax policy challenges for economic growth and fiscal sustainability.
- European Commission (2016), Water Scarcity & Droughts in the European Union.
- E3G (March 2016), Briefing paper: Pulling ahead on clean technology. China's 13th five year plan challenges Europe's low carbon competitiveness.
- European Parliament (2016), Fact Sheets on the European Union.

Additional notes - Germany

- CIA (Accessed Sept 2016), The World Factbook: Germany.
- Eunomia (2015), Study on Environmental Fiscal Reform Potential in 14 EU Member States: Germany.
- European Commission (28 April 2016), Press release. Water: Commission refers GERMANY to the Court of Justice of the EU over water pollution caused by nitrates.
- European Commission (2014), COUNCIL RECOMMENDATION on the 2014 National Reform Programme of Germany and delivering a Council opinion on the 2014 Stability Programme of Germany.
- European Commission (Accessed Sept 2016), Data on taxation: Germany.
- European Commission (2015), Recommendation for a COUNCIL RECOMMENDATION on the 2015 National Reform Programme of Germany and delivering a Council opinion on the 2015 Stability Programme of Germany.
- European Commission (2016), Recommendation for a COUNCIL RECOMMENDATION on the 2016 national reform programme of Germany and delivering a Council opinion on the 2016 stability programme of Germany
- European Commission (2014), Taxation Trends in the European Union. Edition 2014.
- European Commission (Accessed July 2016), Taxes in Europe Database: Aviation Tax.
- European Commission (Accessed July 2016), Taxes in Europe Database: Nuclear fuel tax.
- European Union (Accessed Sept 2016), EU member countries.
- Statistisches Bundesamt (April 6, 2016), Press release. 4 million jobs covered by minimum wage.
- OECD (2016), OECD Economic Surveys Germany.
- Wagner, Gernot, et al. (Accessed Sept 2, 2015), Energy policy: Push renewables to spur carbon pricing.
- International Business Publications (2012), Germany Country Study Guide Volume 1 Strategic Information and Developments.
- World Bank (April 21, 2016), Press Release. Leaders Set Landmark Global Goals for Pricing Carbon Pollution.
- World Energy Council (Accessed Sept 2016), Coal in Germany.

Additional notes - Poland

- Eunomia and EC (2016), Study on assessing the environmental fiscal reform potential for the EU28.
- Ministry of Treasury Republic of Poland (April 28, 2015), Share of shadow economy declines in Poland.
- European Commission (2015), Council Recommendation on the 2015 National Reform Programme of Poland and delivering a Council opinion on the 2015 Convergence Programme of Poland.
- European Commission (Accessed Sept 2016), Data on taxation: Poland.
- European Commission (2016), Recommendation for a COUNCIL RECOMMENDATION on the 2016 national reform programme of Poland and delivering a Council opinion on the 2016 convergence programme of Poland.
- European Union (Accessed Sept 2016), EU member countries.
- OECD (2016), OECD Economic Surveys POLAND.
- UNDP (2015), Chapter 5: Human Development Report 2015.
- World Energy Council (Accessed June 2016), Coal in Poland.

Additional notes - Spain

- Eunomia (2015), Study on Environmental Fiscal Reform Potential in 14 EU Member States: Spain.
- European Commission (2014), COUNCIL RECOMMENDATION of on the National Reform Programme 2014 of Spain and delivering a Council opinion on the Stability Programme of Spain.
- European Commission (Accessed September 2016), Data on taxation: Spain.
- European Commission (2012), Recommendation for a COUNCIL RECOMMENDATION on Spain's 2012 national reform programme and delivering a Council opinion on Spain's updated stability programme.
- European Commission (2015), Recommendation for a COUNCIL RECOMMENDATION on the 2015 National Reform Programme of Spain and delivering a Council opinion on the 2015 Stability Programme of Spain.
- European Commission (2014), Spain - Post Programme Surveillance Spring 2014 Report.
- European Commission (2014), Taxation Trends in the European Union. Edition 2014.
- European Union (Accessed September 2016), EU member countries.
- Eurostat (March 22, 2016), Nights spent at tourist accommodation establishments.
- Eurostat (2015), Energy, transport and environment indicators.
- Migration Policy Institute (2016), Spain. New emigration policies needed for an emerging diaspora.
- OECD (2014), Economic Surveys Spain Overview.
- World Energy Council (Accessed June 2016), Solar in Spain.
- World Energy Council (Accessed June 2016), Wind in Spain.
- IEA (2015), Energy Policies of IEA Countries - Spain 2015 Review.

Additional notes - The Netherlands

- Amin, Lucas (October 15, 2016), Shell and Exxon's €5bn problem: gas drilling that sets off earthquakes and wrecks homes, The Guardian.
- Eunomia and EC (2016), Study on assessing the environmental fiscal reform potential for the EU28.
- Council of the European Union (2016), Recommendation for a COUNCIL RECOMMENDATION on the 2016 national reform programme of the Netherlands and delivering a Council opinion on the 2016 stability programme of the Netherlands.
- European Commission (Accessed September 2016), Data on taxation: Netherlands.
- European Commission (2014), Taxation Trends in the European Union. Edition 2014.
- European Commission (2015), Taxation trends in the European Union. Data for the EU Member States, Iceland and Norway. 2015 edition.
- European Commission (2014), Recommendation for a COUNCIL RECOMMENDATION on the Netherlands' 2014 national reform programme and delivering a Council opinion on the Netherlands' 2014 stability programme.
- European Commission (2015), Recommendation for a COUNCIL RECOMMENDATION on the 2015 National Reform Programme of the Netherlands and delivering a Council opinion on the 2015 Stability Programme of the Netherlands.
- European Union (Accessed September 2016), EU member countries.
- Government of the Netherlands (February 12, 2016), Press Release. Minister Dijksma: carbon pricing key to reducing CO2 emissions.
- IMF (2015), Kingdom of the Netherlands: Staff Concluding Statement of the 2015 Article IV Mission.
- OECD (2016), OECD Economic Surveys: Netherlands overview.
- World Energy Council (Accessed June 2016), Gas in Netherlands.

"Sustainable development is only possible if we manage our environment according to sensible business principles. The goal of every corporation is to guarantee its own continued existence and economic growth in the interest of employees and shareholders.

Isn't it about time for us all, as shareholders of Earth, Inc., to secure the durability of our future prosperity? We shouldn't do so out of pie in the sky idealism or vague messianic incentives, but out of pure economic necessity, a source of inspiration that in the past has often lead to ingenious inventiveness."

- Eckart Wintzen (Founder of BSO/Origin), 1996.