

# Investment in low-carbon technology - the legal issues

November 2007



## FOREWORD

*The growing realisation of the potential impact of climate change on every aspect of our life has led our firm to adopt a holistic approach to the issue. It is not just a matter for our environmental practice or energy practice but something that can impact nearly all of the legal advice we give and it is a topic which inspires our younger lawyers. The articles brought together here by associates from our London office demonstrate the commitment and deep appreciation of the relevant legal issues across these complex, diverse and rapidly developing areas of law.*

*We are seeing an increasing number of deals which are influenced by the regulatory environment discussed in these articles. Recent examples on the carbon capture and storage front include acting for Centrica in relation to its project in North East England and in assisting BP to set up the global joint venture "Hydrogen Energy" with Rio Tinto, announced in June 2007. On the new nuclear front, we continue to be actively involved with EDF Energy in relation to their new-build programme in the UK and for SNN as they deal with the regulatory challenges of developing nuclear new-build in Romania. Other recent high-profile matters on the biofuels and renewables fronts have included acting for British Sugar Group in setting up their biofuels joint venture with BP and Dupont announced in June, acting for Ofgem on the new regime for offshore electricity connections and assisting with the financing of a major photovoltaic development in Spain. We anticipate that activity in this area will continue to grow as more and more attention is focussed on low-carbon technologies and the laws that arise to promote and control these technologies.*

Louise Moore  
Partner  
louise.moore@herbertsmith.com  
+44 20 7466 2096

Mark Newbery  
Partner  
mark.newbery@herbertsmith.com  
+44 20 7466 2225

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## OVERVIEW

In this paper, we examine the legal issues facing investment in the low-carbon technologies covered by the London Accord and provide commentary on specific regulatory incentives and risks associated with low-carbon technologies. We have concentrated on the regulatory position in the UK (as influenced by international and European Union measures), providing a comparison with other jurisdictions where appropriate.

There are a number of regulatory mechanisms which aim to drive investment in low-carbon technologies in the UK. These include regulatory mechanisms directed specifically at mitigating climate change by encouraging reductions in the greenhouse gas ("GHG") emissions that contribute to climate change (eg, emissions trading schemes and carbon capture and storage). Other regulatory mechanisms are aimed at adapting to the harmful effects of climate change, conserving energy (eg, energy efficiency requirements), promoting a diversity of energy supplies (for competition and security of supply reasons) and combating local pollution (eg, controls on particulate emissions). The mechanisms themselves vary in nature and include taxation and fiscal measures aimed at promoting the development of new technologies.

A major driver of investment in low-carbon technologies is the market itself – most notably commodity prices. We have not examined the role of the market in driving investment in low-carbon technology. After all, the vast majority of regulatory mechanisms aimed at promoting low-carbon technology are brought into existence to attempt to address specific failures of the market to promote low-carbon investment: failures arising from market externalities or the fact that many of these technologies require an economic “head-start” to compete with more traditional technologies. It is the mechanisms that attempt to deal with these market externalities and that provide the "head-starts" for emerging technologies that are the focus of this paper.

This paper is divided into six sections. In the first, we provide an overview of the regulatory mechanisms at the international, European Union and UK level which are specifically aimed at the mitigation of climate change (through GHG emissions reduction) and adaptation to climate change. In the second section, we focus on the regulatory risks associated with a specific form of climate change mitigation: carbon capture and storage. This is quickly emerging as a technology with a massive potential to significantly reduce carbon dioxide emissions from power generation – if only the economic and legal hurdles can be overcome.

In the remaining sections of this paper, we look at those low-carbon technologies which are motivated by a desire to mitigate climate change as well as broader sustainability issues, such as concerns over energy conservation, security of supply and local environmental issues. The technologies we consider in this regard are renewable energy, biofuels, new nuclear and energy efficiency. Investment in each of these technologies is heavily influenced by the regulatory environment created by EU and UK law, and we are currently in a major state of reform of the regulatory drivers applying to each of these technologies.

Low-carbon technology is an area of intense activity and regulations to promote and control these technologies are developing at a fast pace. As a result, it may be that some of the regulatory instruments and policies have moved on by the time you are reading this. We have endeavoured as far as possible to present the law and political situation as it stood as at early November 2007.

Lewis McDonald  
16 November 2007

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## 1

## CLIMATE CHANGE: MITIGATION AND ADAPTATION THROUGH REGULATION

Lewis McDonald<sup>1</sup> | Senior Associate | lewis.mcdonald@herbertsmith.com

*It is now 15 years since the development of the first international agreement to mitigate and adapt to climate change (the UNFCCC). In this period, the international growth in GHG emissions has continued to accelerate, year on year, mirroring the sustained period of economic growth the world has experienced. Our awareness of the dangers of climate change and man's role in contributing to it has also increased significantly during this period. This awareness has moved from the fringes of society into the mainstream. Climate change is now a central issue in mainstream energy policy and sustainability planning and poses regulators with the enormous challenge of decoupling economic growth from the growth in GHG emissions.*

*The EU and the UK have taken the lead internationally in implementing domestic measures to address climate change mitigation measures and adaptation strategies and have publicly committed to aggressive GHG reduction targets. But the nature of the problem requires all nations to sign up to similar measures. Even before the first period of international hard targets commences on 1 January 2008, the realisation that these targets are insufficient has shifted the focus of national governments to the next round of international negotiations to be held in Bali later this year. We all watch with keen interest to see what can be produced from these negotiations for the period beyond 2012. In the meantime, a new regulatory challenge has emerged as we face up to designing measures to adapt to the additional climate change we will be experiencing over the coming years, regardless of what new international agreement emerges.*

### 1.1 Introduction

It is widely agreed among scientists that to limit dangerous interference with the climate system, the long term concentration of carbon dioxide ("CO<sub>2</sub>") equivalent in the atmosphere must stabilise at between 450 and 550ppm.<sup>2</sup> We are now at 430ppm and rising at a rate of around 2.3ppm per year.<sup>3</sup> Stabilisation between 450 and 550ppm is thought to limit temperature rise, when compared with pre-industrial levels, to 2°C, which scientists consider will avoid the worst impacts of climate change. According to the Stern Review on the Economics of Climate Change (the "**Stern Review**"), in order to achieve stabilisation

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<sup>1</sup> Lewis would like to thank his colleagues Anna Kirk, Silke Goldberg, Pippa Thompson and Natalia Sivakumaran for their assistance in the preparation of this section.

<sup>2</sup> Stern Review on the Economics of Climate Change, Part III, Chapter 13. The Stern Review, commissioned by the Chancellor of the Exchequer in July 2005, was set up to understand more comprehensively the nature of the economic challenges of climate change and how they can be met, both in the UK and globally. It was published on 30 October 2006, and employed economic analysis to assess both the human and environmental impacts of, and responses to, climate change.

<sup>3</sup> Stern Review, Part I, page 3.

at 450ppm without overshooting, global CO<sub>2</sub> emissions would need to be reduced to 70% of current levels by 2050.<sup>4</sup>

However, as Stern points out, a rise of 2°C could still cause many adverse impacts around the world.<sup>5</sup> As a result, policies and regulations are required not only to reduce future GHG emissions (wherever they arise), but also to adapt to the inevitable climate change that will result over the coming decades from past (and current) GHG emissions.

Given that GHGs contribute to climate change in the same way regardless of where they are emitted in the world, each country has an interest in reducing future GHG emissions. For this reason, any successful approach to addressing the risks associated with climate change (in any country) must be international in nature, must include the major emitters of GHGs and must have as its aim a reduction in GHG emissions consistent with the above targets. Conversely, measures designed to adapt to the adverse impacts of climate change will necessarily be regional or local in nature.

## 1.2 The international legal framework

### 1.2.1 United Nations Framework Convention on Climate Change (the "UNFCCC")

The UNFCCC is the primary international instrument that deals with mitigation and adaptation measures in relation to climate change. The UNFCCC came into force on 21 March 1994 and has been ratified by 191 countries, including the UK.<sup>6</sup>

The ultimate aim of the UNFCCC is to stabilise GHG levels in the atmosphere to a level which prevents dangerous human-caused interference with the climate system. The UNFCCC prescribes mitigation measures including voluntary GHG reduction targets and other related obligations which are aspirational in nature. However, it does not impose any legally binding obligations on parties to achieve emission reduction targets.

As well as being required to take action to mitigate climate change, parties to the UNFCCC are committed under the UNFCCC to develop individual policies to adapt to unavoidable climate change and to cooperate with each other in preparing for adaptation.<sup>7</sup> Developed countries are also committed to assisting developing countries adapt to climate change.

### 1.2.2 Kyoto Protocol to the UNFCCC

The Kyoto Protocol to the UNFCCC (the "**Kyoto Protocol**") was signed in 1997 and entered into force on 16 February 2005, following its ratification by Russia.<sup>8</sup>

The Kyoto Protocol strengthened the mitigation measures set out in the UNFCCC by committing the states listed at Annex 1 to the UNFCCC (developed countries that are signatories to the Protocol) ("**Annex 1 Countries**") to individual, legally-binding GHG emission reduction targets to limit or reduce emissions of

<sup>4</sup> Stern Review, Part III, page 193.

<sup>5</sup> Stern Review, Part II, Chapter 3.

<sup>6</sup> [http://unfccc.int/essential\\_background/convention/items/2627.php](http://unfccc.int/essential_background/convention/items/2627.php).

<sup>7</sup> Articles 3.3 and 4.1(b), (e) and (f) of the UNFCCC.

<sup>8</sup> In accordance with Article 25(1) of the Kyoto Protocol.

the 6 main GHGs,<sup>9</sup> including CO<sub>2</sub>. Emerging economies such as China and India and other developing countries ("**Non-Annex 1 Countries**") were not assigned any legally binding emission reduction targets under the Kyoto Protocol. The Kyoto Protocol also strengthens the measures under the UNFCCC relating to adaptation by requiring parties to report on the measures they are taking to adapt to climate change.<sup>10</sup> Given the fundamental importance of the Kyoto Protocol, it is worth briefly setting out how it is intended to operate.

The overall aim of the Kyoto Protocol is to achieve a reduction of global GHG emissions of 5%, relative to a 1990 baseline level, over the "commitment period" of 2008–2012 ("**Commitment Period**").<sup>11</sup> In recognition of the different costs to countries of achieving this overall goal, GHG emission reduction targets are differentiated between the Annex 1 Countries.<sup>12</sup> The maximum amount of GHG emissions (measured as the equivalent in CO<sub>2</sub>) that a party may emit over the Commitment Period in order to comply with its target is known as a party's assigned amount unit ("**AAU**").

Under the Kyoto Protocol, the European Union ("**EU**") Member States agreed to accept a collective target of an 8% reduction in GHG emissions relative to 1990 levels during the Commitment Period. This arrangement is known as the "EU Bubble" and allows individual EU Member States to exceed the individual emission reduction targets assigned to them under the Kyoto Protocol, provided that the EU Member States collectively achieve an aggregate 8% reduction over the Commitment Period. EU Member States within the EU Bubble have differentiated targets set out under a burden sharing agreement.<sup>13</sup> Under this agreement, the UK has accepted a 12.5% emission reduction target below its 1990 baseline over the Commitment Period.

The Kyoto Protocol contains three main mechanisms (known as "flexible mechanisms") to assist Annex 1 Countries to achieve their emission reduction targets in the most economically efficient way. These flexible mechanisms encourage emission reductions to take place where they can be achieved for the least cost. The flexible mechanisms are:

- **Joint Implementation ("JI")** – an Annex 1 Country may implement a project in the territory of another Annex 1 Country and count the resulting emission reduction units ("**ERUs**") against its own target;<sup>14</sup>
- **Clean Development Mechanism ("CDM")** – an Annex 1 Country may implement a project in a Non-Annex 1 Country and use resulting certified emission reductions ("**CERs**") to help meet its own target;<sup>15</sup> and

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<sup>9</sup> Annex A of the Kyoto Protocol: the 6 main GHGs are carbon dioxide (CO<sub>2</sub>); methane (CH<sub>4</sub>); nitrous oxide (N<sub>2</sub>O); hydrofluorocarbons (HFCs); perfluorocarbons (PFCs); sulphur hexafluoride (SF<sub>6</sub>).

<sup>10</sup> Article 10 of the Kyoto Protocol.

<sup>11</sup> Article 3(1) of the Kyoto Protocol.

<sup>12</sup> See Annex B to the Kyoto Protocol.

<sup>13</sup> Doc. 9702/98 of 19 June 1998 of the Council of the European Union reflecting the outcome of proceedings of the Environment Council of 16-17 June 1998, Annex 1 ([http://www.climnet.org/EUenergy/ratification/EUCOM01579\\_en.pdf](http://www.climnet.org/EUenergy/ratification/EUCOM01579_en.pdf)).

<sup>14</sup> Article 6 of the Kyoto Protocol.

<sup>15</sup> Article 12 of the Kyoto Protocol.



- **Emissions Trading** – an Annex 1 Country may transfer some of the emissions under its AAU to another Annex 1 Country that finds it more difficult to meet its emissions target.<sup>16</sup>

Additionally, removal of GHGs from the atmosphere by "carbon sinks" (which may be located in any state which is a party to the Kyoto Protocol) generate removal units ("**RMUs**"). RMUs may also be used by Annex 1 Countries to help meet their emission reduction targets.<sup>17</sup> Annex 1 Countries can transfer CERs, ERUs or RMUs amongst each other, although some must be held in a commitment period reserve for the duration of the Commitment Period and cannot be traded.

Since the Kyoto Protocol was agreed, the details of the flexible mechanisms and "carbon sinks" have been developed at subsequent annual UNFCCC conferences. For example, in 2001 the "Marrakesh Accords" were adopted. These comprise a compilation of detailed rules and procedures through which the flexible mechanisms and "carbon sinks" may be implemented and also contain mechanisms to ensure Annex 1 Countries take action domestically (as well as internationally) to achieve their emission reduction targets without relying exclusively on the flexible mechanisms. At present, the only emissions trading scheme to be implemented is the EU Emissions Trading Scheme discussed below. However, there is a growing recognition of the importance of the role of a healthy carbon market in climate change mitigation measures. For example, a number of US states, Canadian provinces, European countries and New Zealand have recently formed the International Carbon Action Partnership to share information on designing effective carbon markets.<sup>18</sup>

### 1.2.3 **Effectiveness of the current international framework**

The current international framework for mitigating climate change is widely regarded as a useful starting point for an international regime to combat climate change. Indeed, the flexible mechanisms of the Kyoto Protocol (in particular emissions trading) have led to the development of an international carbon market. However, in its present form it is simply not sufficient to bring about the scale of emission reductions necessary to avoid dangerous climate change. This is largely because:

- the commitment by Annex 1 Countries to reduce their overall emissions by 5% during the Commitment Period is insufficient;
- the Kyoto Protocol does not place binding emission reduction commitments on major emerging economies (such as China and India);
- major developed countries such as the United States and Australia have not taken the domestic action necessary to implement the Kyoto Protocol; and
- there are no clear plans to modify or extend the Kyoto Protocol beyond 2012.

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<sup>16</sup> Article 17 of the Kyoto Protocol.

<sup>17</sup> Article 3(3) of the Kyoto Protocol.

<sup>18</sup> See <http://www.icapcarbonaction.com>.

These deficiencies in the international framework are causing major concerns for investors in low-carbon technologies across the world. This is because of the crucial role the international framework plays in driving regional and local mitigation measures and the fact that there is no certainty as to the nature of the regulatory framework post 2012. The investment required to bring about a major uptake of low-carbon technology is significant and requires stable economic and regulatory conditions to prevail over a time-frame that is appropriate for this level of investment.

As a result of pressure being put on governments by business to delivery certainty, as well as an increased understanding of the scientific basis for climate change and its likely impacts, attention is being focussed on the international regime to apply beyond 2012, even before the 2008 – 2012 Commitment Period under the Kyoto Protocol has even commenced. Discussion on the post-2012 regime is happening in a number of forums around the world including the UN, the EU, the G8 and the Asia-Pacific Economic Cooperation (which includes the US and Australia). The US also convened a series of meetings of major GHG emitters in early October 2007.

There is broad agreement emerging from these forums that the UNFCCC should continue to be the framework for international action on climate change beyond 2012. There also seems to be general agreement that much greater emission reductions are required and that obligations to reduce emissions should extend to emerging economies as well as developed countries, with targets set on a differentiated basis to reflect different economies and capabilities. However, the US continues to state that individual nations should set their own voluntary goals to curb climate-warming emissions, rather than mandatory global targets.<sup>19</sup>

The details of the post-2012 regime will be discussed at the next Conference of the Parties to the UNFCCC in Bali, Indonesia between 3 and 14 December 2007. In order to provide certainty to investors in low-carbon technology, it is essential that the post-2012 regime is in place as soon as possible and that there is no gap between the current international regime and the post-2012 regime. According to the European Council and the UK Government, this requires that the negotiations on the post-2012 regime be completed by the end of 2009.<sup>20</sup> This is indeed a challenging time frame.

### 1.3 The approach of the EU

#### 1.3.1 EU policy on climate change

The EU is determined to take the lead internationally to try to ensure that global average temperature increases do not exceed pre-industrial levels by more than 2°C. This objective forms the central goal of the EU's current policy on climate

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<sup>19</sup> See, for example, President Bush's remarks to the Major Economies Meeting on Energy Security and Climate Change on 28 September 2007 (<http://www.state.gov/oes/rls/rm/2007/92938.htm>), in which he called for a global long term goal for reducing GHG emissions but made no mention of setting legally binding targets, referring instead to the need to make reductions without undermining economic growth or prosperity.

<sup>20</sup> Presidency Conclusions of the Brussels European Council, 8/9 March 2007, paragraph 29.

change.<sup>21</sup> To achieve this objective, the European Council (the EU's highest policy making institution) agreed in March 2007 to commit the EU to a 20% reduction in GHG emissions by 2020. In addition, the European Council has stated that the EU will aim for a 30% reduction in GHG emissions by 2020 and a 60% to 80% reduction by 2050, provided that a comprehensive global agreement can be reached on climate change.<sup>22</sup>

Given that 80% of all GHG emissions in the EU arise from the energy sector, it is this sector that is the major target of the EU in its efforts to reduce the GHG emissions of EU Member States. In March 2007, the European Council committed EU Member States to the following measures in relation to the energy sector:

- an increase in the EU's energy efficiency of 20% by 2020;
- an increase in the share of renewable energy to 20% by 2020 (including all energy used in heat and transport as well as electricity); and
- a 10% minimum target for the share of biofuels in petrol and diesel consumption (subject to the condition that biofuels are sustainable).

Without firmly committing the EU, the European Council also welcomed the stated intention of the European Commission (the executive branch of the EU) to construct 12 large-scale carbon capture and storage demonstration plants in Europe by 2015.<sup>23</sup> Carbon capture and storage is analysed in detail in section 3 of this paper.

The European Council believes that a differentiated approach to EU Member States' contributions is necessary to achieve its ambitious goals and has asked the European Commission to prepare detailed proposals on each Member State's contribution to the EU targets.<sup>24</sup> These proposals are expected in January 2008 and are likely to reflect the "burden-sharing" approach taken by the EU to divide emissions reduction commitments between Member States.

### 1.3.2 The EU Emissions Trading Scheme (the "EU ETS")

One of the main mechanisms currently in place for the EU Member States to meet their GHG emission reduction targets is the EU ETS. The EU ETS is essentially a "cap and trade" scheme designed to create a value for the emission of CO<sub>2</sub> (and other GHGs) into the atmosphere. In this sense, it is a market-based instrument which is intended to modify the behaviour of major GHG emitters by internalising the cost of emitting GHGs. The EU ETS commenced on 1 January 2005.<sup>25</sup>

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<sup>21</sup> See Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, "Limiting Global Climate Change to 2 degrees Celsius: The way ahead for 2020 and beyond", 10 January 2007.

<sup>22</sup> Presidency Conclusions of the Brussels European Council, 8/9 March 2007, paragraphs 30-31.

<sup>23</sup> Presidency Conclusions of the Brussels European Council, 8/9 March 2007, Annex I (Energy Policy for Europe), paragraphs 6, 7 and 10.

<sup>24</sup> Presidency Conclusions of the Brussels European Council, 8/9 March 2007, paragraph 33.

<sup>25</sup> The EU ETS was established by Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003.

Under the EU ETS, each EU Member State is allocated a total number of allowances based on its differentiated target for emission reductions. The Member State then identifies certain large scale stationary CO<sub>2</sub> emission sources (known as "**installations**")<sup>26</sup> to be included in the scheme. It allocates each installation a number of allowances (based on the historical level of its emissions) that determine the amount of CO<sub>2</sub> it may emit each year of the phase.

The scheme works on the basis that installations are provided with emission allowances (based on their historical emissions) which have to surrender a number of allowances each year equal to their actual CO<sub>2</sub> emissions. If the installation's actual emission of CO<sub>2</sub> exceeds its allowances, it will have to purchase additional allowances from the open market so that it has enough allowances to surrender. Installations that invest in reducing their CO<sub>2</sub> emissions, and therefore have an excess number of allowances, can sell those excess allowances on the open market. Installations receive their allowances in January of each year and must settle against actual emissions by the end of April of the following year. While installations may use a new year's allowance to settle any deficit from the previous year, they cannot carry allowances forward from one phase of the scheme to another. If insufficient allowances are surrendered, a fine is imposed (€40 per tonne of CO<sub>2</sub> in Phase I and €100 per tonne of CO<sub>2</sub> in Phase II), but this fine does not relieve the installation of its obligation to surrender the applicable number of allowances (which the installation will need to purchase if it is in deficit).

Because of the central role played by the EU ETS in the EU's overall climate change mitigation strategy and the fact that the EU ETS is looked upon internationally as the "model" emissions trading scheme, we have set out some observations on its initial operation and likely future. Those readers not seeking detailed commentary on the EU ETS are encouraged to skip to section 2.3.3, where we discuss adaptation measures in the EU.

#### *Phase I of the EU ETS*

Phase I of the EU ETS commenced on 1 January 2005 and ends on 31 December 2007. During Phase I, the EU ETS has suffered from a number of inconsistencies in relation to the legal, taxation and financial services status of allowances. In addition, there are a number of other lessons that need to be learned from the first phase of the EU ETS in order to improve the functioning of the scheme and to make Phase II (as well as any future phases) a success.

Commentators from non-government organisations ("**NGOs**"), companies and governments alike have acknowledged that the current uncertainties inherent to the EU ETS arise from a number of factors, including inconsistent methodologies for determining an installation's base level of emissions, the period of validity of the allowances and issues relating to state aid.

The uncertainties arising from incoherent methodologies for base level emissions are of particular concern, as they go to the core of the EU ETS. In early May 2006 the market price for emission allowances famously collapsed. At the time, this was reported to have been caused principally by companies overstating their

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<sup>26</sup> Defined in Article 3(e) of Directive 2003/87/EC.

historical emissions and historical emissions being out of date.<sup>27</sup> Reliance on historical data of companies' emissions is therefore problematic in calculating the allowances to be allocated to a given installation. The sole reliance on historical data does not take into account any changes in:

- (a) the way the company runs its installation;
- (b) a company's GHG emissions; and
- (c) relevant GHG science and technology occurring between the cut-off date for the determination of historical emission data, allowance allocation and the commencement of trading.

It is important that the European Commission, together with the national emission authorities, reach agreement on a uniform methodology for the allowances earmarked for the new entrants' pool in order to avoid any future discrepancies and any competitive disadvantages that might put the harmonised internal market at risk.

Another uncertainty is linked to the period of validity of the allowances. The two or five years' validity applicable to allowances is not long enough to create the necessary investment certainty for business stakeholders. Future commitment periods need to be long enough (some commentators have suggested 30-40 years) to create that certainty.

Finally, issues in relation to state aid and the free allocation of allowances under the EU ETS have not yet been fully settled.

#### *Phase II of the EU ETS*

Phase II of the EU ETS brings with it a number of changes to the scheme which are likely to cause some uncertainty in relation to its mechanics and possibly its reliability. The period of Phase II coincides with the Commitment Period of the Kyoto Protocol (2008 – 2012).

Pursuant to EU Directive 2004/101/EC (known as the "**Linking Directive**"), Phase II sees the introduction of emission credits established under the Kyoto Protocol into the EU ETS, namely ERUs from JI projects, CERs and, albeit on a lower scale, AAUs.

The introduction of Kyoto mechanism emission credits creates a number of technical issues for the EU ETS. The Community Independent Transaction Log ("**CITL**") records the issuance, transfer, cancellation, retirement and banking of allowances that take place in the registry. The CITL will now need to be compatible with and connect to the International Transaction Log ("**ITL**") in order to correctly capture and record the trades made under the EU ETS involving ERUs and/or CERs. In addition, the CITL will need to be able to register submissions of allowances for compliance purposes. The UNFCCC has estimated that the connection of EU Member States and the CITL with the ITL may take

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<sup>27</sup> In some instances there was a two year gap between the historical data provided by companies and the commencement of trading.

place after 1 December 2007. This leaves very little time prior to the commencement of Phase II on 1 January 2008.

Another source of uncertainty for Phase II is the commitment period reserve ("CPR") which will come into effect from January 2008. The CPR is a mechanism which is intended to encourage Annex 1 Countries to take climate change mitigation action domestically and also to prevent Annex 1 Countries from overselling emission allowances and subsequently being unable to meet their own emissions targets under the Kyoto Protocol. Pursuant to the CPR, each Annex 1 Country is required to hold a minimum level of ERUs, CERs, AAUs and RMUs in its national registry, this minimum having been defined as the lower of the following:

- 90% of the Annex 1 Country's assigned amount of emission allowances; and
- the level of national emissions indicated in the Annex 1 Country's most recent emissions inventory (multiplied by five, for the five years of the commitment period).

In terms of the EU ETS, this means that only 10% of a Member State's EU ETS allowances may be traded outside the relevant Member State at any time. This has the potential of restricting market liquidity, but prior to the commencement of Phase II, it is difficult to estimate the extent of this possible impediment. Likewise, it is not yet clear how the CPR will be enforced given the large number of individual accounts across the EU.

### 1.3.3 The EU's approach to adaptation

In addition to the need to mitigate climate change through a reduction in GHG emissions, the EU also recognises the need for existing businesses and industries to adapt to the impacts that climate change is already creating (and will continue to create even if the EU achieves its goal of limiting climate change to an increase of 2°C). This has compelled the European Commission to consider climate change adaptation strategies in addition to prevention strategies. These strategies could have potential regulatory impacts for all industries, and particularly for the energy industry – regardless of whether a business is involved in GHG-reducing technologies.

The EU released a Green Paper on adaptation in June 2007.<sup>28</sup> The impetus behind this strategy is to encourage the development of early adaptation policies and to minimise the risk (and the harmful effects) of being forced to suddenly adapt to extreme climate change impacts, without appropriate planning or preparation. The EU is considering the adoption of new policies at the European level, as well as encouraging policies at the national and local levels, to promote early adaptation strategies. As we learn more about climate change and its likely impacts, there is a growing recognition that early adaptation strategies will be essential.

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<sup>28</sup> Green Paper from the European Commission to the European Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, "Adapting to climate change in Europe – options for EU action", 29 June 2007.

Key industries in the EU which would be significantly affected include agriculture, forestry, fisheries, water, energy, health care, and infrastructure. Regulatory changes may be seen in the areas of water use, planning and building codes, and incentives may also be put in place to encourage biodiversity or the development of crop species resilient to extreme weather. In addition, the concept of adaptation offers market opportunities for innovative technology which can assist in programmes to promote (for example) water efficiency and cope with the impacts of extreme weather.

The Green Paper specifically notes that the energy sector will need to adapt to the potential impacts of climate change. Water scarcity may have a significant effect on the ability of nuclear power stations or hydro-dams to operate, and focus is now turning to policies which should be put in place to cope with such scarcity. In addition, extreme weather is likely to increase demand for electricity (eg, to power air conditioning or central heating), require greater diversification of energy sources (since changing conditions could affect existing sources such as nuclear and hydro power, and open new opportunities for solar and photovoltaic power), and increase pressure on national grids and demand-response management in order to cope with extreme energy demand fluctuations.

The Green Paper suggests that market forces are unlikely to produce efficient adaptation strategies on their own, and that policy responses will be required both within the EU and in the EU's dealings with non-EU states. Such responses will impact on all policy areas in the EU, not just those specifically focused on climate change. An EU communication on adaptation which will expand upon adaptation policies is expected to be published by the end of 2008.

## 1.4 UK-specific actions

### 1.4.1 UK policy on climate change

The UK has set a domestic GHG reduction commitment which is consistent with those recommended for the EU by the European Council. In its Energy White Paper of 2003, the UK government adopted a policy of reducing the UK's CO<sub>2</sub> emissions by 20% below 1990 levels by 2010, and 60% by 2050, with real progress by 2020.<sup>29</sup> This commitment has been maintained in the Energy White Paper released in May 2007.<sup>30</sup> The UK will update this commitment, and the measures designed to achieve it, following the decision by the European Council on burden sharing under a revised EU ETS, expected in early 2008. There is still work to do to meet this target: the UK's CO<sub>2</sub> emissions in 2006 were only 11% below 1990 levels.<sup>31</sup>

The strategy by which the UK is intending to achieve this level of reduction encompasses a broad range of measures set out in the 2007 Energy White Paper

<sup>29</sup> DTI Energy White Paper 2003, "Our energy future – creating a low carbon economy", especially paragraphs 1.10, 1.18 and 2.12.

<sup>30</sup> DTI Energy White Paper 2007, "Meeting the energy challenge", especially executive summary, pages 8 and 24.

<sup>31</sup> UK Climate Change Programme: Annual Update to Parliament, July 2007-11-11, p7 (<http://www.defra.gov.uk/environment/climatechange/uk/ukccp/pdf/ukcc-annrpt-07.pdf>)

and the UK Climate Change Programme.<sup>32</sup> The UK Government sees a strengthened EU ETS (which covers around 50% of total UK emissions) as a key element of its contribution to reducing GHG emissions.<sup>33</sup> The UK is also heavily involved in the international efforts to establish an international climate change regime post 2012, mainly through its presence in the G8 and the EU.

#### 1.4.2 **Climate Change Bill**

If passed by the UK Parliament, another key aspect of UK domestic action will be the Climate Change Bill, which was published for consultation in March 2007. The Climate Change Bill intends to put in place a legal framework for the UK to achieve its 60% reduction in GHG emissions by 2050 and a 26-32% reduction by 2020 (compared with 1990 levels). The Bill proposes moving towards these targets by setting five year "carbon budgets" which will create binding limits on these emissions. Further, the Bill proposes to empower the UK Government to extend the scope of the EU ETS cap and trade scheme to include non-energy intensive businesses not covered by the EU ETS. The Bill has been reviewed by a joint parliamentary committee and is due to enter the Houses of Parliament for debate in the third parliamentary session of 2007.

The Bill envisages that the UK's targets for CO<sub>2</sub> reductions may be changed by order of the Secretary of State (subject to affirmative resolution procedure in both Houses of Parliament) if there is a significant development in international law or policy. According to the consultation paper issued with the draft Bill, the UK "may be prepared to go further than its unilateral targets" in the context of an international agreement being reached for the post-2012 period.

However, it is not clear whether failure to reach international agreement could equate to a significant development such that the Secretary of State could reduce the UK target. This may be one of the reasons why the Joint Committee on the draft Bill recommended that the relevant clause be changed so that the power to amend the target is restricted to upwards amendments only and greater Parliamentary scrutiny is given to any amendments.

The UK targets set out in the Bill exceed the EU's own stated targets, although the new burden-sharing agreement relating to post-2012 targets may result in the UK having to adopt a higher target.

#### 1.4.3 **Adaptation**

The UK Government recognises that in addition to policies designed to reduce GHG emissions, some level of adaptation will be required to reduce the costs and disruption caused by climate change in the UK, particularly from extreme weather events such as storms, floods and heat waves.<sup>34</sup> The UK Government

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<sup>32</sup> Also see the document released by the UK Government in October 2007 entitled "Moving to a global low carbon economy: implementing the Stern Review", which sets out the way in which the UK Government intends to adopt the recommendations set out by Stern.

<sup>33</sup> DTI Energy White Paper 2007, "Meeting the energy challenge", especially executive summary (pages 8, 11 and 14), paragraph 1.33 and Annex C.

<sup>34</sup> UK Government, "Moving to a global low carbon economy: implementing the Stern Review", October 2007, page 3.



established the United Kingdom Climate Impacts Programme in 1997 to help organisations assess the impacts of climate change on them.<sup>35</sup>

The UK Government is also seeking to develop policies on adaptation and to enhance the regulatory framework underpinning this area and has pledged significant funding to address issues posed by adaptation. It recently announced a funding increase in funding of £600 million in 2007-2008 rising to £800 million in 2010-2011. In addition to addressing climate change mitigation issues, the Climate Change Bill (discussed above) will also address adaptation by requiring the Government to periodically report to Parliament on its progress on meeting adaptation goals and on integrating adaptation into wider climate change policies.

Finally, the UK Government has recognised the importance of assisting developing countries (which are often more vulnerable to climate-related natural disasters) to develop and implement adaptation policies. The Department for International Development and the Department for Environment, Food and Rural Affairs ("**DEFRA**") have taken an active role in supporting international initiatives and research in this area, as well as developing its own policies instruments and supporting UK-based research relating to adaptation and development.<sup>36</sup>

In relation to the City of London, a new Greater London Authority Bill also addresses the need for specific adaptation policies for London and, if passed, will require the Mayor of London to develop strategies to implement adaptation policies.

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<sup>35</sup> See <http://www.ukcip.org.uk/>.

<sup>36</sup> See, for example, Linking Climate Adaptation Network at <http://www.linkingclimateadaptation.org/>.

## 2

**CCS AND CLEAN COAL: LEGAL BARRIERS TO DEVELOPMENT**

Simon Tysoe | Senior Associate | [simon.tysoe@herbertsmith.com](mailto:simon.tysoe@herbertsmith.com)

*The development of CCS requires not only consistently higher carbon prices than prevail today but also the settlement of key legal issues. Whilst much work is required on the part of legislators, a regulatory framework for CCS is slowly growing in various jurisdictions. The EU is expected to take a large step forward with the imminent issuing of the draft CCS Directive. This is encouraging, not only because the EU's legislation may well prove to be a powerful precedent for other jurisdictions (as has been the case elsewhere in the past), but also because it is the EU which is the most likely jurisdiction to see a consistently higher carbon price in the medium term.*

**2.1 Purpose**

This paper outlines the principal legal impediments to the development of carbon capture and sequestration ("CCS") projects, impediments which are often cited as barriers to CCS because they place risks of unquantifiable costs on to potential projects. These impediments are legal in their nature either because they are incidents of where CCS related activities are prohibited or restricted by existing regulations or alternatively instances where CCS throws up novel problems where the rights or potential liabilities of the entity involved in CCS are unclear. All of these impediments are ones that will require resolution before any investor-owned company would be able to adopt CCS. Accordingly, the paper will go on to discuss some of the initiatives currently under consideration for the resolution of these impediments, or at least the quantification of their associated risks. In terms of geographical scope, the paper will focus on developments in the EU since this has been identified by many commentators as being the jurisdiction most likely to create carbon prices high enough to support the costs of CCS within the next 10 to 15 years.

As a preliminary matter this paper also briefly discusses the regulation of coal-fired plant in the EU since CCS has been associated with the "clean coal" initiative because of the relatively high carbon emissions of coal-fired plant.

**2.2 Background****2.2.1 What is CCS and "Clean Coal"?**

CCS is an approach to mitigating climate change via the process of capturing CO<sub>2</sub> emissions from large point sources such as power plants, compressing it into a dense fluid, transporting it (usually by pipeline) and storing it securely in geological formations, on land or under the seabed. The CO<sub>2</sub> emitted is thus (in theory, at least) prevented from entering the atmosphere. Many countries and

organisations are undertaking CCS pilot or commercial projects around the world. In fact, commercial, demonstration and research and development CCS projects are being conducted on every continent except Antarctica.

CCS has been seen by many as having its greatest application in relation to coal-fired power stations, and hence the term "clean coal" has been used pretty much interchangeably with CCS. However, the term "clean coal" is more properly used for any initiative designed to enhance both the efficiency and the environmental acceptability of coal extraction, preparation or use.

### 2.2.2 What does CCS entail?

There are a number of stages involved in the generation of power using CCS technology. Capture of the CO<sub>2</sub> may occur in three principal ways, through post-combustion flue gas separation, through oxygen fuelled combustion or through pre-combustion capture.

The capture stage is followed by compression of the CO<sub>2</sub> into a liquid or supercritical form and then transportation through pipelines (or in theory by other means such as vessels) to a storage site.

The final stage is storage of the gas, which usually involves injection into underground geological formations, perhaps hydrocarbon reservoirs, perhaps aquifers, both onshore and offshore. Other options such as storage by direct injection into deep water have been considered as well but are beyond the scope of this paper.

In essence therefore the process of CCS can be reduced into three key elements:

- CO<sub>2</sub> separation and capture;
- CO<sub>2</sub> compression and transportation; and
- CO<sub>2</sub> injection and storage.

In addition some regulators (notably the Australian Government) have identified long term storage, storage site decommissioning and long term responsibilities as a separate element. However, for the purposes of this paper we have adopted the three stage analysis outlined above.

## 2.3 Overview of issues

Regardless of the regulatory system considered, the legal impediments to the implementation of CCS projects tend to increase as the CO<sub>2</sub> gets further down the CCS chain.

Whilst the most technically challenging and costly process of the CCS chain, the processes involved with capture of CO<sub>2</sub> raise relatively few legal issues. In essence these are industrial chemical processes and so the development of plant to carry this out would likely be done within the existing framework of planning, health and safety and environmental regulations in the relevant jurisdiction. However, in the context of "clean coal" it is worth briefly examining the legal issues surrounding the development of coal-fired plant.

The legal issues associated with CCS begin to appear once the CO<sub>2</sub> has been captured. To some extent these problems stem from the classification of CO<sub>2</sub> as "waste" and the existing restrictions on the handling and disposal of waste under local and international law. We will discuss this in more detail below.

The storage of CO<sub>2</sub> raises another raft of possible issues, which differ from jurisdiction to jurisdiction, whether one is considering storage in onshore or offshore sites. Issues of land ownership, the interaction between CO<sub>2</sub> storage and hydrocarbon regulations and issues of waste disposal will have to be faced. In addition questions of short, medium and long term liability for stored CO<sub>2</sub> have nowhere been adequately addressed.

The final barrier which CCS faces is one which pervades all of its elements: that is, that there is little in the way of financial incentive for the construction of what is a costly engineering project.

## 2.4 Coal-fired plant

Construction of coal-fired power plants was at its highest in the years between 1960 and 1990. In the period since 1990, coal-fired power plant construction has declined while an increasing number of natural gas combined cycle plants have been built. However, growing concerns in relation to security of supply (in particular, concerns over diminishing domestic supplies and an over-reliance on imported liquefied natural gas ("LNG")) along with high oil and gas prices have caused many in the industry (particularly within the EU) to once again consider coal as a viable option.

The key issue for anyone looking at constructing a coal-based power plant is that much of the legislation that currently applies to such plant has not been developed to encourage new, cleaner plant to be developed but broadly to encourage a switch away from coal. The situation in the EU is reflective of the sort of environmental legislation that has been developed over the last decade.

The revised Large Combustion Plant Directive ("LCPD")<sup>37</sup> applies to combustion plants with a thermal output of greater than 50MW. It aims to reduce acidification, ground level ozone and particles throughout Europe by controlling emissions of sulphur dioxide ("SO<sub>2</sub>"), nitrogen oxides ("NO<sub>x</sub>") and dust (particulate matter) from large combustion plants. These include plants in power stations, petroleum refineries, steelworks and other industrial processes running on solid, liquid or gaseous fuel. The LCPD is therefore important in the regulation of coal-fired power plants. It has been transposed in the UK and other EU Member States.<sup>38</sup>

### 2.4.1 Implications for coal-fired plant

The requirements of the revised LCPD for existing facilities mean that by 2016, all major pulverised coal-fired power plants will have to install equipment for removal of substantially all NO<sub>x</sub> and SO<sub>2</sub>. At estimated investment costs of between €100 and €150/kW each, these retrofit costs cannot be ignored. At a combined cost of approximately €250/kW to fully equip an existing facility to

<sup>37</sup> Directive 2001/80/EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants.

<sup>38</sup> In the UK by way of the Large Combustion Plants (England and Wales) Regulations 2002 SI 2002 No. 2688 and the Large Combustion Plant (Control of Emissions) (Scotland) Regulations 1991 SI 1991 No. 562.

new power plant standards, an existing power station would need to see an increase in revenues of at least €37.5/kW to recover the additional investment cost alone.<sup>39</sup>

In addition to the cost of retrofitting, 11GW of coal-fired capacity in the EU has been opted out of the scheme and will therefore be constrained to 20,000 hours between 2008-2015. It is anticipated that some of this generation capacity will close before the 2015 deadline.

In the shorter term, the combined impact of the revised LCPD and the requirement to include all such plant in the EU ETS (discussed below) is a key factor that is creating uncertainties with regard to the future life of fossil fuel-based (especially traditional coal-fired) power stations. The belief that such legislation will increase in severity over time makes it now unlikely that any coal plant in an OECD country would be developed without incorporating "clean coal" technology.

#### 2.4.2 Likely proposals under EU draft CCS legislation

The European Commission's Proposal for a Directive of the European Parliament and of the Council on the geological storage of carbon dioxide (the "**draft EU CCS Directive**") is widely expected to amend the LCPD to include an obligation on all new-build combustion plants to have, as a condition of their permit, a suitable space on the site for CCS equipment to be retro-fitted.<sup>40</sup> This proposed change will focus the impetus of the LCPD onto CCS. This approach has been foreshadowed by the approach of the UK Government, which has already started including obligations on developers of new power stations in the UK to have space for CCS equipment and for the design of the plant to be compatible with a potential future retrofit.<sup>41</sup> This is consistent with the UK Government's statement that it believes that by 2030 a third of the UK's generating plant will be CCS-equipped. It is unlikely to be considered an onerous provision as the majority of European power developers are already considering how to "future-proof" their plant.

### 2.5 CO<sub>2</sub> as waste

Legal issues arise in relation to CO<sub>2</sub> once it is captured because, as a by-product of an industrial activity, CO<sub>2</sub> is apt to be classified as "waste" in many jurisdictions. Under EU law, the issue of whether CO<sub>2</sub> is a waste product turns on whether the holder of the CO<sub>2</sub> discards or intends to discard the CO<sub>2</sub>. This has wider application since an almost identical definition to that used in EU law has been adopted by the Organisation for Economic Cooperation and Development (the "**OECD**").<sup>42</sup> *Prima facie* the act of transporting captured CO<sub>2</sub> to a geological formation for storage without any intention to recover it appears to demonstrate an intention to discard.

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<sup>39</sup> Figures quoted from IEA Clean Coal Centre publication "European legislation (revised LCPD and EU ETS) and coal", May 2007.

<sup>40</sup> The draft CCS Directive is expected to be published on 5 December 2007. Our comments are based on our understanding of the likely content of this draft.

<sup>41</sup> Three consents granted in autumn 2007 under section 36 of the Electricity Act have included such obligations.

<sup>42</sup> C(2001)107 of the OECD.

Accordingly, CO<sub>2</sub> is likely to be considered waste under existing EU legislation, and therefore make the activity of CCS in the EU subject to waste treatment regulation, in particular the EU Waste Directive,<sup>43</sup> the EU Waste Shipment Regulation<sup>44</sup> and the EU Landfill Directive,<sup>45</sup> under which the injection of liquid waste into landfill sites is prohibited. The one exception will be where the CO<sub>2</sub> has an immediate and certain further use in an ongoing process of production, that is in enhanced oil or gas recovery.

Further issues arise if CO<sub>2</sub> is classified as a "hazardous waste". The EU, consistent with the OECD, has adopted a characteristics-based definition of hazardous waste, such that CO<sub>2</sub>, if it is defined as waste in the first place, could fall into the definition, especially if impurities are included in the CO<sub>2</sub> stream.

### 2.5.1 Implications for transportation

As regards transportation, the principal issues relate to the transportation of CO<sub>2</sub> across national boundaries. Transboundary shipment within and (potentially) out of the EU is likely to be an issue which affects European CCS players in particular. The Waste Shipment Regulation prohibits the export of waste for disposal outside the EU. Where shipment is not prohibited (ie, within the EU) trans-frontier shipment control system is based on "prior informed consent". It requires notification, where appropriate, to the competent authorities of dispatch, destination and transit, using a consignment note containing prescribed information. The regulation also requires shipments of hazardous waste to be covered by a financial guarantee. These obligations are likely to be incompatible with the sort of arrangements likely to be favoured for CO<sub>2</sub> storage.

If CO<sub>2</sub> is classified as a "hazardous waste" then the application of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal would need to be considered, but a discussion of this is outside the scope of this paper.

### 2.5.2 Implications for onshore storage

Classification of CO<sub>2</sub> as "waste" in the EU could have potentially severe implications. Under the Landfill Directive, the injection of liquid waste into landfill sites is prohibited. Injection of CO<sub>2</sub> from CCS is likely to be in liquid form.

Focussing on the UK, the injection of liquid waste into onshore petroleum reservoirs has been considered by the English courts in this context. The pumping of waste water back into the reservoir after extraction of the useful oil was found to have been dumping "waste" and as such the site in which this was happening (an onshore oil reservoir) constituted a landfill site for the purposes of the UK's landfill regulations.<sup>46</sup>

The court's decision has consequences for onshore storage in that if the liquid stream of CO<sub>2</sub> is not exempted from the prohibition, if a storage site were to be

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<sup>43</sup> Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste.

<sup>44</sup> Council Regulation (EEC) No. 259/93 of 1 February 1993 on the supervision and control of shipments of waste within, into and out of the European Community.

<sup>45</sup> Council Directive 99/31/EC of 26 April 1999 on the landfill of waste.

<sup>46</sup> *Blackland Park Exploration Limited v Environment Agency* [2003] EWCA Civ 1795.

classified as a landfill site, provisions relating to site selection, site design, waste acceptance criteria, provision of financial security and closure procedures would all apply.

### 2.5.3 Implications for offshore storage

Given the potential issues with onshore storage it is likely that CCS projects will look to offshore storage. Indeed, the UK Government has announced that one of the criteria for entry into the competition for funding of the UK's commercial demonstration project is that the storage facility is located offshore.<sup>47</sup> Storage of CO<sub>2</sub> in the seabed requires consideration of the principal conventions governing the international marine environment.

With 80 contracting parties, the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (the "**London Convention**") is by far the most geographically significant convention in this regard. The London Convention and its 1996 Protocol (the "**London Protocol**") together were seen as a barrier to the development of offshore storage since they prohibited the deliberate dumping of waste at sea, in the seabed or the subsoil. However, the London Protocol was amended in October 2006 to allow injection of CO<sub>2</sub> if (1) the disposal is into a sub-seabed geologic formation; (2) the CO<sub>2</sub> stream consists overwhelmingly of CO<sub>2</sub> and (3) no other waste is added for the purposes of disposal. The parties to the London Convention have subsequently engaged in the development of a set of guidelines on CCS risk assessment and management which is to be adopted at the next meeting of the contracting parties in November 2007.

For the projects located in the seas off northern and western European states, including the UK, Scandinavia, Germany, the Netherlands and France, the Convention for the Protection of the Marine Environment of the North-East Atlantic (the "**OSPAR Convention**") contains a prohibition on the dumping of waste similar to that in the London Protocol. In June 2007 the contracting parties amended the OSPAR Convention by adopting amendments to the Annexes to allow the storage of CO<sub>2</sub> in geological formations under the seabed. However, this still requires ratification by at least seven contracting parties before the amendment comes into force, a process which is not expected to be completed for some time. The parties have also undertaken to develop guidance on transport and storage of CO<sub>2</sub> and also in relation to monitoring of storage sites.

### 2.5.4 Proposed changes and outlook

These issues have been noted by the EU during its consultation on CCS regulation and we expect that the draft EU CCS Directive will contain proposals to exclude from the definition of "waste" CO<sub>2</sub> captured and transported for the purposes of geological storage. This would remove the barriers referred to above at a stroke, although the EU legislative process and the time required thereafter to make the necessary changes to Member State legislation mean that there will be substantial "legacy" issues for some years yet.

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<sup>47</sup> UK Department of Business Enterprise and Regulatory Reform press release, 9 October 2007.

Whilst the process for revising the definition of waste might soon be on its way in the EU, the widespread usage of similar definitions by the OECD and in international treaties will mean that any CCS project will need to be alive to these potential issues outlined above even where operating outside the EU. Any CCS developer would need to carefully review applicable local waste legislation and treaties before embarking on any development.

## 2.6 Property rights regarding storage sites

It is crucial for a CCS investor to have certainty as to its property rights over storage sites. The legal position in relation to ownership of the sub-surface passing with ownership of the surface differs from one jurisdiction to another. In many common law jurisdictions (such as the US and UK) ownership of land includes both the surface and sub-surface. In these jurisdictions, a developer would necessarily have to acquire rights to the surface land required for the project and the sub-surface land from the landholder. In order to facilitate development here a regime for the compulsory acquisition of rights of access to the sub-surface land would need to be adapted for use by CCS operators. Whilst these powers are commonly granted to developers in other analogous industries such as gas storage in the UK, many such projects in the UK have sought to resolve these issues by private treaty with landholders rather than rely on such powers. This is largely because of experience of delays in exercising such compulsory powers (caused by the necessity for public inquiries, which can be a substantial break on development), and also because in today's environment few developers would wish to push a project through against local opposition in reliance on these powers. However, the mere fact that the powers exist and can be exercised by the developer will of itself assist any would-be developer in seeking to negotiate access rights.

The allied issue of planning consent also needs to be addressed to ensure that where developers require land (with or without recourse to compulsory acquisition) an efficient planning regime is in place that can balance international and national needs against local concerns. In the UK, the Government White Paper "Planning for a Sustainable Future" cites CCS projects as the sort of project which might be dealt with at a national (rather than local) level to ensure consistency.

The landholder issues are less complex offshore, with ownership of the seabed usually vesting in the relevant state within the 12 mile limit and further if rights under the UN Convention on the Law of the Sea ("UNCLOS") are asserted. Perhaps for this reason, the UK has concentrated on offshore storage in its regulatory consultation papers. In the UK offshore environment, once the UK's rights under UNCLOS are asserted, the necessary land rights can be granted by the Crown. However, both onshore and offshore projects are likely to face transboundary issues thrown up by differing legal regimes regarding title, access, liability and other critical issues. Contractual solutions such as unitisation agreements may be used but ultimately the effective resolution of transboundary issues will depend on the cooperation of national regulators in much the same way as it does today for the hydrocarbon industry.

## 2.7 Liability issues

The issue of the assumption of liability is often cited as one of the main barriers to investment in CCS. At first sight this focus on liabilities seems curious. CO<sub>2</sub> is not a particularly hazardous substance, particularly when compared with natural gas. Whilst large scale leaks might cause environmental and property damage, and potentially even loss of life, the risks of operating facilities (which have the much greater potential to cause



catastrophic damage) are accepted by facility operators and insurers in many existing industries, especially the power and hydrocarbon industries. The issue is so acute in CCS because, unlike most other industries, the liabilities for leakage could arise centuries after the cessation of storage when the operator has ceased to exist and the storage sites are no longer in use and have been decommissioned. Any financial gain enjoyed by the operator might well have been dissipated some considerable time before the leakage occurs and it may be impossible at the time a leakage occurs to seek compensation from the person who benefited from the storage of the CO<sub>2</sub>. Absent any other provision, this will mean that the liability will have no home and therefore likely default to the tax-payer. Given that the tax-payer will likely already have paid for the CCS projects through taxation and/or higher power prices, this seems unfair.

The conventional solution to the issue of operator credit risk would be for operators to lodge security. Even if they subsequently cease to exist or cease to be able to meet their obligations, there will be funds available to meet the costs of remediation. This approach is simple and in accordance with existing practice. As a result, it is well understood by governments and the oil and gas industry in respect of the decommissioning of facilities. However, unlike the costs of decommissioning existing facilities, the costs of tackling leaks of CO<sub>2</sub> from storage sites and remedying the damage caused by them is hard to ascertain. Any attempt to quantify these costs will rely on estimates of abatement costs and leakage probability which, at this early stage of the development of CCS projects, would be little more than well educated guesses. More seriously, however, the lodging of security addresses only short to medium term liability, as any insurance company, bank or parent company that provides the relevant security is no more likely to be in existence in the time scales that CCS requires than the operator itself.

Given these difficulties, it has been widely proposed that liability for leakage from storage sites should be transferred to the relevant government at the time storage facilities are decommissioned. This approach is preferred since it seems to offer the greatest hope that any leakage costs will be covered and that storage sites will be maintained and monitored correctly. At the very least the credit risk on the entity obliged to carry this out is at the highest level available in the jurisdiction. Transferring the liability to the government immediately rather than waiting for the government to act as a "remediator of last resort" also seems a pragmatic approach. However, the funds needed for this would most likely come from taxation, either ring-fenced in advance or raised at the time, and so ultimately rests with future tax-payers.

It is unlikely that one single option will be adopted. Whilst there are clear reasons why governments should ultimately take responsibility for liability, it is likely that where they do so they will seek to put in place legislation to pass some of this liability back to participants in the industry or create funds from the industry players to offset such future liability. Such an approach is taken in the case of hazardous waste liability in the US, where the "Superfund" legislation<sup>48</sup> passes clean-up responsibility to the government, but allows the government to claw back these costs from past and present owners and operators of the site (among others). Similarly in the UK, the decommissioning of offshore facilities rests, ultimately, on the government. However, wide powers have been granted under statute to allow the government to seek contributions from past and present owners of sites which require decommissioning expenditure, and their fellow group companies.<sup>49</sup> This is

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<sup>48</sup> Comprehensive Environmental Response, Compensation, and Liability Act (Superfund) 42 U.S.C. s/s 9601 et seq. (1980).

<sup>49</sup> eg, Petroleum Act 1998 (particularly section 29).

similar to the structure the government is proposing in relation to long-term nuclear liabilities.

It is our understanding that the draft EU CCS Directive is likely to address the issue by stating that the Member State in which a storage site is located will take over responsibility for the storage site (and associated liabilities) at a pre-defined handover point or by default if the operator ceases to be able to perform its obligations. However, it is also likely that the relevant Member State will seek security from the operator to cover its prospective liabilities.

## 2.8 **Lack of incentives for CCS**

The development of CCS is currently impeded by the lack of financial incentives for would-be investors in CCS. A range of possible incentives do exist, however, and they break down into three main classes: (i) those based on the carbon market; (ii) other financial incentives such as subsidies; and (iii) legal requirements to deploy CCS.

### 2.8.1 **Carbon market incentives - Clean Development Mechanism and EU ETS**

CCS, particularly in developing countries, could be incentivised by crediting CCS activities through CDM projects. However, CCS is not specifically included in the CDM of the Kyoto Protocol, and whilst there has been speculation for several years that CCS projects may soon qualify as CDM projects, progress has been slow. In 2006, the CDM Executive Board referred two CDM project proposals to the CDM Methodological Panel. The Panel was tasked with preparing methodological issues related to CCS as CDM projects for discussion by the Board and by the parties to the Kyoto Protocol. However, faced with disagreement over what the right approach should be the Executive Board has deferred taking any decision. CCS projects will also have to be considered more generally by the Panel before there is any certainty as to whether they will gain Board approval. The meeting of the parties to the UNFCCC in Bali at the end of 2007 is likely to result in guidance being given to the Panel, and it is hoped that a methodology will be adopted early next year.

Development of CCS in the EU might be facilitated by means of the EU ETS. Currently, CCS is not specifically included in Phase II of the EU ETS. The EU ETS does not distinguish between power stations with CCS technology and power stations without and so an allowance is required for each tonne of CO<sub>2</sub> produced from a power station whether or not it is stored underground. Despite this, the UK Government has indicated in its National Allocation Plan for the 2008–2012 Kyoto Commitment Period that it intends to recognise CCS projects during this period. This will probably be achieved by the "opt-in" process under the EU ETS on a project by project basis. Where a project is "opted in" it is expected that the CCS generator will be credited with EU ETS allowances (as any other generator) but will not be required to surrender allowances to the extent its emissions are captured and stored.

It appears likely that this "opt-in" approach might not be necessary if the EU amends the EU ETS regime to include all CCS facilities automatically. It is widely expected that the draft EU CCS Directive will contain provisions to do this. It seems likely that under these proposals stored CO<sub>2</sub> will not be counted as being emitted for the purposes of the EU ETS and, therefore, the CO<sub>2</sub> generator will not need to surrender allowances for the stored CO<sub>2</sub>. Assuming any

allowances allocated to the CO<sub>2</sub> generator with CCS will be the same as those granted to similar plants without CCS, the CCS equipped generator will be free to sell its spare credits and generate income to offset the cost of its investment in CCS. In theory this additional revenue will trickle down the CCS value chain through the transportation charges and the charges levied by the storage operators.

Whilst this approach is the simplest option, it is not one that has been unanimously praised by all in the industry, particularly as it places the financial incentive into the hands of the generators. Alternatives to this approach exist and they include awarding credits to the installation which stores the CO<sub>2</sub> or crediting each facility in the CCS chain separately.<sup>50</sup> If this is indeed the EU's proposed way forward under the draft Directive, it will be interesting to see if this view changes as the legislation is considered further.

### 2.8.2 **Other financial incentives for demonstration projects**

Even if the EU ETS is amended to include CCS, it is doubtful that this will be sufficient to enable the development of commercial scale CCS projects in the EU in the short-term. The price of carbon under the EU ETS is not yet consistently high enough to meet the costs of developing CCS projects. Accordingly, if they are to be built, demonstration projects are likely to have to be funded by governments through direct incentives until such time as the price of carbon consistently reaches a sufficient level and the cost of CCS is reduced. Both the EU and the UK have announced that they wish to see the development of commercial scale demonstration projects. The UK has opted to run a competition and make an award of funding to the winning project, with the competition due to be completed and the award made during 2008. The idea of direct and "active" government funding, especially through a competition, has been criticised by some commentators because it means that the Government will inevitably be involved in the selection of one of the three main competing forms of CCS technology at the expense of the other two. This fear that the Government will be too closely involved in technology selection has been compounded by the Government's announcement in October 2007 that only post-combustion capture projects would be eligible for the competition.

Many commentators favour a less interventionist approach aimed at creating investment conditions which favour CCS more broadly and which does not involve governments in technology selection. The classical way to do this is through the development of appropriate tax incentives, either tax breaks for CCS investors or else by creating tax penalties on emissions. This latter approach has been adopted by Norway, where the government imposed a tax of \$40 per tonne of carbon emitted from offshore oil and gas installations. However, imposing a tax of this sort on all generators, rather than just a small class of emitters, is unlikely be palatable to the power industry in the short-to-medium term.

### 2.8.3 **Non-financial incentives**

Alternatively, or in parallel to offering financial incentives, governments might enact legislation requiring new power plants to be built with CCS technology, or

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<sup>50</sup> For a fuller discussion of the various methodologies see the article by Watchman, Bowman, Read and Addison 15[2005/2006] URL Carbon Capture and Storage

possibly even require existing power plants to retrofit the necessary technology. Whilst the idea of mandating the deployment of CCS in the EU has been mooted, it is not considered likely that the draft EU CCS Directive will contain a requirement for CCS to be mandatory. The main reason for this is that whilst such mandatory requirements would perhaps bring in CCS earlier than simply relying on investment signals from the market, they would do so at a high cost. Without some "carrot" to accompany the "stick", the mandatory imposition of CCS might lead to unintended consequences, such as the "offshoring" of generation to less restrictive jurisdictions (where possible) or, in deregulated markets, the stagnation of plant building and consequential economic harm.

What is more likely is a requirement for new plant to be designed to be "capture-ready" so as to be ready to fit CCS in the future. As discussed in section 2.4.2 above, this is already being implemented in the UK and is likely to be included in the draft EU CCS Directive.

## 2.9 Lack of regulatory framework

It is perhaps not surprising given the nascent nature of the CCS industry that no legislator has so far produced a regulatory framework for CCS. To the extent that regulations apply to CCS, they do so because aspects of CCS look like other activities, such as hydrocarbon production. Accordingly, many small-scale projects are currently regulated under existing or slightly amended mining or hydrocarbon regulations of the relevant jurisdiction. An example of this is Norway's Sleipner project where the storage of CO<sub>2</sub> is regulated under the Norwegian Petroleum Act as a necessary part of gas processing.<sup>51</sup>

However, these approaches are largely ad hoc and have not sought to address the issues associated with CCS in a concerted manner. If CCS is to be carried out on a commercial scale in any jurisdiction, that jurisdiction would have to consider the most effective legislative infrastructure available to it to deliver safe and environmentally sound CCS without undue regulatory burden. This is, to a certain extent, a matter of selecting the most appropriate existing laws, applying these to CCS and developing new laws to complement these existing laws to cover any CCS-specific issues. However, there are likely to be a number of CCS-specific issues that these extant legal systems are unlikely to currently cover. Until these issues are considered and the necessary legal infrastructure put into place, this legal uncertainty is likely to act as a major deterrent to further development of CCS.

It is worth considering what key issues any such regulatory framework needs to address. First, depending on the existing legislation of the jurisdiction, a regime should act to simplify the existing treatment of CO<sub>2</sub> under relevant legislation to ensure that CCS activities are not inadvertently prohibited or unnecessarily restricted. For instance, in the EU, it is understood that the draft EU CCS Directive looks to amend the classification of CO<sub>2</sub> as waste and the interaction of CCS and waste management industry regulation. Second, any regulatory system should have as its primary aim the reduction of leakage risk by providing a framework of best practice for site selection, well design and construction and site operation. Third, once sites have been identified any regime should address property issues regarding CO<sub>2</sub> and access to the storage sites themselves, to the extent that these arise in the relevant jurisdiction. Fourth, the regime should address monitoring and verification of injected CO<sub>2</sub>. Fifth, any such regulations should make some attempt to

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<sup>51</sup> Other examples include In Salah (Algeria), regulated under the Algerian Hydrocarbon Law, and RECOPOL (Poland), regulated under the Polish Mining Law.

answer questions of liability for leakage, both short term and long term. Finally, any regulatory system must have as its aim the encouragement of the development of CCS, and this may include economic incentives of some sort.

#### 2.9.1 Adequacy of current regulatory initiatives - Australia

Australia has been considered by many to be at the forefront of the development of CCS regulation, due in part to the legislation created as part of the Gorgon CCS project in Western Australia. Proposed amendments to the Commonwealth Offshore Petroleum Act 2006 (with the first CCS blocks to be released next year) are imminent, and similar initiatives are underway in Queensland and South Australia. It is understood that the proposed amendments will address the following six key issues seen as fundamental to a CCS regulatory framework:

- assessment and approvals processes;
- access and property rights;
- transportation issues;
- monitoring and verification;
- liability and post-closure responsibilities; and
- financial issues.

It is understood that the Bill will also allow for the establishment of an effective regulatory framework to ensure that CCS projects meet health, safety and environmental requirements. The Bill will incorporate a licensing framework broadly similar to the existing regime for petroleum activities including CCS-specific assessment (exploration) permits, holding leases and injection licences.

Indications are that the proposed legislation will go a long way to satisfying the main requirements of CCS regulation noted above. One area which is not yet defined is whether the legislation will provide for the transfer of post-closure liability from the storage operator to the state. In the context of the Gorgon project in Western Australia, it has been reported that the state and federal governments did not favour such a transfer. If this position is reflected in the final proposals, it is likely that the regime will fall some way short of the aspirations of CCS developers. The other significant gap under the Australian model is the lack of financial support. Without a system such as the EU ETS in place, and without CDM coverage, Australian projects have no clear route to incentives other than Australian governmental initiatives.

Overall, the proposed Australian approach is to address the issues of CCS by amending legislation developed for petroleum exploration and development. This is an understandable approach due to the co-existence of the petroleum and CCS industries, the need to establish determinable rights between both industries, and the similarities in the technologies used by both industries. Ultimately it is essentially a technical solution to the key technical issues, but unless the proposal is changed from the currently mooted start point, it runs the risk of not addressing key legal and commercial issues.

### 2.9.2 Adequacy of current regulatory initiatives - the EU

In January 2007 the European Commission published a Communication to the Council and the European Parliament setting out the major EU policy choices for CCS and the work programme on CCS for the next two to three years.<sup>52</sup>

The Communication signalled the Commission's intention to encourage 12 demonstration plants across Europe and hand-in-hand with this develop a legal framework and economic incentives package for CCS within the EU. The Commission's stated aim was to produce a harmonised regulatory framework for CCS to ensure the environmentally safe operation of CCS activities. The Commission also commissioned an impact assessment to consider the risks of CCS, requirements for licensing of CCS and for managing these risks. A draft CCS Directive is due to be published on 5 December 2007. Whilst that is after the submission of this paper, the main points it is expected to contain have been discussed above based on our understanding of the EU's current thinking. Following its publication, the draft will be subject to consultation and so our comments here are necessarily preliminary. However, it is worth considering the expected content of the draft EU CCS Directive as a whole to see whether it addresses the issues likely to be of most concern to CCS developers.

The EU was faced with deciding whether to amend existing EU laws so that they apply to CCS (eg, the Integrated Pollution Prevention and Control Directive<sup>53</sup> and the Waste Framework Directive<sup>54</sup>) or to propose a stand-alone framework. From our understanding of what will be contained in the draft EU CCS Directive, the EU appears to be proposing a bespoke, stand-alone regime which promises to address most of the key issues facing CCS. The draft EU CCS Directive also looks likely to simplify the regulatory treatment of CCS by amending existing regulations so as to place CCS outside of the EU waste, industrial emissions and water regulation framework.

Under the draft EU CCS Directive, it is almost certain that Member States will be mandated to establish bodies to oversee and administer the regulatory framework of CCS, with the EU Commission playing a coordinating and overseeing role.

As well as seeking to address the issues of safety and integrity, the draft EU CCS Directive is likely to reflect the principle that storage operators and CO<sub>2</sub> transporters must offer their services on a non-discriminatory basis. This would be consistent with the EU's general position on energy infrastructure. It remains to be seen whether this approach is likely to be desirable in the infancy of the industry when the main impetus must surely be the rapid deployment of technology. In analogous areas where security of supply issues were seen to outweigh the encouragement of competition, such as the building of gas storage and LNG infrastructure, developers have been granted exemptions from third party access for CCS facilities where the CCS infrastructure would not otherwise be built.

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<sup>52</sup> Communication from the Commission to the European Council and the European Parliament, "An Energy Policy for Europe", 10 January 2007.

<sup>53</sup> Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control.

<sup>54</sup> Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste.

It is understood that the draft EU CCS Directive will address the issue of liability, requiring the state to take liability for stored CO<sub>2</sub> after handover of the facility by the operator. It is also likely that the state will act as a safety net and step in where the operator fails to take necessary corrective measures to address leakages. As discussed above, it is widely expected that the draft will also provide for a financial incentive by incorporating CCS within the EU ETS scheme, and treating CO<sub>2</sub> emitted and stored as not being emitted for the purposes of the scheme.

The main issue which will need to be addressed at national level is landholder rights. This will inevitably be an issue to be resolved at Member State level, but guidance from the EU on the point would be welcome and it is hoped that the draft will address this.

In addition, the nature of EU law is that much of the detail will be left to Member States to decide upon, and it is, of course, in this detail that the devil lurks. In particular, whilst the draft EU CCS Directive is expected to be clear in passing liability to the Member States, it is likely that state will seek financial security for the CCS operator to cover the operator's liabilities. How this is implemented by the Member States and the degree to which this is used to pass risk back to the CCS operator remains to be seen.

In the UK, this process is likely to be started after publication of the draft EU CCS Directive, with regulatory consultation papers on CCS slated for release soon thereafter. Further, the UK government promised on 6 November 2007 to bring forward legislation to create a regulatory framework to enable private sector investment in CCS projects. This is expected to enter Parliament shortly in the form of the Energy Bill.

## 3

**RENEWABLE ENERGY**

Helena Anderson<sup>55</sup> | Associate | helena.anderson@herbertsmith.com

Emily Norton | Trainee Solicitor | emily.norton@herbertsmith.com

*The current legislative framework for renewable energy in the EU has created a disparate array of incentives for the development of renewable energy across Member States and the EU is lagging behind its current targets in relation to renewable energy by some distance. With a growing realisation of the problems associated with climate change and security of supply, the EU has recently announced a major step forward in promoting renewable energy across Europe – the imposition of a binding 20% target by 2020. This is likely to lead to knock-on effects in the legislative measures adopted by all Member States, as soft targets are replaced by hard targets. Major changes to other regulations will be required to ensure that these measures can be effective, most notably in the planning system. There are also major challenges ahead in relation to offshore renewable energy projects. In relation to the UK, major reform is being pushed on both of these fronts.*

### 3.1 Introduction

In this section we consider the main drivers for investment in renewable energy projects in the UK and the key obstacles to the establishment and development of renewable energy projects in the UK, with a focus on offshore renewable energy projects.

The main drivers comprise a combination of:

- EU and UK targets and obligations; and
- stronger demand for cleaner energy supplies, heightened in the last few years by increasing public and media attention on climate change issues.

We analyse the efficacy of these targets and obligations and the current reform process relating to them. We then highlight key obstacles to the establishment and development of renewable energy projects in the UK, including costs associated with planning and in relation to offshore renewable projects, additional issues relating to decommissioning and grid connections.

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<sup>55</sup> Helena and Emily would like to thank their colleagues Lucy Morton and Isabelle Desgranges for their assistance in the preparation of this section.



## 3.2 Drivers for renewable investment

### 3.2.1 The EU

It is worth noting that there is currently no overall definition of what is "renewable" for the purposes of EU legislation, creating an area of uncertainty for project developers. However, over the past 10 years, the European Commission has issued a stream of consultations, policy papers and legal instruments which provide the framework for the development, production and sale of renewable energy in the EU (including Directive 2001/77 on the promotion of electricity produced from renewable energy sources in the internal electricity market (the "**RES Directive**"), the 2006 Energy Efficiency Action Plan and the 2007 Renewable Energy Road Map).<sup>56</sup>

The RES Directive is the key regulatory driver at the EU level for renewables and sets an aggregate overall target for all Member States of 22% of electricity to be generated from renewable sources by 2010. This target is differentiated for each Member State to take account of the different circumstances in each state; targets range from 5.7% (for Luxembourg) to 78.1% (for Austria). The UK's target is 10%.

The targets set out in the RES Directive are not binding. The EU Member States are only required to implement measures to *encourage* increased consumption of energy produced from renewable sources and to publish reports on the national targets. Progress towards this target has been slow so far, with only 7% of the EU's energy currently being derived from renewable energy.<sup>57</sup>

The Commission has recently proposed an ambitious new target of 20% for renewable energy's share of energy consumption in the EU by 2020.<sup>58</sup> This target has been endorsed by the European Commission<sup>59</sup> and will give rise to a new directive containing binding obligations on all Member States. The method of achieving this overall target will be by imposing differentiated targets (taking into account different starting points and potentials) on Member States and requiring each Member State to submit a national allocation plan, containing sectoral targets and measures designed to achieve the differentiated targets.<sup>60</sup> A package of legislative measures to implement these new targets is expected to be released in January 2008.

Under the RES Directive as it currently stands, Member States are given significant discretion to implement customised incentive schemes to meet the

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<sup>56</sup> Communication from the Commission, "Action Plan for Energy Efficiency: Realising the Potential", 19 October 2006; Communication from the Commission to the Council and the European Parliament, "Renewable Energy Road Map - Renewable energies in the 21st century: building a more sustainable future", 10 January 2007.

<sup>57</sup> Communication from the Commission to the European Council and the European Parliament, "An Energy Policy for Europe", 10 January 2007, page 14.

<sup>58</sup> Communication from the Commission to the Council and the European Parliament, "Renewable Energy Road Map - Renewable energies in the 21st century: building a more sustainable future", 10 January 2007.

<sup>59</sup> Presidency Conclusions of the Brussels European Council, 8/9 March 2007, pages 21-22.

<sup>60</sup> Communication from the Commission to the European Council and the European Parliament, "An Energy Policy for Europe", 10 January 2007, page 15.

non-binding EU initiatives, resulting in a variety of support schemes and incentives as illustrated at Table A to this section. The RES Directive allows Member States to choose from two different support mechanisms, basically feed-in tariffs and green certificates, and provides for other mechanisms like public tendering, investment incentives and tax exemptions. Most Member States have opted to apply feed-in tariffs, and the widely held view is that such tariffs have been most effective in promoting renewables in the EU. However, a market-based green certificate mechanism has been preferred in deregulated markets like the UK. Member States also differ in the manner of administration of support schemes. In Spain, for example, substantial leeway is given to regional governments to implement their own administration procedures and requirements for the granting of licences.

The European Commission has indicated that it is too early for harmonisation to be feasible given Member States' varying potential for development of renewable energy and the difficulty of harmonising support schemes at an EU level. Notwithstanding this, the EU Energy Commissioner recently advocated the creation of an EU-wide market for the trading of green certificates as part of a planned new EU framework for promoting renewable energy.<sup>61</sup> His statement came in the face of opposition from the renewable energy industry on the basis that such a market could undermine existing support schemes based on feed-in tariffs.

While further guidance is required as to how the different regulations, standards and targets relating to renewable energy interrelate, and how the new legislative proposals (outlined above) will alter the existing framework, more general EU-wide programmes can also affect renewable energy projects. For example, the Commission's draft Third Energy Package proposes full "unbundling" (the separation of the operation of electricity transmission networks from generation and supply, as has already occurred in the UK), the introduction of enhanced powers and cooperation of national independent regulators, increased network cooperation between transmission system operators and the establishment of a European Network for Transmission System Operators.

In addition, competition concerns mean that the structures implemented by Member States to reach EU targets are likely to come under close scrutiny from the European Commission's Directorate General for Competition. However, such EU-wide programmes, which directly affect European electricity investments, and therefore renewable energy investments, are outside the scope of this paper.

### 3.2.2 United Kingdom

As a result of the non-binding nature of EU targets, the UK renewables industry is governed primarily by UK legislation. The Renewables Obligation (the "**RO**"), which came into force on 1 April 2002, is the primary support mechanism in the UK. This sets mandatory targets on suppliers. These targets require 10% of electricity to be sourced from renewable sources by 2010, 15% by 2015 and 20% by 2020. The RO requires all licensed electricity suppliers to produce evidence that these percentages of their supply to customers has been met by generation from an eligible renewable source, or to pay a "buy-out" payment to the extent

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<sup>61</sup> ENDS Europe Daily, 12 October 2007, issue 2407.

that they do not do so. Eligible renewable generators are issued with a "renewable energy certificate" (a "**ROC**") for each MWh of renewable generation. Suppliers need to purchase the ROCs as evidence of renewable generation if they wish to avoid paying the buy-out price. The RO is intended to be a self-standing mechanism to support the development of new renewable projects. The additional income received by the generator from the sale of the ROC is intended to supplement the price that the generator could otherwise get for the sale of the electrical output from the facility, thus making viable technologies that could otherwise not compete with coal or gas-fired, or nuclear, generation.

While the RO arrangements have successfully stimulated growth in renewable electricity generation in the UK, they do not differentiate between higher- and lower-cost technologies. They therefore arguably fail to give sufficient support to costly emerging technologies, in particular offshore technologies such as wind, wave and tidal, while more mature technologies (such as co-firing) are over-supported. In the 2007 White Paper, "Meeting the Energy Challenge", the Government proposed addressing this issue by introducing differentiated levels of support for renewable technologies through "banding" of the RO. The Office of Gas and Electricity Markets ("**Ofgem**") has however argued that there are much cheaper ways of reducing carbon emissions than continued subsidisation of the renewables industry. The UK Government has also recently announced that it will be introducing new legislative measures through the Energy Bill to strengthen the RO to drive greater and more rapid deployment of renewables in the UK. Any future legislative measures would also need to be made consistent with the new binding targets to be imposed by the EU.

Additional regulatory complexity has been caused by the Government's decision to move away from the predecessor to the RO, the Non-Fossil Fuel Obligation ("**NFFO**").<sup>62</sup> The NFFO process involved the implementation of an NFFO Order requiring public electricity suppliers to contract for certain amounts of electricity-generating capacity from renewable sources, with generators invited to submit tenders for contracts under the NFFO Order. However the NFFO arrangements still apply and, as a result, sit alongside the RO arrangements and the Fossil Fuel Levy Fund. Although most NFFO technologies are compliant under the RO Order, a generator of renewable energy is not entitled to receive the benefit of ROCs (or of Climate Change Levy Exemption Certificates ("**LECs**")) in addition to the bid price. There are also a substantial number of NFFO contracted projects that have yet to be commissioned (a result of delays relating to planning permission and local grid connections).

### 3.3 **Planning issues**

Planning delays are a significant area of regulatory uncertainty for investors in renewable energy projects in the UK. The UK planning system is complex, particularly for major infrastructure projects such as renewable energy plants, and obtaining planning permission for these involves multiple consent regimes.

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<sup>62</sup> The last NFFO round was held in 1998.

### 3.3.1 Complexity in the planning system

There is no simple and consistent method of obtaining planning permission for renewable energy projects in the UK; every planning application must balance legal requirements against national, regional and local policy guidance, site-specific requirements, local politics and community concerns.

The developer of an offshore wind farm (for example) would be required to obtain consent from the Secretary of State for Business, Enterprise and Regulatory Reform ("**BERR**") (under the Electricity Act 1989), a licence from the Secretary of State for Environment, Food and Rural Affairs (a "FEPA licence", under the Food and Environmental Protection Act 1985) and potentially planning consent for any infrastructure necessary to connect the wind farm to the grid. The local community must also be consulted, and opposition would be likely. As a result, decisions on major infrastructure projects can take years.<sup>63</sup> Major sources of delay include conflicts between local and national policies, incomplete planning applications and environmental statements and local protests, which will be seen as "material" to any planning decision.

Whilst national guidance<sup>64</sup> encourages regional and local planning bodies to be open to renewable energy and to take environmental benefits into account, this is not a specific statutory requirement (although section 39 of the Planning and Compulsory Purchase Act 2004 does require authorities to consider the broad objective of contributing to the achievement of sustainable development). Local authorities are slow to react, and there can be a number of years between submission of a planning application for a wind farm and electricity actually reaching the grid. It is estimated that if planning approval was given to all the wind farm applications which are currently being processed in the UK planning system, more than four million homes could be supplied with electricity.<sup>65</sup>

### 3.3.2 Reform of the planning system: the Planning White Paper

The Planning White Paper<sup>66</sup> proposals include:

- strengthening the RO;<sup>67</sup>
- issuing an authoritative national policy statement in relation to infrastructure projects;<sup>68</sup>
- imposing a single consent requirement for major nationally significant infrastructure projects (including renewable energy projects);<sup>69</sup> and

<sup>63</sup> Planning White Paper, "Planning for a Sustainable Future", May 2007, paragraph 1.20 (<http://www.communities.gov.uk/documents/planningandbuilding/pdf/320546>).

<sup>64</sup> Planning Policy Statement 22: Renewable Energy, 2004 (<http://www.communities.gov.uk/documents/planningandbuilding/pdf/147444>).

<sup>65</sup> Figures from the Department for Business, Enterprise and Regulatory Reform.

<sup>66</sup> Planning White Paper, "Planning for a Sustainable Future", May 2007 (<http://www.communities.gov.uk/documents/planningandbuilding/pdf/320546>).

<sup>67</sup> Renewable Energy: Reform of the Renewables Obligation, May 2007 (<http://www.dti.gov.uk/consultations/page39586.html>).

<sup>68</sup> Planning White Paper, paragraphs 1.16 and 1.17.

<sup>69</sup> Chapters 2 – 5 of the Planning White Paper.

- establishing a central decision making body, the Infrastructure Planning Commission ("**IPC**"), to determine major infrastructure project applications.

The UK might in this regard follow other Member States, including Denmark, Sweden and Germany, where this issue has been dealt with using pre-planning mechanisms, under which the permit requirements are reduced and implemented faster in pre-planned areas. However, the IPC is unlikely to be in place before 2009 and the timing for implementation of other proposals is unclear.

### 3.4 **Issues affecting offshore renewable investments**

#### 3.4.1 **Decommissioning costs and uncertainty**

Under Article 60(3) of UNCLOS, coastal states are obliged to ensure that installations or structures within their Exclusive Economic Zone which are abandoned or disused are removed. Decommissioning requirements present a significant cost for developers of any energy project, but are of particular concern to developers of offshore renewable projects in the UK due to the requirement to comply with international obligations to decommission installations in marine environments.

In addition to the existing decommissioning obligations imposed by the Crown Estate, the Government has expressed its intention in a recent consultation document<sup>70</sup> to ensure that offshore developers take account of their decommissioning liabilities at the beginning of projects and make adequate provision to ensure that sufficient funds will be available to meet their liabilities. The Government's approach includes extending the "polluter pays" principle to parent/associate companies and requiring a guarantee for all costs likely to be associated with future decommissioning at the approval stage. Such costs are extremely difficult to estimate for offshore renewables prior to construction, making it very difficult for potential sponsors to quantify their liabilities. This leads to the imposition of "rolling" credit obligations over the life of the project.

UNCLOS gives coastal states discretion as to whether they require the removal of installations, creating diverging policies and requirements for offshore renewables across Member States. In North-West Europe, for example, highly restrictive provisions have been put in place, with limited grounds for derogation from requirements for removal. The regime applicable in the Netherlands requires payment into a segregated decommissioning fund for a minimum of 10 years.

Diverging licence systems and varying coastal environments also impact on decommissioning costs for offshore developers. Under the decommissioning regime in the Netherlands, for example, the costs involved are lower than in the more treacherous waters around the UK. Relatively high decommissioning costs in the UK have meant that the majority of offshore projects have been financed on-balance sheet (as opposed to project financed).

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<sup>70</sup> Consultation Document "Decommissioning Offshore Energy Installations", June 2007 (<http://www.dti.gov.uk/consultations/page39781.html>).

### 3.4.2 Availability and costs of connecting to the grid

Like the developers of any new power projects, developers of renewable energy projects, particularly offshore projects, face the issue of availability constraints in relation to grid connections, both in terms of delays associated with new connections to the grid and in terms of the allocation of existing availability.

The costs associated with connection to the grid for renewable energy projects in the UK can be a significant barrier to the development of renewable energy projects due to the large cost relative to the size of the investment. For projects developed offshore or in remote areas they can amount to 20-30% of total development costs. The applicable codes, especially the Security and Quality of Supply Standard, which were developed for conventional plant, require modification to ensure that renewables do not face excessive cost.

The connection costs of renewable energy projects are treated differently in different Member States.

For offshore renewable energy projects in the UK, connection costs are borne by the parties investing in the project. The high-voltage transmission network connection costs are generally borne by the operator and the low-voltage distribution network connection costs by the developer. A key issue relating to the costs facing offshore developers in the UK is the current treatment of offshore connections as "grid" or "transmission" connections. This position may change as the regime applicable to transmission system operators is currently under review (see paragraph 3.4.3 below).<sup>71</sup>

By contrast, in the Netherlands, connection costs are generally not borne by project parties; such costs are covered by the grid operators. The German government imposes a further obligation on grid operators to prioritise the connection of plants generating renewables. These initiatives have proved significant incentives to the development of renewable energy projects in the Netherlands and Germany.

The additional cost imposed on projects in the UK has been highlighted by the UK Government as an area for reform in the recently released Planning White Paper. In this paper, the UK Government indicates that it will implement measures to accelerate access to the electricity grid for renewable generators by streamlining the planning procedures, an approach that may also lead to reduced costs.

### 3.4.3 Uncertainty as to the shape of the transmission regulatory regime

There is currently no single legal framework in the UK for regulating the transmission of offshore renewable energy. However, Ofgem and the Department for Business, Enterprise and Regulatory Reform ("**DBERR**") have announced that they are working together to develop a regime for competitions for licences to develop offshore electricity transmission assets, which will be implemented by commencement of certain provisions of the Energy Act 2004 relating to offshore

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<sup>71</sup> "Offshore Electricity Transmission – A Joint Ofgem/BERR Policy Statement", 25 July 2007 (<http://www.ofgem.gov.uk>).

renewable energy projects.<sup>72</sup> (The Energy Act 2004 puts in place a legal framework for offshore renewable energy projects and establishes a Renewable Energy Zone within which the licensing/exemptions regime will apply.)

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<sup>72</sup> "Offshore Electricity Transmission – A Joint Ofgem/BERR Policy Statement", 25 July 2007 (<http://www.ofgem.gov.uk>).

**TABLE A - RENEWABLE ENERGY INCENTIVE SCHEMES**

Country	Examples of renewable energy incentive schemes
Denmark	Fixed-premium mechanism (variant of the feed-in tariff scheme)
Finland	Tax incentives and investment subsidies
France	Feed-in tariff combined with tendering system in some cases
Germany	Feed-in tariff scheme
Ireland	Government-supported REFIT scheme with supported price-caps (feed-in tariff and tendering system)
Italy	<p>Green certificate system</p> <p>A successful subsidised loan scheme</p> <p>State aids</p>
Norway	<p>Feed-in tariff scheme</p> <ul style="list-style-type: none"> <li>• Feed-in tariffs are significantly lower than some European countries.</li> <li>• New support scheme for renewable energy is due to start from 1 January 2008, offering wind power a tariff for a period of up to 15 years.</li> </ul>
Spain	<p>Fixed Premium</p> <ul style="list-style-type: none"> <li>• Royal decree 661/2007 has been passed, approving a revised wind feed-in tariff.</li> <li>• Attractive solar tariff: the Royal decree has revised the solar PV tariff to €140/MWh for systems less than 100kW, €117/MWh for 100kW to 10MW capacity plants and €230/MWh for 10MW to 50MW systems. The tariff is available for 25 years, after which payments continue at 80% of the feed-in tariff. The national cap for solar PV has been revised and, with such an attractive tariff, is likely to be met quickly.</li> </ul>
The Netherlands	Feed-in tariff scheme
UK	<p>ROC system</p> <ul style="list-style-type: none"> <li>• The White Paper proposes banding specific technologies: <ul style="list-style-type: none"> <li>➢ 1.5 ROCs per MWh of offshore wind capacity</li> <li>➢ Retention of 1 ROC per MWh of onshore wind</li> <li>➢ 2 ROCs per MWh of emerging technologies such as wave and tidal, biomass, energy from waste, solar and geothermal.</li> </ul> </li> </ul> <p>Tax exemptions</p>



## 4

**BIOFUELS**

Silke Goldberg | Associate | [silke.goldberg@herbertsmith.com](mailto:silke.goldberg@herbertsmith.com)

*The European legal framework for biofuels is still evolving and the targets are becoming more onerous. Whilst targets for volumes of biofuel to be sold by fuel suppliers might go some way to encouraging the market for biofuels, such targets (and their associated incentives and penalties, respectively) are at the moment aimed at fuel suppliers. In order to encourage the production of biofuel from sustainable feedstock in the long term, a clear certification framework (which is currently absent from EU and national legislation) for sustainable feedstock, alongside market incentives at both producer and supplier level will be needed. To ensure that all aspects of the biofuel chain is covered, car manufacturers will also require encouragement to ensure that motor vehicles are capable of running with higher percentages of biofuel and that warranties extend to such usage.*

#### 4.1 Introduction

Growing world demand for hydrocarbons alongside concerns about security of supply and climate change has led, over the last few years, to rapid growth in the biofuel industry internationally. Many nations are pushing ahead with ambitious targets for biofuel, which could see biofuels playing a major part in the international fuel mix.<sup>73</sup>

This section investigates the key regulatory drivers and issues associated with the uptake of biofuels in the UK. These drivers stem from EU directives and UK laws and are aimed at three broad areas: minimum biofuel requirements for motor vehicles, the manufacture of cars to cope with these minimum requirements and the growing of biofuel crops. We also analyse the legal issues associated with the growing of biofuel crops, and the approach being taken to address these issues at the international and the EU level.

#### 4.2 EU drivers for biofuel

With claims that the large-scale introduction of biofuel has the potential to cut oil dependence of transport in Europe by 43 million tons of oil equivalent (approximately 6% of the gross EU consumption of crude oil) by 2020,<sup>74</sup> biofuel has become a key component

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<sup>73</sup> For example, biofuels have recently received political support in the US, with President Bush referring to a target of 20% of fuel coming from renewable sources within 10 years in his State of the Union 2007 speech.

<sup>74</sup> Communication from the Commission to the Council and the European Parliament, "Biofuels Progress Report: Report on the progress made in the use of biofuels and other renewable fuels in the Member States of the European Union", 10 January 2007 ([http://ec.europa.eu/energy/energy\\_policy/doc/07\\_biofuels\\_progress\\_report\\_en.pdf](http://ec.europa.eu/energy/energy_policy/doc/07_biofuels_progress_report_en.pdf)).

in the EU's strategy to reduce GHG emissions. The EU has implemented legislation, or is proposing to support biofuel development, in four separate areas:

- in the area of energy policy, by adopting the Biofuel Directive (see below);
- through the development of EU Fuel Quality Standards;
- in the area of energy taxation; and
- through the Common Agricultural Policy ("CAP").

The measures adopted under each of these headings will be examined below in turn:

#### 4.2.1 The Biofuel Directive

Directive 2003/30/EC (the "**Biofuel Directive**") aims at promoting the use of biofuel or other renewable fuels to replace diesel or petrol for transport purposes in each Member State. The Biofuel Directive is motivated by ambitions to contribute to climate change commitments, environmentally friendly security of supply and promoting renewable energy sources.

Under the Biofuel Directive, Member States have to ensure that a minimum proportion of biofuel and other renewable fuels is placed on their markets, and set national indicative targets.

Under the Biofuel Directive 5.75% of all petrol and diesel placed on the markets of Member States for transport purposes must be comprised of biofuel.

For the purpose of meeting the target, biofuel may be made available in any of the following forms:

- as pure biofuel or at high concentration in mineral oil derivatives, in accordance with specific quality standards for transport applications;
- as biofuel blended in mineral oil derivatives, in accordance with the appropriate European norms describing the technical specifications for transport fuels;<sup>75</sup> and
- under certain circumstances, as liquids derived from biofuel, such as ETBE (ethyl-tertiobutyl-ether).

Member States are under the obligation to monitor the effect of the use of biofuel in diesel blends above 5% by non-adapted vehicles and shall, where appropriate, take measures to ensure compliance with the relevant Community legislation on emission standards.

Member States also have to ensure that information is given to the public on the availability of biofuel and other renewable fuels. Biofuels, blended in mineral oil derivatives, exceeding the limit value of 5% of fatty acid methyl ester or of 5% of bio-ethanol have to be clearly labelled.

Before 1 July of each year Member States have to report to the Commission on:

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<sup>75</sup> EN228 and EN590.

- the measures taken to promote the use of biofuel or other renewable fuels to replace diesel or petrol for transport purposes;
- the national resources allocated to the production of biomass for energy uses other than transport; and
- the total sales of transport fuel and the share of biofuel, pure or blended, and other renewable fuels placed on the market for the preceding year.

The targets set out in the Biofuel Directive are to be over-hauled shortly. The EU has recently committed to a mandatory target of 10% renewable fuels in road transport by 2020,<sup>76</sup> which represents the most ambitious multi-jurisdictional biofuel programme in the world today. The details of this new 10% target are expected to be released in early 2008 and will likely have a major impact on the regulation of biofuels in the EU.

#### 4.2.2 EU Fuel Quality Standards

Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Council Directive 93/12/EC (the "**Fuel Quality Directive**") sets common EU specifications for petrol, diesel and gas oil used in road vehicles, inland waterway barges and non-road mobile machinery such as locomotives, earth moving machinery and tractors. The 5.75% by volume target prescribed by the Biofuel Directive represents the maximum biofuel content allowed under the Fuel Quality Directive. Fuel Standards in the UK comply with the Fuel Quality Directive.

All modern cars can use fuel containing 5% biofuel without modifications or violation of manufacturers' warranties.<sup>77</sup> The future expansion of the market for biofuel will therefore also depend on adaptations to vehicle motors and the relevant manufacturers' warranties which would enable cars to run on petrol or diesel containing higher levels of biofuel. Current technical and legal (warranty) limits are therefore obstacles to greater demand for biofuel. However, there are no current plans to legislate for change in this area at national or EU level.

In a bid to create the legislative conditions for the future use of biofuel, the European Commission, in January 2007, launched its proposal to review the Fuel Quality Directive to allow up to 3.7% oxygen by mass in "high biofuel petrol" (current value 2.7%) and 10% ethanol by volume in "high biofuel petrol". It will be essential for this to be updated to reflect the targets under the Biofuel Directive.

Other minor amendments proposed by the European Commission include changes to the maximum permissible level of sulphur in gas for use in non-road mobile machinery to enable future emissions control technology on these machines. The Department of Transport in the UK is currently carrying out a

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<sup>76</sup> Communication from the Commission to the Council and the European Parliament, "Renewable Energy Road Map - Renewable energies in the 21st century: building a more sustainable future", 10 January 2007.

<sup>77</sup> Diesel vehicles are warranted to use BS:EN590 fuel which can contain up to 5% biodiesel by volume, where the biodiesel meets BS:EN14214 specification. Petrol vehicles are warranted to use BS:EN228 or BS:7800 fuel which can contain up to 5% bioethanol by volume.

consultation on the Commission's proposals which closes on 22 November 2007.<sup>78</sup>

#### 4.2.3 **EU framework for the taxation of energy products**

The EU framework for the taxation of energy products is of relevance to the promotion of biofuel as it allows Member States to introduce specific tax incentives in aid of alternative forms of energy, thereby giving such energy and/or fuel a competitive edge over conventional energy sources.

Council Directive 2003/96/EC<sup>79</sup> of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity (the "**Tax Directive**") extends the scope of the Community energy taxation framework (which was previously confined to mineral oils) to all energy products including coal, natural gas and electricity, and increases the minimum Community rates of taxation.

In particular the Tax Directive is aimed at reducing the distortions of competition between mineral oils and other energy products which were not previously subject to Community fiscal provisions and reinforcing measures to encourage energy efficiency (thus reducing dependency on energy imports and CO<sub>2</sub> emissions).

It also authorises Member States to grant tax advantages to businesses taking special measures to reduce their emissions. This includes the possibility of Member States applying lower than the minimum taxation levels imposed EU-wide by the Tax Directive for biofuel. The Tax Directive specifies that any such exemption applied by Member States has to be adjusted to take account of changes in raw material prices to avoid over-compensating for the extra costs involved in the manufacture of biofuel and other energy products that may benefit from an exemption.

The relevant exemptions may be granted, also as part of a multi-annual tax incentive programme, until 31 December 2012 at the latest.

#### 4.2.4 **The CAP and biofuels policy instruments**

Cereals are currently one of the major feedstocks for EU bio-ethanol production. As part of the CAP reform, the EU has introduced since 1992, as part of its review of price support mechanisms for agricultural crops, incentives for the growing of cereals. In addition, there are specific incentives for farmers to increase the production of biofuel and electric and thermal energy produced from biomass.

Farmers can receive €45 per hectare (up to the overall limit of 2 million hectares) as long as they have concluded a contract with a collector/first processor and the crops will be used for processing into the relevant energy products. The implementation of the scheme started in 2004, when the area used for biofuel

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<sup>78</sup> Interested parties can view the consultation documents at <http://www.dft.gov.uk/consultations/open/consuleupetroldieselreqs/>.

<sup>79</sup> OJ L 283, 31.10.2003, page 51.

feedstock totalled 0.31 million hectares across the EU. Following the uptake of this incentive, the total area used for the cultivation of biofuel feedstock reached approximately 2.84 million hectares.

As a consequence, the Management Committee for Direct Payments under the CAP decided on 17 October to reduce the area in relation to which each farmer may claim the special aid for energy crops in 2007, because the original target of 2 million hectares has now been exceeded.

This monetary incentive is accompanied by a number of other CAP measures designed to support the cultivation of biofuel feedstock, including the decoupling of income support from production. In particular, crops that were previously eligible for direct payments only under the non-food regime on so-called set-aside areas under the CAP, may now be cultivated on any area without loss of income support.

The set-aside obligation, which was introduced under the 1992 CAP reform as a tool to balance the cereals market, allows for the cultivation of non-food crops (including energy crops) if the use of the biomass is guaranteed either by a contract or by the farmer.

#### 4.3 UK specific biofuel obligations

In the UK, the main policy vehicle to meet the obligations under the Biofuel Directive is the Renewable Transport Fuel Obligation (the "**RTFO**").<sup>80</sup> According to the Department of Transport, the RTFO is expected to reduce the carbon emissions from road transport in 2010 by about 0.7-0.8 million tonnes, equivalent to taking 2.6-3.0 million tonnes of CO<sub>2</sub> from road transport in 2010 by about 1 million tonnes per annum.<sup>81</sup> It is anticipated that by the time the level of the RTFO reaches 5%, it will have created a demand for 2.5 billion litres of biofuel a year (across the UK).<sup>82</sup>

The RTFO will, from April 2008, place an obligation on fuel suppliers to ensure that a certain percentage of their aggregate sales is made up of biofuel.

The levels of obligation for the years 2008/9 to 2010/11 are as follows:

- 2.5% for the financial year 2008/09;
- 3.75% for 2009/10; and
- 5% for 2010/11.<sup>83</sup>

It should be noted that these targets have been set on a volume basis for aggregate renewable fuel sales. They do not include separate bio-diesel and bio-ethanol targets and fall below the reference value set out in the Biofuel Directive for 2010.

<sup>80</sup> Powers to set up an RTFO were provided by the Energy Act 2004, with the labelling obligations of the Biofuel Directive being transposed by the Biofuel (Labelling) Regulations 2004. See SI 2004 No. 3349.

<sup>81</sup> <http://www.dft.gov.uk/pgr/roads/environment/rtfo/aboutrtfo>.

<sup>82</sup> <http://www.fcl-biofuels.com/news/070907.pdf>.

<sup>83</sup> Department of Transport website, <http://www.dft.gov.uk/pgr/roads/environment/ukreporttotheeuropeancommiss3851?page=2#a1003>, accessed on 15 October 2007.

According to the Department of Transport,<sup>84</sup> this anticipated shortfall below the EU's requirements follows stakeholder consultation and takes a number of factors into account, including EU fuel quality standards, anticipated sustainability risk in relation to the sourcing of quality biofuel, the time required to build new production capacity (in relation to securing investment and obtaining planning permission for as well as the construction of new facilities) and time required to develop supply infrastructure (in particular in relation to new storage tanks and investment needed for fuel terminals).

The UK Government has also indicated that the RTFO targets could rise beyond 5% after 2010-11, if the relevant infrastructural conditions and vehicle standards are met.

In contrast to other EU Member States, which have chosen to implement the targets of the Biofuel Directive by way of tax incentives, the UK has modelled the RTFO on the existing RO in the electricity supply industry (as detailed in section 4 of this paper).

The RTFO is essentially a "cap and trade" system. The essence of the RTFO is that an administrator will issue Renewable Transport Fuel Certificates ("RTFCs") to fuel suppliers according to the quantity of renewable fuel sold by them and on which duty has been paid. Fuel suppliers are able to trade RTFCs. If a fuel supplier does not hold enough RTFCs at the end of each annual compliance period under the RTFO scheme, it will have to pay a fine (see below) into a "buy-out fund". The fine for insufficient RTFCs will be 15 pence per litre in the first year of operation of the RTFO.

In the UK, there is also an extension of the 20 pence per litre (ppl) biofuels duty incentive until 2008/09. The combination of duty incentive and buy-out price is guaranteed at 35ppl in 2009/10, reducing to 30ppl in 2010/11. This approach is designed to encourage investment in biofuel.

The first phase of the RTFO (2008-11) also includes a mandatory carbon and sustainability reporting scheme. Under the scheme, companies have to report on the sourcing of their biofuel or feedstock. However, it will still be possible to include biofuel in the calculation of the RTFO target the sourcing of which is uncertain or not known.

#### 4.4 Issues associated with the growing of biofuel crops

The legal framework of agricultural policy and corporate social responsibility issues in relation to biofuel are closely related. In the absence of clear certification obligations under EU or international agreements for biofuel, concerns around energy's role in food crop price volatility and the economic pressures to convert rainforest to agricultural land<sup>85</sup> are central issues in any strategy in relation to the regulation of biofuel.

There is currently no international legal framework for biofuel or their certification. However there is a growing recognition at the international level of the issues associated with the growing of biofuel.

There is already some movement towards a more coordinated approach to biofuel and in March 2007, the International Biofuels Forum was created as a joint project of Brazil, China, India, South Africa, the US and the European Commission.

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<sup>84</sup> *Ibid.*

<sup>85</sup> For a full discussion of CSR issues and biofuel, see E. Holtz-Giménez, "Les cinq mythes de la transition vers les agrocarburants", in *Le Monde Diplomatique*, June 2007.

Various NGOs<sup>86</sup> and the European Parliament<sup>87</sup> have demanded transparent international standards in the form of mandatory, legally binding certification for biofuels, particularly in relation to their environmental impact. Some of the criteria against which future biofuel might be assessed for certification purposes could include the following:

- carbon balance and GHG life-cycle from production through to processing, as energy intensive fertiliser input into biofuel feedstock increases nitrous oxide ("**N<sub>2</sub>O**") emissions and intensive cropping may contribute to releases of soil bound CO<sub>2</sub>;
- land use in relation to the relevant feedstock to address concerns that land of high natural value (rainforests) is not converted into intensive farmland; and
- impacts of feedstock farming on water, soil and biodiversity.

In 2003, the European Council of Automotive Research, Conservation of Clean Air and Water in Europe ("**CONCAWE**") and the Joint Research Centre of the European Commission published the first findings of a joint evaluation of the "Well-to-Wheels" energy use and GHG emissions for a wide range of potential future fuels (the "**WTW Report**"). In 2007, an updated version of the report was published.

Whilst the WTW Report suggested that first generation biofuel can save up to 60% of carbon emissions and second generation biofuel can save up to 80% as compared with using fossil fuels, it pointed out that the fossil energy and GHG savings of conventionally produced bio-fuels such as ethanol and bio-diesel are critically dependent on manufacturing processes and the fate of by-products. In particular, the GHG balance of biofuel production and use is uncertain due to N<sub>2</sub>O emissions from agriculture. Biofuels generated from rapeseed and corn in particular have been criticized for producing more GHG emissions than they save compared to conventional fuels.<sup>88</sup>

Emissions from biofuel typically stem from:

- fertilizers and processing;
- transportation of the relevant biomass; and
- transport of the biofuel to end consumer.

Other environmental and social concerns in relation to biofuel stem from the deforestation which can be undertaken to produce them and threats to biodiversity resulting from an increased competition for arable land between food and biofuel crops. For example, fears of rising food prices as a result of biofuel agriculture led the National Development and Reform Commission of China to stop the granting of new ethanol licences for cereal crop based biofuel projects.<sup>89</sup>

Increasing demand for corn in Mexico, which imports 30% of its corn from the US,<sup>90</sup> and associated price increases for cereals have been linked to the pressure placed on the

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<sup>86</sup> See, for instance, [http://www.biofuelsummit.info/en/press/presslounge/release\\_13.html](http://www.biofuelsummit.info/en/press/presslounge/release_13.html).

<sup>87</sup> See, for instance, the European Parliament report on Biomass, PE 378.547.

<sup>88</sup> L. Smith, The Times, "Study: Biofuels May Produce More Greenhouse Gas Than Oil", 24 September 2007.

<sup>89</sup> <http://media.cleantech.com/1299/china-considering-banning-corn-ethanol>.

<sup>90</sup> E. Holts-Giménez, "Les cinq mythes de la transition vers les agrocarburants".

Mexican corn market by demand for corn crops as feedstock for biofuel in the US.<sup>91</sup> To avoid future distortions of its national corn market, the Mexican congress is, as part of a bill to promote and develop biofuel,<sup>92</sup> encouraging the development of sugar cane as a feedstock for biofuel produced in Mexico and debating a specific exclusion of corn as a feedstock for biofuel.

Given that the European Commission has recently concluded that, in spite of efforts at national and EU level, the target set for 2010 is not likely to be achieved,<sup>93</sup> the demand for biofuel feedstock and the growing import of feedstock from developing or threshold economies is likely to continue and, given sustainability concerns as exemplified by the licensing stop in China, certification is likely to become a central issue for feedstock producers, suppliers of biofuel and investors alike.

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<sup>91</sup> See, for instance, The Economist, "Woodstock revisited", 8 March 2007 ([http://www.economist.com/science/displaystory.cfm?story\\_id=8766061](http://www.economist.com/science/displaystory.cfm?story_id=8766061), accessed on 15 October 2007); or "Etanol: Alerta el BID a Mexico sobre escasez de maiz" (<http://www.crisisenergetica.org/article.php?story=20070111203857883>).

<sup>92</sup> Ley de Promoción y Desarrollo de los Bioenergéticos.

<sup>93</sup> Communication from the Commission to the Council and the European Parliament, "Biofuels Progress Report: Report on the progress made in the use of biofuels and other renewable fuels in the Member States of the European Union", 10 January 2007 ([http://ec.europa.eu/energy/energy\\_policy/doc/07\\_biofuels\\_progress\\_report\\_en.pdf](http://ec.europa.eu/energy/energy_policy/doc/07_biofuels_progress_report_en.pdf)).



## 5

**NUCLEAR NEW-BUILD IN ENGLAND AND WALES**

Caroline Powell | Senior Associate | caroline.powell@herbertsmith.com

Sarah Pollock | Associate | sarah.pollock@herbertsmith.com

*Nuclear new-build is being considered around the world as a potential part of the solution to the problems of climate change, diminishing fossil fuels, concerns around security of supply and increasing demand for electricity. The UK Government has formed an in principle view that nuclear generation has a role to play in the UK's generating mix. This view was subject to public consultation, which ended on 10 October 2007 and the results of which are yet to be announced.*

*Previous projects to construct and operate nuclear plants in the UK have been undertaken by Government entities and in the case of the most recent nuclear build, Sizewell B, took many years from conception to commissioning. Any new nuclear build in the UK will be proposed and developed by the private sector and the Government has proposed a number of facilitative measures to reduce the time and uncertainty involved in earlier developments.*

*The measures proposed (and in one case implemented on a contingent basis) relate to areas such as regulatory review of reactor designs, the planning and consenting process, waste management and financial provision for nuclear liabilities. Other areas the Government may need to address include carbon pricing, the availability of insurance and wider EU energy policy.*

## 5.1 Introduction

Against a backdrop of climate change, decreasing supplies of fossil fuels, concerns about security of supply and an increasing demand for electricity, the UK Government has formed a preliminary view, as set out in the Energy White Paper 2007 and "The Future of Nuclear Power: the Role of Nuclear Power in a Low Carbon UK Economy" Consultation Document, that nuclear generation has a role to play in the UK's generating mix.

Nuclear generation currently provides around 20% of the UK's electricity but all but one nuclear power plant, Sizewell B, will close in the next 20 years. If we are to retain nuclear capacity, the Government's view is that the regulatory framework will need to be reformed to provide a robust regime which is capable of approving new-build projects within a reasonable timeframe.

Sizewell B, the last nuclear plant built in the UK, took 15 years from conception to commissioning, including a lengthy public enquiry. The House of Commons Environmental Audit Committee Reports ("Keeping the Lights On: Nuclear Renewables and Climate Change") proposed a pre-construction period of seven years from the making of an "in principle" decision to the start of construction of a new nuclear plant.

The Government has recently consulted on the future of nuclear power in the UK and on proposed reforms to the UK planning system. In addition, the Government and the regulators have proposed a number of facilitative measures to streamline the consent process for nuclear new-build. If implemented, these reforms will impact on the time required to develop a new nuclear project in the UK.

## 5.2 The regulatory process

In order to build and operate a nuclear power station in England and Wales a number of authorisations are required. These include a nuclear site licence issued by the Health and Safety Executive ("**HSE**") pursuant to the Nuclear Installations Act 1965, consent from the Secretary of State for BERR for the construction and operation of a generating station under section 36, and for the construction of overhead electrical lines under section 37, of the Electricity Act 1989, planning permission (deemed planning permission can be granted under the section 36 consent), a discharge authorisation from the Environment Agency ("**EA**") under the Radioactive Substances Act 1993 and a generation licence from Ofgem pursuant to section 6 of the Electricity Act 1989. The Government has proposed ways of restructuring these consents in order to, amongst other things, resolve as many issues in relation to nuclear new-build as possible at a national level, in advance of the planning process and other site-specific approvals.

The Generic Design Assessment process ("**GDA**") is an example of the changes to regulatory processes which have been introduced, in this case, to accelerate approval of a new reactor design by the HSE and the EA.

Before the introduction of the GDA, the regulators (HSE, through the Nuclear Installations Inspectorate ("**NII**"), incorporating the Office for Civil Nuclear Security, and the EA) would review each reactor design, and the impact of that reactor at a particular site, when the prospective operator applied for a nuclear site licence. The GDA enables the regulators to consider the safety, security and environmental impact of each of the industry preferred reactor designs, at the request of a reactor vendor, in advance of any consideration of the impact of each reactor at a particular site when the prospective operator applies for a nuclear site licence.

Once a reactor design has been the subject of the GDA, the need to discuss the safety, security and environmental impacts in depth during the site-specific approval process should be reduced, thereby making it more efficient and providing further certainty around the timescales involved in the consenting process.

The GDA is underway and the NII and the EA are currently reviewing four reactor designs. On 10 September 2007, the HSE and the EA launched one of the public consultation elements of the GDA process. This will allow the public to view detailed design information on the internet and comment on the safety, security and environmental aspects of the design. As the GDA progresses, further public consultations will be conducted.

A second facilitative action proposed by Government, and on which it has recently consulted, is the Strategic Siting Assessment ("**SSA**"). Previously, in relation to Sizewell B for example, the planning inquiry for a new nuclear plant has considered whether the proposed site was the most appropriate for new-build, delaying each application.

The Government proposes to use the SSA, to be conducted by DBERR, to develop a list of criteria which would be used to determine suitable sites for new nuclear power stations. It is proposed that the SSA should be combined with a Strategic Environmental Assessment

("SEA") to consider the high level environmental impact of nuclear power plants. DBERR would invite the public, including industry, to nominate sites to be assessed against these criteria.

Together, the SSA and the SEA would consider issues at a strategic, national level and result in the publication of a "National Policy Statement". This statement would list the criteria which would be used to assess the suitability of sites. It would also identify which of the nominated sites meet the criteria.

The National Policy Statement would be a "material consideration" in the determination of any planning application for a new nuclear power station. It is intended that the SSA and SEA will limit the need to discuss in detail the suitability of alternative sites for nuclear new-build or the high level environmental impact of nuclear power plants during the planning process. The Government has said that the SSA and SEA processes would not be launched unless, and until, the Government confirms its preliminary view that nuclear has a role to play in the future UK energy mix. If such a decision is made, publication of the results of the SSA and SEA processes are expected in mid-2009.

A further facilitative action which has been proposed by the Government, but which would not commence until, and unless, the Government has confirmed its preliminary view, is to introduce amendments to the justification process. The Justification of Practices Involving Ionising Radiation Regulations 2004 require the Justifying Authority, in this case the Secretary of State for BERR, to assess any new practice involving exposure to ionising radiation and conclude that it is justified on the basis that the economic, social and other benefits outweigh the health detriments caused by the practice before the practice can be introduced.

In order to make justification more efficient, the Government has suggested that it should call for applications for justification in a time limited window. The Secretary of State will then consider applications concurrently. The call for applications is expected in early 2008 with a justification decision to be made in mid 2009.

### 5.3 **Planning**

One of the key lessons learned from Sizewell B was that the planning inquiry was not the forum to decide issues of public interest, such as whether new-build should go ahead; but instead should concentrate on issues of local significance. To address this, the Barker Review of Land Use Planning, published in December 2006, proposed radical changes to the way planning decisions were made for major infrastructure projects. In its Pre-Budget Report ("PBR"), the Government gave a positive response to these proposals. As a result, in May 2007, the Government published the Planning White Paper, "Planning for a Sustainable Future", which largely adopted the recommendations of the Barker Review. This in turn fed into the Energy White Paper, "Meeting the Energy Challenge", in which the Government set out its proposals for nuclear new-build.

The Government announced the Planning Reform Bill in the 2007 Queen's Speech which will implement the proposals in the Planning White Paper. The key planning reforms are as follows:

- the Government will produce a "National Policy Statement" to clarify Government policy, provide a clear strategic framework for sustainable development and remove a source of delay from inquiries;

- the IPC will be established, made up of leading experts in the planning field, to assess planning applications for major infrastructure projects in the light of the National Policy Statement. These experts will work within a statutory time limit of nine months. The IPC will replace the current system whereby applications are made to the relevant local authorities, potentially taking many years to consider;
- many of the regimes for obtaining the consents necessary to implement major infrastructure projects will be rationalised to create a single application process to be administered by the IPC; and
- applicants will be required to undertake stakeholder engagement before they submit their application, thereby removing a key source of delay.

As discussed above, a number of the Government's proposed reforms to the regulatory system for nuclear new-build are designed to resolve appropriate issues at a national level rather than during each local planning application.

The IPC's role would be to consider the site-specific issues relating to the proposed project in light of the National Policy Statement resulting from the outcome of the SSA. The IPC is expected to consider the planning application and the applications for consents to construct and operate a generating station and to construct overhead lines as required by the Electricity Act 1989, as well as other consents for a new nuclear power station. This should streamline, and shorten, the planning process, previously a major hurdle for new nuclear projects.

#### 5.4 **Radioactive waste**

The Government is also considering how the regulatory regime should apply to the storage of high level radioactive waste generated not only as a result of past and current nuclear energy production but also in respect of any new-build programmes. The UK has no high level waste repository; high level waste is currently stored at the Sellafield site in West Cumbria. Following the findings of the Committee on Radioactive Waste Management, the Government has given the Nuclear Decommissioning Authority ("NDA") the responsibility for overseeing the process to construct a waste storage facility. An application to construct a long term storage facility, or repository, is likely to be determined by the IPC because such a project will be a major development of national significance. The Government is also considering the need to produce a National Policy Statement in respect of radioactive waste disposal.

One issue that will need to be addressed is who will pay for the waste repository and what the balance will be between funding for legacy and new-build waste. "The Future of Nuclear Power: the Role of Nuclear Power in a Low Carbon UK Economy" Consultation Document says that "any private sector developers of new nuclear power stations would be required to meet their full decommissioning and full share of waste management costs". This was reiterated by the Government when the Energy Bill was announced in the recent Queen's Speech. The Energy Bill will, if the Government's preliminary view is confirmed, create the framework in respect of operators funding their decommissioning costs and full share of waste management costs that will help protect the taxpayer. There will need to be clarity on what "full share" of costs means.

### 5.5 **Decommissioning liabilities**

The Government stated in the Energy White Paper 2007 that, if new nuclear is pursued in the UK, the Government will launch a further consultation on the financing of decommissioning costs of new-build. Legislation would be introduced to provide a robust mechanism for financing the decommissioning of new-build. The legislation will need to be sufficiently robust to ensure that the necessary funds are available where an operator becomes insolvent and where, for whatever reason, a plant ceases to operate earlier than expected, in each case resulting in contributions to the decommissioning fund ceasing. Any involvement of the Government, or a body of the Government (eg, the NDA), would need to comply with state aid rules.

### 5.6 **Further measures**

The future price of carbon has important implications for the financial viability of nuclear power. With progress on a successor to the Kyoto Protocol slow and the EU ETS under review, the future direction of the carbon price is unclear. The market to date has been volatile and the phases too short to support long term capital investment. Whether there will be further intervention required to establish a long term stable price for carbon to support long term investments remains to be seen.

Under the Nuclear Installations Act, which obliges nuclear sites to hold a nuclear site licence, there is no insolvency regime addressing who would run the site if the operator – the one with the nuclear site licence enabling it to operate the site – gets into financial difficulty.

Government intervention may also be required in respect of nuclear insurance. Under the Nuclear Installations Act, the operator of the site is required to hold insurance for third party incidents up to certain limits. As derived from the Paris and Brussels Conventions on third party nuclear liability, the Nuclear Installations Act 1965 channels liability for third party personal injury and damage to property to the operator of the nuclear power station. Liability over those limits is covered by Government and above higher limits by the parties to the Conventions. The limits currently are as follows:

- £140 million is borne by the operator;
- over £140 million and up to £150 million is borne by the installation state; and
- over £150 million and up to £260 million is borne collectively by the parties to the Conventions.

The Conventions were revised in 2004 to increase the amount of an operator's liability and to expand the scope of liability to include certain environmental damage and some types of economic loss. The UK has not yet ratified these amendments. It is not clear whether the insurance market will be prepared to cover this increased scope of liability. The Government acknowledged in the Energy White Paper that, to the extent commercial cover was not available, it would explore any available alternative options. In addition to insurance required for third party incidents under the Nuclear Installations Act, the market will also have to be content that there is insurance available to cover any losses of the project company itself. Further, in order for nuclear new-build to commence in the UK, the sites identified in the SSA (see above) will need to be available to the operators. Many of the most obviously suitable sites for new nuclear build are those adjacent to existing

nuclear facilities. This land is principally owned by the NDA and British Energy. A market in the relevant sites will need to be developed.

There are other issues that will also need to be addressed including EU energy policy attitude to nuclear new-build, for example in relation to long term offtake arrangements, but with sufficient political will at EU and national level, these should be capable of resolution.

## 6

**ENERGY EFFICIENCY**

Pippa Thompson | Associate | pippa.thompson@herbertsmith.com

*The EU target of achieving a 20% reduction of GHG emissions by 2020 through the implementation of energy efficiency measures is ambitious, particularly with the continued reliance on road transport, growth of air transportation and the need to improve the efficiency of existing building stock, but the impact of adopting more energy efficient technologies will not only reduce emissions, in the long run it will be financially beneficial. A significant focus is being placed on consumer education to increase awareness of the benefits of investing in energy efficiency technologies, financial incentives are being introduced to remove the barrier of significant up-front costs, and an extensive regulatory framework has been put in place at the EU level, which is being implemented in Member States, to encourage the adoption of existing energy efficient technologies and continue to support the development of new options for the future. This is undoubtedly a significant growth area with massive opportunities for investment.*

**6.1 Introduction**

Whilst identifying and developing new technologies to produce alternative energy sources is a key element to the provision of a secure energy supply, it is recognised that this strategy needs to go hand in hand with decreasing end user demand for energy. If nothing is done to reverse the ever-growing energy demand, the European Commission has indicated that EU energy consumption could increase by almost 10% over the next 15 years. Transport alone accounts for almost 20% of total EU primary consumption and is synonymous with pollution and congestion costing the European economy about half a point of gross domestic product ("**GDP**") per year. The heating, lighting and ventilation of buildings accounts for a further 40% of the EU energy consumption. Whilst the introduction of more stringent building codes will help to improve the energy efficiency of new buildings, the upgrading and renovation of existing building stock is also vitally important. Readers may be surprised to know that using the stand-by mode in electrical equipment accounts for a staggering 7% of total energy consumption, so the introduction of legislative requirements to drive manufacturers to phase out the stand-by mode will potentially have a significant impact on energy consumption.

Increasingly, fluctuations in the price of oil affecting the cost of electricity, gas and vehicle fuel are hitting the pockets of energy consumers. With no foreseeable end to these spiralling costs, the financial incentive to decrease energy demand may be sufficient of itself to encourage consumers to make the capital outlay to invest in energy efficient technologies. By using outdated energy-consuming equipment and failing to take simple measures to save energy, we are driving up our energy bills and inadvertently raising our cost of living and the size of our carbon footprint.

In the meantime, the European Commission has introduced a raft of measures to encourage industry to develop energy efficient technologies and bring them to market perhaps sooner than they would have without this regulatory driver. The opportunities for investment in this area are therefore numerous as the energy efficiency umbrella encompasses an extensive range of sectors from construction and industrial installations to household appliances, domestic and commercial road vehicles, air transportation and mass transit infrastructure.

Increasing energy efficiency awareness amongst both commercial and residential energy consumers through targeted communications, education and training is also a key area for investment.

This section will examine the incentives in place to promote energy efficiency in the EU. It provides an overview of existing EU directives and considers UK initiatives in the areas of commercial and residential energy consumers and road and air transportation.

## 6.2 The EU

In October 2006 the Commission unveiled its Energy Efficiency Action Plan, a package of priority measures covering a wide range of cost-effective energy efficiency initiatives, through stringent energy efficiency standards to obligations for the energy suppliers to promote energy efficiency and specific financial mechanisms to support technological development. When announcing this new action plan, the EU Energy Commissioner noted that at present Europe wastes at least 20% of the energy it uses and that by acting now the direct cost of energy consumption could be reduced by more than €100 billion annually by 2020 (equating to yearly savings of between €200-1000 for an average household), and could avoid the emission of about 780 million tonnes of CO<sub>2</sub> per year, which is twice the EU 2012 Kyoto target.

The European Council emphasises that the EU is committed to transforming Europe into a highly energy-efficient and low GHG-emitting economy and has decided that, until a global and comprehensive post-2012 agreement is concluded, and without prejudice to its position in international negotiations, the EU will make a firm independent commitment to achieve at least a 20% reduction of GHG emissions by 2020 compared to 1990.<sup>94</sup>

The EU has adopted a range of directives that cover areas including the energy performance of buildings, labelling and design of energy using products, and end-use efficiency and energy services. There is also a voluntary labelling scheme called the Energy Star Programme for the energy efficiency labelling of office equipment established under Regulation (EC) No. 2422/2001.<sup>95</sup> Correct pricing and energy taxation, improved financing tools and economic incentives are also recognised as being vital in driving the necessary shift towards creating a carbon-efficient economy. One of the priorities of the EU action plan is to encourage the banking sector to offer finance packages specifically aimed at small and medium enterprises and energy service companies to adopt energy efficient savings strategies.

### 6.2.1 Energy efficiency in buildings

The aim of improved energy efficiency in buildings has been set out in earlier existing legal instruments. Among the main Community legislation for the sector

<sup>94</sup> Presidency Conclusions of the Brussels European Council, 8/9 March 2007, paragraph 32.

<sup>95</sup> [http://eur-lex.europa.eu/LexUriServ/site/en/oj/2001/l\\_332/l\\_33220011215en00010006.pdf](http://eur-lex.europa.eu/LexUriServ/site/en/oj/2001/l_332/l_33220011215en00010006.pdf).



are the Boiler Directive (92/42/EEC),<sup>96</sup> the Construction Products Directive (89/106/EEC)<sup>97</sup> and the buildings provisions in the SAVE Directive (93/76/EEC).<sup>98</sup> The Energy Performance of Buildings Directive (2002/91/EC)<sup>99</sup> has far-reaching implications for the owners, operators and developers of all buildings in Europe (both domestic and non-domestic). Its key provisions are the setting of minimum requirements for the energy performance of all new buildings, large existing buildings subject to major renovation, energy certification of all buildings and regular mandatory inspection of boilers and air conditioning systems in buildings. The Energy Performance of Buildings (Certificates and Inspections) (England And Wales) Regulations 2007<sup>100</sup> were made on 29 March 2007 and come into force over the period from 19 April 2007 to 1 October 2008. These Regulations implement Articles 7, 9 and 10 of the directive in England and Wales. The other substantive articles, Articles 3-6, were implemented on 6 April 2006 by the Building and Approved Inspectors (Amendment) Regulations 2006.<sup>101</sup>

### 6.2.2 End-use efficiency and energy services

Estimates are that the EU's energy consumption is approximately 20% higher than can be justified on economic grounds. There is a very large economic potential of unrealized energy savings. A part of these energy savings can effectively be realized through energy services and other end-use efficiency measures. The Energy End-Use Efficiency and Energy Services Directive (2006/23/EC)<sup>102</sup> provides the necessary targets, mechanisms, incentives and institutional, financial and legal frameworks to remove existing market barriers and imperfections for the efficient end use of energy. The directive requires Member States to save at least an additional 1% of their final energy consumption each year, in relation to the previous year's consumption, between 2008 and 2017. It is anticipated that the directive will be a significant driver to developments in energy-efficient and cost-effective lighting, heating, hot water, ventilation and transportation.

According to Article 14(2) of the directive, Member States shall submit their first National Energy Efficiency Action Plan ("NEEAP") to the Commission by 30 June 2007, to show how they intend to reach the 9% indicative energy savings target by 2016. The UK Government was one of only seven Member States to

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<sup>96</sup> Council Directive 92/42/EEC of 21 May 1992 on efficiency requirements for new hot-water boilers fired with liquid or gaseous fuels.

<sup>97</sup> Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products and Commission communication which lists the titles and references of harmonised standards under the Directive (2006/C 304/01).

<sup>98</sup> Council Directive 93/76/EEC of 13 September 1993 to limit carbon dioxide emissions by improving energy efficiency (SAVE).

<sup>99</sup> Directive 2002/91/EC of the EU Parliament and of the Council of 16 December 2002 on the energy performance of buildings.

<sup>100</sup> SI 2007 No. 991 (<http://www.uk-legislation.hmso.gov.uk/si/si2007/20070991.htm>).

<sup>101</sup> SI 2007 No. 652 (<http://www.uk-legislation.hmso.gov.uk/si/si2006/20060652.htm>).

<sup>102</sup> Directive 2006/32/EC of the EU Parliament and the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC. In the UK the Directive Implementation Advisory Group (DIAG) has been established to advise Government on the energy performance of buildings and the implementation of this Directive (<http://www.diag.org.uk/>).

submit a NEEAP by the deadline. Consultation in the UK on the obligations of energy suppliers and distributors, billing and metering took place following submission of the UK NEEAP<sup>103</sup> and a final consultation is due to take place in December 2007 with a view to bring regulations into force to implement the directive in March-May 2008.

### 6.2.3 **Eco-design and energy using products**

Eco-design aims to improve the environmental performance of products throughout the life-cycle by considering all environmental aspects when first designing a product. Some earlier legislation relates to specific products such as the Ballasts for Fluorescent Lighting Directive (2000/55/EC)<sup>104</sup> and the Household Electric Refrigerators and Freezers Directive (96/57/EC).<sup>105</sup> The Eco-design Directive (2005/32/EC)<sup>106</sup> establishes a framework for setting eco-design requirements (such as energy efficiency requirements) for all energy using products in the residential, tertiary and industrial sectors (excluding vehicles for transport). It does not introduce directly binding requirements for specific products, but does define conditions and criteria for setting requirements regarding environmentally relevant product characteristics (such as energy consumption) and allows them to be improved quickly and efficiently. In the UK, the Ecodesign for Energy-Using Products Regulations 2007 ("EPR"), implementing the Eco-design Directive, came into force on 11 August 2007.

### 6.2.4 **Energy labelling of domestic appliances**

Coupled with the design of eco-products, communicating the energy efficiency rating of electric appliances is recognised as being fundamental to influencing a change in consumer behaviour. As standards of living rise across the EU, the consumption of electronic products continues to grow. A number of directives have been introduced in relation to the labelling of specific household appliances such as fridges, washing machines, dishwashers, ovens and air-conditioning systems pursuant to the Labelling and Standard Product Information Directive (92/75/EEC).<sup>107</sup>

## 6.3 **UK introduction**

Research from the Carbon Trust shows that cost-effective energy efficiency measures pay back under normal rates of return are a viable option for most businesses, but where market failures prevent these alternatives being chosen, the Government recognises the need to intervene. The framework for this intervention was set out in the "Statement of Intent on Environmental Taxation" (1997) and "Tax and the Environment: using economic

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<sup>103</sup> [http://ec.europa.eu/energy/demand/legislation/doc/neeap/uk\\_en.pdf](http://ec.europa.eu/energy/demand/legislation/doc/neeap/uk_en.pdf).

<sup>104</sup> Directive 2000/55/EC of the European Parliament and of the Council of 18 September 2000 on energy efficiency requirements for ballasts for fluorescent lighting.

<sup>105</sup> Directive 96/57/EC of the European Parliament and of the Council of 3 September 1996 on energy efficiency requirements for household electric refrigerators, freezers and combinations thereof.

<sup>106</sup> Directive 2005/32/EC of the European Parliament and of the Council of 6 July 2005 establishing a framework for the setting of ecodesign requirements for energy-using products and amending Council Directive 92/42/EEC and Directives 96/57/EC and 2000/55/EC of the European Parliament and of the Council.

<sup>107</sup> Council Directive 92/75/EEC of 22 September 1992 on the indication by labelling and standard product information of the consumption of energy and other resources by household appliances.

instruments" (2002 PBR)<sup>108</sup> and the recent 2007 PBR<sup>109</sup> reaffirmed the Government's commitment supporting the development, demonstration and deployment of new energy and efficiency technologies in the UK by removing the legislative barriers to investment.

The Stern Review recognised that behaviour change is a significant barrier to climate change mitigation.

Several barriers to action are identified:

- lack of information to enable individuals to understand the full costs and benefits of energy conservation;
- access to capital restricts investment in more energy efficient processes and products that may have significant up-front costs;
- a tendency towards focussing on short term gain rather than long term savings affects the way people calculate the value of investment in energy efficient technologies; and
- the need for various parties to work together to implement energy efficiency measures, for example where responsibility for a building is split between a landlord and one or more tenants.<sup>110</sup>

While financial barriers may be overcome by making grants available or reducing taxation to make investment more economically viable, regulation is also needed to reduce the barriers to adopting more energy efficient options. The following sections set out various regulations and fiscal policies adopted or being developed in the UK to meet the EU target of reducing energy consumption by 20% by 2020.

#### 6.4 Commercial energy consumers

Buildings account for almost half of energy consumption and carbon emissions in the UK, and most businesses have experienced rising energy costs. Adopting energy efficiency measures such as installing an advanced metering system and replacing aging water and air heating equipment to reduce a commercial building's energy consumption could therefore make a significant contribution towards achieving the target and would be financially advantageous to businesses in the long run.<sup>111</sup>

##### 6.4.1 Climate Change Levy ("CCL")

The CCL is a tax on electricity, gas, coal and liquefied petroleum gas used for energy that introduced in 2001 to encourage business to reduce energy demand. The CCL was developed following Lord Marshall's report "Economic Instruments and the Business Use of Energy" (1998). To minimise compliance costs the levy is imposed at the time of supply rather than consumption. It was

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<sup>108</sup> HM Treasury, "The Climate Change Levy Package", March 2006.

<sup>109</sup> HM Treasury, "Meeting the aspirations of the British people: 2007 Pre-Budget Report and Comprehensive Spending Review", October 2007.

<sup>110</sup> UK Government, "Moving to a global low carbon economy: implementing the Stern Review", October 2007.

<sup>111</sup> UK Government, "A guide for businesses: reducing the energy usage and carbon emissions from your heating and hot water systems", October 2007.

estimated, by independent analysis by Cambridge Econometrics,<sup>112</sup> that the levy delivered cumulative savings of 16Mt CO<sub>2</sub> by 2005. Improving energy efficiency helps businesses reduce their energy costs and makes them less vulnerable to energy market volatility. The full impact of the CCL was set out in a report<sup>113</sup> published alongside the Budget 2006 and indicates that the CCL is expected to have reduced commercial energy demand by 2010 by 2.9% a year, compared with the levy package not being in place. Although the CCL rates were frozen until March 2006, they now rise in line with inflation.

#### 6.4.2 Climate Change Agreements ("CCAs")

CCAs provide an 80% discount from the CCL for energy-intensive sectors, provided they enter into agreements to meet energy efficiency targets. HM Revenue and Customs, working with Treasury, are responsible for the CCA legal framework. Relevant trade associations negotiate umbrella agreements with DEFRA,<sup>114</sup> on behalf of the companies in the sector concerned, setting out the sector targets and conditions of participation, but it is up to each participant facility to determine how best to achieve the energy savings specified in their underlying agreement. Current agreements are due to last until 13 March 2013, but are reviewed by DEFRA every couple of years and in the PBR the Government announced its intention to continue the CCA scheme until 2017, subject to state aid approval. CCAs have reduced emissions while supporting the competitiveness of energy-intensive businesses. By 2010, it is estimated CCAs will deliver savings of 10.2Mt CO<sub>2</sub> per year.<sup>115</sup>

Energy-intensive sectors were initially defined as activities listed under Part A1 or A2 headings in Part 1 of Schedule 1 to the Pollution Prevention and Control (England and Wales) Regulations 2000,<sup>116</sup> as amended by the Pollution Prevention and Control (England and Wales) (Amendment) Regulations 2001.<sup>117</sup> This criterion applies throughout the UK. Eligibility was extended by the 2004 Budget so that around 50 sectoral agreements have now been entered into covering around 10,500 individual facilities.

A review of the effectiveness of the CCA and CCL by the National Audit Office, published in August 2007,<sup>118</sup> concluded that while the CCA have been successful targets could have been more demanding. Taken together, the CCA and CCL are expected to cut business carbon emissions by 5.4Mt CO<sub>2</sub> a year by 2010. However, there is some concern that the reductions would have happened without these measures and that some companies covered by agreements may have received discounts even though they failed to meet their targets because other

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<sup>112</sup> "Modelling the Initial Effects of the Climate Change Levy", March 2005 (<http://www.hmrc.gov.uk>). This was undertaken before the EUETS was introduced so did not take it into account, but did account for the voluntary UK Emissions Trading Scheme now incorporated into the EU ETS.

<sup>113</sup> "The Climate Change Levy Package".

<sup>114</sup> Umbrella agreements are public documents and can be found on the DEFRA website (<http://www.defra.gov.uk/environment/climatechange/uk/business/ccl/intro.htm>).

<sup>115</sup> "Meeting the aspirations of the British people: 2007 Pre-Budget Report and Comprehensive Spending Review", paragraph 7.37.

<sup>116</sup> SI 2000 No. 1973.

<sup>117</sup> SI 2001 No. 503.

<sup>118</sup> National Audit Office, "The climate change levy and climate change agreements: a review by the NAO", August 2007.

companies in their sectors over-achieved. As a result, the House of Commons Environmental Audit Committee<sup>119</sup> announced on 30 August 2007 that it would undertake an inquiry to review the effectiveness of these measures and to examine how they fit with other policy measures such as the EU ETS and Carbon Reduction Commitment.

#### 6.4.3 **The Carbon Reduction Commitment ("CRC")**

The CRC was proposed by the 2007 Energy White Paper to incentivise large non-energy intensive public and private sector organisations, to reduce their energy consumption through a mandatory auction based cap and trade scheme which will include a buy-only link to the EU ETS. The CRC would cover about 5000 organisations such as hotels, supermarkets, banks, water companies and central Government and large Local Authorities, who currently emit about 14MtC, accounting for 10% of the UK's emissions. It is proposed that the electricity emissions factor will be calculated on the basis of 0.52 tonnes of CO<sub>2</sub> per MWh and is believed that the CRC could achieve approximately 4Mt CO<sub>2</sub> reductions per year by 2020 in relation to a 2010 baseline. The DEFRA consultation on the CRC closed on 9 October 2007 and it is anticipated that there will be a further consultation on draft CRC Regulations in summer 2008 before coming into force in 2009.

The CRC, a renaming of what had been called the Energy Performance Commitment under the 2006 Energy Review, will be implemented using enabling powers in the draft Climate Change Bill. Apart from the scheme's name, the CRC envisages a threshold where half hourly metered electricity consumption exceeds 6,000MWh/yr based on consumption during 2008. This is double the threshold proposed under the Energy Performance Commitment and therefore reduces the number of installations that will be caught by the scheme. The Government has decided not to allow smaller organisations under the inclusion threshold to voluntarily opt-in to CRC. However, it is proposed that even if a CRC organisation's consumption falls below the 6,000MWh/yr threshold it will remain in the CRC for the duration of the phase of the scheme.

In respect of group undertakings, it is proposed that the UK parent company would be the CRC participant which would, therefore, include all UK subsidiary companies. Where a parent company is outside the UK, any UK subsidiary over the inclusion threshold would be covered by CRC.

Organisations with over 25% of their energy use emissions in CCAs will be exempt from the CRC, but where there is a group undertaking, only the subsidiary operating under the CCA will be exempt; the remainder of the group will be covered by the CRC.

It is anticipated that the CRC will commence in 2010 and will feature an introductory phase of three years (running January to December), with an annual fixed price sale of allowances each January, and thereafter each capped phase will last five years. It is suggested that auction revenue will be recycled to participants by means of a simple, direct, annual payment proportional to average annual emissions since the start of the scheme with a bonus or penalty depending on the

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<sup>119</sup> [http://www.parliament.uk/parliamentary\\_committees/environmental\\_audit\\_committee.cfm](http://www.parliament.uk/parliamentary_committees/environmental_audit_committee.cfm).

organisation's position in a CRC league table. The CRC will allow for self-certification of monitoring, reporting and verification of energy use and emissions, backed by an independent risk-based audit regime whereby 20% of CRC organisations will be audited by the scheme administrator each year.

To avoid any double counting of ROCs the CRC will not differentiate between different sources of electricity. In other words, it is proposed that electricity sourced from renewables will be treated the same as regular "brown" electricity.

#### 6.4.4 **Enhanced Capital Allowances ("ECAs")**

ECAs were introduced alongside the rest of the CCL package in April 2001 and are administered by the Carbon Trust. The ECA provides 100% first-year allowance for capital expenditure on designated energy-saving technologies and products, enabling business to write off the whole cost of the investment. ECAs provide support for investments on over 13,000 products spanning 15 categories of energy-saving technologies, but the list of qualifying technologies is constantly being reviewed to reflect developments and market changes.<sup>120</sup>

#### 6.4.5 **Energy Performance Certificates ("EPCs")**

EPCs are the UK's response to the European Energy Performance in Buildings Directive. They come into force for buildings over 500m<sup>2</sup> from 6 April 2008 and for buildings under 500m<sup>2</sup> from 1 October 2008. To ensure all businesses know the energy consumption of their buildings all business premises will be required to hold an EPC describing the building's energy rating (from A to G) and setting out what steps can be taken to improve its performance. EPCs will also apply to residential buildings. From January 2008 sellers must provide an EPC as part of their home information packs.

### 6.5 **Residential energy consumers**

Improving the energy efficiency of products used in homes and offices is identified as being one of the most cost-effective ways of meeting the Government's goal of saving 3.5-10Mt CO<sub>2</sub> by 2020. Priority products include consumer electronics, lighting, pumps, motors heating, air conditioning, office equipment, white goods and standby, but it is acknowledged that action in this area needs to be taken at the EU level to be effective, although manufacturers, retailers and service providers are being encouraged to take voluntary action to phase out the least efficient products such as the announcement on 27 September 2007 to phase out incandescent light bulbs by 2011 resulting in UK energy savings equivalent to the output of a medium sized power station.

#### 6.5.1 **Carbon Emissions Reduction Target ("CERT")**

Households account for over a quarter of UK energy consumption and CO<sub>2</sub> emissions. The Energy Efficiency Commitment ("**EEC**"), to be known as Carbon Emissions Reduction Target (CERT) from 2008,<sup>121</sup> is the main means of

<sup>120</sup> "The Climate Change Levy Package", Chapter 4. Further information and a full list of qualifying technologies can be obtained at <http://www.eca.gov.uk/etl/default.htm>.

<sup>121</sup> The Energy White Paper 2007 announced that EEC would be renamed as CERT to reflect the new focus on reducing CO<sub>2</sub> emissions as opposed to just energy efficiency, and was accompanied by a DEFRA consultation on how the CERT might work.

encouraging take up of energy efficiency measures in UK homes.<sup>122</sup> However, the utilities companies are also obliged, under the Gas Act 1986 (section 33BC) and Electricity Act 1989 (section 41A), to promote improvements in energy efficiency in the use of gas and electricity by their consumers through installing insulation, promoting energy efficient light bulbs and supplying high efficiency appliances or boilers. The first phase of the EEC ran from 1 April 2002 to 31 March 2005 and it is believed it will have saved 1.1Mt CO<sub>2</sub> annually by 2010. The current phase (2005-08) doubles the activity of the first phase and is expected to deliver savings of 1.8Mt CO<sub>2</sub> by 2010. The third phase will run from 2008-11 and will include microgeneration and behavioural measures. The overall target for CO<sub>2</sub> emissions reductions are set out in the CERT Order due to come into force in December 2007, but individual energy supplier targets will be allocated by Ofgem. DEFRA has indicated that post 2011 the Government is committed to placing a further obligation on energy suppliers for the domestic sector until at least 2020.

### 6.5.2 The Warm Front

The Warm Front programme (previously called the Home Energy Efficiency Scheme), launched in June 2000, provides heating and energy efficiency measures to low-income vulnerable households. To achieve this, the Community Energy Efficiency Fund has been set up to provide financial support in 2007-08.

### 6.5.3 Zero carbon homes

Under section 217 of the Housing Act 2004 the Secretary of State is required to take reasonable steps to ensure that by 2010 the general level of energy efficiency of residential accommodation in England has increased by at least 20% compared with 2000 energy efficiency levels. Accordingly, a range of tax measures have been introduced including a reduced rate of VAT for professionally installed energy saving materials, Landlord Energy Saving Allowances and from 1 October 2007 stamp duty land tax ("**SDLT**") exemption on the acquisition of new homes meeting zero carbon standard costing less than £500,000, or for those over this threshold a reduction of £15,000 on the SDLT bill.

The standard for zero carbon homes was published under the Code for Sustainable Homes<sup>123</sup> with an aim of achieving zero carbon homes by 2016. The Code sets out six levels for sustainability in homebuilding to act as a clear signal to consumers and developers. Building regulations will become tighter progressively, by 25% in 2010 and 44% in 2013, up to the zero carbon target in 2016. A definition of "zero-carbon" homes will cover appliance emissions as well as heating and lighting, and will apply to developments rather than individual dwellings. A housing Green Paper<sup>124</sup> set out further details of the policy changes needed and the aim to build at least five "eco-towns" of 5,000-20,000 homes as zero carbon developments.

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<sup>122</sup> "Meeting the aspirations of the British people: 2007 Pre-Budget Report and Comprehensive Spending Review", paragraphs 7.38-7.41.

<sup>123</sup> Published in December 2006 ([http://www.planningportal.gov.uk/uploads/code\\_for\\_sust\\_homes.pdf](http://www.planningportal.gov.uk/uploads/code_for_sust_homes.pdf)).

<sup>124</sup> Department for Communities and Local Government, "Homes for the future: more affordable, more sustainable", published 23 July 2007.

#### 6.5.4 Microgeneration

Microgeneration, which is defined as the production of heat and/or electricity on a small scale from a low carbon source, includes the installation of a range of technologies from solar panels, wind turbines and small hydro generators, to ground and air heat pumps, bio-energy or hydrogen fuel cells. The Government anticipates that microgeneration will play a part in developing zero carbon homes, and is supporting increased uptake of these technologies through the low carbon buildings programme, reduced VAT on installations, access to ROCs and tax exemptions for revenues earned from domestically generated electricity exported to the grid. Installation of microgeneration may also take place within a commercial context and to avoid this giving rise to increased liability for business rates the PBR proposes that such investments are only taken into account at 5 year re-valuation of business rates rather than in ad hoc reassessments.<sup>125</sup> Under the Climate Change and Sustainable Energy Act 2006,<sup>126</sup> if at 1 November 2008 the Secretary of State considers it would be appropriate to do so, he is required to designate one or more national microgeneration targets or publish a statement outlining his reasons for not doing so. The technologies considered to be microgeneration energy sources are set out in section 82(7) of the Energy Act 2004.<sup>127</sup> Appropriate amendments to the building regulations and permitted development orders in relation to planning permission are also considered under the Climate Change and Sustainable Energy Act 2006 to facilitate the installation of microgeneration systems.

#### 6.6 Transportation

As noted above, transportation currently accounts for about 20% of energy consumption in the EU, is the fastest growing sector in terms of energy use and is dependent upon fossil fuels. The continued supremacy of road transport is unquestionable. Average personal car usage has doubled from 17 to 35km per day in the last 30 years and road transportation accounts for almost 45% of freight movements.

At the same time, the airline industry continues to grow, increasing the pressure for airport expansion. Whilst the EU's total emissions controlled under Kyoto fell by 5.5% from 1990 to 2004, its GHG emissions from international aviation increased by 87%. Aviation currently contributes only 2% of global emissions, but this is expected to rise to 5% of global emissions by 2030 and to account for 25% of the UK's emissions by this date.

In May 2007 the Department of Transport (in the UK) published its low carbon transport innovation strategy which highlights a range of new technologies which can contribute to carbon reductions in road, aviation, rail and shipping. Undoubtedly, the development of energy efficient vehicles and improved efficiency in urban, rail, maritime and aviation systems offer significant areas for investment.

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<sup>125</sup> "Meeting the aspirations of the British people: 2007 Pre-Budget Report and Comprehensive Spending Review", paragraph 7.29.

<sup>126</sup> Section 4 (National Targets for microgeneration).

<sup>127</sup> Those sources of energy and technologies are: biomass; biofuels; fuel cells; photovoltaics; water (including waves and tides); wind; solar power; geothermal sources; combined heat and power systems; and other sources of energy and technologies for the generation of electricity or the production of heat, the use of which would, in the opinion of the Secretary of State, cut emissions of GHGs in Great Britain.



### 6.6.1 Road

In 2001 vehicle excise duty ("**VED**") for cars was reformed, and based on graduated CO<sub>2</sub> bands to give motorists a clear signal to choose more fuel efficient vehicles, and in 2005 fuel efficiency labelling in car showrooms was brought into line with the graduated VED structure.<sup>128</sup>

In 2002 company car tax was reformed to encourage take up of more fuel efficient cars. These changes are forecast to deliver savings of 1.5-3.3Mt CO<sub>2</sub> per year by 2020.

The interim report of the King review<sup>129</sup> indicates existing vehicle technology can deliver CO<sub>2</sub> reductions of 30% compared with current models, and could be standard within 5-10 years if there is sufficient consumer demand to drive manufacture investment.

At the EU level, the Commission published proposals in February 2007 that car manufacturers must achieve mandatory targets to reduce average new car emissions to 130g/km of CO<sub>2</sub> by 2012 and aims to publish a full legislative proposal by the end of 2007.<sup>130</sup> While the EU intends to make Euro V and VI emission standards for cars and small vans mandatory from 1 January 2011 and 1 September 2015 respectively, the UK is considering incentivising early uptake of Euro V technology.<sup>131</sup>

### 6.6.2 Air

GHG emissions from air transport are not accounted for under the UNFCCC and are therefore not subject to quantified emissions limitations under Kyoto. In its February 2005 communication<sup>132</sup> the Commission argued that international aviation should be included in any post-2012 climate change regime to give Member States a stronger incentive to take action on their own and in cooperation with others.<sup>133</sup> This concept has been endorsed by the International Civil Aviation Organization. Member States can already introduce fuel taxation for domestic flights under Directive 2003/96/EC.

In December 2006 the Commission proposed legislation to include aviation emissions in the EU ETS in two steps.<sup>134</sup> From the start of 2011 it is proposed

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<sup>128</sup> "Meeting the aspirations of the British people: 2007 Pre-Budget Report and Comprehensive Spending Review", paragraphs 7.44-7.46.

<sup>129</sup> Announced in the 2007 Budget and led by Professor Julia King working with Sir Nicholas Stern, this is a review of vehicle and fuel technologies which could 'decarbonise' road transport over next 25 years, due to be published in time to inform the 2008 Budget. The interim findings were published alongside the PBR.

<sup>130</sup> "Meeting the aspirations of the British people: 2007 Pre-Budget Report and Comprehensive Spending Review", paragraph 7.43.

<sup>131</sup> *Ibid.*, paragraph 7.53.

<sup>132</sup> Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, "Winning the Battle Against Global Climate Change", 9 February 2005.

<sup>133</sup> Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, "Reducing the Climate Change Impact of Aviation", 27 September 2005.

<sup>134</sup> MEMO/06/506, "Questions and answers on aviation and climate change".

that all flights between EU airports are covered, extending to all flights that arrive or depart from an EU airport in 2012. Total allowances allocated to airlines will be capped at the average of emissions for the years 2004-2006 and will be allocated at an EU rather than a national level. By 2020 it is estimated that a total of 183 million tonnes of CO<sub>2</sub> will be saved per year on the flights covered by the EU ETS, a reduction of 46% compared with business as usual. It is anticipated that the inclusion of aviation emissions in the EU ETS will drive the development of more fuel-efficient aircraft providing another focus for energy efficiency investment.

UK aviation currently accounts for 6.3% of CO<sub>2</sub> emissions and is forecast to rise to 15% by 2030. In December 2003, the UK government published a White Paper on the future of air transport, which set out the strategic framework for sustainable, long term development in air travel until 2030 and concluded that this would be best achieved through a trading regime. It is not surprising therefore that the Government has been active in lobbying for aviation to be included in the EU ETS; in the meantime, air passenger duty ("**APD**") is being used domestically to drive greater efficiency in the airline industry. Currently APD, to be frozen at current rates for 2008-09, are on a per passenger basis, but from 1 November 2009 will be payable on a per plane basis encouraging airlines to fill the flights to capacity and use newer, more fuel efficient aeroplanes. It is believed the change to APD in the 2006 PBR will deliver savings of up to 1.1Mt CO<sub>2</sub> per year, and that these latest changes could equate to savings of 2.1 to 4.4Mt CO<sub>2</sub> annually.<sup>135</sup>

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<sup>135</sup> "Moving to a global low carbon economy: implementing the Stern Review", paragraph 4.66.

**GLOSSARY OF TERMS**

<b>AAU</b>	Assigned Amount Unit
<b>APD</b>	Air Passenger Duty
<b>Annex 1 Countries</b>	Developed countries that are signatories to the <b>Kyoto Protocol</b>
<b>BERR</b>	Business, Enterprise and Regulatory Reform
<b>Biofuel Directive</b>	Directive 2003/30/EC
<b>CAP</b>	Common Agricultural Policy
<b>CCAs</b>	Climate Change Agreements
<b>CCL</b>	Climate Change Levy
<b>CCS</b>	Carbon Capture and Sequestration
<b>CDM</b>	Clean Development Mechanism
<b>CERs</b>	Certified Emission Reductions
<b>CERT</b>	Carbon Emissions Reduction Target
<b>CITL</b>	Community Independent Transaction Log
<b>CO<sub>2</sub></b>	Carbon Dioxide
<b>Commitment Period</b>	Period of 2008-2012 during which <b>Annex 1 Countries</b> have binding emission reduction commitments under the <b>Kyoto Protocol</b>
<b>CONCAWE</b>	Conservation of Clean Air and Water in Europe
<b>CPR</b>	Commitment Period Reserve
<b>CRC</b>	Carbon Reduction Commitment
<b>DBERR</b>	Department for Business, Enterprise and Regulatory Reform
<b>DEFRA</b>	Department for Environment, Food and Rural Affairs
<b>Draft EU CCS Directive</b>	The European Commission's Proposal for a Directive of the European Parliament and of the Council on the geological storage of carbon dioxide
<b>EA</b>	Environment Agency

<b>EB</b>	The <b>CDM</b> Executive Board
<b>ECAs</b>	Enhanced Capital Allowances
<b>EEC</b>	Energy Efficiency Commitment
<b>EOR</b>	Enhanced Oil Recovery
<b>EPCs</b>	Energy Performance Certificates
<b>EPR</b>	Ecodesign for Energy-Using Products Regulations 2007
<b>ERUs</b>	Emission Reduction Units
<b>EU</b>	European Union
<b>EU Bubble</b>	Arrangement by which <b>EU</b> Member States agreed to accept collective target of an 8% reduction in <b>GHG</b> emissions relative to 1990 levels during the <b>Commitment Period</b>
<b>EU ETS</b>	<b>EU</b> Emissions Trading Scheme
<b>Fuel Quality Directive</b>	Council Directive 93/12/EC
<b>GDA</b>	Generic Design Assessment
<b>GDP</b>	Gross Domestic Product
<b>GHG</b>	Greenhouse Gas
<b>HSE</b>	Health and Safety Executive
<b>installations</b>	Certain large scale stationary CO <sub>2</sub> emissions sources as defined in Article 3(e) of Directive 2003/87/EC
<b>IPC</b>	Infrastructure Planning Commission
<b>ITL</b>	International Transaction Log
<b>JI</b>	Joint Implementation
<b>Kyoto Protocol</b>	Kyoto Protocol to the <b>UNFCCC</b>
<b>LECs</b>	Climate Change Levy Exemption Certificates
<b>Linking Directive</b>	Directive 2004/101/EC
<b>LCPD</b>	Large Combustion Plant Directive
<b>London Convention</b>	Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter

<b>London Protocol</b>	1996 Protocol to the <b>London Convention</b>
<b>LNG</b>	Liquefied Natural Gas
<b>Mt CO<sub>2</sub></b>	Million tonnes of <b>CO<sub>2</sub></b>
<b>N<sub>2</sub>O</b>	Nitrous Oxide
<b>NEEAP</b>	National Energy Efficiency Action Plan
<b>NII</b>	Nuclear Installations Inspectorate
<b>NFFO</b>	Non-Fossil Fuel Obligation
<b>NGOs</b>	Non-government organisations
<b>Non-Annex 1 Countries</b>	Emerging economies that were not assigned any legally binding emission reduction targets under the <b>Kyoto Protocol</b>
<b>NO<sub>x</sub></b>	Nitrogen Oxides
<b>OECD</b>	Organisation for Economic Cooperation and Development
<b>Ofgem</b>	Office of Gas and Electricity Markets
<b>OSPAR Convention</b>	Convention for the Protection of the Marine Environment of the North-East Atlantic
<b>PBR</b>	Pre-Budget Report
<b>ppm</b>	Parts per million
<b>RES Directive</b>	Directive 2001/77/EC on the Promotion of Electricity Produced from Renewable Energy Sources
<b>RO</b>	Renewables Obligation
<b>ROC</b>	Renewable Energy Certificate
<b>RMUs</b>	Removal Units
<b>RTFCs</b>	Renewable Transport Fuel Certificates
<b>RTFO</b>	Renewable Transport Fuel Obligation
<b>SDLT</b>	Stamp Duty Land Tax
<b>SEA</b>	Strategic Environmental Assessment
<b>SI</b>	Statutory Instrument
<b>SO<sub>2</sub></b>	Sulphur Dioxide

<b>SSA</b>	Strategic Siting Assessment
<b>Stern Review</b>	Stern Review on the Economics of Climate Change
<b>Tax Directive</b>	Directive 2003/96/EC
<b>UNCLOS</b>	United Nations Convention on the Law of the Sea
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>VED</b>	Vehicle Excise Duty
<b>WTW Report</b>	A joint evaluation of the Well-to-Wheels energy use and <b>GHG</b> emissions carried out by the European Council of Automotive Research, <b>CONCAWE</b> and the Joint Research Centre of the European Commission

## Contacts

If you would like further information on any topics covered in this publication please contact:

**Mark Newbery**

Partner

+44 20 7466 2225

[mark.newbery@herbertsmith.com](mailto:mark.newbery@herbertsmith.com)

**Louise Moore**

Partner

+44 20 7466 2096

[louise.moore@herbertsmith.com](mailto:louise.moore@herbertsmith.com)

**Lewis McDonald**

Senior Associate

+44 20 7466 2073

[lewis.mcdonald@herbertsmith.com](mailto:lewis.mcdonald@herbertsmith.com)

# Herbert Smith

## Amsterdam

Stibbe  
Stibbetoren  
Strawinskylaan 2001  
PO Box 75640  
1070 AP Amsterdam  
T +31 20 546 06 06  
F +31 20 546 01 23

## Bangkok

Herbert Smith (Thailand) Ltd  
1403 Abdulrahim Place  
990 Rama IV Road  
Bangkok 10500  
T +66 2657 3888  
F +66 2636 0657

## Beijing

Herbert Smith LLP  
Units 1410-1419  
China World Tower 1  
1 Jianguomenwai Ave  
Beijing 100004  
T +86 10 6505 6512  
F +86 10 6505 6516

## Berlin

Gleiss Lutz  
Friedrichstrasse 71  
D-10117 Berlin  
T +49 30 800 979-0  
F +49 30 800 979-979

## Brussels

Herbert Smith LLP  
Central Plaza, Rue de Loixum 25  
1000 Brussels  
T +32 2 511 7450  
F +32 2 511 7772

Gleiss Lutz  
Central Plaza, Rue de Loixum 25  
1000 Brussels  
T +32 2 551 1020  
F +32 2 551 1039

Stibbe  
Central Plaza, Rue de Loixum 25  
1000 Brussels  
T +32 2 533 5211  
F +32 2 533 5212

## Budapest

Gleiss Lutz  
Cooperation partner:  
Bán, S. Szabó & Partners  
József nádor tér 5-6  
HU-1051 Budapest  
T +36 1 266-3522  
F +36 1 266-3523

## Dubai

Herbert Smith LLP  
Dubai International Financial Centre  
Gate Village 7, Level 4  
P.O. Box 506631  
Dubai UAE  
T +971 4 428 6300  
F +971 4 365 3171

## Frankfurt

Gleiss Lutz  
Mendelssohnstrasse 87  
D-60325 Frankfurt/Main  
T +49 69 95514-0  
F +49 69 95514-198

## Hong Kong

Herbert Smith  
23rd Floor, Gloucester Tower  
15 Queen's Road Central  
Hong Kong  
T +852 2845 6639  
F +852 2845 9099

## Jakarta

Associated firm  
Hiswara Bunjamin and Tandjung  
23rd Floor, Gedung BRI II  
Jl. Jend. Sudirman Kav. 44-46  
Jakarta, 10210  
T +62 21 574 4010  
F +62 21 574 4670

## London

Herbert Smith LLP  
Exchange House  
Primrose Street  
London EC2A 2HS  
T +44 20 7374 8000  
F +44 20 7374 0888

Stibbe  
Exchange House  
Primrose Street  
London EC2A 2ST  
T +44 20 7466 6300  
F +44 20 7466 6311

## Moscow

Herbert Smith CIS LLP  
10 Ulitsa Nikolskaya  
Moscow 109012  
T +7 495 363 6500  
F +7 495 363 6501

## Munich

Gleiss Lutz  
Prinzregentenstrasse 50  
D-80538 Munich  
T +49 89 21667-0  
F +49 89 21667-111

## New York

Stibbe  
350 Park Avenue, 28th Floor  
New York, NY 10022  
T +1 212 972 4000  
F +1 212 972 4929

## Paris

Herbert Smith LLP  
20 Rue Quentin Bauchart  
75008 Paris  
T +33 1 53 57 70 70  
F +33 1 53 57 70 80

## Prague

Gleiss Lutz  
Jugoslávská 29  
CZ-12000 Prague 2  
T +420 2 24007 500  
F +420 2 24007 555

## Shanghai

Herbert Smith LLP  
38th Floor, Bund Center  
222 Yan An Road East  
Shanghai 200002  
T +86 21 6335 1144  
F +86 21 6335 1145

## Singapore

Herbert Smith LLP  
#09-02 Chevron House  
30 Raffles Place  
Singapore 048622  
T +65 6868 8000  
F +65 6868 8001

## Stuttgart

Gleiss Lutz  
Maybachstrasse 6  
D-70469 Stuttgart  
T +49 711 8997-0  
F +49 711 855096

## Tokyo

Herbert Smith  
41st Floor, Midtown Tower  
9-7-1 Akasaka, Minato-ku  
Tokyo 107-6241  
T +81 3 5412 5412  
F +81 3 5412 5413

## Warsaw

Gleiss Lutz  
ul. Złota 59  
00-120 Warsaw  
T +48 22 22242-00  
F +48 22 22242-99

[www.herbertsmith.com](http://www.herbertsmith.com)  
[www.gleisslutz.com](http://www.gleisslutz.com)  
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