State of GreenBusiness 2013

by **Joel Makower** and the editors of **GreenBiz.com**

GreenBiz group in partnership with TRUCOST PLC

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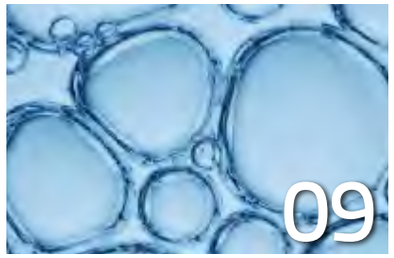
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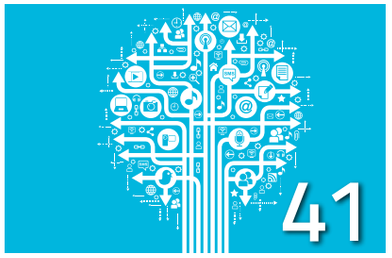
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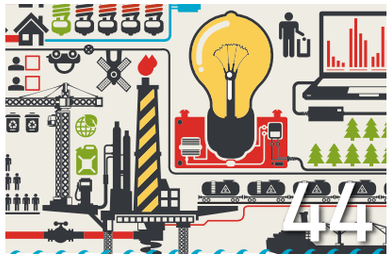
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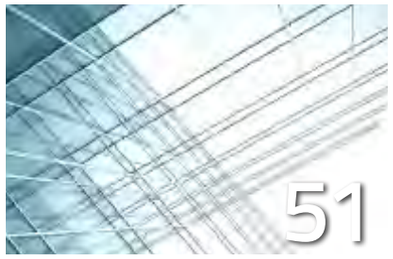
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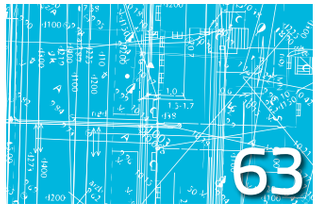
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Introduction

In this, our sixth annual *State of Green Business* report, we've made some significant changes — not just in the look and feel of the document you're reading, but in its content.

First and foremost, we've partnered with Trucost, a leading research firm focusing on natural capital and sustainability metrics, to revamp the indicators by which we assess progress by the private sector in addressing global environmental challenges. In the spirit of continuous improvement, we scrapped the set of metrics we'd used for the previous five reports in favor of a more comprehensive and robust set that is global in scope. They cover companies' natural capital costs, their supply-chain impacts, various measurements of transparency and disclosure, and other things.

Unchanged is our Top Trends section, which looks at where the world of sustainable business is headed — the leading indicators of future progress.

Our efforts mirror those of the business world we reflect: a work in progress.

I hope you find insight and inspiration from this year's report, and look forward to your feedback.

Joel Makower
Chairman & Executive Editor
GreenBiz Group

Foreword

The global economy needs deep and liquid markets of all types of capital to run effectively. Natural capital, long overlooked in traditional financial accounting, is now recognized as a material economic input as businesses increasingly seek to manage volatile commodity prices linked to resource scarcity and extreme weather events. Important steps are now being taken to account for the natural resources that fuel economic growth, as well as the pollution that undermines it. We are pleased to partner with GreenBiz Group to bring natural capital metrics to the "State of Green Business" report.

Trucost has been valuing natural capital and putting a price on resource use and pollution for more than a decade to help companies and investors address sustainability issues in board room business decisions. Trucost's Environmental Register, the world's most comprehensive database of natural capital metrics, provided the data insights for this year's report, showing that companies became more environmentally efficient over the past five years. Simply put, businesses used fewer resources and polluted less to generate revenue. Notably, though, U.S. companies were found to lag their global peers, suggesting that without improved corporate efforts in North America to measure and manage the natural capital in their operations and supply chains, their global competitiveness may stall.

Although companies are developing ways to deliver goods and services more efficiently, their overall reliance on natural capital grew, with environmental costs rising by 8 percent to almost $352 million between 2007 and 2011. Companies have yet to decouple growth from environmental damage. This is mainly because of our global economy's continued reliance on carbon-intensive fossil fuels, which meant that 42 percent of costs came from greenhouse gas emissions.

Dr. Richard Mattison
CEO
Trucost Plc

It's clearly not just about greenhouse gases, though. Water is also material, as the repercussions of drought in the U.S. and elsewhere have shown, from shipping disruptions to rising crop prices. The majority of the S&P 500's $84 million in water costs are embedded within global supplier webs, so any business aiming to be more resilient and avoid commodity price shocks will need to scrutinize supply chains and engage with strategic suppliers.

Most companies now disclose at least some environmental impacts, and a growing number are having third-party assurance completed on their quantified performance data to make their reporting more credible. Despite improvements by U.S. companies, their global peers are ahead on most Trucost indicators captured in this report, including disclosure. Investors now need to rout out the most material risks and opportunities, allocate financial capital effectively and start rewarding companies taking the initiative to measure and disclose natural capital.

Where there are risks, lie opportunities. The cost of protecting natural capital creates strategic opportunities for businesses that can optimize resource use, and deliver innovative products and services to help companies better align business success with environmental megatrends.

Many of the companies analyzed are already reaping the rewards of strengthening supply-chain resource management, from cost savings to innovation that leads to new revenue streams. The number of S&P 500 companies reporting on profits from environmental activities rocketed by 61 percent over five years. Their environmental R&D more than doubled, despite economic gloom. The best is yet to come.

The opportunity is ripe for forward-thinking leaders of multinational companies to take the lead in remaining competitive in a resource-constrained, volatile economy that has become the "new normal." That journey begins by measuring and understanding reliance on natural capital and using that insight to cut costs, extract value, and unleash opportunity.

TOP SUSTAINABLE **BUSINESS TRENDS** of 2013

In the world of sustainable business, there is a tried-and-true litany of reasons why companies take proactive measures. You hear them recited at conferences and read them in books and articles, as well as in companies' own sustainable business reports and manifestos: *We do these things not because they are required by law, but because they make us a better company. They reduce costs, improve quality, meet customers' expectations, engage employees, and foster innovative new products and services. They help improve the bottom line and, in some cases, grow the top line.*

Those are the reasons that have become standard rationale under sustainable business as usual.

But these are not usual times.

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WITH INCREASING VOLATILITY, WHERE EVERYTHING FROM NATURAL RESOURCES TO SUPPLY CHAINS CAN BE TURNED TOPSY-TURVY IN SHORT ORDER, "SUSTAINABILITY" TAKES ON A NEW, POIGNANT MEANING

ABOUT THE REPORT

Trucost's CEO on the methodology

Watch Now

As the global economy sputtered back to life, companies began to link their sustainability strategy to critical business activities.

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With increasing volatility, where everything from natural resources to supply chains to political realities to the global economy can be turned topsy-turvy in relatively short order, "sustainability" takes on new, poignant meaning. It has to do with aligning economic, environmental and social interests, of course. But increasingly, it is taking on even more strategic importance, linked to reducing supply-chain risk and ensuring business continuity during disruptions, the right to operate in resource-stressed areas, reliable and cost-efficient energy supplies, and brand value and reputation.

In other words, the things upon which companies sink or swim.

Ours is a world in which a flood in Thailand can cut off global supplies of computer disk drives for the better part of a year; where a record-low Mississippi River can choke the flow of commerce; where an unprecedented hurricane (or "superstorm") can upend one of the world's financial centers for weeks. In that context, how should a company view climate change, renewable energy, and resource efficiency? How should its shareholders view risk and resilience as it relates to the surety of their investments? And how should communities assess the responsibility of companies within their regions, in terms of the fair appropriation of local resources when they become scarce?

The "old" rationale hasn't gone away — companies are still harnessing sustainability to cut costs, improve quality, engage employees, and all the rest — but the world of sustainable business made some slight but profound shifts in 2012. As the global economy sputtered back to life, companies began to link their sustainability strategy to critical business activities. Today's rationale might sound something like this: *We do these things to insulate ourselves from turbulent times, adhere to customer requirements, ensure that communities where we operate will welcome us, and protect our reputation. They help us be resilient and ensure our survival amid disruptions.*

This is the new world of sustainable business. It goes well beyond the nice-to-do issues of "corporate responsibility" and "eco-efficiency." It views incrementalism as insufficient, ignorance as unacceptable, and unpredictability as the new norm.

Technology is playing a critical role, with

the growth and expansion of the interconnected, networked world. What has been dubbed the "Internet of things" is enabling companies, cities, and others to monitor, track, analyze, and control just about anything from just about anywhere, and do so increasingly cheaply and efficiently. Sensor networks and associated software and controls mean even highly rated "platinum" green buildings still can enjoy dramatic improvements in energy efficiency. Vehicles of all kinds, from bikes to buses, can operate more efficiently by maximizing their overall use and minimizing downtime, optimizing their innards to decrease fuel use, plotting routes to minimize time and energy, and employing other technological tricks. And communities, campuses, and cities can improve and strengthen their infrastructure by providing real-time data about their use, analyzing and troubleshooting operations 24/7.

AS ENGAGEMENT GROWS, SOME COMPANIES ARE FINDING THEY ARE ABLE TO ACHIEVE, EVEN EXCEED THEIR SUSTAINABILITY GOALS.

But it's not just tech. Last year saw a resurgence of interest in the idea of accounting for "natural capital" — the indispensable stocks of natural resources provided by the planet that are essential for human survival and economic activity. The notion of integrating sustainability reporting with financial reporting — and, in the process, making the two inextricably linked — also got some lift. In both cases, progress is slow and the changes relatively small, but the conversation is changing: These things are now being discussed by some of the world's largest companies, and not just in passing. In the coming years, they will become part of sustainability's next wave — a new level of company engagement with the world in which they operate.

As engagement grows, some companies are finding they are able to achieve, even exceed, their sustainability goals. Suddenly, small improvements in energy efficiency seem quaint, compared with the leapfrog advances enabled by advanced technology and systems-level thinking. Some companies are even finding that they've set the bar too low.

The question, of course, is what positive changes are actually taking place, and at what speed, scale, and scope. Is the growing engagement of companies sufficient to alter the trajectory of negative environmental and social trend lines — issues like climate change, air quality, the health of aquifers, species extinction, the abundance of topsoil and fisheries, human health and well-being, and all of the other things that make up, for lack of a better term, "the sustainability agenda"?

That's an open question. In this sixth annual State of Green Business report, we take stock of the trends and indicators that tell how, and how well, the world of business is addressing these concerns.

Where are we headed? Here, in no particular order, are 10 key trends for 2013. E

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1 COMPANIES TAKE STOCK OF NATURAL CAPITAL

The idea of natural capital — the limited stock of Earth's natural resources that humans depend on for our prosperity, security, and well-being — has been around a long, long time — since the 1973 publication of E.F. Schumacher's book, *Small is Beautiful*. (Franklin D. Roosevelt didn't use the exact term, but he referred to "the fact that the natural resources of our land — our permanent capital — are being converted into … wealth at a faster rate than our real wealth is being replaced. … That is the unbalanced budget that is most serious" — in 1937.)

Natural capital creates value through ecosystem services, the "free" deliverables provided to business and society by a healthy planet, including clean water, breathable air, pollination, recreation, habitat, soil formation, pest control, a livable climate, and other things we generally take for granted because we don't directly pay for them. In 1997, researchers estimated the annual economic value of 17 ecosystem services for the entire biosphere at $33 trillion. In today's dollars, that's about $47 trillion — more than two-thirds of current global GDP, estimated at $69 trillion.

All that is pretty academic, literally and figuratively. Natural capital and ecosystems services have been rarely discussed inside companies, let alone calculated in their financial statements.

In 2012, that began to change. One of the more surprising outcomes of the Rio+20 United Nations conference was the focus on natural capital, culminating with the signing of a Natural Capital Declaration by 39 global financial institutions — primarily from Europe and South America, but no major U.S. banks. The declaration committed them to develop methodologies to value and account for nature's vital role in the global economy, and integrate those methodologies into their institutions' financial decisions. It is unclear whether that means making loans based on a company's impacts on such things as water quality, soil erosion, or flood protection. Still, it's an important first step. It will take time for this to filter into company accounting and reporting.

A 2012 report by KPMG and the Association of Chartered Certified Accountants brought the concept of natural capital to chief financial officers. KPMG and ACCA conducted a survey, with more than half of CFOs and CEOs saying they had included natural capital concerns in their company's business-risk evaluations. Forty-nine percent identified natural capital as a "material issue" for their business and linked it directly to "operational, regulatory, reputational and financial risks." But few companies yet integrate these things into their accounting systems, let alone report such information to investors.

Companies will be under increasing pressure to measure, if not manage, their impacts to natural capital. In 2012, companies seeking financing from the World Bank's International Finance Corporation, as well as from 76 global banks that signed on to the Equator Principles,

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NATURAL CAPITAL ISN'T JUST A BUZZWORD. THERE ARE PRINCIPLES UNDERGIRDING THE CONCEPT. BUT SOME "NATURAL CAPITAL" COMMITMENTS SEEM LIKE WARMED-OVER ENVIRONMENTAL GOALS.

became subject to due-diligence processes that examine corporate impacts and dependencies on ecosystem services. Meanwhile, more than 16 national and regional governments continued to focus on ways to integrate ecosystem services into public policy, according to a report by BSR.

Natural capital isn't just a handy buzzword. There are principles undergirding the concept. They include the idea that one species' waste is another species' food; that materials cycle endlessly through the web of life; that species live off current solar "income"; that resilience comes from diversity; and that everything is interconnected. Each of these can be translated into everyday business practices, as well as overall strategy.

Our partner in this report, Trucost, has worked on more than a dozen natural capital valuation projects. One project is with Veolia Water, which is looking to help clients understand how the true valuation of water varies across production locations due to the operational, regulatory, reputational and financial risks that water scarcity presents.

One promising initiative aimed at accelerating corporate understanding of natural capital is TEEB — the Economics of Ecosystems and Biodiversity — convened by a consortium including the United Nations, European Union, and the International Union for Conservation of Nature. TEEB, which has been described as the Rosetta Stone for natural capital, aims to help the environmental and financial communities start speaking the same language about how to value nature. TEEB's research is headed by Pavan Sukhdev, a senior banker from Deutsche Bank, along with experts from the fields of science and economics. Among its findings, TEEB has pointed to the connection between species loss and economic well-being, and the need to ensure that human development takes proper account of the real value of natural ecosystems.

Even before TEEB's research is complete, companies are making commitments, albeit tentative ones, around natural capital. A partnership between the Corporate Eco Forum and The Nature Conservancy, launched at the 2011 Clinton Global Initiative, engaged 24 companies within its first year, from Dell to Dow to Disney, to make commitments related to protecting natural capital. Some of those commitments were focused — on forestry or fisheries, for example — but others were all-encompassing. Disney, for one, committed to conduct a study "to quantify ecosystem benefits and services other than carbon."

But some of the "natural capital" commitments reported by these companies in 2012 seemed like warmed-over environmental commitments companies had already made. GM, for example, committed to achieve landfill-free status at 100 manufacturing sites, "thereby conserving natural resources, keeping them in their use phase, and reducing associated life-cycle environmental impacts." At the time of the commitment, some 90 GM plants were already declared "landfill-free," and the hundredth was a few months away, so this wasn't exactly a stretch goal. However honorable the achievement, GM's Clinton Global commitment was pretty much the continuation of programs it began in the 1990s.

All of which points to both the two-edge sword of a growing corporate recognition of the value of natural capital. On the one hand, it could lead to corporate decisions that balance economic and environmental needs, and that consider the longer-term consequence of business strategies and initiatives, eventually integrating the concept into planning and accounting.

On the other, "natural capital" could become just another synonym for "environmental responsibility," the latest advance in corporate messaging without necessarily a corresponding advance in anything else. The jury is still out on that one. E

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2 | SUSTAINABILITY BECOMES A MATTER OF RISK & RESILIENCE

Risk and resilience haven't typically been part of most companies' sustainability vocabularies. But Mother Nature's fury is changing that, as droughts, floods, hurricanes and wildfires disrupt companies and their supply chains.

Around the world, extreme has become the new normal. Weather was a major factor for many companies in 2012, connecting the dots between sustainability and risk. At the top of the list was Hurricane Sandy, which ravaged the U.S. East Coast in October. It wasn't necessarily the planet's biggest storm last year, but its location — in the heart of a heavily populated center of global finance, commerce and media — brought forth a relative tsunami of media attention, compared to an equivalent storm in, say, Bangladesh.

Sandy shined a light on how well companies, cities and communities in one of the world's richest countries were prepared to cope with an anticipated rise in turbulent, even violent weather, most likely linked to a changing climate. The design and resilience of everything from roads and traffic lights to gas stations and hospitals came under scrutiny — at least for a while. And the cost to business, in terms of disruption, relocating and rebuilding, was in the tens of billions of dollars.

But Sandy was far from the only weather event that upended business and society.

Last year saw drought conditions in 56 percent of the lower 48 United States, the worst since the 1950s. Wildfires consumed close to 10 million acres across the U.S. mainland. In the Philippines, more than 300,000 people lost their homes when Typhoon Bopha struck in December. Fifty major wildfires burned in central and southern Chile, fueled by intense heat, dryness, and high winds, causing thousands to evacuate, creating millions of dollars in damages, and destroying hundreds of homes. A severe drought impacted more than 1,000 towns in Brazil, leading to "water wars" and massive livestock deaths.

Europe suffered its worst cold snap in a quarter century, killing more than 650 people, the majority in Russia, Ukraine, and Poland. Record-breaking flooding in southwestern Queensland and northern New South Wales in Australia led to the isolation of entire towns and the abandonment of thousands of homes. Almost five million people were evacuated in China due to the rains and flooding, resulting in losses of $2 billion.

Globally, five countries, including the United States, set heat records in 2012. None set cold records.

The economic toll from such events is growing, say experts. In the U.S., the National Oceanic and Atmospheric Administration calculated 11 extreme weather and climate events that reached the billion-dollar threshold in losses

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The cost of protecting natural capital creates strategic opportunities to optimize resource use.

during 2012. While that's down from 14 such events in 2011, the economic losses grew, from $60 billion in 2011 to $100 billion from Sandy alone. That makes 2012 the second costliest in 30 years, trailing only 2005, the year of Katrina. The trend isn't likely to abate; in fact, it could worsen in lockstep with the growing effects of climate change.

It's not just the weather. Sustainability and risk issues rising up through investor communities, from so-called socially responsible investors to mainstream pension funds and university endowments, Wall Street stock analysts, and the regulatory agencies that oversee publicly traded companies. All are concerned with the risks facing companies in a world of constraints related to the availability of energy, water, and other resources; where the toxicity of products or manufacturing processes present perils all the way up the supply chain; and where climate shifts can disrupt the availability of raw materials and threaten the well-being of employees and customers.

A 2011 report by the McKinsey Global Institute and the McKinsey Sustainability & Resource Productivity practice, which focuses on growing resource constraints in a world of more middle-class consumers, put it succinctly: "The deterioration in the environment, itself driven by growth in resource consumption, also appears to be increasing the vulnerability of resource supply systems." Food is the most obvious area of vulnerability, but there are others. For example, changes in rainfall patterns and greater water use could significantly impact the 17 percent of world electricity supplied by hydropower, as well as fossil-fuel and nuclear power plants and water-intensive methods of energy extraction, like hydraulic fracturing, or fracking.

Keeping an eye on this is becoming part of the job of a growing handful of sustainability executives in global companies. They see risk management as a new part of their role, in addition to all the usual eco-efficiency stuff. For them, understanding risk and sustainability

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means learning a new language and translating it into their companies' far-flung operations.

BUSINESSES, WHICH THINK REGULARLY ABOUT RISK, ARE JUST BEGINNING TO THINK ABOUT CLIMATE CHANGE LIKE OTHER BUSINESS RISKS.

Climate remains the No. 1 risk. The insurance industry has been concerned about the impacts of climate change for years. In a 2011 white paper about the risks of climate change for business by the insurance and risk management firm Marsh, CEO David Batchelor writes, "Climate change should be amongst the top considerations companies will need to take into account when making long-term capital investment decisions."

Businesses, which think regularly about risk mitigation, are just beginning to think about climate change and resource constraints like other business risks. They are starting to deploy the same set of tools, such as enterprise risk management, business continuity planning and scenario planning. As the World Economic Forum wrote in a paper, Global Risks 2012, "rising greenhouse gas emissions" and the "failure of climate change adaptation" are in the same risk quadrant as food shortages and terrorism.

Some pension funds and other institutional investors are helping move companies to act, or at least better disclose their potential risks related to climate change, water scarcity, and other things. (Many of these investors are members of the Investor Network on Climate Risk, a project of the nonprofit Ceres.) But it is unclear whether and how such efforts are pushing companies to become more proactive.

It's only a matter of time. The attacks of 9/11 weren't the first time terrorists had violently disrupted civilians and their institutions, but it had a lasting impact. Among other things, it changed the way we design buildings and spaces. Today, while we may grumble at long airport security lines or other inconveniences, we generally accept our more security-centric world as a given, along with the investment it takes to secure the places we live, work, shop, travel and play. It's hard to imagine ever going back.

At what point will climate, extreme weather and resource constraints be similarly seen as a potent threat that requires changes to the design and operation of our businesses and supply chains? What will be the dramatic event(s) that provide the tipping point? How much disruption and inconvenience will the public be willing to tolerate?

The answer to such questions will help determine how sustainability is viewed inside companies — whether it's "only" a matter of environmental responsibility or a much broader and more strategic topic that cuts to the very core of a company's ability to survive and thrive in the face of a changing, challenging world. E

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3 | CORPORATE REPORTING GETS INTEGRATED

The idea of melding sustainability reporting with companies' traditional financial reporting has been kicking around for a few years, but is now starting to take root — "starting" being the operative word. As it does, it becomes another potent tool to help make sustainability mainstream inside companies and among investors.

Freestanding sustainability reports have become mainstream — more than 5,000 are published annually worldwide, according to CorporateRegister.com — but most aren't very helpful. They contain too much information that is feel-good, extraneous to evaluating a company's sustainability impacts and risks. Moreover, most reports aren't written with investors in mind — they are targeted at a broad range of stakeholders, many of which have a specific environmental, social or governance (ESG) interest.

There are signs that standalone sustainability reporting may go the way of the rotary-dial phone. A growing movement is shaping up to push companies toward "integrated" reporting, or IR, that combines conventional financial information along with key sustainability data, all in a much more investor-friendly way. Says Harvard Business School professor Robert G. Eccles, one of the leaders of the IR movement: "Even so-called mainstream investors are increasingly recognizing that a company's ESG performance increasingly affects its ability to create value for shareholders over the long term, and can even put its license to operate at risk."

One of the more interesting and public exercises in IR comes from PUMA, a division of the PPR Group, a French company that also owns several luxury and lifestyle brands, including Gucci, Yves Saint Laurent, and Alexander McQueen. In 2012, PUMA published an Environmental Profit and Loss, or EP&L statement valuing the costs to the planet incurred by its operations across its supply chain. The company says the report will help it pinpoint areas to develop more sustainable materials and methods; provide an early view of emerging risks, for instance around availability of water for production and costs associated with greenhouse gas emissions; and enable the company to make better, more informed business decisions that take account of environmental impacts as well as more traditional financial and operational considerations.

The footwear company doesn't yet have many companies following in its footsteps, but its high-profile efforts have shown how blending financial and non-financial metrics can strengthen decision-making.

Much of the energy for IR is coming from outside the United States. For example, 2012 was the first year that the nearly 500 companies listed on the Johannesburg Stock Exchange were required to file integrated reports — or explain why they can't. Another stock exchange, Brazil's BM&FBOVESPA, adopted a similar "Report or Explain" policy earlier in 2011 for listed companies. Germany,

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Spain and the U.K. are also considered leaders in this area. At least one U.S. stock exchange, NASDAQ OMX Group, led by its vice chairman, Meyer "Sandy" Frucher, already is beginning to push integrated reporting. In June 2012, it signed up to begin requiring more material information on ESG operations for listed companies.

Much of this is being pushed by the International Integrated Reporting Council (IIRC), a global coalition of regulators, investors, companies, standards bodies, the accountancy profession and NGOs. IIRC is aggressively pushing for a globally accepted integrated reporting framework, linking arms with the World Business Council for Sustainable Development, the Global Reporting Initiative, The World Bank, Ceres, BSR, the Association of Chartered Certified Public Accountants, and others. IIRC will be publishing its Draft Framework in 2013.

One challenge is that the growth and sophistication of sustainability reporting is limited, if not undermined, by the tools companies are using to produce them. According to a 2012 report published by Ernst & Young in partnership with GreenBiz.com, "those tools remain rudimentary, even primitive, compared with those used for reporting on financial measures." When asked to name the tools used to compile their sustainability reports, most companies cited spreadsheets, centralized databases, emails and phone calls as the principal tools, with about one in four using packaged software. As integrated reporting catches on, it will push companies to use tools that help them generate higher-quality sustainability data.

Sustainability reporting is not likely to go away — companies have invested too much reputational capital in telling stories and providing detailed information, and stakeholders have come to view them as a minimum requirement of a company's sustainability commitment. But as integrated reporting ramps up, sustainability reports will need to provide more detailed performance data relevant to broader stakeholders, insight into what is driving changes in metrics, and deeper explanations of management responses to social, resource, and pollution challenges.

Says Harvard's Eccles: "Good companies will see integrated reporting as an opportunity to communicate on and implement a sustainable strategy, which I define as one that creates value for shareholders over the long term while contributing to a sustainable society. But accomplishing this at a global scale means that integrated reporting needs to be a mandatory, not voluntary, exercise." E

ONE CHALLENGE IS THAT THE GROWTH AND SOPHISTICATION OF SUSTAINABILITY REPORTING IS LIMITED, IF NOT UNDERMINED, BY THE TOOLS COMPANIES ARE USING TO PRODUCE THEM.

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4 | THE SHARING ECONOMY MAKES ITS MARK

Embedding sustainability in the consumer marketplace isn't just about refining or redesigning products and packaging, or even turning products into services — downloading music rather than buying CDs, for example. It's also about redesigning business models and entire systems of commerce.

That redesign has been unfolding over the past few years in what has been dubbed the "sharing economy." (It also goes by other names, like "access economy" and "collaborative consumption." Clearly, this is a trend in need of better branding.) And like many other marketplace innovations — downloading music rather than buying CDs, for example — the companies engaging in this business model transformation aren't doing it for sustainability reasons. They're doing it because it creates products and services that are better for customers.

The sharing economy isn't new; Zipcar, for example, one of the poster children of the movement, which is being acquired by Avis, was founded in 2000. But over the past year or so, we've seen sharing-economy companies grow and mature, with promising new players coming onto the scene, some bearing impressive pedigrees. We've also seen problems arise, as these companies begin to horn in on the interests of entrenched incumbents intent on defending their turf. They are also bumping up against regulatory and other institutional barriers that will have to be sorted out if some of these companies are to become formidable.

Simply put, sharing-economy companies' business model is based on providing access to goods and services rather than their outright ownership, often through peer-to-peer networks. In a nutshell, these companies decouple consumption from economic growth. Much of what is being offered in the sharing economy is available for a price, though some of it is free.

The sharing economy is enabled by technology trends as well as some societal ones. At the core of many such companies are our GPS-enabled mobile devices that can link us with people, places, and products in real time and space — what we want, where and when we want it. That lowers the friction, as the online gurus put it, making it more convenient to borrow or share things instead of having to buy them. Social media, which connects friends and strangers, further reduces friction by connecting suppliers and consumers easily and quickly.

Car sharing (like Zipcar) is the prototypical sharing-economy example: You get access to transportation — often in and around your neighborhood — without actually owning a vehicle.

A more recent example is yerdle, a platform for sharing stuff with your friends, created by the former heads of sustainability at Walmart and at Saatchi & Saatchi. Yerdle

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Most of these companies weren't created for sustainability reasons; few sharing-economy companies self-identify as green businesses, at least for marketing purposes.

is a platform for giving away things away to people you know, or getting things you need from them. By signing up, you access your Facebook network and are immediately connected to all that they have to offer.

Like a lot of online start-ups, yerdle's revenue model isn't obvious — how do you make money helping people give stuff away? The answer: services, such as moving and courier, as well as facilitating sales of items too precious to give away, or items sold outside your network. As with other sharing-economy companies, yerdle emphasizes experience as much as transactions; that is, it aims to create or strengthen communities, which is how other online platforms have monetized their offerings. (Facebook, for example.)

The number of sharing-economy companies is staggering. A website maintained by Lisa Gansky, author of *The Mesh*, which chronicles the phenomenon, lists around 8,000 such companies spanning 25 categories in more than 130 countries — from farming to fashion to finance to food.

As we said, most of these companies weren't created for sustainability reasons; few sharing-economy companies self-identify as green businesses, at least for marketing purposes (yerdle, despite its co-founders' sustainability credentials, calls itself "a magical place where people share things with friends"), but they're what sustainability should be about: increasing efficiency, improving access, reducing consumption and waste, saving money, connecting people, creating or strengthening communities.

And some of these companies will disrupt huge industries. Consider car-sharing. Thanks to Zipcar, RelayRides and their ilk, Millennials — young adults aged 18 to 34 — accounted for nearly 30 percent fewer new cars bought in 2011 than in 2007, according to Edmunds.com. A Zipcar study found 78 percent of Millennials saying owning a car is difficult due to high costs of gas and maintenance and, in some places, parking.

If you're Ford, GM, Toyota, or Daimler, how do you ensure your long-term success in a world where fewer people want to own your products but still want access to them? By getting into the business themselves, either by launching such services themselves or getting in

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via partnerships, investments, and other link-ups.

We'll be seeing other large incumbents getting into the sharing economy in the near future. For example, major retailers like Walmart and Home Depot are expected to get in on the action, becoming the neighborhood hubs were people can rent or borrow (or lend) cars, tools, even clothing. Learning from the fates of bookstores, music stores, and video stores, these retailers understand that they must change or die.

Some incumbents are putting up fights, as they see potential loss of business. For example, taxi regulators in some U.S. cities want to shut down Uber, a mobile car-service start-up that enables people to find a black limo car ride simply by pressing a button on a mobile app. GPS-equipped drivers enable riders to see which car will pick them up and see exactly where that car is. And then there's SideCar, a real-time ridesharing community that connects drivers with spare seats in their car to passengers who need instant rides across the city.

Taxi commissions — which operate as monopolies in some cities — view these services as a threat, but they're not the only hurdles. So are insurance companies and their regulators, which are confronted with new and different risks in a world where anyone can be a limo driver. (Car-sharing faces similar challenges: If someone borrows your car and gets into an accident, who's liable?) Many of these start-ups will find themselves slogging through insurance regulations, jurisdiction by jurisdiction, just to be in business.

It's not just cars. New York City is cracking down on residents renting out rooms via services like Airbnb, arguing short-term rentals violate state laws against renting out rooms or apartments for less than 30 days.

These are solvable problems that many new technologies encounter, though it make take time to sort through them, and some start-ups won't be able to hang on. We saw this with music downloading: Some of the earliest companies failed, making room for successes. But the lag time can be short: The interval between Napster's demise and iTunes' cross-platform availability was less than a year.

It may be too early to declare that "sharing is the new owning," but for a wide range of industries, it may be time to face the music. E

SOME INCUMBENTS ARE PUTTING UP FIGHTS, AS THEY SEE POTENTIAL LOSS OF BUSINESS. FOR EXAMPLE, TAXI COMMISSIONS, WHICH OPERATE AS MONOPOLIES IN SOME CITIES, VIEW RIDE-SHARING AS A THREAT.

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ACCELERATE

At VERGE 12, San Francisco, ten share-economy companies competed before a panel of judges. The winner: Scoot Networks, a Zipcar-style sharing network for electric scooters.

5 | COMMERCE GETS RELOCALIZED

For more than a decade, critics have been railing against economic globalization, in which a rapid increase in the international movement of goods, services, technologies and capital would strip local firms and their communities of jobs, revenue, and security. Cheaper labor forces not only would move operations outside of developed economies but would also create a homogenized world filled with chain stores and strip malls that would decimate cities and suburbs.

That dystopian vision failed to materialize, though not completely: Many urban cores in the United States have fallen into disarray, and you can find big-box stores and fast-food chains practically wherever you travel around the planet.

A confluence of forces is reversing some of those trends, revitalizing local commerce and communities. This is not necessarily a new trend — there have been signs of it for years — but we're seeing a growing snowball of activity that's encouraging.

Some of this can be found in the sharing economy, where hyperlocalized, peer-to-peer sharing of local goods and experiences is made frictionless and is highly valued. Information technology is playing a key role, not just in the sharing part, but also in Web and mobile search technology, where results are increasingly skewed to wherever you are at the moment. Thanks to localized search technologies and services such as Yelp and AOL's Patch, it's no longer the biggest players that reach the top of the search list when you look for, say, appliance repair; you are just as likely to get the closest dealer, whatever the size, along with reviews from customers. That might give you trust and confidence to patronize the small local shop instead of the big national brand.

Moreover, there are growing networks to support local sustainability-minded businesses, from Auckland to Arkansas, whose principal goal is to promote locally owned commerce. In North America, many of these are affiliated with BALLE, a nonprofit alliance that envisions a "global system of human-scale, interconnected local economies that function in harmony with local ecosystems to meet the basic needs of all people, support just and democratic societies, and foster joyful community life." BALLE promotes the idea of "localism" — communities strengthened by local economies using regional resources, "reconnecting eaters with farmers, investors with entrepreneurs, and business owners with the communities and natural places on which they depend."

It may sound Utopian, or even quaint, but it's also pragmatic, linked to risk and resilience in an age of uncertain climate and economic trends. As the nonprofit Post-Carbon Institute puts it: "Relocalization is a strategy to build societies based on the local production of food,

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ONE OPEN QUESTION IS HOW MUCH VALUE BIG BUSINESS SEES IN ALTERNATIVE CURRENCIES, HYPERLOCAL BUSINESS, AND STRENGTHENING LOCAL ECONOMIES.

energy and goods, and the local development of currency, governance and culture. The main goals of relocalization are to increase community energy security, to strengthen local economies, and to improve environmental conditions and social equity."

In some cases, communities are issuing their own currencies — alternatives to the dollar (or peso or pound) designed to support local commerce. There are BerkShares, used in the Berkshire region of Massachusetts, a tool for community empowerment, enabling merchants and consumers to trade for goods and services locally. There were more than 3 million BerkShares, worth about 95 cents each, in circulation in 2012, and they are accepted at many local banks. There's the CHE in Portland, Oregon; Bay Bucks in Traverse City, Michigan; Trade Dollars in Fayetteville, Arkansas. There's also Eco-Money in Japan, the Eco-Pesa in Kenya, the Crédito in Argentina, Artmoney in Denmark, the Ilios in Greece, and dozens of others. In the Mexican state of Veracruz, the tiny town of Espinal has created a local currency called "tumin" ("money" in the local Totonac language). Each tumin is the equivalent of one Mexican peso, but it can only be spent in the region.

Some of these currencies have been around for years — BerkShares launched in 2006 — but there are signs of growth. While there were only about 20 active community currencies in the United States in 2009, there has been a recent resurgence, with at least a dozen communities developing their own currencies in the past couple of years, according to Loren Gatch, a professor of political science at the University of Central Oklahoma. Last year, lawmakers in more than 10 U.S. states, including Virginia, Georgia, South Carolina, Idaho and Tennessee, circulated proposals to introduce alternative currencies — many of which would be issued in the form of gold or silver coins. (The U.S. Constitution prohibits individual states from printing and issuing paper money as legal tender, but coins are okay.)

One open question is the role of big business in all this — how much value they see in alternative currencies, hyperlocal business, and strengthening local economies. One place they may play a key role is in "reshoring," the U.S.-centric term for bringing well-paying manufacturing jobs back to the United States by helping companies "more accurately assess their total cost of offshoring, and shift collective thinking from 'offshoring is cheaper' to 'local reduces the total cost of ownership,'" in the words of the Reshoring Initiative. Apple, ever the trend-setter, made a small splash in 2012 when it announced it would invest $100 million in manufacturing some of its Mac computers (via third parties) in the United States. It was a shrewd move for the quintessential "designed in America, made in China" company. Whether it sparks a U.S. manufacturing renaissance remains to be seen.

Equally significant is an initiative led by Zappos CEO Tony Hsieh to revitalize downtown Las Vegas, one of America's more depressed urban centers. Hsieh is moving his company's headquarters from a nearby suburb into the old Las Vegas City Hall, and participating in a consortium to invest $350 million in Downtown Project, with the goal of transforming Las Vegas "into the most community-focused large city in the world." The strategy: "inspiring and empowering people to follow their passions to create a vibrant, connected urban core." It's an idea that's so audacious and counterintuitive that it just might work. E

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6 | M2M ENABLES THE RISE OF GREENER MACHINES

Science fiction writers and fear-mongering pundits have long railed against the "rise of the machines" — a point at which large swaths of daily life would take place without human intervention, machines interacting with other machines. That future has played out in many ways, though it's invisible to most of us and lacks the sci-fi drama many envisioned. And it is emerging as a key enabler for radical efficiency and corporate sustainability efforts.

The world of machine-to-machine, or M2M, communications is growing rapidly, largely behind the scenes. It is linked to what's been called the "Internet of Things," a vast and exploding network of objects embedded with sensors and able to communicate with one another, take measurements and make decisions — everything from light switches to refrigerators, utility meters to parking spaces. Already, there are an estimated 10 billion connected devices worldwide, compared to "only" about 2.5 billion Web-connected PCs and phones. Ericsson CEO Hans Vestberg, in a recent annual report, estimated there could be 50 billion connected devices by 2020. According to ABI Research, more than 5 billion wireless connectivity chips will ship in 2013 alone. Gartner, the leading information technology research and advisory company, recently included the Internet of Things on its list of the top 10 strategic technology trends, higher on the list than enterprise app stores and cloud computing.

What does all this have to do with sustainability? Lots.

For example, the management of buildings and facilities is being revolutionized by M2M-based systems in a range of applications, including security, energy efficiency, predictive maintenance, and asset management. M2M is a key technology in demand response, a set of technologies designed to manage customer consumption of electricity in response to supply conditions — by having devices automatically power down during periods of high energy demand, or ramp up on-site generation in response to market prices, for example. Demand response is a critical component of the smart grid, the network of information and communications technology that work in automated fashion to improve the efficiency, reliability, economics, and sustainability of the production and distribution of electricity.

In an M2M world, everything that can be connected, will be. Already, commercial and industrial buildings are being harnessed with thousands of sensors able to monitor, control and optimize pretty much everything down to the component level — a plug, light switch, heating and cooling vent, data terminal, refrigeration unit, etc. — increasingly making predictive "decisions" that anticipate energy needs without human intervention.

Microsoft has been deploying some of these technologies at its headquarters campus in Redmond, Washington,

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Winkler on the face of Big Data

Watch Now

M2M is seen as a key enabling technology in improving the efficiency of everything from agriculture to health care to supply chains to traffic flow.

In an M2M world, everything that can be connected, will be.

using it as a living lab to explore M2M's potential. In 2011, it rolled out an initial pilot involving 13 buildings (out of 118 buildings it uses in Redmond). A daily data feed automatically keeps track of building occupancy and other key parameters. Weather and utility information is gathered from third-party providers. The system can predict building energy needs in near-real time, adjusting continually to optimize energy use. Moreover, the system automatically detects faults that wouldn't otherwise show up until the building was inspected, about once every five years. Microsoft has found millions of dollars in savings, and quick paybacks — in a region with some of the mildest weather and lowest energy costs in the Unites States.

Transportation is another area rich with M2M possibilities. Telematics and in-vehicle entertainment is one area of focus. Recent examples include Ford, which teamed with AT&T to embed Ford Focus Electric vehicles with a wireless connection and dedicated app that includes the ability for the owner to monitor and control vehicle charge settings, plan single- or multiple-stop journeys, locate charging stations, pre-heat or cool the car. Last year, GM's OnStar division partnered with Spain's Telefónica to provide M2M connectivity to General Motors' vehicles outside North America.

Wireless-enabled fleet management and telemetrics help trucking and logistics companies cut the number of empty or underutilized trucks on the road. For instance, better fleet management through wireless technology could cut the amount of time that trucks idle, reducing fuel costs per truck by $3,600 annually, according to a 2011 report by BSR and CTIA, The Wireless Association.

There's much more. M2M is seen as a key enabling technology in improving efficiencies in everything from agriculture to health care to supply chains to traffic flow.

All of which is why some of the world's largest companies see vast opportunities in M2M to help customers dramatically reduce their energy use, improve reliability, reduce waste, and increase efficiency.

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GENERAL ELECTRIC BELIEVES THAT CONNECTING DEVICES TO THE INDUSTRIAL INTERNET COULD BOOST GLOBAL GDP BY $15 TRILLION BY 2030 — ROUGHLY THE SIZE OF TODAY'S U.S. ECONOMY.

Many of the world's largest telecom companies are making big bets in M2M technologies. Sprint, for example, has a major division focused on this, and has formed a wide range of partnerships, including providing comprehensive wireless connectivity to thousands of residential and commercial electric vehicle charging stations. In 2012 it partnered with Orange Business Services, a division of France Telecom, to expand its M2M reach to 180 countries.

Another big vote of confidence in M2M and the Internet of Things came from General Electric, which in 2012 launched a campaign around what it called the "Industrial Internet" — about how "the deeper meshing of the digital world with the world of machines holds the potential to bring about profound transformation to global industry, and in turn to many aspects of daily life, including the way many of us do our jobs." That's no small statement from a company with $147 billion in annual revenue.

GE sees this as a very big business opportunity, forecasting that connecting devices to the Industrial Internet could boost global GDP by $15 trillion by 2030 — roughly the size of today's U.S. economy. The savings come from such things as lower fuel and energy costs; better-performing and longer-lived physical assets, like airplanes and power plants; and lower-cost healthcare. The authors claim that in the U.S. alone the Industrial Internet could boost average incomes by 25 to 40 percent over the next 20 years "and lift growth back to levels not seen since the late 1990s."

It's still early days for M2M — think the Internet circa 1996 — and there will be a lot of ups and downs between here and GE's forecasts. But there's no question M2M has the potential to reduce energy use and greenhouse gas emissions far more than any government mandates ever could. E

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7 | SUSTAINABILITY GOES APP CRAZY

As data increasingly spews from everything — buildings, vehicles, transit systems, cash registers, and potentially every light fixture, switch, plug, and machine — there's a growing opportunity to capture it and make it useful for consumers and professionals. Some of it is making its way into apps.

App, of course, is short for "application software." As anyone with a smartphone, tablet or PC knows, apps come in a vast assortment of flavors: utilities, games, social networking, shopping, productivity, communications, remote monitoring, and more. Lots more.

The growth of apps mirrors some of sustainability's other technology trends — the sharing economy, the smart grid, machine-to-machine communications. All are about data. Big Data: unprecedented and unfathomable volumes of 1s and 0s traversing our world, informing our (and our machines') decisions about how to achieve the most with the least while addressing everyone's needs. Energy, water, waste, toxics, carbon — the future of all of these things is linked in large part to how, and how well, we can measure, track, monitor, and optimize their flows. And that's all about data, and the apps that make it useful.

In a world where the perception of clean technology is that it largely "failed" — witness the bankrupt startups and lost investments and (in the U.S., at least) the toxic political conversation that emerged about cleantech during 2012 — apps may be its saving grace. Many of the most promising startups in cleantech focus on devices and apps that enable individuals, households, businesses, and cities to use data to improve their energy and environmental footprint.

Sustainability-related apps cover the gamut of topics and audiences — and professionalism. A random sampling: greenMeter (computes your vehicle's power and fuel use, and evaluates your driving to increase efficiency), JouleBug (a social, mobile game that rewards players for reducing energy waste), AirStat.us (a free, daily air-quality alert for your city), iRecycle (access to more than 1.5 million ways to dispose of stuff), iGo Vampire Power Calculator (shows how much energy the electronics in your home use and cost), PEV4me (calculates the financial and environmental impacts of driving plug-in electric vehicles), Light Bulb Finder (shows how to switch from conventional light bulbs to energy-saving equivalents with the same fit, style and light quality), and GoodGuide (provides health, environmental, and social performance ratings for consumer products).

A number of apps take advantage of the Green Button program, launched in 2012 by California utilities but quickly championed by the White House. It standardizes the delivery of energy data from utilities to enable energy users to analyze and optimize their energy use. Green Button was designed as a catalyst to create an ecosystem for software

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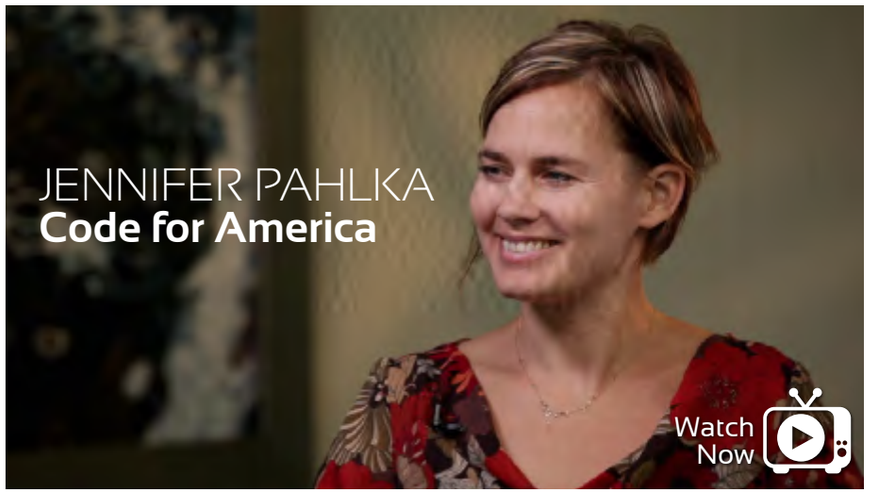
At Hack City, participants spent two days applying their information technology skill sets to challenges posed by our known resource constraints. They emerged from this design charette with new strategies (several apps and data visualizations) that generated radical efficiencies across key VERGE markets.



Code for America helps governments work better for everyone with the people and the power of the web.

developers to produce new services and products. That ecosystem seems to be emerging. Dozens of apps now exist that allow consumers and businesses to download data and interpret it in a variety of ways. Examples include VELObill, Distributed Energy Calculator, GreenSuite, and eTester.

Some of these come from big companies; Wiser EMS, for example, is a Green Button app from the North American division of Schneider Electric, the giant French electric engineering company. Another giant, Alcoa, created Aluminate, an app to facilitate recycling aluminum cans. Other apps are part of the gamification strategy of companies like Recyclebank and Opower, whose businesses focus on using Web- and mobile-based game technology to engage consumers and small businesses in being more environmentally responsible. Many of these apps come from small start-ups — so-called "Cleanweb" companies — harnessing data and apps as a profitable enterprise. Still others come from nonprofits and government agencies seeking to promote and enable environmental behaviors.

And a few emerge from the growing number of "hackathons" — events in which computer programmers, graphic designers, user-interface experts and others collaborate over a short period — typically a day or a weekend — on software projects. Hackathons are being sponsored by cities, nonprofits and for-profits, and tend to have a specific focus. Some have sustainability as a key driver.

Consider Hack City, the hackathon held during 2012 by GreenBiz Group as part of its VERGE SF conference. The weekend-long event brought together several dozen participants who self-organized into teams and went to work. Their goal was to use data sets and programming tools to create apps that could transform users' energy consumption. The data and tools for Hack City were provided by General Motors' OnStar division, Johnson Controls, and the city of San Francisco's Department of the Environment as well as the city's SFPark office. The teams competed to design apps, which at the end of the weekend went before a panel of judges who awarded cash prizes to winning teams. (You can view a brief video of the event on this page.)

And then there's Facebook, the mother of all platforms, which passed the billion-member mark during 2012. It also hired its first sustainability executive: Bill Weihl, formerly the "energy czar" at Google. Part of Weihl's mission at Facebook is to find ways to tap the company's massive network to promote environmental behaviors. Companies like Opower and Recyclebank already use Facebook's platform, but — like everything in the online world — there's almost limitless room for others.

Should Facebook and its ilk succeed in massively growing global markets for green behaviors, they will certainly rank among sustainability's biggest champions. It's still too early to assess that potential, but there's growing recognition that apps and online platforms are one potent way sustainability finally reaches the mainstream. E

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VERGE
BILL WEIHL
FACEBOOK
Why Sustainability Needs Social Media
Watch Now

Where Technology CONVERGENCE is Going

Derek Top Sr. Editor, GreenBiz Group

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The convergence of new technologies and an explosion of information-enabled products and services are creating intriguing business opportunities for sustainability. VERGE takes a systems-thinking approach encompassing the emerging role of cities and how data, IT and new platforms for third-party development disrupt the markets for energy, buildings and transportation.

Here's a preview for what's next for VERGE in 2013.

- **New Platforms to Accelerate Energy Efficiency.** Information technology is redefining the ways commercial and industrial buildings operate. By offering the ability to monitor systems with real-time data, and to track and analyze energy use, a host of web-based platforms allow facilities managers and building engineers to maximize efficiency in buildings old and new. But with some 200 energy management tools and software available, facilities managers face a daunting task to navigate a crowded market. While the industry is far from seeing connected, intelligent buildings as the norm, the emerging ecosystem of energy-efficient platforms provides a glimpse into the future of building efficiency.

- **Cities Push Data Transparency for Energy Use.** A spate of cities are now mandating that owners of large commercial buildings measure and release records of their annual energy usage. These laws are designed to bring greater transparency to the commercial real estate market, incentivize landlords to develop energy-efficiency and retrofit strategies, and help potential tenants understand a building's energy consumption. A number of U.S. cities are leading the way with energy disclosure laws, including New York City, Seattle, Philadelphia, Washington D.C., Austin, and San Francisco — a list that is sure to grow in 2013.

- **Fleets and Car-Sharing Drive EV Growth.** With the launch of mass-marketed electric vehicles just two years ago, there's been a great detail of anticipation in the growth of EVs. While there certainly has been some uptake — a nearly 200 percent increase in sales of plug-in vehicles in the United States in 2012, with 14 models on the market today — the excitement has waned a bit. Still, we're likely to see modest growth as municipalities and businesses modernize and electrify their fleets. Example: Indianapolis, Ind., committed to shift all its light duty vehicles to plug-ins and hybrids by 2025. Another growth driver is the introduction of EV car-sharing services. Two prominent automakers offering new car-sharing services include BMW, with its all-electric Active E fleet in San Francisco, and Daimler's Car2Go service in San Diego. By collaborating with cities on the buildout of charging infrastructures and giving consumers a chance to "test drive" an electric vehicle, these services — and new ones sure to sprout in 2013 — will drive the growth of EVs.

- **Green Button Turns 1.** Green Button — a feature to let consumers and businesses download their own detailed energy usage – has been adopted by 33 utilities in the U.S after launching in January 2012. But so far only seven utilities have implemented programs to take advantage of the data, which is seen as a catalyst and platform for app developers to produce new services and products. One notable new commercial service utilizing cloud-based, energy data from Green Button is Johnson Controls' Panoptix management platform, intended to help commercial building owners and operators save energy and money. Among the third-party developers participating tapping Green Button data for Panoptix are First Fuel, EnergyAi, Lucid and EnergyPoints.

- **Cities 2.0 and Economic Revitalization.** In the 2012 report "Citystates," authored by SustainAbility, one message resonated: "Business should view cities as a crucial frame through which to understand and pursue sustainability." Cities are increasingly the place to leverage gains in energy efficiencies, scale sustainability goals and develop more informed, revitalized communities. At our 2012 VERGE event in San Francisco, Zappos CEO Tony Hsieh presented his company's plans to transform downtown Las Vegas into the "most community-focused large city in the world." Hsieh highlighted current efforts to bring technology, education and small business development together. We'll see open data and converging technologies as additional enablers for municipal governments to work with businesses and citizens to develop "cities 2.0."

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8 | MATERIALITY BECOMES MATERIAL FOR INVESTORS

For more than 20 years, the Holy Grail for sustainable business has been to engage investors. If only they could understand the competitive advantage and reduced risk afforded companies that manage their operations, people and supply chains through the lens of environmental and social well-being — well, the theory goes, investors would vote with their dollars and companies would have no choice but to adjust their strategy and operations to align with investor interests.

Reality hasn't been so simple. Few investors — particularly the large pension funds and other institutions that can move financial markets — have viewed sustainability as a relevant investment criterion. Even when shown studies that sustainability leaders outperformed their peers on key financial indicators and ratios, including stock price, most analysts and fund managers haven't been impressed. Only hard core "socially responsible investors" hew to the theory.

But extreme weather and other business risks are upending that ambivalence. A growing corps of mainstream investment firms are coming to terms with sustainability's role in investment decisions, looking at how well companies manage these issues and insulate themselves from risks and negative outcomes. It's not yet mainstream, but it's getting closer.

That is to say: Sustainability issues are increasingly being viewed as material. The International Federation of Accountants states that information is material if its omission or misstatement could influence economic decisions on the basis of a corporation's financial statements. The most obvious impact is on a company's valuation or stock price.

European asset managers already have more than $500 million in assets under management that is carbon-optimized. Investors include the U.K.'s largest corporate pension fund, the BT Pension Scheme, with more than $161 million in a carbon-tilted passive equity index fund with markedly lower exposure to carbon and fossil fuel costs. During the first 18 months of its inception, through November 2012, the UK Equity Carbon Optimized Index Fund returned 3.42 percent in gross returns, compared with 3.06 percent for the FTSE All-Share Index. Meanwhile, the Australian superannuation fund VicSuper has invested more than $210 million in a carbon-efficient portfolio managed since 2009 by Vanguard Investments.

A variety of issues including greenhouse gas emissions, toxic ingredients in products, and reliable access to water, energy, and raw materials are increasingly seen as material risk factors that warrant scrutiny by regulators. In 2010, the U.S. Securities & Exchange Commission (SEC) issued guidance regarding companies' responsibility to disclose material risks related to climate change. This placed sustainability directly into the realm of financial

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risk management, expanding the CFO's role in ways that would have been hard to imagine even a few years ago.

While SEC rulings are mandating reporting of material environmental, social and governance (ESG) issues in agency filings, their disclosure is typically sparse, inconsistent, and can omit large issues facing a company. By all accounts, most companies' responses to this guidance has been in the form of boilerplate language, not useful for investors. Many companies simply supplement their regulatory filings of annual reports and 10-Ks by appending their latest corporate sustainability report.

Some growing forces could change that.

One is the Sustainability Accounting Standards Board, or SASB, which entered the field during 2012 with the ambitious goal of establishing a reporting framework of ESG issues considered material for investors in public companies, at least in the United States. SASB aims to create and disseminate "industry-specific accounting standards for material sustainability issues for use by U.S. publicly listed corporations and their investors." SASB's goal is to have its standards incorporated into SEC rules for all publicly held companies, governing the specific kinds of sustainability information companies must disclose, how to disclose it. (Disclosure: GreenBiz Executive Editor Joel Makower serves as an unpaid advisor to SASB.)

The model for SASB is FASB — the Financial Accounting Standards Board, set up 40 years ago to establish and improve standards of financial accounting and reporting. FASB's standards, which govern the preparation of financial reports, are officially recognized as authoritative by the SEC. SASB is in the process of developing standards for 89 industries in 10 sectors suitable for use in 10-K forms (along with its counterpart, 20-F, for "foreign private issuers" that have listed equity shares on U.S. exchanges).

Another new initiative aimed at transforming corporate disclosures is the Global Initiative for Sustainability Ratings. A joint initiative of Ceres and the Tellus Institute, GISR is creating a standard (to be launched in May 2013) for sustainability ratings that aims to "accelerate the infusion of sustainability content into mainstream financial markets," and "steer capital toward companies that are implementing sustainability into strategy, practices, products and services, and demonstrating concrete, measurable outcomes by doing so." It is the latest effort to create

MOST COMPANIES' SUSTAINABILITY DISCLOSURES ARE IN THE FORM OF BOILERPLATE LANGUAGE NOT USEFUL FOR INVESTORS. SOME SIMPLY SUPPLEMENT FILINGS BY APPENDING THEIR LATEST SUSTAINABILITY REPORT.

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a corporate-level standard for sustainability (although, in this case, GISR is creating a standard for other standards). GISR's collaboration partners include SASB and the Global Reporting Initiative.

MORE THAN 300,000 BLOOMBERG TERMINALS NOW MAKE SUSTAINABILITY DATA REDILY AVAILABLE TO INVESTORS.

Operating at an even larger scale is the Principles for Responsible Investment (PRI) initiative, an international network of investors headed by the United Nations, working together to put six principles into practice. Its goal is "to understand the implications of sustainability for investors and support signatories to incorporate these issues into their investment decision-making and ownership practices." The combined assets under management for the initiative's signatories are greater than $32 trillion.

True, it's a long way from signing principles to actually making them operational. Even then, it's often unclear whether these principles, standards, and other frameworks apply to an investor's entire portfolio, not just its "socially responsible" subset — typically only a sliver of the entire pie.

Still, getting sustainability-related information to investors is getting easier, thanks in large part to information service providers like Bloomberg. Bloomberg terminals, the computer screens found at the fingertips of nearly every investment professional, offer a growing amount of ESG data. As of the end of 2012, there were about 315,000 Bloomberg terminals worldwide that can access ESG information. ESG data is available for more than 5,500 companies (though only comprehensive data on about 3,000 companies). The number of users of ESG data by Bloomberg customers grew 30 percent during 2012 over 2011.

Put it altogether — the terminals, the global push toward standardizing information relevant to investors, and the growing interest in ESG disclosure by regulatory bodies — and there's an unmistakable forward march underway. It will be a herculean task to break through the business-as-usual armor that has insulated sustainability from most money managers. But there are a few cracks in that armor, and as they grow and deepen, companies will find themselves exposed to new questions and concerns on the part of shareholders and stakeholders. E

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9 | COMPANIES **LOOK PAST** THEIR **GOALS**

An interesting challenge has emerged for companies that have been focusing on sustainability for a half decade or more: What do they do after they've met their goals?

Of course, no company of any size has yet claimed to be sustainable, and is therefore "done." But a growing number of corporations have achieved or exceeded what they set out to do a few years back and now must decide what to do next. It's a pivotal moment for these companies, and for countless others to follow.

Indeed, we've seen a steady stream of companies trumpeting their overachievements in recent years. SC Johnson polished off its goal to reduce total greenhouse gas emissions by 8 percent from 2005 levels. Supermarket chain Safeway cracked its goal set in 2010 to increase cage-free egg sales from 6 to 12 percent within two years; more than 15 percent of eggs sales are now cage-free. Shipping and logistics firm UPS rolled past four of the seven key sustainability goals it established for 2011. Darden Restaurants, parent to Red Lobster, clawed its way past its 2015 goal of reducing restaurant-wide water consumption by 15 percent. And British consumer packaged goods giant Reckitt Benckiser reported in 2012 that it had scrubbed 20 percent off its total carbon footprint per use, eight years ahead of its goal.

What to think about these things? Should we celebrate these overachievements or criticize the companies for aiming too low? After all, these announcements are essentially self-graded report cards for achievements that, at the end of the day, amount to "doing less bad."

How to view them is a quandary faced by watchdog groups, not to mention journalists and bloggers that follow these things, who often can't decide whether to conclude that the glass is half full or half empty.

In reality, the glass is simply too small. Most corporate goals and achievements are insufficient to address the problems at hand — climate change, resource depletion, and species loss, among others — at the scale and scope required to reverse current trends.

More important is how the companies themselves view their accomplishments — and what they do next. A sustainability executive from one U.S. consumer products company recently described his company's challenge. The firm was four years into a six-year set of commitments, and already had exceeded three of the four goals. What to do, he asked? "If we hold to the original six-year goal period, it takes pressure off the organization to continue to improve on the three metrics they have already exceeded. On the other hand, one could also argue that resetting new goals early penalizes their overachievement." (The company in question ended up revising its goals two years early.)

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Overachievement or not, many companies will find themselves facing new questions about how high to set the bar going forward. Do they take on what they know they can achieve, or create ambitious (and risky) stretch goals? Where's the sweet spot between goals that will move the needle and those that won't come back to bite them if they underperform?

A few companies have set bold, audacious goals, even if they don't know exactly how to reach them. Walmart made some head-turning commitments in 2005, including being 100 percent powered by renewable energy, producing zero waste and selling products that sustain people and the environment. But when the company set actual targets and timetables, achieving them proved tough. Example: Walmart said in 2010 it would eliminate 20 million metric tons of greenhouse gas emissions from its supply chain by the end of 2015. In fact, the company has reduced the energy use of its stores built before 2005 by an average of 10 percent, eliminating some 1.5 million metric tons of carbon-dioxide annually, but the addition of new stores have canceled out those improvements, adding at least 3.5 million metric tons of yearly greenhouse gas emissions, according to a 2012 report by the Institute for Local Self Reliance. Simply put, they're going in the wrong direction.

Some companies seem to be figuring this out. Dow Chemical, for instance, is working on its third set of sustainability goals. In 1996, the company produced a set of 10-year goals that led to Dow investing $1 billion in environmentally beneficial products, including solar shingles and advanced battery technologies, for which it has achieved a $5 billion return. It set its second set of 10-year goals in 2006, making a commitment that by 2015 it would get 10 percent of its sales from "sustainable chemistry," maintain greenhouse gases below 2006 levels, and reduce energy intensity 25 percent from 2006 levels. Dow is now developing its next-gen goals, to begin in 2016, with the aim of ensuring the viability of the company for the next half-century.

That sounds about right. As more companies look at their current and next set of goals and commitments, they would do well to hew to Dow's mix of goals that lead not just to reducing environmental harm, but to creating solutions that help customers reach their sustainability goals, too. E

A FEW COMPANIES HAVE SET BOLD, AUDACIOUS GOALS, EVEN IF THEY DON'T KNOW EXACTLY HOW TO REACH THEM. BUT WHEN THEY SET ACTUAL TARGETS AND TIMETABLES, ACHIEVING THEM CAN PROVE TOUGH.

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10 | PEAK SUSTAINABILITY THREATENS CORPORATE PROGRESS

As much activity as there is in the sustainable business arena — all the goals, commitments, and achievements that take place over the course of a typical year — there's a disturbing trend to report: It appears the wave of major companies hiring their first full-time sustainability executives crested long ago. That's the takeaway from GreenBiz's 2013 "State of the Profession" report, which tracks the salaries, duties, and trends of sustainability executives in mainstream companies.

This may seem counterintuitive. After all, the number of companies engaging in sustainability continues to grow along with their ambitions and goals. There are more companies doing more things to reduce their impacts and improve the sustainability profile of their operations and outputs.

But if hiring a senior executive to champion and coordinate sustainability efforts fulltime is a leading indicator of future efforts, there's a case to be made that such efforts may have plateaued.

How do we figure? When GreenBiz surveyed the 4,000-plus members of the GreenBiz Intelligence Panel in mid 2012 — three-fourths from companies with annual revenue greater than $1 billion — we asked "What year was the first full-time environmental sustainability position created by your organization?" The results formed a classic bell curve, beginning to rise around 2000, peaking in 2008, when 47 companies reported making their first full-time sustainability hire, then declining to the point that the number of new sustainability executive positions created in 2012 (9 companies) roughly matched the level in 2003 (8 companies).

None of this is to undermine the number of companies that have dug in, or even doubled down, on their sustainability efforts. We see them every day. But could it be that pretty much everyone who's coming to this party has already arrived?

Perhaps. But there are countervailing trends. One is that sustainability has become embedded inside companies. In a growing number of large companies, the locus of power when it comes to sustainability sits outside the sustainability office. Instead, it can be found in purchasing, operations, facilities, fleets, energy, real estate, even human resources. As sustainability becomes increasingly woven into the corporate fabric, companies may see less need for a chief sustainability officer.

Consider what happened to quality. In the 1980s and early 1990s, there was much ado in the business world about "total quality management" or TQM. At the time, Japanese manufacturing companies were growing quickly on the global scene while traditional manufacturing economies — like the United States — were losing ground. As Japan

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AS SUSTAINABILITY BECOMES INCREASINGLY WOVEN INTO THE CORPORATE FABRIC, SOME COMPANIES MAY SEE LESS NEED FOR A CHIEF SUSTAINABILITY OFFICER.

manufacturing took market share from other countries, the notion of TQM took off. Seemingly overnight, there were books, conferences, and magazines on the topic. The Malcolm Baldrige National Quality Award was established by the U.S. Congress in 1987. Nearly everyone, it seemed, was a quality consultant. Companies elevated quality experts to the highest ranks of senior management. Many reported to a vice president of quality.

You don't hear much about quality these days, though it's hardly gone away. It has become inextricably embedded into modern manufacturing. Indeed, it has moved beyond the manufacturing sector into such areas as service, healthcare, education and government. Where quality was a marketing message a quarter century ago, it's simply a customer expectation today.

The parallel to sustainability should be obvious. As sustainability increasingly is recognized as strategic to business success, it is becoming part of everyday business, no more special than customer relations, employee satisfaction or — well, quality. Where it once seemed a potent marketing message, it increasingly is a customer — and societal — expectation. In that regard, it becomes part of everyone's job.

But the parallel to quality has its limits: sustainability relates to every aspect of company operations, not just manufacturing or customer service. It's not a simple set of metrics you can use, like defect rates or customer satisfaction. Customer and societal expectations around sustainability continue to rise in lockstep with the state of the art; yesterday's best practice is today's business as usual. And the techniques and technologies that enable companies to achieve sustainability excellence are still unfolding. In this dynamic environment, it's hard to succeed at sustainability without someone leading the charge.

In that light, the declining growth of fulltime corporate sustainability execs is concerning. Companies that have demonstrated leadership in sustainability all have a senior executive whose fulltime job it is to ensure programs are being conducted as effectively and efficiently as possible. It simply doesn't happen any other way.

We're not entirely clear why we seemed to have reached Peak Sustainability in 2009. Perhaps it was the recession, where sustainability was seen as an unaffordable luxury. Or maybe it's because companies believe they're already doing all that needs to be done.

It's important to note that Peak Sustainability is different from Peak Oil (or Water or other things) in at least one obvious dimension: physical resources are far different from business trends. We've seen corporate sustainability unfold in waves, with continuing peaks and valleys. We fully expect corporate sustainability, unlike oil, to rebound in the near future. E

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Three Trends SHAPING the Profession in 2013

John Davies VP & Sr. Analyst, GreenBiz Group

The executives leading sustainability efforts at large companies occupy one of the newest positions in management. For the past three years we've taken a look at how much they make, where they work, and what they do as we conducted an annual salary survey of our 3,000-member GreenBiz Intelligence Panel.

This year we expanded our research, looking more at how sustainability professionals got their positions and where they might be going. In our 2013 State of the Profession report, we look at what it means to have a career in sustainability. In addition to the "peak sustainability" trend, here is what else we found.

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- **Multiple Ways Toward Early Days.** In our most recent survey, we asked survey respondents how many years they've worked on sustainability within their present companies. Sixty-eight percent of vice presidents and 73 percent of directors have logged fewer than six years on these efforts. That made us curious to find out where they spent their time before embarking on this shift in their careers.

  From an educational perspective, the predominant degrees were granted in business/management, engineering, and environmental studies. As to where these executives reported before working in sustainability, 21 percent moved into sustainability from the EHS organization (or added sustainability to their environmental, health and safety responsibilities) and 10 percent noted that their first job was in sustainability. No other department recorded double-digit transfers — not marketing (8 percent), communications (6 percent), or facilities management (5 percent).

- **Budgets Shrink, Teams Grow.** Sustainability is not a function overseeing a large dedicated budget. Ninety-four percent of large companies have sustainability budgets of $10 million or less. In 2011, we saw budgets increase almost across the board. In 2012, they slipped back closer to their 2010 levels.

  While budgets have stayed relatively small, the size of sustainability teams at large companies continues to grow. The percentage of companies with teams of one to five members has steadily decreased between 2010 and 2012, from 54 percent to 43 percent of those surveyed. Conversely, the number of teams with six to 10 members has increased from 10 percent to 22 percent since 2010.

- **The New Convergence.** Over the past three years, we've seen a significant shift in the responsibilities and areas of functional oversight for sustainability leaders. Some vice presidents are witnessing a convergence of their responsibilities. For executives who have responsibility for at least one of the functions of environmental, health and safety (EHS) or corporate social responsibility (CSR), 44 percent have a combined responsibility for both departments. In 2010, only 24 percent had combined oversight for EHS and CSR.

  The evolution toward a broader executive role to manage a combined EHS and CSR function is elevating the strategic nature of the role of sustainability within large corporations. More and more environmental and social issues overlap across a company's extended supply chain, from raw materials through to end-of-life responsibilities for products. This increasingly requires a single point of responsibility to coordinate these important activities.

Sustainability leaders continue to be charged with a broad mandate but little direct authority. This requires them to engage employees, value-chain partners and customers in order to achieve their company's strategic goals. For those companies "doubling down" on their sustainability efforts, the role of dedicated sustainability professionals is becoming more associated with value creation and not just a cost to be managed. E

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The Index

This year, we have revamped our collection of indicators measuring corporate environmental progress to create The Index. In collaboration with Trucost, we present more than two dozen indicators looking, in aggregate, at a spectrum of company performance for 500 U.S. companies as well as 1,600 of their global counterparts. Particularly noteworthy are the indicators measuring the cost companies and their supply chains levy on natural capital.

As in past years, the story told by The Index is mixed — some measures showing progress, others less so, and many — many — of them appearing static, with insignificant changes over the five-year span we used for most of the indicators.

The infographics shown on these pages are backed by detailed data sets, as well as an explanation of the methodology. Readers of the PDF version of this report will find these in the back of this report. Readers of the interactive iPad version can simply touch the graphics to view pop-up data tables.

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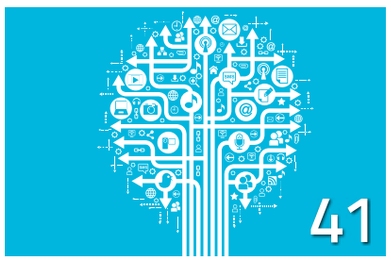
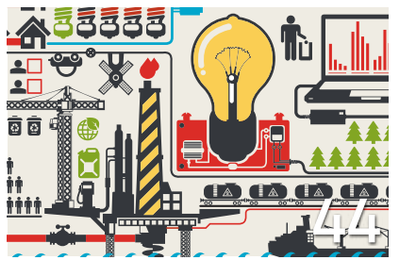
Sections

Where Impacts Happen



Natural Capital



Company Performance

Disclosure & Transparency

Corporate Leadership

WHERE IMPACTS HAPPEN

Supply chains used to be something only logistics and procurement professionals discussed. Even then, only two things really mattered: making sure suppliers shipped deliverables on a timely basis and at the lowest price. Where those products were sourced or how they travelled was of little consequence, so long as they met certain requirements. In general, supply-chain practices were largely ignored, at least until there was a problem.

That ship has sailed. Today, the term "supply chain" is key not just to a company's business performance, but also to its environmental performance, reputation, and risk profile.

For many types of companies, such as those in the apparel, consumer electronics, and food and beverage industries, the majority of their environmental and social impacts are incurred in the supply chain, as opposed to in their direct operations, such as their offices or stores. As companies are being pressed to account for those impacts, they are turning to suppliers, and suppliers' suppliers, to disclose, reduce, and monitor a vast array of information: where materials come from, under what conditions they are mined or manufactured, where and how things are made, how things are packaged and transported, and more. Such information comprises a company's environmental (and social) footprint — and all of it is subject to scrutiny by stakeholders, investors, regulators, and others.

Understanding the full environmental footprint behind products has become a critical challenge for manufacturers, retailers, and others. The challenges come from collecting reliable and comparable data from suppliers, which can number in the thousands, or even tens of thousands, and are typically spread across multiple continents. In the case of some large brands, they may not even know who all of their suppliers are, due to multiple levels of contractors and subcontractors.

And then there's the processing of all of the information in a way that is useful. New standards are emerging to track supply-chain impacts, such as the Greenhouse Gas Protocol's Corporate Value Chain accounting and reporting standard, released in 2011. Advances in accounting and reporting methodologies will enable companies to identify suppliers that matter most to reduce resource dependence and pollution. This will allow companies to review alternative suppliers or supplied goods, or selectively engage suppliers to cost-effectively manage risk and opportunity in their own supply chains and product development.

Supply chains are key not just to a company's business performance, but also to its environmental performance, reputation, and risk profile.

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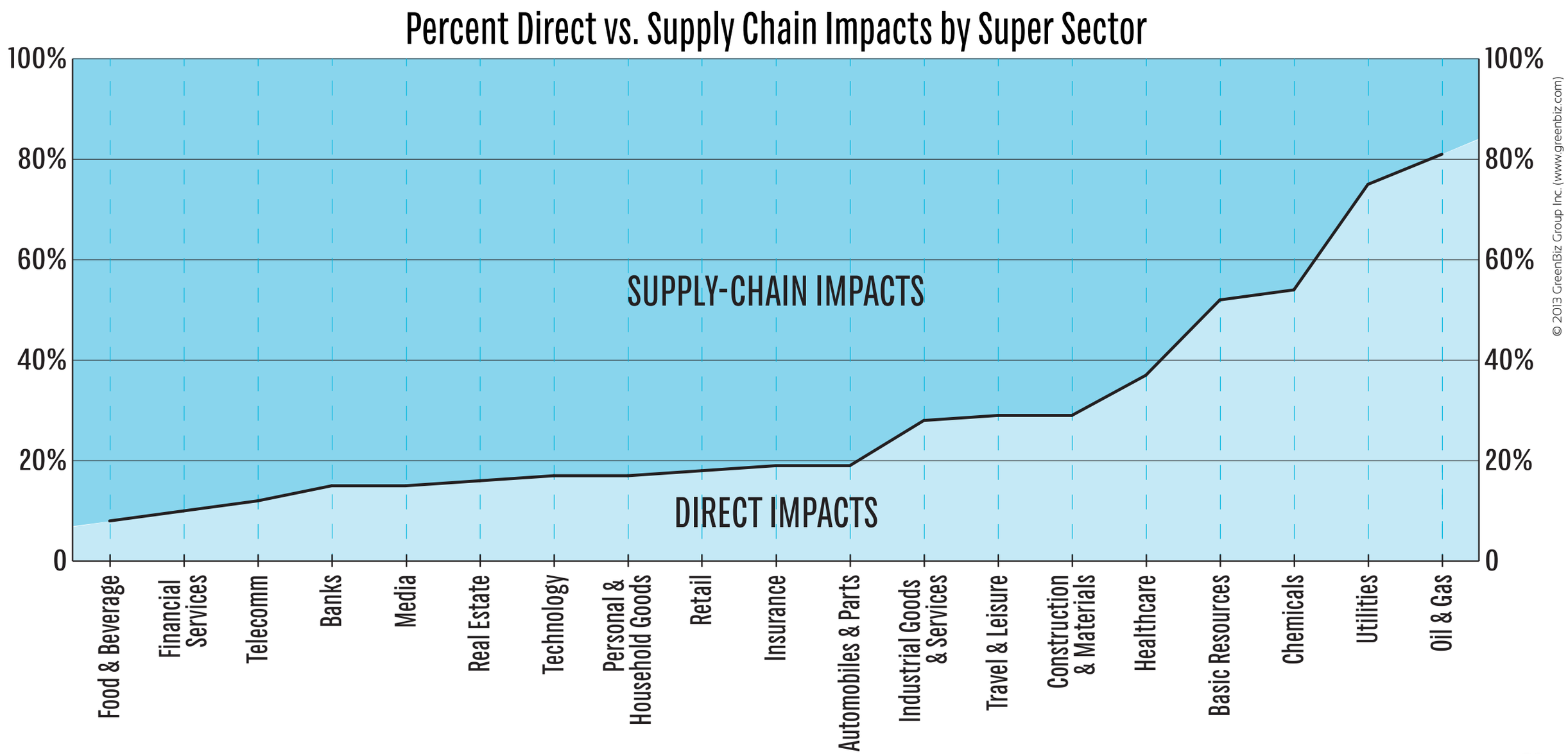
Direct vs. Supply-Chain Impacts

Looking across sectors, the portion of environmental costs incurred through direct operations and the amount incurred in the supply chain remained largely flat from 2007 to 2011. On average, American firms saw about 40 percent of environmental costs occur through direct impacts, with the supply chain accounting for 60 percent. The 40/60 ratio holds true for both our U.S. and global samples.

But these averages belie stark differences among sectors. For U.S. firms, for example, utilities have the largest portion of environmental costs in direct emissions — 81 percent — but only three sectors incur the majority of environmental costs through direct operations versus their supply chains: basic resources at 75 percent, oil and gas at 54 percent, and chemicals with 52 percent of environmental costs from direct impacts.

At the other extreme, the highest supply-chain environmental costs can be found in food and beverage companies (92 percent of impacts in supply chains), financial services (90 percent), banks (88 percent), telecommunications (85 percent), media (85 percent) and retail (83 percent).



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Top Key Performance Indicators

One thing is fairly consistent among companies around the world: their top four environmental impacts represent about 80 percent of their overall footprint. That confirms the Pareto Principle — also known as the 80-20 rule — that for many events, roughly 80 percent of the effects come from 20 percent of the causes.

In the global view of business, that 80 percent comes from

- greenhouse gas emissions of all types (41 percent);
- water abstraction — the process of taking water from any source, for irrigation, energy production, manufacturing, drinking water, or other uses (27 percent);
- acid rain and smog precursors, which include sulfur dioxide (SOx), nitrous oxides (NOx) and ammonia for acid rain, and NOx and carbon monoxide for smog (7 percent); and
- dust and particles suspended in air, microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems (5 percent).

The mix of top KPIs differs somewhat between U.S. and global companies, and between companies' direct emissions and those of their suppliers, though the 80/20 rule remains roughly intact. E

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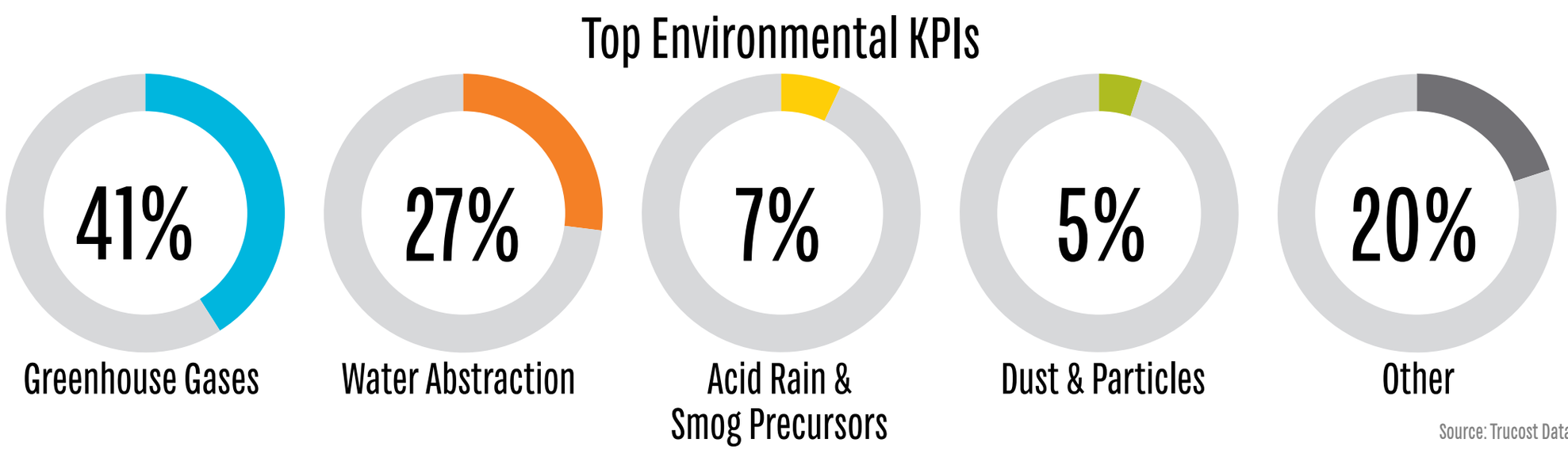


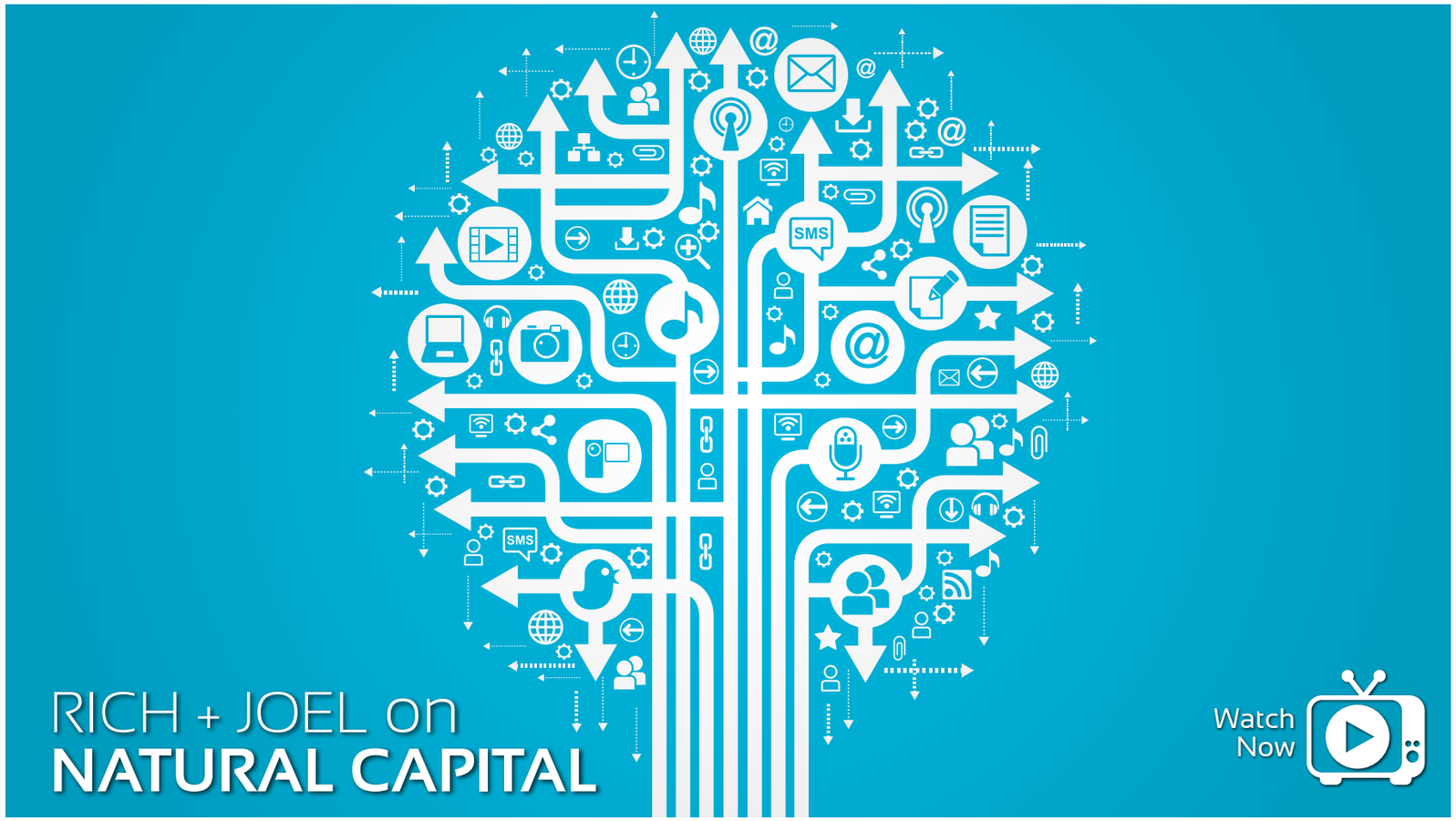
NATURAL CAPITAL

The full costs of doing business are not accounted for in financial disclosures and filings. Those statements fail to calculate externalities — the cost to people and the planet that companies unwittingly inflict. Among those are the natural capital from which companies derive their resources and into which they expel their wastes. Such costs — of polluted air and water, extracted nonrenewable resources, emissions that contribute to climate change, and more — have not traditionally been quantified in monetary terms. From a business perspective, they are considered "free."

They are not, of course. All of us — companies, communities, citizens — bear the cost of a despoiled and less-resilient world, whether through increased health costs or the planet's decreased ability to regulate climate, cleanse the air, pollinate crops, sustain fisheries, and, increasingly, protect against the ravages of extreme weather.

That does not mean, however, that these costs — that is, the natural capital businesses "spend" in the course of their business activities — cannot be quantified, tracked and more efficiently utilized.

The indicators in this section place aggregate costs on natural capital, as measured by Trucost. Arguably, doing so can ensure a company's long-term viability. As Paul



Polman, the CEO of Unilever, put it: "It's very clear that if we continue to consume key imports like food, water, and energy without thought to their long-term sustainability, then none of us will prosper. A company like Unilever will also not be successful. We cannot operate in a world that doesn't function." Polman stated in 2012 that he believes climate change impacts were already costing the company €200 million (about US$270 million) a year.

Trucost uses an environmental economics methodology to analyze the impacts of more than 4,000 companies worldwide. Its methodology standardizes and combines company-disclosed data with input-output modeling to quantify hundreds of indicators related to the resources consumed (input) to create the goods or services sold (output), as well as the externalities (pollution, emissions) related to those goods and services, both internally and throughout the supply chain. At the end, each firm's environmental impact and materiality is measured, relative to its financial performance. (See a full description of Trucost's methodology in the back of this report.)

In essence, Trucost's calculations answer the question, "If a company actually had to pay for its impacts on natural capital, what would it cost, and how would that affect the company's profitability?"

What we found is that environmental costs represent both a risk and an opportunity. As governments begin to regulate carbon and as the changing climate forces shifts in the monetary value of resources companies rely on, environmental costs will become a bigger lever for success or failure.

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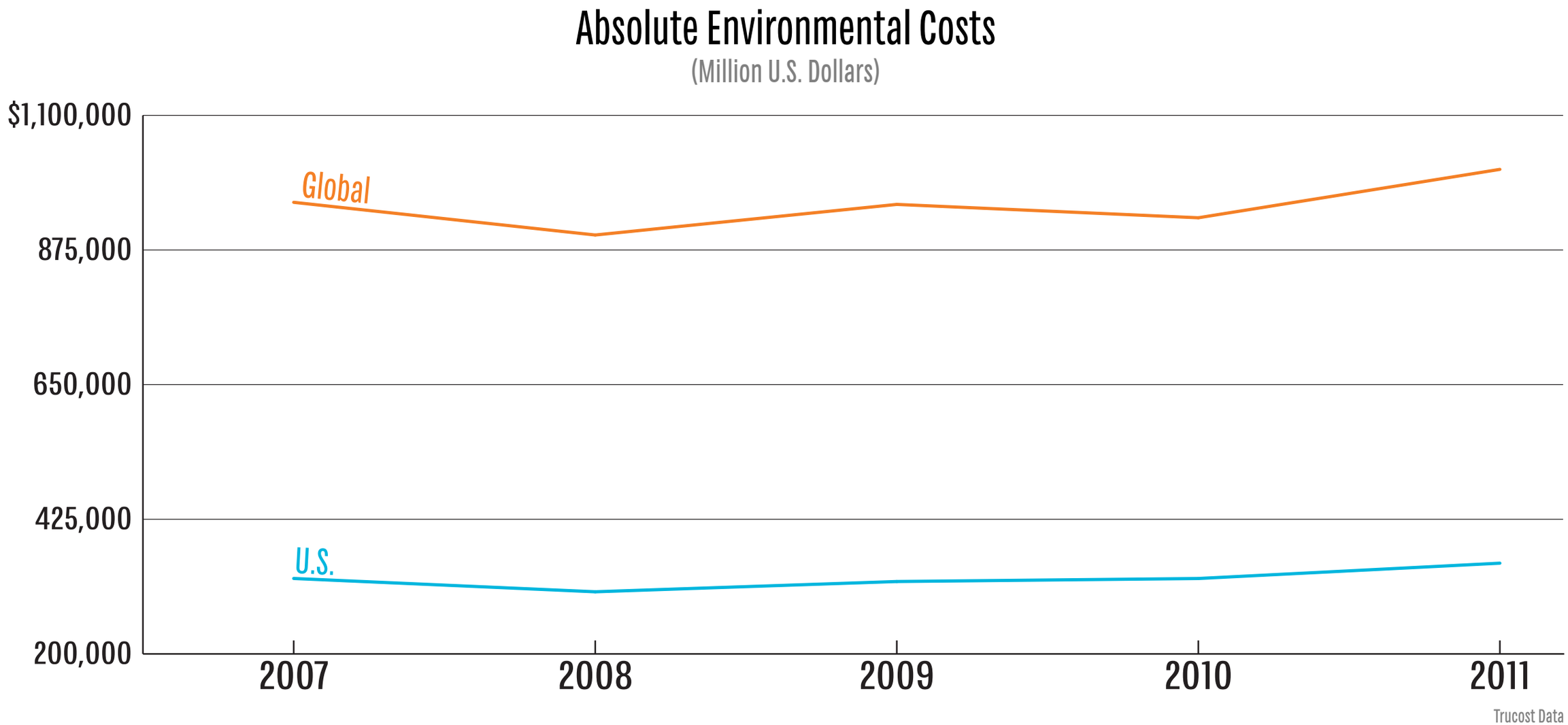
Total Environmental Costs

Absolute environmental costs are tallied by compiling companies' individual impacts, such as carbon emissions, water consumption and waste, and assigning a cost to each impact. Trucost bases these values on peer-reviewed academic research, data from a long list of national government survey data, as well as likely regulated costs based on their impact to environmental health. In addition, Trucost has the support of an international advisory panel of leading academics in the fields of economics and the environment.

The absolute environmental costs, assessed for U.S. firms as well as globally, fell between 2007 and 2008, which is likely due in part to low economic activity in the wake of the global recession. By 2011, as the engines of commerce kicked back in, absolute costs regained their 2007 levels and then some, with natural capital costs for U.S. firms reaching $351.6 billion, and $1.01 trillion for firms globally.



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Environmental Efficiency and Return on Natural Assets

These indicators, which look at natural capital costs as a percentage of total revenue, show how efficiently companies are using their natural capital over time.

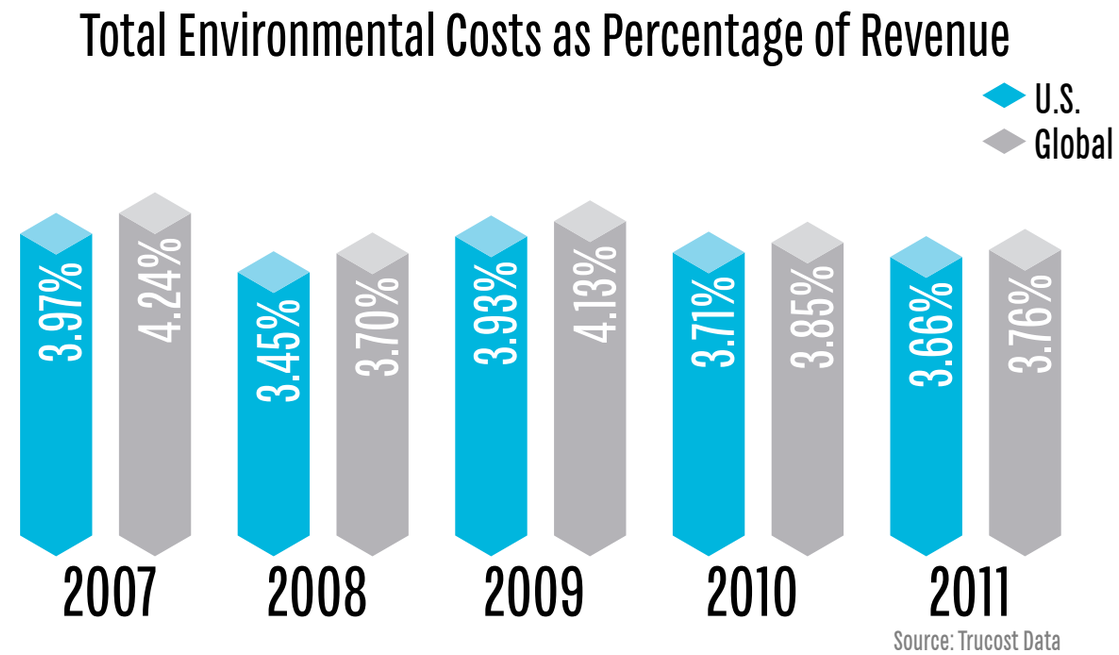
Between 2007 and 2011, this indicator moved slowly in a positive direction. In 2007, the costs for U.S. firms represented 3.97 percent of their revenue, dropping slightly to 3.66 percent in 2011. Globally, the figure fell from 4.24 percent in 2007 to 3.76 percent in 2011.

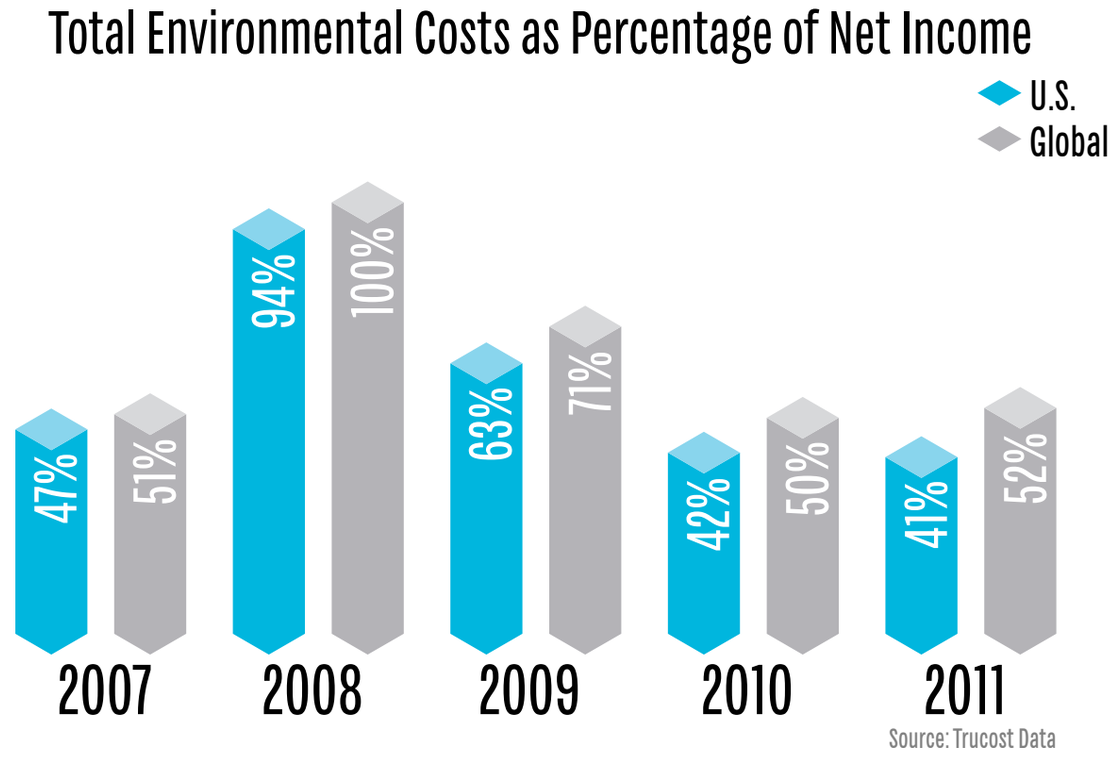
That may seem a relatively small slice of revenue, but the story takes on a different hue when looking at natural capital costs relative to profitability. On average, natural capital costs were 41 percent and 52 percent of net income for U.S. and global companies, respectively, in 2011.

The results for 2008 are an anomaly, albeit a startling one: Profits dropped 50 percent that year, while natural capital costs dropped only about 6.5 percent, worldwide. Environmental impacts dropped in 2008 as well, despite growing revenues, but this is likely linked to the skyrocketing oil prices that year (the damage to extract said oil having already been accounted for in previous years). The result is that natural capital impacts were roughly equal to company profits in the U.S. in 2008, and slightly exceeded them globally. That is to say: If companies had to account for their environmental impacts in 2008, their entire profits would have been wiped out.

As James Salo, Senior Vice President, Strategy and Research at Trucost, points out, the implications of this are significant. “Another major financial event, coming from the euro troubles or debt ceiling troubles in the U.S., combined with greater environmental risk, such as consequences of drought or devastation from events like Hurricane Sandy, and the overall consequence to companies could be devastating.”

Even discounting 2008, however, the ratio of environmental costs to profits hovered just above or below 50 percent during recent years. That makes a strong case for lowering natural capital costs through boosting efficiencies in order to reduce risks — though with just five years of data, there is no discernible trend showing that as the environmental efficiencies improve, the percent of profits at risk due to natural capital costs decreases. E





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COMPANY PERFORMANCE

Considering the demands companies are making on natural resources, we see a few areas of encouragement amid a troubling background of business as usual.

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Considering the demands companies are making on natural resources, and the direction in which these demands are headed, we see a few areas of encouragement amid a troubling background of business as usual. Energy is being used more efficiently in the U.S. and other regions, but not everywhere. Companies appear to be getting the memo that they should use less paper — and to increase the recycled content of the paper they use. But that's a bright spot. Overall, more waste is landing in landfills.

Greenhouse gas emissions are dropping, both domestically and abroad, but it's all relative: The drop is anemic when viewed in absolute terms rather than through the economic lens of intensity — emissions per unit of revenue. U.S. firms are outperforming their global counterparts by scaling back reliance on ground and surface water, but overall we are not seeing remarkable reductions in water use. Companies worldwide are damping down smokestack emissions, but the environmental costs of these emissions, especially of particulates as well as acid rain and smog precursors, are still high.

Bringing more renewable energy online should improve many of these metrics. Here, the data is encouraging. While green power is still a minute slice of the total electricity pie around the world, it has made impressive strides over the past five years. Looking ahead, the International Energy Agency sees renewables' fastest growth (not including hydropower) in onshore wind, bioenergy and solar photovoltaics, predicting a 14 percent growth for those technologies in each of the next five years.

Energy Efficiency

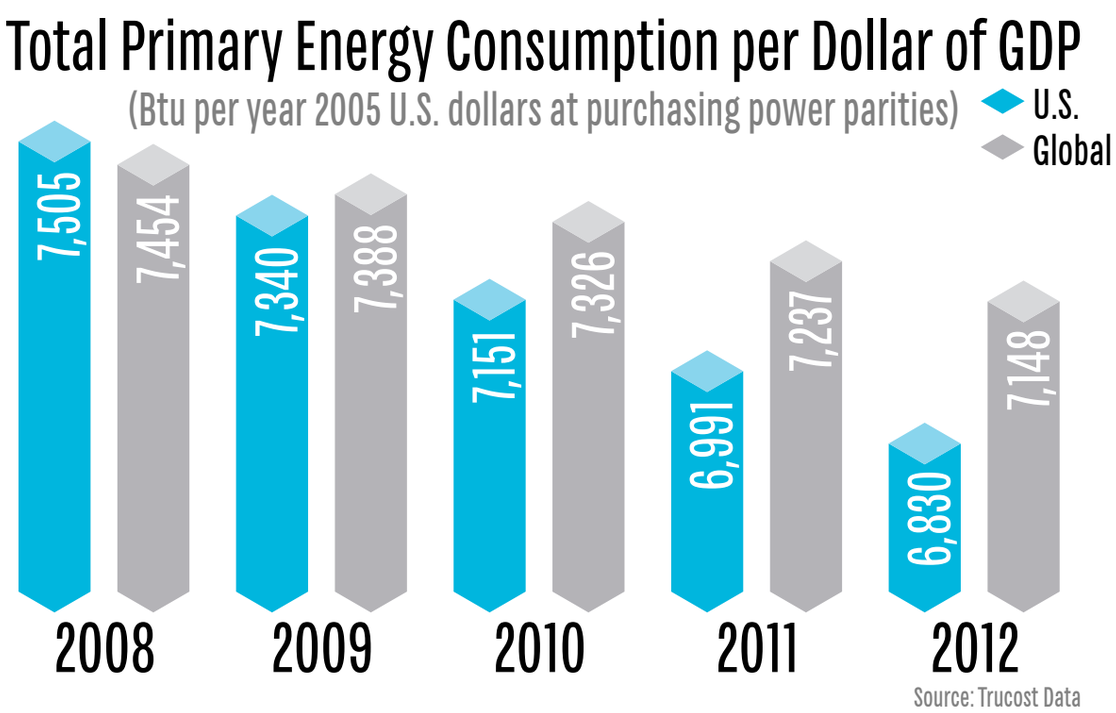
Energy efficiency is on the rise, especially in the United States. In 1980, it took an average of 9,297 BTUs to generate one dollar of gross domestic product (in 2005 U.S. dollars) worldwide — what is referred to as "energy intensity." By 2009, worldwide energy intensity fell by 20 percent, reflecting more efficient use of energy. However, in the United States, energy intensity fell by a whopping 45 percent over the same period.

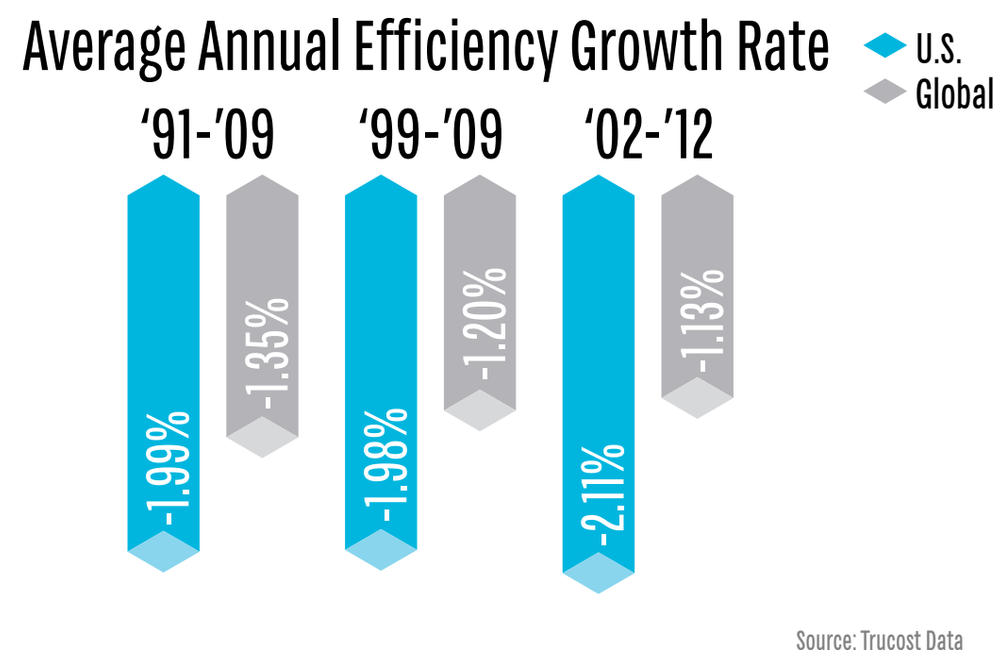
In fact, since the late 1990s, U.S. energy consumers, both commercial and residential, have broken the link between economic growth and increased energy consumption. The Energy Information Administration predicts that energy use in the United States will grow less than 1 percent through 2040, thanks largely to improved lighting technology, more-efficient appliances and advanced manufacturing processes. With 2013 being cast as the "year of the LED" — that is, the year market uptake of those light bulbs reaches the tipping point — better lighting could shrink electricity demand even faster.

With most electricity demand coming from fossil-fuel sources, the decreased demand will have a salutary effect on carbon emissions. The news isn't quite so positive for some energy utilities that are scrambling to find new ways to maintain revenue amid sagging electricity sales.

Updating antiquated transmission lines in the United States and other developed nations is one area of focus for utilities, and a crucial first step to bring more renewable sources of energy onto the power grid. Power companies are also shifting to sensor-based smart meters that will allow demand-based pricing and better load balancing on the grid. GTM Research expects spending on the power utility data analytics sector — hardware and services that collect, manage and analyze data from the smart grid — to hit $20 billion by decade's end.

Globally, energy-efficiency efforts remains on most countries' to-do list. While demand for energy is expected to fall among OECD member countries, global demand overall is expected to grow by more than a third by 2035, led primarily by China and India. The IEA projects that China's electricity prices will be around 7.5 cents per kilowatt-hour by 2035, around half the cost in the U.S. and nearly a third of Europe's prices. This would make efficiency efforts less attractive in what will be the world's largest energy market. Still, concerted energy-efficiency efforts can improve economic prosperity for China and other emerging markets, not to mention reduce greenhouse gas emissions. The IEA believes that two-thirds of the global economic potential to improve energy efficiency remains untapped. That's a multi-trillion-dollar opportunity.





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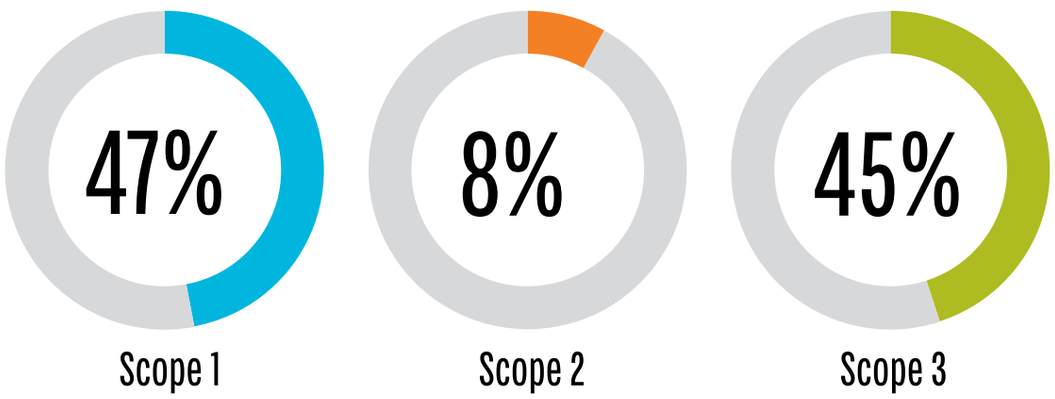
Greenhouse Gas Emissions

Total greenhouse gas (GHG) emissions among both U.S. and world market indices have remained largely flat. Between 2007 and 2011, U.S. firms pushed GHG emissions down, but just by 4 percent, while globally, emissions rose slightly — up 0.75 percent. Overall, that's progress when compared to rates of GHG growth in prior years.

Drilling into the GHG emissions pattern by scope, U.S. firms produced 8 percent fewer Scope 1 (direct operations) emissions in 2011 than in 2007. Globally, Scope 1 emissions came down by 2.5 percent, though they rose and fell during this period. Scope 2 (indirect, such as through the purchase of electricity) emissions increased in both indices from 2007 and 2011, but they rose and fell for each without a clear pattern. Scope 3 (which includes transportation, supply chain and outsourced operations) fell for U.S. firms by 1.6 percent, but increased by 2.5 percent globally, reflecting U.S. outsourcing of manufacturing to other countries.

When viewed in relation to economic activity, a somewhat different picture emerges. GHG intensity — that is, GHG emissions per unit of revenue — fell across all three scopes for U.S. firms and globally, -18 percent and -15 percent respectively, a seemingly positive trend. But the climate doesn't care about intensity — it responds only to absolute emissions, which continue to grow.

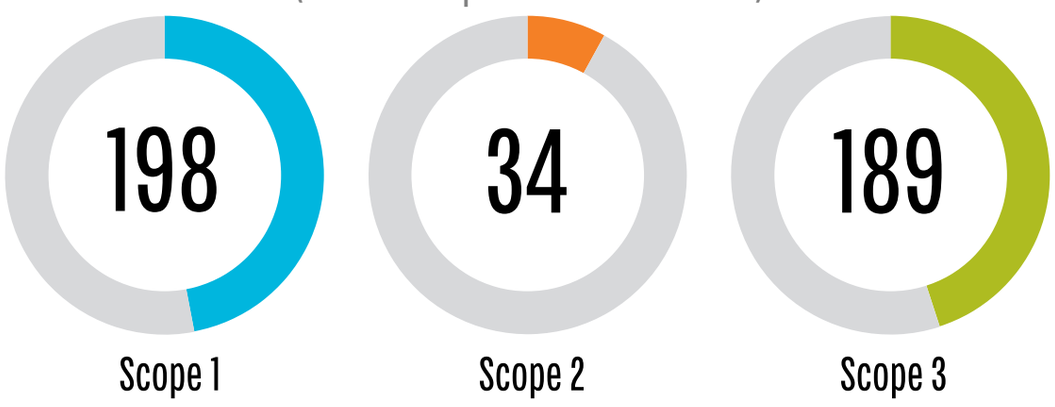
GHG Percentages by Scope, 2011



Source: Trucost Data

Global GHG Intensity by Scope, 2011

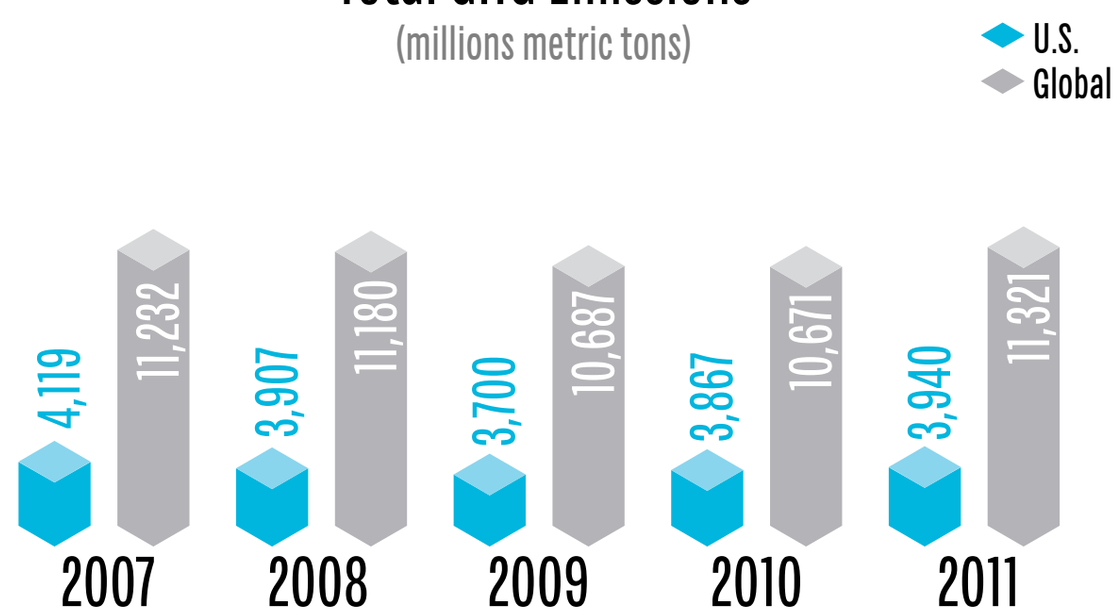
(metric tons per million U.S. dollars)



Source: Trucost Data

Total GHG Emissions

(millions metric tons)



Source: Trucost Data

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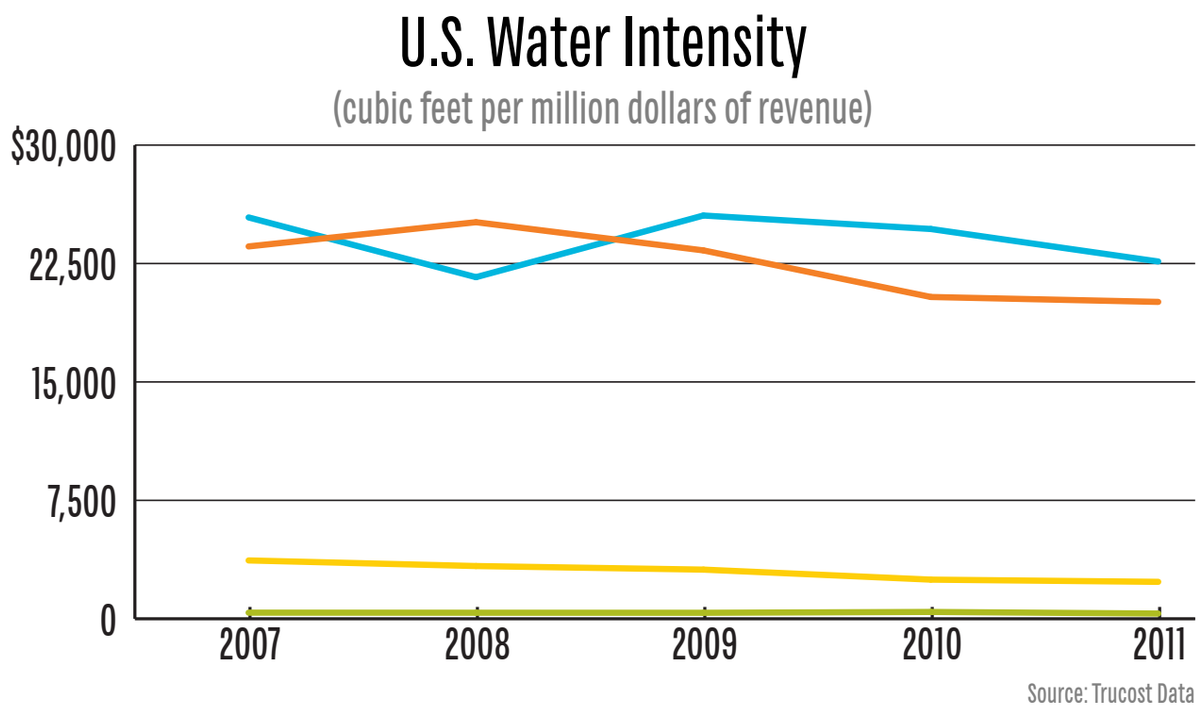
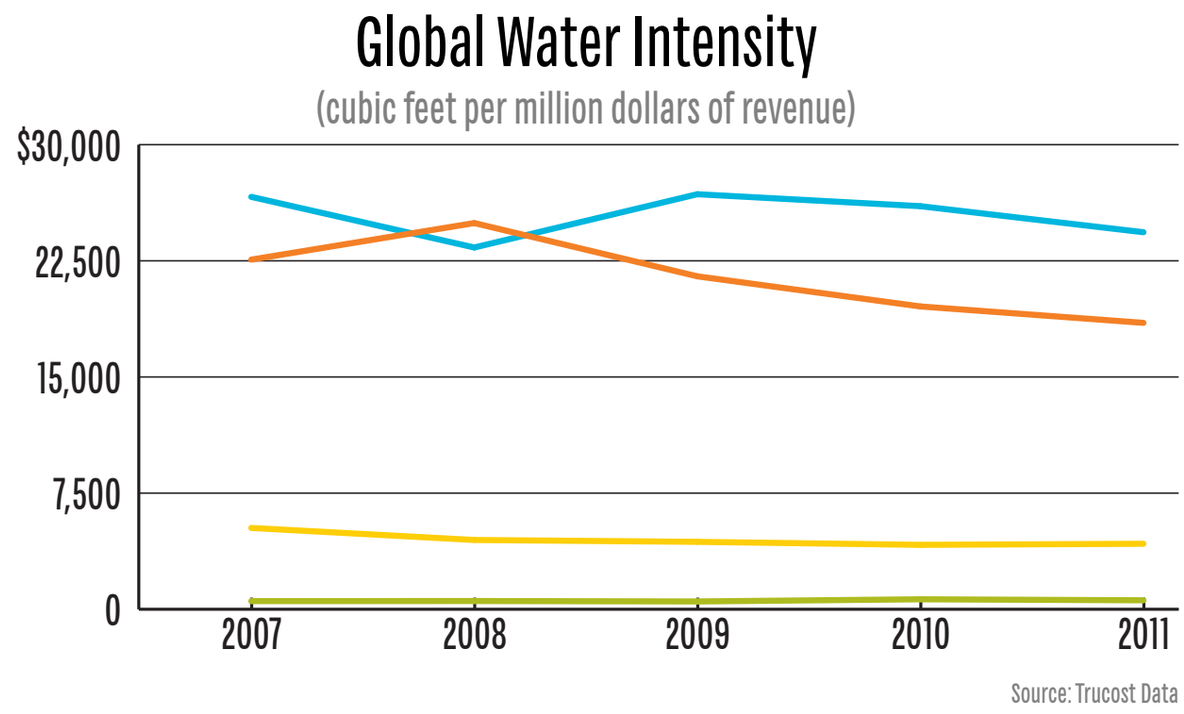
Water Use and Intensity

Despite growing awareness of the importance of water conservation, and increasing concerns over water scarcity and security issues, businesses did not substantially reduce their water footprints between 2007 and 2011. When viewed in terms of intensity — that is cubic meters of water used per million dollars of U.S. revenue, U.S. firms reduced water use by 17 percent between 2007 and 2011, while globally water intensity dropped 15 percent.

As with GHG emissions intensity, water intensity may give a false sense of progress; once again, ecosystems respond to absolute, not relative, impacts. Even viewed as economic intensity, the biggest single source of water use by scope — supply chains — saw the smallest reductions.





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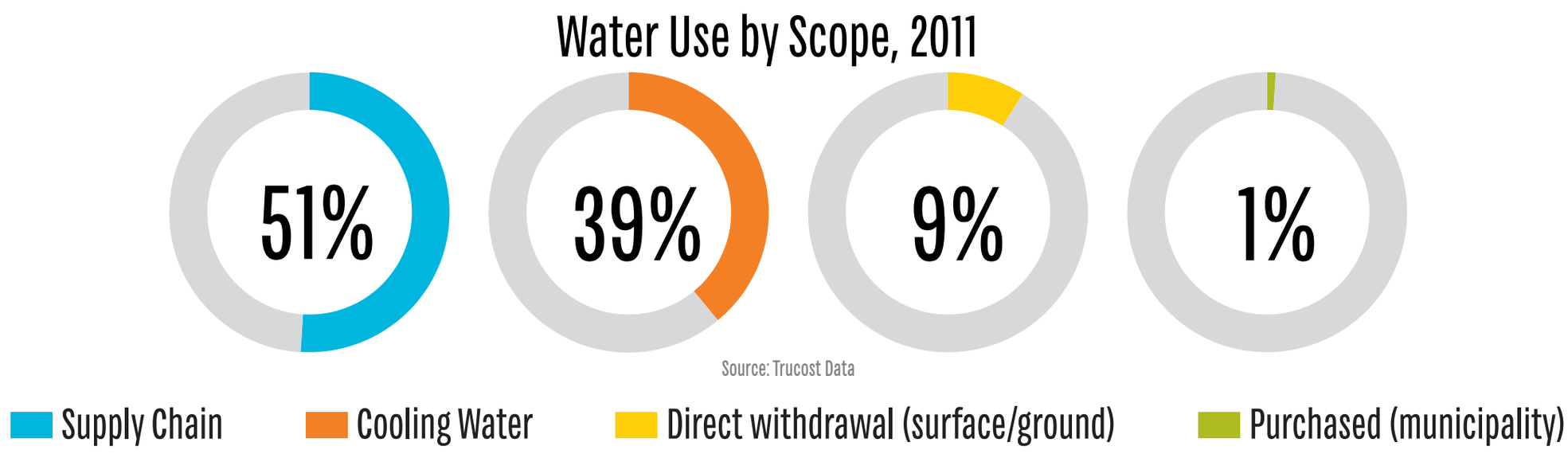
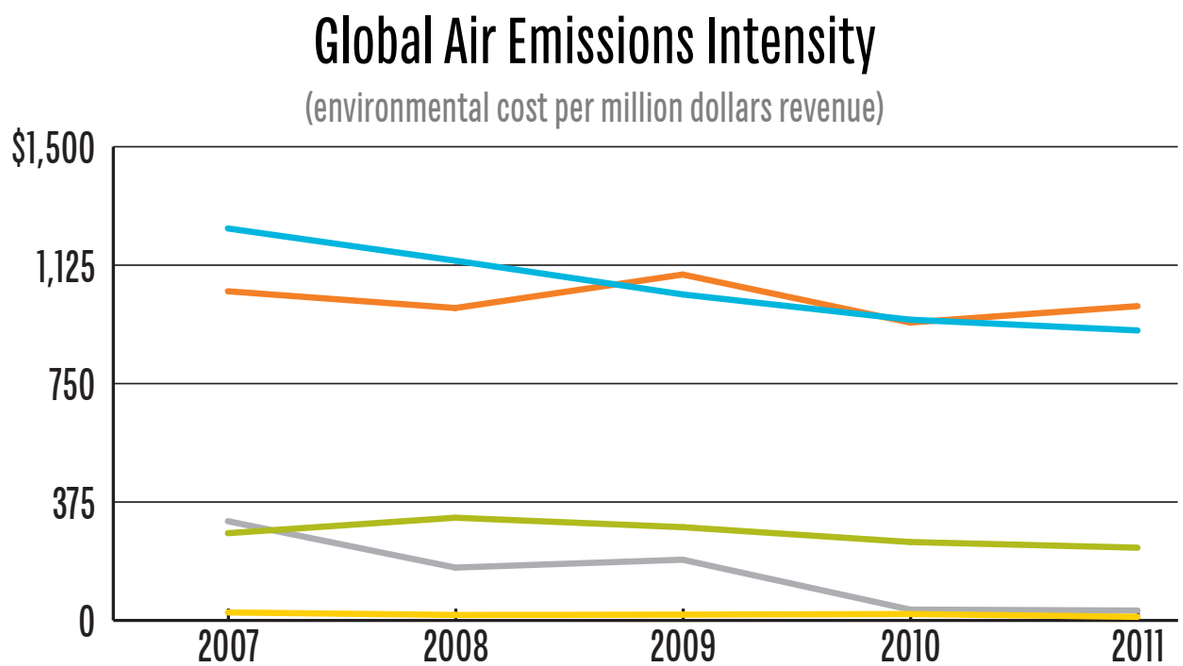


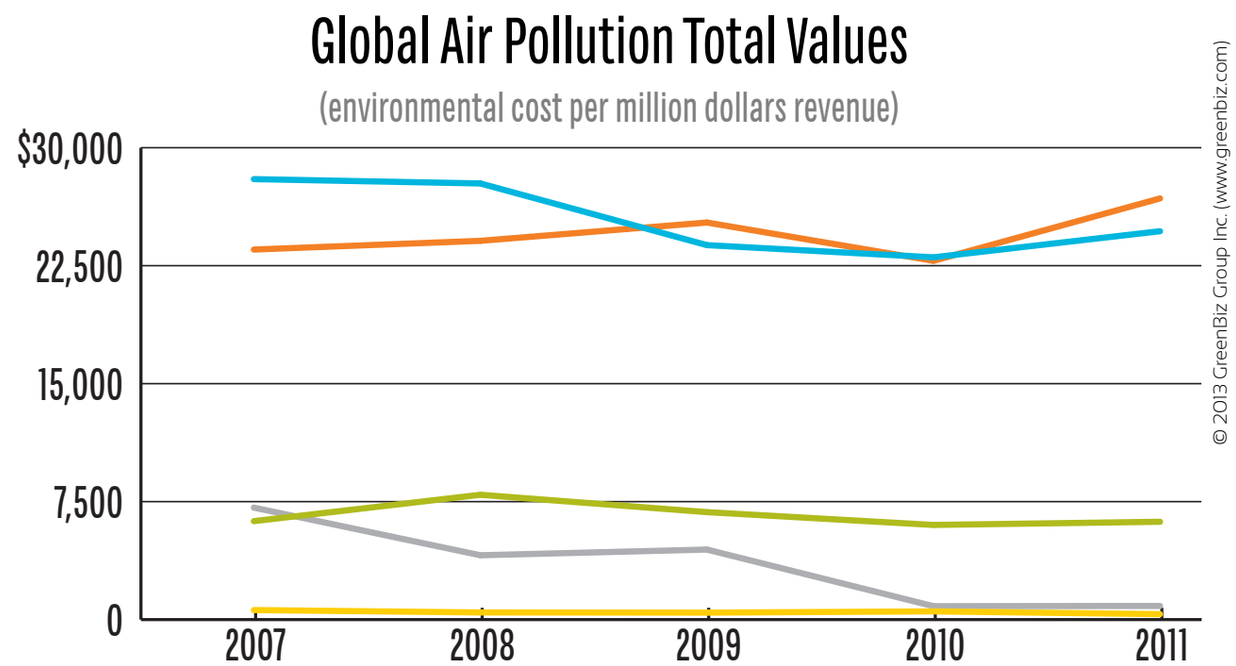
Air Emissions

Generally, business is polluting less to the air. Between 2007 and 2011, U.S. and global firms reduced the environmental cost of the dust, acid rain and ozone precursors, volatile organic compounds, ozone-depleting substances and metal emissions they emit. These reductions, however, have been relatively small, around 10 percent overall. U.S. and global firms followed a similar pattern in reductions, although both saw an uptick in acid rain/smog precursors and dust and particles in 2011, the source of about 80 percent of all air emissions.

Expressed in terms of intensity — emissions per unit of revenue — the air appears clearer. Overall, air emissions intensity decreased just over 30 percent worldwide between 2007 and 2011, but looking only at acid rain/smog precursors and particulates, the global decrease is only 16 percent during that period. Once again, absolute emissions of pollutants, not their intensity, is the only real metric when it comes to impacts on people and the planet.

China is making a major push to be a leader in renewable energy — its current Five-Year Plan calls for 11.4 percent energy generation from renewables by 2015 — but at the same time, despite targets to cut pollution, controls are evidently inadequate. The smog that engulfed Beijing in early 2013 registered 728 on an Air Quality Index designed to top out at 500. Aside from its dire impact on public heath, such sun-blocking pollution also makes solar panels less efficient.





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Acid Rain & Smog Precursors · Dust & Particles · Ozone Depleting Substances · Volatile Organic Compounds · Metal Emissions to Air

Solid Waste

Trucost data shows a troubling increase in the amount of waste companies are sending to waste streams. In 2007, U.S. firms sent 3.96 metric tons to landfills per million dollars of revenue. That intensity spiked in 2009 at 6.15 metric tons before falling to 5.5 metric tons in 2011. Globally, intensity also increased, following a different pattern but also ending higher than it started. Despite the growing number of companies committing to zero-landfill operations, the net amount being sent to landfills is piling up.

One especially vexing area is electronic waste. Due to government regulations, manufacturers in the European Union are on the hook to help keep televisions, computers and other e-waste out of landfills. In around half of U.S. states, manufacturers must comply with some type of electronics take-back or recycling programs. But despite international treaties to prevent it, e-waste is often shipped to developing economies and scavenged with little or no safety oversight. Some of the major electronics manufacturers, as well as a United Nations group, are attempting to gain better control over the electronic waste value stream, and to reclaim the economic value hidden in that waste. The eCycling Leadership Initiative — a coalition of manufacturers, retailers, recyclers, and nonprofits — is aiming to recycle a billion pounds of electronics by 2016.

At 2012 VERGE SF, Recology CEO Mike Sangiacomo describes his company's a vision of how a city's solid waste becomes the feedstock for fuels, energy, and materials.

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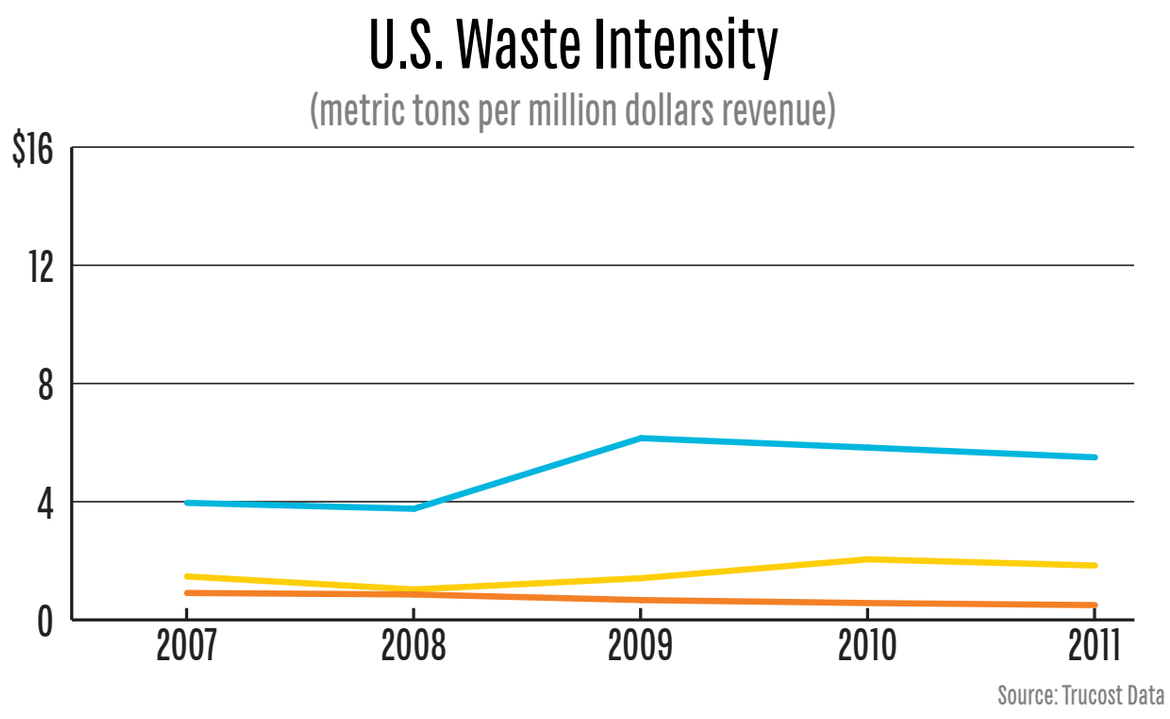

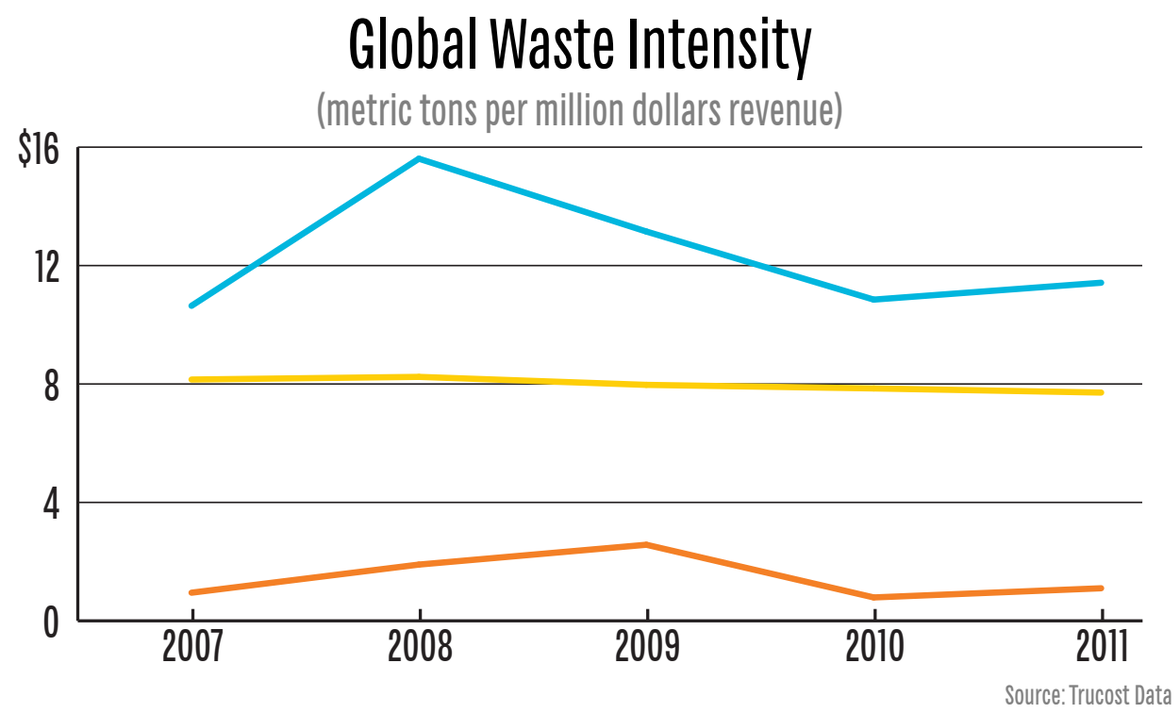

Landfill Incineration Company Reported Recycling

Paper Use and Recycling

While total global paper production has increased in recent years, so has the amount of recovered paper used in that paper. As a result, the amount of wood pulp produced globally for paper is headed in the right direction: down. Our data, sourced from the Food and Agriculture Organization of the United Nations, also shows that while paper and paperboard production fell in 2009, likely linked to the global recession, the amount of paper recovered actually increased, which made recovered paper the highest percentage (53 percent) of paper production back recorded since the FAO began tracking the data in 1970. This is a positive trend, not only because recovered paper reduces the need for virgin wood, but also because manufacturing recycled paper is less energy-intensive. According to the Environmental Paper Network, recycled copy paper uses 31 percent less energy, generates 37 percent fewer pounds of greenhouse gas, and generates 53 percent less wastewater than manufacturing paper from virgin wood.

Despite the move toward digital communications from boardrooms to dorm rooms, global paper consumption is projected to continue to grow along with population and development. Emphasis is turning to boosting recycled paper production and seeking new sources and methods of reuse. As of 2009, Europe was outpacing the U.S. in terms of recovered paper, with paper recovery rates of 73 percent and 64 percent, respectively. But in the U.S., the amount of recycled paper manufactured has remained flat. The reason: Exports of recycled paper pulp to Asian markets has skyrocketed.

Aside from its connection to the loss of forests, habitats, and carbon sinks, the paper manufacturing process can create significant air and water emissions. Some paper-makers are pulling value from a manufacturing byproduct called black liquor, by burning it and generating energy for use in manufacturing, but that does not reduce the carbon emissions produced.

With office copying and other commercial printing accounting for nearly half of the printing and writing paper consumption in the United States, businesses can move the needle on reducing paper waste and improving sourcing. As of 2011, 27 U.S.-based Fortune 500 firms had made commitments such as purchasing products made with Forest Stewardship Council-certified fiber. Two big chains, Staples and Office Depot, are working with vendors, NGOs and landowners to encourage sustainable and FSC-certified paper production. E

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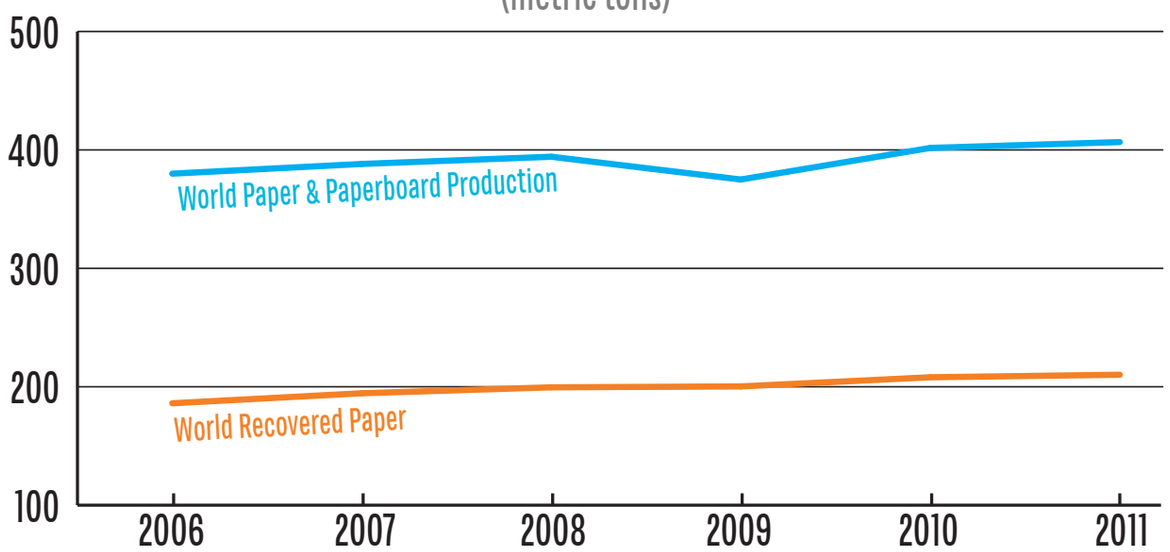
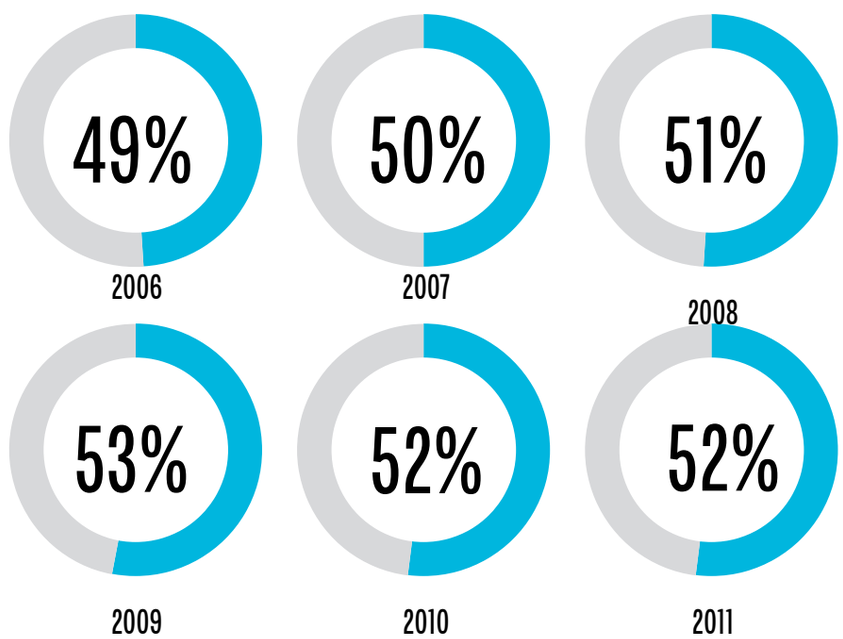
Global Paper Recycling

(metric tons)



Source: United Nations Food & Agriculture Organization Forestry Database (FAO-STAT)

Percent of Paper from Recycled Stock



DISCLOSURE and **TRANSPARENCY**

It used to be that only leading-edge firms released environmental reports, but by 2012 a third of U.S. firms had begun disclosing these facets of their operations, along with 40 percent of companies globally.

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There are three things we can definitively say about environmental reporting disclosure and transparency: companies are improving on both scores; they're moving beyond disclosing just carbon emissions; and they are increasingly working with supply-chain partners to account for environmental impacts made outside their walls. Taken as a whole, these indicators point to an increasing openness among companies to share, measure, and compare environmental impacts. In the past, firms outside the U.S. were more likely to make environmental disclosures, but in almost every measure we consider here, U.S. firms are closing this gap.

Disclosure Trends

It used to be that only firms at the leading edge of sustainable business released environmental reports, but by 2012 a third of American firms had begun disclosing these facets of their operations, along with nearly 40 percent of companies globally.

Reporting on environmental and social impacts is not merely a way to air dirty laundry — if it were, few firms would do it. Yes, the old adage about "what gets measured gets managed" holds true here. But reporting has become more strategic, as companies consider the economic, enviornmental, and social costs of consuming natural capital and releasing emissions, along with the risks these things pose to the company.

Without thorough reporting on water consumption, costs, quality, and similar metrics, for example, food and beverage companies and other water-intensive industries operating in water-stressed regions can't ensure their long-term viability. Water disclosures aren't merely a nice-to-have — they are necessary to ensure business continuity amid a changing climate and to maintain reputational capital in communities where they operate.

It's important to note that "sustainability reporting" doesn't necessarily equate to "publishing a sustainability report." Companies disclose information in other ways, such as filings with regulatory agencies as well as to nongovernmental bodies such as the Carbon Disclosure Project, or CDP, a voluntary standard-reporting system for carbon emissions and water consumption. In this light, we see a trend toward more environmental and sustainability reporting among U.S. companies, as they close the gap with global firms. From 2005 to 2007, reporting among U.S. firms grew by 159 percent.

This growth should continue, if not accelerate. The banking and accounting sectors are now valuing natural capital as part of standard accounting frameworks. The Association of Chartered Certified Accountants last year released a report chiding accountants for poor reporting of the material risks associated with natural capital. The Natural Capital Declaration project calls for integrating environmental reporting with financial reporting in order to align financial services, such as loans, investments, or insurance policies, with natural capital.

Essentially, the bean counters and the bean growers are starting to understand the importance of assigning economic values to environmental impacts. Apparel company PUMA, with help from Trucost and PwC, made strides in this arena with its first Environmental Profit & Loss report in 2011, and EP&L disclosures are expected to become more commonplace. Jochen Zeitz, Executive Chairman of PUMA and Chief Sustainability Officer of parent company PPR, said, "The unprecedented PUMA Environmental Profit & Loss Account has been indispensible for us to realize the immense value of nature's services that are currently being taken for granted but without which companies could not sustain themselves." He says that the company now views EP&L reports "as an essential tool to help drive PPR's sustainability development across its group of brands," and that doing so "will not only help conserve the benefits of ecosystem services but also ensure the longevity of our businesses."

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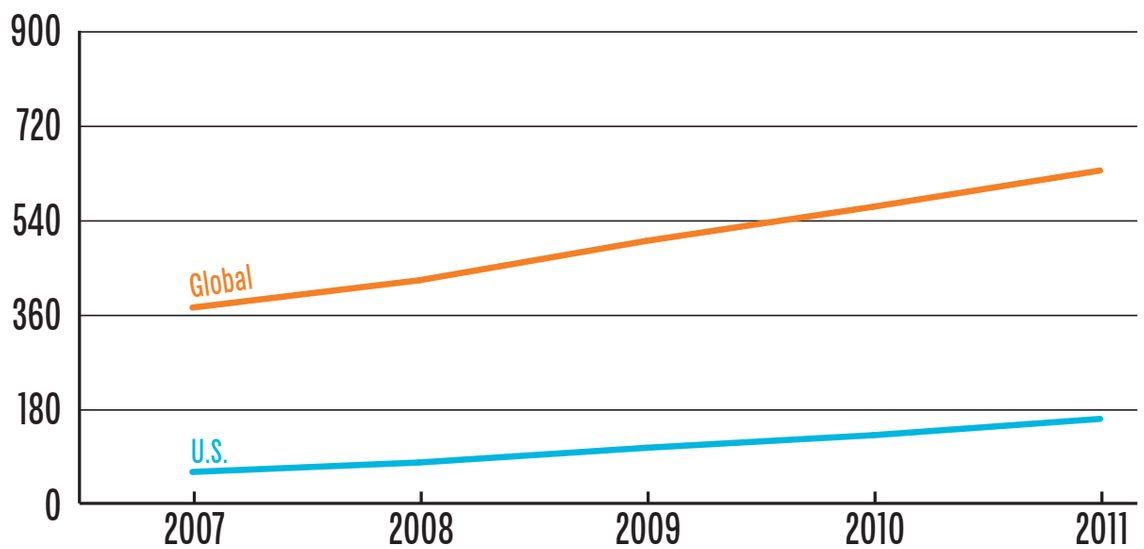
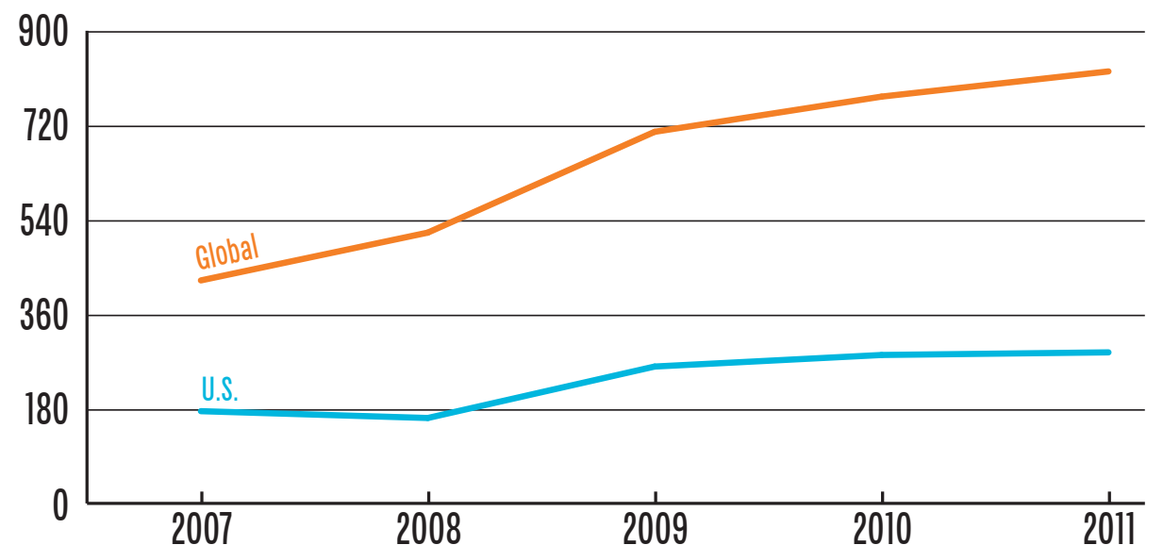
Company Reporting –Standalone Reports



Source: Trucost Data

Company Reporting – Other Disclosures



Source: Trucost Data

Greenhouse Gas Emissions

Over the past five years, the number of companies reporting on their greenhouse gas emissions has grown significantly, both in the U.S. and globally. Scope 1 sources (direct emissions) have been consistently the most commonly reported. In fact, 58 percent and 61 percent of U.S. and global companies reported Scope 1 GHG disclosures in 2011.

There is now a growing trend toward reporting emissions generated through Scope 2 (purchased electricity) and Scope 3 (emissions generated through transportation and supply chains). This provides not only more data on emissions linked to industry, but also where and how those emissions are generated — a key step in understanding and addressing the carbon-intensive aspects of a company's value chain.

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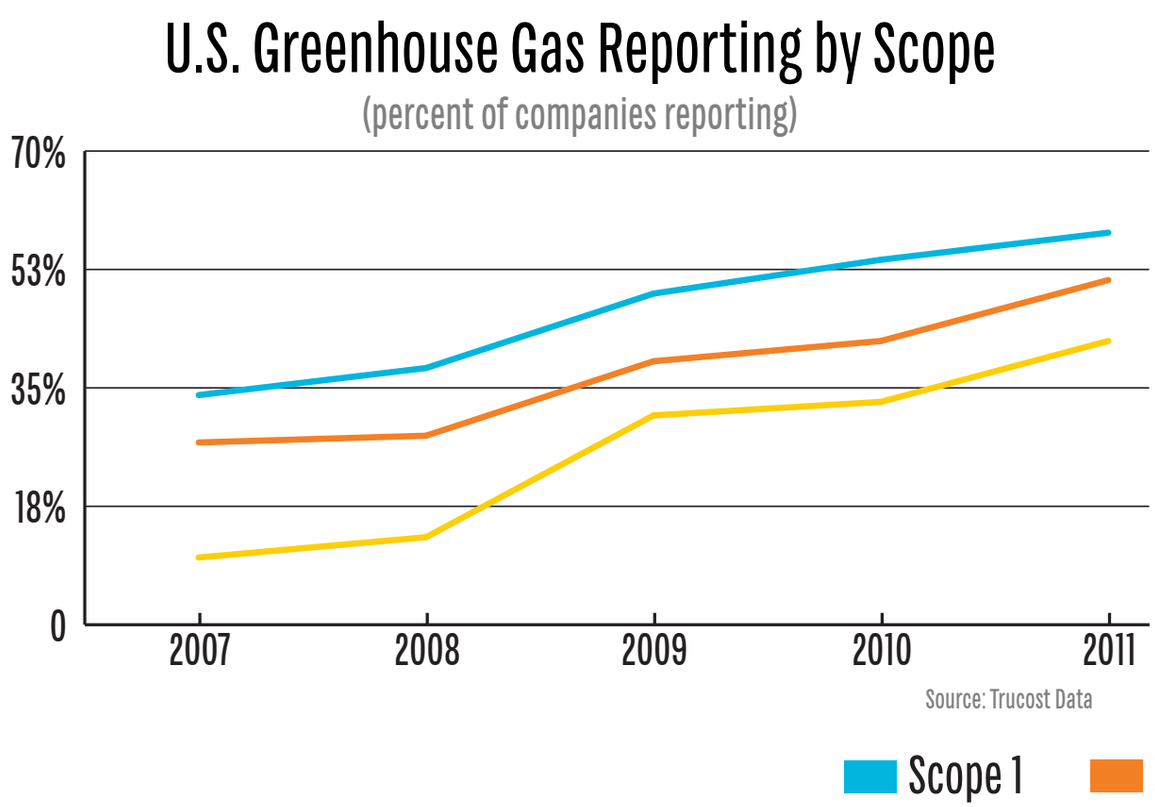
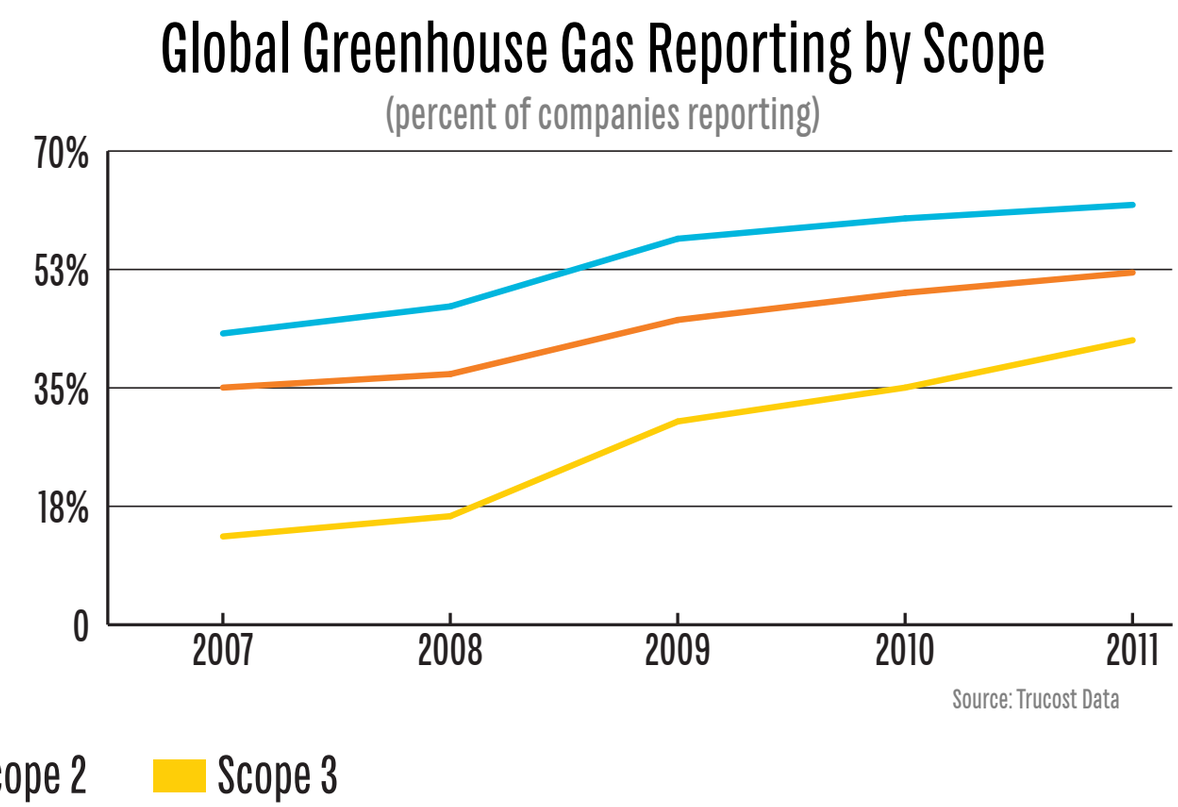




Scope 1 Scope 2 Scope 3

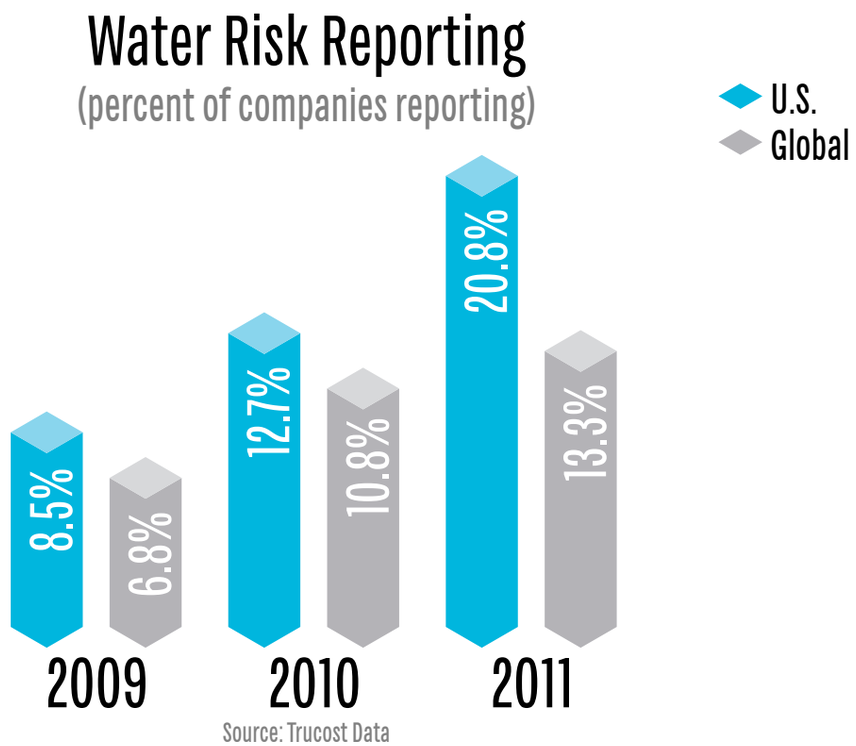
Water Risks

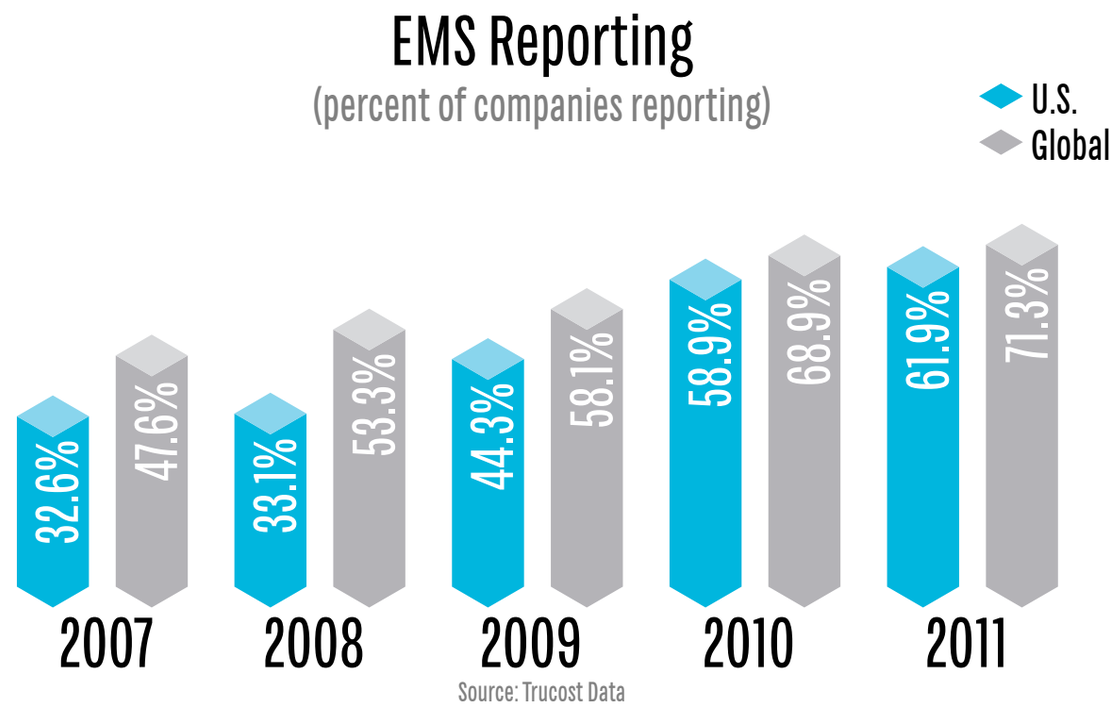
More companies are disclosing their water risks, though before 2009 relatively few companies tracked and reported such data. Not surprisingly, the disclosures are generally focused on business sectors that operate in water-stressed areas. In 2011, 13.3 percent of global firms reported on water risks, nearly double the 7 percent reporting in 2009. In the U.S., the growth was even faster: 21 percent reported in 2011, up from 8.5 percent in 2009. A subset of these firms disclose specifics regarding water use in stressed areas, such as how dependent their products or operations are on these water sources. A footwear manufacturer, for example, might note the water inputs required for producing leather or synthetic materials. An apparel firm might link water concerns with its cotton supply chain. This level of understanding and disclosure will be critical going forward as access to water grows in strategic importance in many sectors and regions of the world.

Environmental Management Systems

An environmental management system, or EMS, is a framework to measure and manage environmental goals. Like water risks, companies are also increasingly disclosing information regarding their EMS. ISO 14001 is the most common EMS standard. In fact, just over 70 percent of global firms were reporting on EMS in 2011, up from just under 50 percent in 2007. Likewise, U.S. firms upped their EMS reporting to 62 percent in 2011, up from 33 percent in 2007.

Having an EMS does not necessarily correlate to superior environmental performance. Rather, it is seen as a minimum requirement for companies, a demonstration that the company has plans in place to manage and address risks related to environmental spills and emissions. However an EMS can serve as a tool to improve environmental performance.





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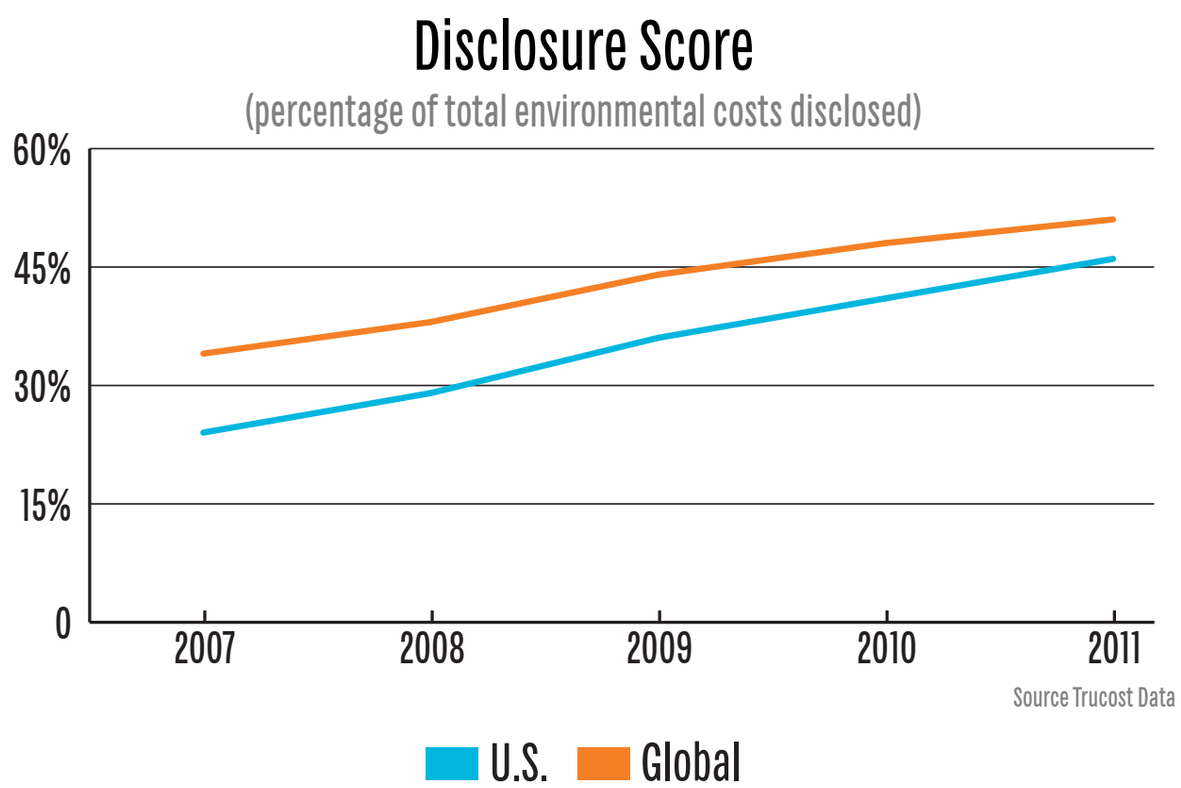
Transparency

Back in 2007, 42 percent and 50 percent of companies in the U.S. and globally, respectively, disclosed at least one type of environmental impact data. In 2011, those percentages rose to 66 percent and 69 percent. More important, the amount of information they disclosed rose in lockstep.

This indicators shows the percent of companies' total environmental impacts that they disclose, as measured and assessed by Trucost. Each year, Trucost tracks more than 700 environmental impacts of more than 4,000 companies—such things as greenhouse gases, emissions contributing to smog or acid rain, solid waste, water use and emissions, resource mining and consumption, and natural resource use. The information is used, among other things, to assess the environmental financial impacts of each company—how much their operations are costing the earth.

"What that means is that, by our calculations, half of all direct impacts are not being recognized by companies," explains Trucost's James Salo. "Those companies that have better information on their impacts, and the risks associated with them, will be at an advantage when looking to minimize the potential costs associated with those risks and therefore to maximize their opportunity to better their competitive peers"



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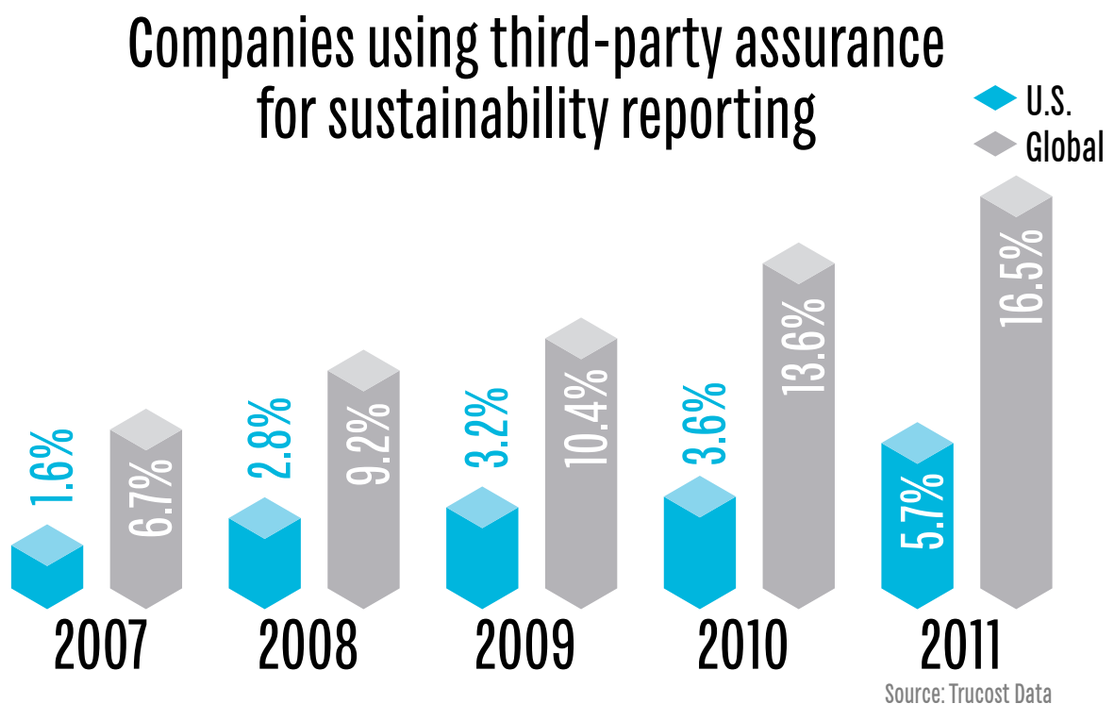
Third-Party Assurance

In tracking the trend toward third-party assurance in sustainability reporting, we looked at sustainability disclosures made in compliance with reporting standards, such as those offered by the Global Reporting Initiative (GRI), the International Organization for Standardization (ISO), or AccountAbility.

As more companies publish sustainability reports, or participate in other voluntary disclosure efforts, they are under increasing pressure to make those disclosures comply with a standard framework for reporting, and to have the reported data verified by independent, third-party auditors. Such validation is becoming increasingly important because it ensures that reporting is done in a manner that is both credible as well as consistent and comparable across firms. It also helps lend credence to the disclosures. From 2007 to 2011, the use of third-party assurance increased by 8 percent worldwide, and by nearly 4 percent in the U.S.

The growth in assurance is being driven from the top. Steve Starbuck, who leads accounting firm Ernst & Young's climate change and sustainability practice, is seeing this happen through an uptick in requests for disclosure report audits from its clients. "The C-suites and even boards are paying attention to sustainability reporting. The risk officers are paying attention, so there is even more emphasis on pulling a CPA auditing office in," he says. In recent years, he's also seen a strong uptick in clients that turn to E&Y for "pre-assurance" work, in which the firm reviews a client's reporting but falls short of a full audit. "They might start with pre-assurance on their water footprint, maybe their energy spend, maybe some health and safety criteria," he says. "They typically take a small number of disclosures and do pre-assurance and then in a subsequent year move to full assurance."

Sustainability reporting assurance is destined to increase as more firms integrate their sustainability reporting with financial reporting, further elevating sustainability metrics and performance to the highest reaches of companies. E



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CORPORATE LEADERSHIP

What are exemplar companies doing? Lots of things; they are the basis for the hundreds of stories and analysis we run each year on GreenBiz.com, as well as many other things companies are doing about which they're not yet talking. Many of these leadership activities are leading indicators, showing where technology development may be going, or where markets are developing for green buildings, clean technologies, and other things.

There's some good news here. Patent activity based on cleantech innovations is humming, especially in the United States (though not necessarily by U.S. firms), with a wide range of innovations related to solar, wind, fuel cells, and advanced batteries.

Beyond patent filing is the research and development work companies are doing, usually behind the scenes and away from the spotlight. This, of course, is business as usual. What's new, however, is that more companies, especially U.S. firms, are disclosing (in annual reports, shareholder disclosures, and on their websites) more details about their green R&D efforts — though without accompanying financial data, it's often difficult to parse the marketing value of these disclosures from their actual business value. Companies in the industrial, utility, and oil-and-gas sectors make up the largest group of firms talking publicly about their green R&D efforts.

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Are those investments showing a return? Yes, or so it seems. A growing number of companies around the world are calling out profits linked to their environmental initiatives. Of course, when the opposite happens — when projects lose money or fail to reach expected milestones — we're far less likely to hear about it in company disclosures.

Beyond the laboratories and research efforts, companies are also changing the environments in which their innovations are shaped. Continuing a trend that started in the early 2000s, 2012 saw the number of commercial buildings certified to the Leadership in Energy & Environmental Design, or LEED, standard surge ahead. But in tandem with increasingly green workplaces, the ways in which employees are interacting with one another and commuting (or not commuting) to work are also changing.

Many of these activities are leading indicators, showing where technology development may be going, or where markets are developing for green buildings, clean technologies, and other things.

Cleantech Patents

To gauge the state of cleantech innovation, we looked at the growth of cleantech patent filings and grants issued in the United States, as well as those in other patent offices and through the World Intellectual Property Office (WIPO), which effectively allows parties to put placeholders for their inventions in multiple national patent offices, since international patents do not exist. The number of cleantech patents filed in the U.S., Europe and through WIPO grew between 2006 and 2010, with the most consistent growth seen in WIPO, whereas U.S. filings dropped off a bit (3.5 percent) before regaining steam in 2010. In terms of sheer numbers of patent filings, the U.S. led WIPO, Europe, and Japan. In 2010, 11,938 U.S. patents were filed for nine cleantech categories, including biofuels, solar, wind, and fuel cells, according to data collected by patent research and consultancy firm IP Checkups. The WIPO records show nearly as many cleantech patents that year, at just north of 9,900. (There's some overlap between the U.S. and WIPO data. To get protection both within and outside the United States, a patentee would file both, but the data doesn't show how many patents live in both the PTO and WIPO. Still, the methodology is consistent year over year, providing a reliable trend line.)

Due to a lag of approximately 18 months between patent filings and the release of these records, the available data extends only to mid-2011, but it reveals important trends with respect to the types of technology being pursued. In each region and at WIPO, interest in solar technology grew at a strong pace from 2006 to around 2009, then began to dim. Fuel-cell research was strong in the U.S., Europe and Japan in 2006 but then dropped off. Filings for patents related to advanced batteries grew steadily from 2006 through 2011, except in Japan, where battery-related filings declined starting in 2009.

As we said, it's not necessarily American firms that are filing U.S. patents. Japanese automakers and electronics firms are among the top cleantech patent assignees in the U.S., so while cleantech patent activity might be low in Japan, its researchers have been busy writing U.S. patent applications. General Electric is the U.S. firm among the top assignees, with Germany's BASF and Siemens being the European standouts.

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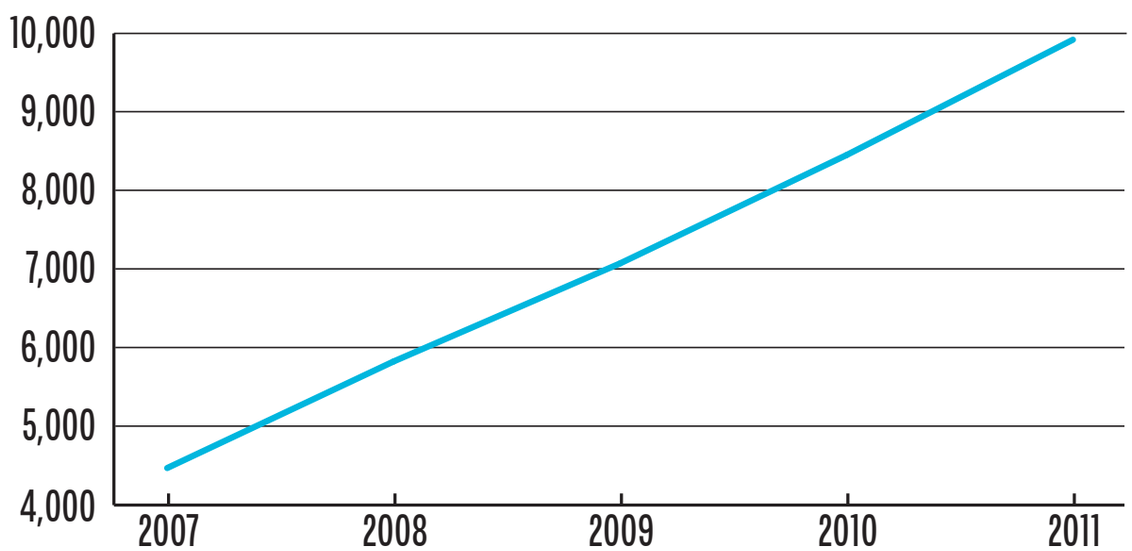
Cleantech Patent Filings



Source: GreenBiz Group research from World Intellectual Property Organization and other national patent office databases

Top Cleantech Patent Companies, 1981-2012

Panasonic	54,614	Samsung	13,334
Mitsubishi	39,422	Sony	10,409
Hitachi	33,441	General Electric	9,999
Toyota	30,641	Canon	9,594
Toshiba	22,882	BASF	8,675
Honda	21,926	Seiko Epson	8,380
Sumitomo	18,325	Siemens	8,238
Nissan	14,087	Yamaha	8,222

Source: Source: World Intellectual Property Organization

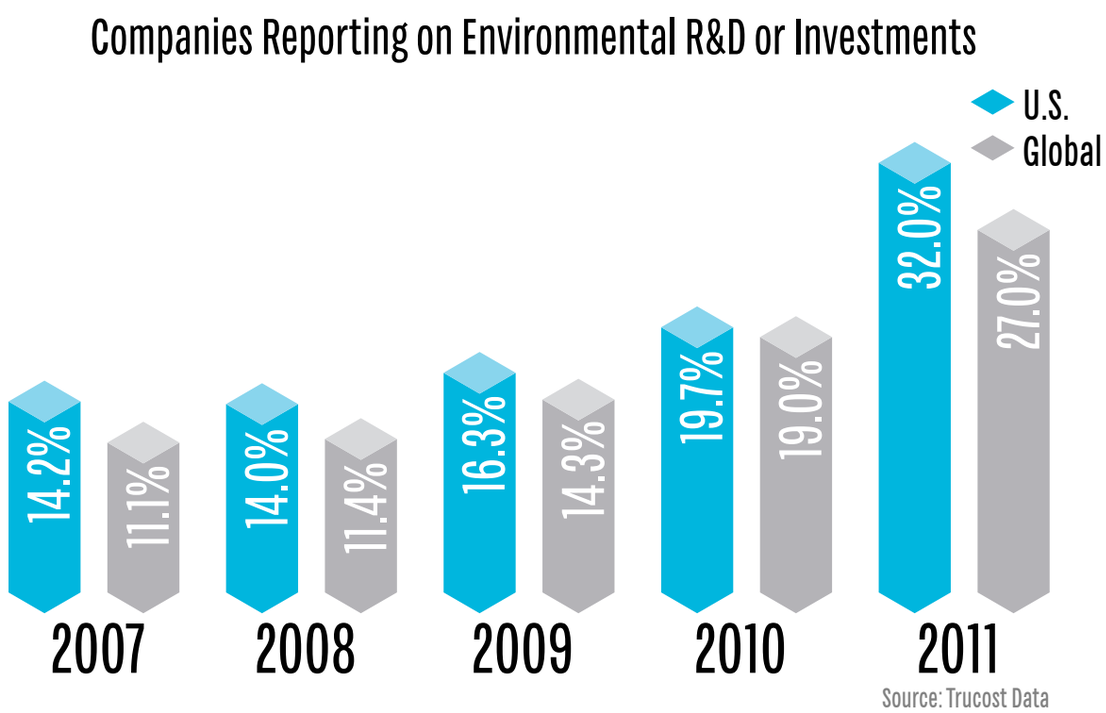
Green Research & Development

Back in 2007, only about 14 percent of U.S. firms and 11 percent of firms worldwide made public disclosures regarding investing in green research and development efforts. But by 2011, those figures ticked up to 32 percent and 27 percent, respectively. This indicates that companies globally are being more proactive, and dedicating more dollars toward R&D in environmentally-focused products and solutions. Considering this trend geographically, the lion's share of firms disclosing green R&D efforts are based in the U.S., followed distantly by Japanese firms and even more distantly by French, German, and Canadian companies. By sector, the biggest percentage of research investment disclosures over the past five years are seen in utilities, industrial goods and services, and oil and gas development.

There is much that this data does not tell us. For one thing, while we know how many firms are publicly disclosing green investments, these disclosures do not always come with dollar (or euro or yen) signs. Despite the number of companies investing in green R&D, the amount being invested may be falling. On the other hand, companies are always working to improve the efficiency of their products and processes, so some of what we would consider green investments might not be called out as such — they may just be more efficient or higher-performing versions of previous products.

The view from the cleantech investment community is clearer: global investments and deals were down in 2012, according to the Cleantech Group's analysis. It says $6.4 billion was invested last year, a 33 percent drop from 2011. Cleantech Group CEO Sheeraz Haji attributes some of this decline to dwindling government funding in the U.S., a general shyness over investments in the wake of a relative handful of marquee failures, and the economic uncertainty that has continued to loom over many global economies. Another nontrivial factor has been the natural gas boon in North America, which has kept electricity prices low, making cleaner but higher-priced technologies less competitive. (The natural gas boon also has led utilities to move away from higher-priced and higher-carbon coal, helping to temper the growth of carbon emissions.) All of these factors conspired to create a sort of cleantech cliff, says Haji.

Looking ahead, a wide range of technologies show great growth potential, from maturing technologies to emerging ones, such as biofuels, biochemicals, and waste-to-energy technology.



At the 2012 VERGE SF conference, Burrows talked about the prospects for cleantech investing.

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Green Business Profitability

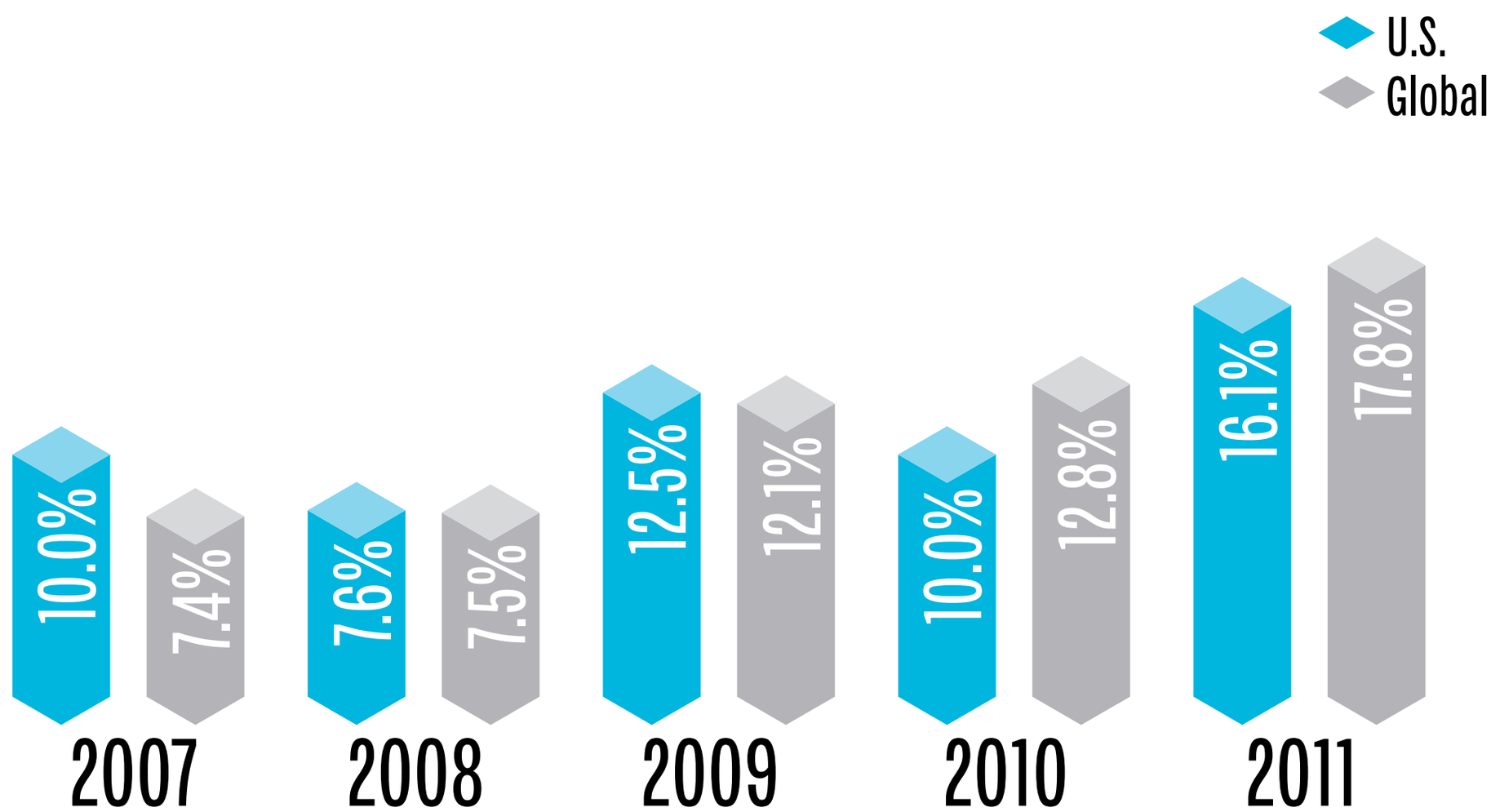
This data tracks the number of companies that are talking about specific outcomes — such as profits within a certain line of business, or returns on improved operational efficiency — resulting from their environmental innovations and lines of business. Between 2007 and 2011, the percentage of U.S. firms disclosing such profits rose from 10 percent to 16 percent. Globally, the trend upward was more aggressive, from 7 percent to nearly 18 percent.

As with disclosures regarding green investments, this does not reveal any financial results linked to these sustainability initiatives — it shows only that profitability was disclosed.

Nor do we know from this whether and how such profitability is driving each firm's larger business goals. Since these are voluntary disclosures, they are used largely for marketing purposes. This indicator, therefore, is likely showing a positive bias.

Others are reaching similar findings. A 2013 report by MIT Sloan Management Review and the Boston Consulting Group found that companies reporting a profit from their sustainability efforts rose 23 percent in 2012, to 37 percent of the total. The study, based on a survey of 2,600 executives from companies around the world, also found that nearly half of respondents said their companies had changed their business model as a result of sustainability opportunities, a 20 percent jump in just one year.

Companies Reporting on Environmental Profits or Savings



Source: Trucost Data

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Green Power

Increasing the amount of electricity generated through renewable and non-fossil sources will play a major role in reducing greenhouse gas emissions in a sustained fashion. The International Energy Agency tracks the amount of renewable energy produced globally each year and the data indicates slow and steady growth. From 2005 to 2010 (the most current IEA data available), the amount of energy derived from renewables grew by 27 percent. Based on this trend, it was projected to reach 4.5 million gigawatt-hours by 2012, a 35 percent increase since 2005.

That said, as a percentage of total electricity generation, renewables have not made significant gains on fossil-based power in recent history, growing from 18.4 percent in 2005 to just under 20 percent by 2010. More significantly, when removing hydropower from the mix, renewables accounted for just 3.5 percent of electricity generation in 2010.

Green power is still a guppy, clearly, in a pond dominated by fossil-fuel fish, which still supply most of the world's power. But the growth of green power is encouraging: an average annual growth rate of 43 percent for solar and 24 percent for wind from 2005 to 2010. During that same period, hydropower grew by an annual average of just 3.1 percent. The IEA expects hydropower to fall from 80 percent of total renewable output in 2011 to 70 percent in 2017, with wind-based energy picking up most of the slack.

In the U.S., the growth of cleaner-burning natural gas means less coal is being burned to generate electricity. Elsewhere, coal is still the cheapest energy source, and countries such as India and China are burning increasingly more of it. Energy storage technologies are still maturing so in the near term, even if wind and solar grew more quickly, fossil-based power will be needed to feed electric grids. Many experts view natural gas a bridge to bringing more renewables online in the U.S., but the higher costs of natural gas in Europe and other parts of the world makes that option less attractive.

Globally, wind power generated 344 terrawatt-hours (344,000 gigawatt-hours) in cumulative additions from 2005 to 2011, according to the IEA, making it the highest growth of all non-hydropower generation. In the U.S., wind had a banner year in 2012, but that was linked to the impending expiration of the federal government's production tax credit, which was due to expire at year's end. A last-minute one-year extension of the tax credit means turbines and wind farms will continue to pop up, though some believe that the wind industry is too dependent on government support to maintain its impressive rate of growth.

Solar continues to be a bright spot. In the U.S., 2012 saw strong growth in solar, with more utility-grade solar projects coming online thanks in part to falling photovoltaic panel costs. Concentrated-solar farms are starting to crop up in the Western United States, but most operational ones are in Spain. The U.S. Energy Information Administration projects that consumption of solar energy to grew by 32 percent in 2012, and expects growth of 31 percent in 2013 and 28 percent in 2014.

Bioenergy is now making its move: The number of nations that generated more than 100 megawatts from bioenergy in 2011 exceeded the number that pulled that much from solar, though IEA expects the two sources to be on par by 2017.

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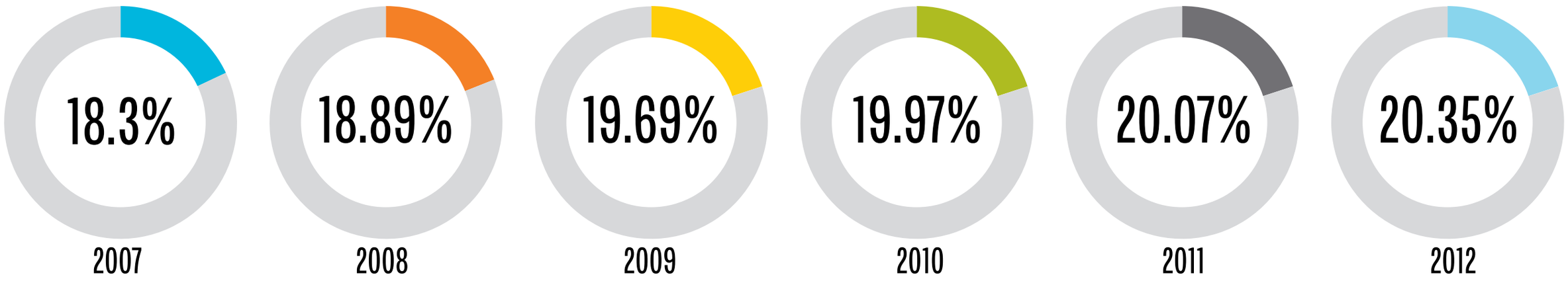
Global Green Power Production as Percent of Total*



*Includes hydroelectricity

Source: International Energy Agency

Green Office Space

Compared to just eight years ago, your chances of working in an office building that is energy efficient and built with other environmental considerations in mind is much improved. Since 2005, the number of construction projects certified to the international building standard framework Leadership in Energy & Environmental Design, or LEED, has grown 59 percent a year on average. At the end of 2012, 4,162 commercial projects around the world were certified for implementing measurable green building solutions in design, construction, operation and maintenance in line with the LEED standard.

When measured in gross square footage, the growth in LEED certifications for commercial interiors has been steady since 2007, with a major surge between 2007 and 2009, about when the economy tanked. Since then, growth has tapered off. This may be in line with a trend seen across the entire built environment: Doing more with less. From office buildings to retail spaces to residential space, square footage is trending down as better utilization of space is trending up. Big-box stores are shrinking as retailers build smaller urban stores. Employers are increasingly consolidating space, fostering collaborative workspaces but also encouraging more workers to log in from home. Commercial real estate research firm CoreNet predicts that by 2017, office workers will be allotted 151 square feet per employee, down from 225 square feet, on average, in 2010.

These trends reflect an acknowledgment that managing for sustainability extends beyond manufacturing and the supply chain. Employers are increasingly linking workforce health and happiness to safer, greener working environments, as well as fewer hours commuting in heavy traffic. For many companies, green buildings are a competitive advantage, helping to attract and retain the best and brightest. Improvements in information and communications technology means video conferencing is viable alternative to traveling for meetings. This means employees spend less time on the road and more time in that greener office, not to mention with their families. E

Employers are increasingly linking workforce health and happiness to safer, greener working conditions, as well as fewer hours commuting in heavy traffic. For many companies, green buildings are a competitive advantage, helping to attract and retain the best and brightest.

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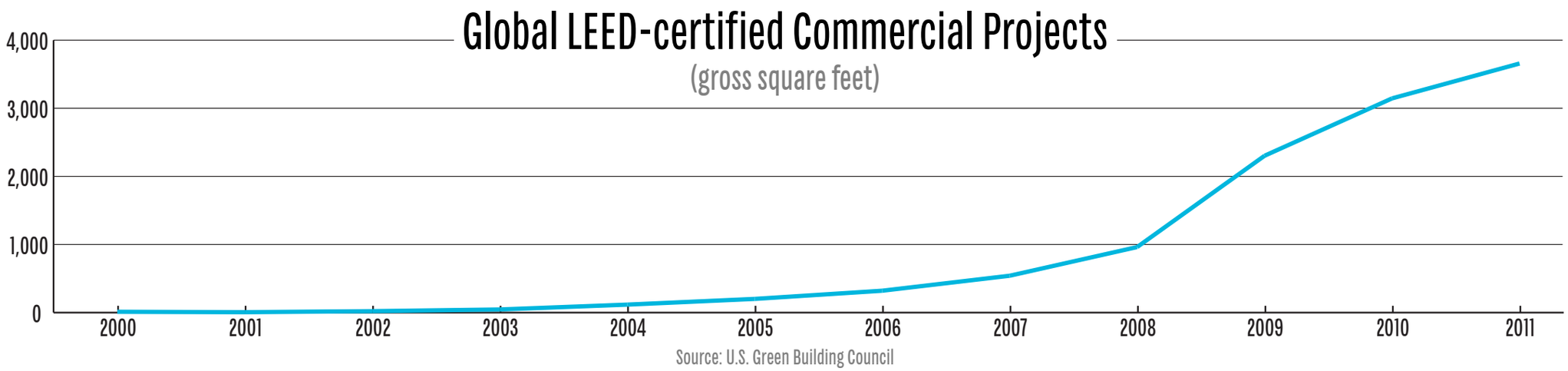


Source: U.S. Green Building Council

METHOD OLOGY

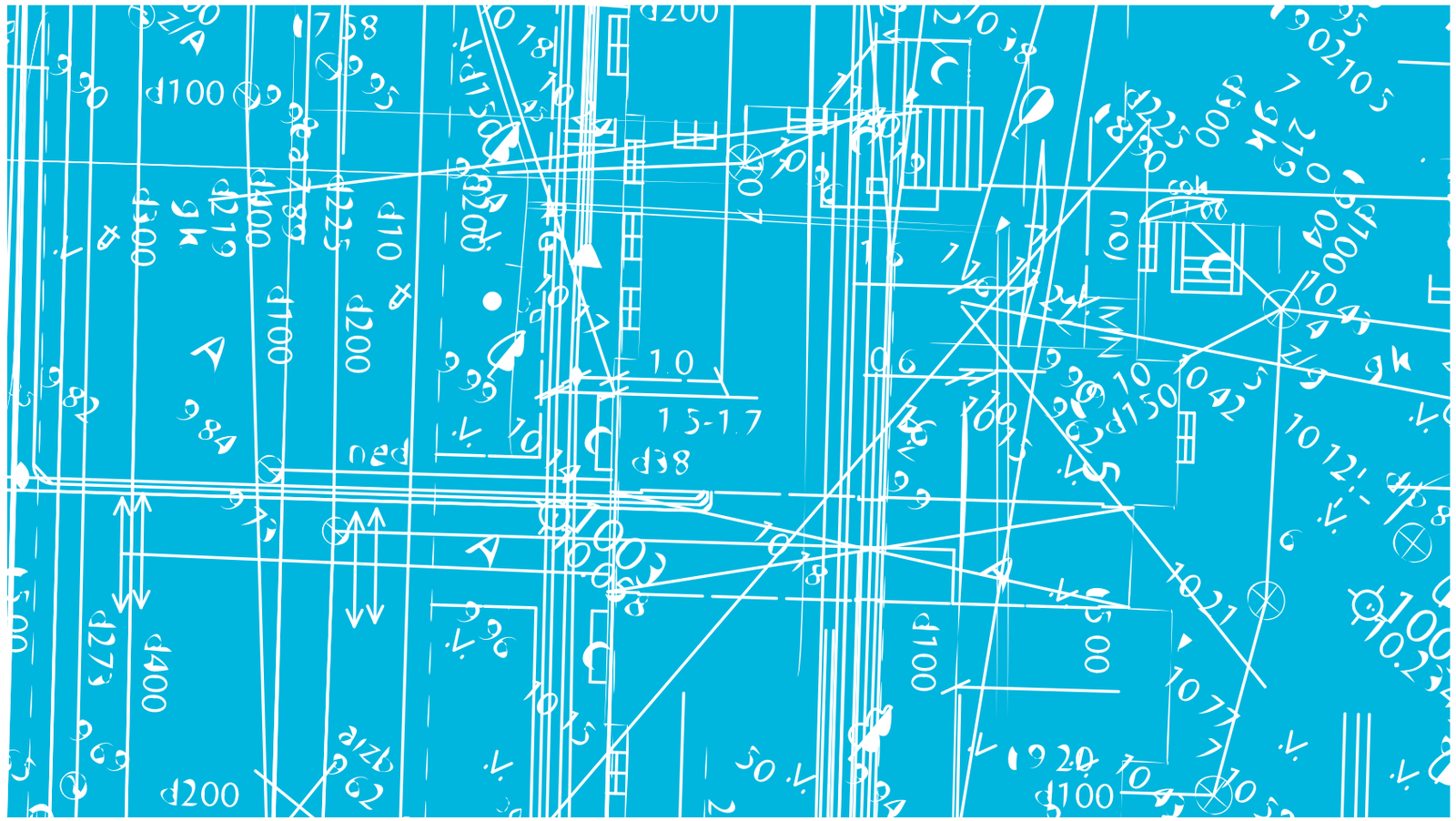
Trucost Methodology

Trucost has analyzed the environmental performance of more than 4,000 companies worldwide and applies an environmental economics methodology to conduct natural capital benchmarking. In this report, those benchmarks have been aggregated for both the S&P 500 index of U.S. companies, and the MSCI World Index covering more than 1,600 companies in 24 developed markets.

Trucost has developed an econometric methodology based on an environmental input-output model to calculate companies' natural capital impacts and allow for comparisons between all companies, regardless of disclosure levels.

Modeling Environmental Impacts

Trucost has conducted extensive studies of industries to identify the quantities of over 700 environmental indicators per unit of output. These indicators cover the use of resources such as water, as well as waste production and pollutants such as mercury and greenhouse gas emissions. The system is consistent with the United Nations Millennium Ecosystem Assessment.



Trucost's input-output economic model analyses business activities at a global level. The model includes data from the U.S. Toxic Release Inventory, Federal Statistics Office of Germany (Destatis), the UK Environmental Accounts, Japanese Pollution Release and Transfer Register, Australia National Pollution Inventory and Canada's National Pollutant Release Inventory.

Quantitative data on industrial facilities' pollutant releases are combined with economic data from sources such as the U.S. Bureau of Economic Analysis to analyze interactions between economic productivity and the environment. Trucost calculates the environmental impacts of 464 sectors. The sector classification used is the North American Industrial Classification System (NAICS), which has been expanded to provide additional granularity to environmentally important sectors.

The environmental impacts modeled for each sector are allocated to a company according to its proportion contributing to total revenue. Trucost primarily uses data from FactSet and company accounts to identify segmental revenue data, which are used to map each company to a set of sectors. The input-output model estimates the amount of resources a company uses (the inputs) to produce goods or services (outputs), and the related level of pollutants.

The model incorporates sector-level inflation data to adjust calculations in line with annual inflation and movements in commodity prices. The model also describes the economic interactions between each sector. Trucost's analysis takes into account both direct and indirect (supply chain) impacts. Within indirect impacts, the Trucost model can distinguish between any level of the supply chain from the first-tier of suppliers all the way through to total upstream supply chain requirements. The input-output methodology models the purchases a company makes and the resultant

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environmental impacts. This analysis, therefore, can be extended to include first tier suppliers that the company buys from, as well as their suppliers, and so on until reaching the supplier of the raw material.

In this way, Trucost can cost the upstream impacts of purchases. This provides a means to differentiate between low-impact supplied goods, such as renewable energy, and high-impact supplied environmental goods, such as fossil-fuel energy.

Company Disclosures

Trucost reviews and incorporates into its database information from companies' annual reports and accounts, environmental reports, sustainability or corporate social responsibility reports, company websites, and other publicly disclosed data. Where a company discloses data for only part of its overall activities, Trucost may normalize quantities in order to estimate the environmental impacts of the business's entire operations. If this is not possible due to insufficient disclosure, Trucost may exclude the company's publicly available data altogether from its environmental profile.

Trucost standardizes the quantities of resources used or pollutants emitted using metric tons or cubic meters to allow for direct comparison across companies, industrial sectors and geographies. For example, greenhouse gas emissions are quantified as metric tons for the entire company's operations in line with the Greenhouse Gas Protocol, the international standard for reporting GHG emissions. All quantities must correlate with the company's relevant fiscal year to allow the costs associated with environmental impacts to be compared with the company's financial results. Trucost conducts an annual engagement program to provide companies with the opportunity to review and verify their data.

Modeling Environmental Impacts

Once the quantity profile of a company has been calculated, a damage cost is applied to each resource and emission to generate an external environmental cost profile. The costs represent the quantities of natural resources used or pollutants emitted multiplied by their environmental damage costs to the economy and society.

External costs are incurred whenever a natural resource is used or emissions are made to air, land or water. The external cost of using an environmental resource, such as water, or emitting a pollutant, such as carbon dioxide, is the cost that is borne by society through the degradation of the environment but which is not borne by the firm that uses the resource or emits the pollutant.

For example, the European Commission estimates that dust and particles from sources including fuel cause the premature deaths of almost 370,000 people every year and reduce life expectancy by 8 months. Air pollutants could result in €189-609bn in health costs by 2020. Measures to reduce pollutants could cost the market economy around €7.1bn annually, saving at least €42bn in health costs.

The fact that external costs are not included in market prices means that the prices used in markets are generally too low, but not all in the same proportion. For example, burning diesel for road transport generates particulates which have an adverse effect on human health and the environment. Since the market price does not account for the total social costs associated with this product, these are borne by health services. Fuel duties apply a cost to diesel in the UK, to at least partially reflect the social costs of this product in the market price so that downstream users pay towards the damage done. In contrast, no taxes are applied to jet fuel kerosene, which has a significant global warming effect.

Valuing Environmental Impacts

Trucost prices the damage that is done to society and human capital by pollutants and natural resource use, including quantifying associated human health costs. Trucost, and many leading academics, believe that pricing these resources and pollutants in financial terms provides the most suitable weighting factor to differentiate the relative damage of a range of impacts. The same approach was applied by the Stern Review on the Economics of Climate Change, a study commissioned by the UK government in 2006. By applying a price to each environmental resource, based on the environmental impact of that resource, the model is able to analyze, in financial terms, the productivity and environmental performance of each sector.

Trucost's external costs-based system addresses a significant gap in rigorous, comparable and quantified environmental research. Trucost has compiled a library of prices for over 700 different natural inputs and outputs. For example, Trucost uses the marginal social damage cost of US$31 for each ton of greenhouse gases in its analysis.

The prices in Trucost's model are based on external cost principles derived from a review of environmental economics literature. Valuations draw on extensive international academic research into the pricing of environmental externalities and are overseen by an independent International Advisory Panel of leading academics.

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Trucost's damage costs differentiate between methods used to manage resources or emissions to reflect relative damage. For example, process water has a higher damage cost than cooling water used by power utilities. Similarly, damage costs for waste sent to landfill are higher than for waste incineration. Trucost can tailor its model to provide bespoke pricing for impacts, for example, by applying the cost of carbon allowances under Emissions Trading Schemes to a company's emissions.

Expressing all impacts in financial terms enables comparison between a company's external costs and traditional financial performance measures. Damage costs can be measured against revenues to compare the impacts of companies of any size or industrial sector.

The costs provide a good proxy for potential exposure to policy measures that seek to apply the "polluter pays" principle. Companies are increasingly required to contribute to external costs through regulations or economic instruments, which often "internalize" costs per unit of resources used and emissions released (i.e, through carbon taxes or allowances).

The external environmental costs of a company's operations give a good long-term indicator of the environmental sustainability of the company's activities.

Applying a Cost to Environmental Impacts

Trucost's input-output model calculates the size of a company's environmental impacts relative to its financial performance, and provides measures of materiality. E

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About Trucost

Trucost has been helping companies, investors, governments, academics and thought leaders to understand the economic consequences of natural capital dependency for over 12 years.

Our world-leading data and insight enables our clients to identify natural capital dependency across companies, products, supply chains and investments; manage risk from volatile commodity prices and increasing environmental costs; and ultimately build more sustainable business models and brands.

Key to our approach is that we not only quantify natural capital dependency, we also put a price on it, helping our clients understand environmental risk in business terms.

It isn't "all about carbon"; it's about water, land use, waste and pollutants. It's about which raw materials are used and where they are sourced, from energy and water to metals, minerals and agricultural products. And it's about how those materials are extracted, processed and distributed.

www.trucost.com

TRUCOST PLC

About GreenBiz Group

GreenBiz Group's mission is to define and accelerate the business of sustainability. It does this through a wide range of products and services, including its acclaimed website **GreenBiz.com** and daily e-newsletter **GreenBuzz**; webcasts on topics of importance to sustainability and energy executives; research reports, such as the annual **State of Green Business**; the **GreenBiz Executive Network**, a membership-based, peer-to-peer learning forum for sustainability executives from Fortune 1000 companies; and conferences such as the **GreenBiz Forum** and **VERGE**.

VERGE is a series of events focused on the convergence of energy, data, buildings, and transportation. VERGE events are creating a new dialogue focused on harnessing radical efficiencies within companies, campuses and cities across their operations and supply chains. VERGE brings together a new ecosystem incorporating executives from such diverse domains as utilities, facilities, fleets, and the public sector. VERGE events in 2013 include conferences in San Francisco, Boston, Paris and São Paulo, along with virtual events and webcasts.

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Enviance is the leading provider of Environmental ERP software, with more than 10 years environmental experience and 17,000 users in 49 countries. Our comprehensive solutions have been developed, tested and proven by serving the world's leading corporations and government organizations for over a decade. As the world business community faces increasing sustainability challenges, Enviance Environmental ERP solutions enable organizations to measure, manage, report GHG emissions, environmental, health and safety (EHS) data and other environmental information. The Enviance system leverages cloud computing technology to deliver its Environmental ERP platform online in real-time—anytime, anywhere and enterprise-wide.

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Richard Mattison Chief Executive Officer, Trucost Plc

Mary Catherine O'Connor Sr. Writer, GreenBiz Group

James Salo SVP, Strategy & Research, Trucost

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Sarah Wainwright Head of Marketing
Kim Woehl Research Analyst

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Direct versus supply-chain impacts by super sector

	Direct	Supply Chain
Food & Beverage	8%	92%
Financial Services	10%	90%
Banks	12%	88%
Telecommunications	15%	85%
Media	15%	85%
Real Estate	16%	84%
Technology	17%	83%
Retail	17%	83%
Insurance	18%	82%
Personal/Household Goods	19%	81%
Automobiles & Parts	19%	81%
Industrial Goods & Services	28%	72%
Travel & Leisure	29%	71%
Healthcare	29%	71%
Construction & Materials	37%	63%
Chemicals	52%	48%
Oil & Gas	54%	46%
Basic Resources	75%	25%

Source: Trucost data

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Top four environmental impacts direct and supply chain – 2011

	Impact 1		Impact 2		Impact 3		Impact 4	
U.S.								
Direct	Greenhouse Gases	51%	Coal	11%	Water	8%	Dust and Particles	7%
Supply Chain	Greenhouse Gases	35%	Water	35%	Nutrients and Organic Pollutants	7%	Acid Rain and Smog Precursors	7%
Total	Greenhouse Gases	42%	Water Abstraction	24%	Coal	7%	Acid Rain and Smog Precursors	7%
Global								
Direct	Greenhouse Gases	50%	Water Abstraction	15%	Dust and Particles	7%	Acid Rain and Smog Precursors	6%
Supply Chain	Water Abstraction	35%	Greenhouse Gases	35%	Nutrients and Organic Pollutants	7%	Acid Rain and Smog Precursors	7%
Total	Greenhouse Gases	41%	Water Abstraction	27%	Acid Rain and Smog Precursors	7%	Dust and Particles	5%

Source: Trucost data

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Absolute environmental costs
(Million U.S. dollars)

	2007	2008	2009	2010	2011
U.S.	$326,075	$303,837	$321,005	$326,012	$351,615
Global	$954,644	$900,046	$951,172	$928,853	$1,009,725

Source: Trucost data

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Total environmental costs as percentage of revenue

	2007	2008	2009	2010	2011
U.S.	3.97%	3.45%	3.93%	3.71%	3.66%
Global	4.24%	3.70%	4.13%	3.85%	3.76%

Total environmental costs as percent of net income

	2007	2008	2009	2010	2011
U.S.	47%	94%	63%	42%	41%
Global	51%	100%	71%	50%	52%
Net income					
U.S.	$687,846	$323,428	$511,750	$776,371	$858,780
Global	$1,877,414	$897,539	$1,332,811	$1,851,757	$1,927,788
Total Environmental costs					
U.S.	$326,075	$303,837	$321,005	$326,012	$351,615
Global	$954,644	$900,046	$951,172	$928,853	$1,009,725

Source: Trucost data

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Total primary energy consumption per dollar of GDP

BTUs per year 2005 U.S. dollars at purchasing power parities

	2008	2009	2010	2011	2012
U.S.	7,505	7,340	7,151	6,991	6,830
Global	7,454	7,388	7,326	7,237	7,148

Average annual efficiency growth rate

	1991-2009	1999-2009	2002-2012
U.S.	1.99%	1.98%	2.11%
Global	1.35%	1.20%	1.13%

Source: Trucost data

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GHGs emissions and percentages by scope					
Total emissions (million metric tons)					
	2007	**2008**	**2009**	**2010**	**2011**
U.S.	4,119	3,907	3,700	3,867	3,940
Global	11,232	11,180	10,687	10,671	11,321
Percent of emissions					
U.S.	**2007**	**2008**	**2009**	**2010**	**2011**
Scope 1	51%	51%	50%	51%	49%
Scope 2	8%	9%	9%	8%	9%
Scope 3	41%	39%	41%	41%	42%
Global					
Scope 1	49%	50%	48%	49%	47%
Scope 2	7%	8%	8%	8%	8%
Scope 3	44%	42%	43%	43%	45%

Source: Trucost data

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GHGs intensity by scope

Metric tons per million dollars of revenue

U.S.	2007	2008	2009	2010	2011
Scope 1	256	228	228	223	201
Scope 2	39	41	40	37	36
Scope 3	206	175	184	181	174
Global					
Scope 1	242	229	224	214	198
Scope 2	36	38	38	35	34
Scope 3	220	193	202	192	189

Source: Trucost data

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Water intensity

Cubic feet per million dollars of revenue

U.S.	2007	2008	2009	2010	2011
Direct withdrawal (surface/ground)	3,695	3,340	3,114	2,479	2,340
Purchased (municipality)	387	382	379	432	331
Cooling water	23,582	25,116	23,330	20,380	20,069
Supply chain	25,419	21,635	25,540	24,686	22,627
Global					
Direct withdrawal (surface/ground)	5,167	4,391	4,271	4,076	4,146
Purchased (municipality)	443	449	421	561	496
Cooling water	22,494	24,855	21,416	19,471	18,412
Supply chain	26,547	23,278	26,718	25,945	24,263

Source: Trucost data

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Air emissions intensity

Environmental cost per million dollars revenue

U.S.	2007	2008	2009	2010	2011
Acid rain and smog precursors	$1,402	$1,239	$1,053	$1,009	$925
Dust and particles	$1,186	$1,020	$1,140	$938	$1,042
Ozone-depleting substances	$55	$8	$8	$8	$7
Volatile organic compounds	$461	$500	$484	$388	$389
Metal emissions to air	$55	$47	$46	$37	$36
Global					
Acid rain and smog precursors	$1,241	$1,139	$1,032	$952	$918
Dust and particles	$1,042	$989	$1,095	$943	$995
Ozone-depleting substances	$25	$17	$18	$20	$11
Volatile organic compounds	$276	$325	$295	$248	$230
Metal emissions to air	$314	$167	$192	$34	$31

Source: Trucost data

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Total air emissions

Environmental cost in millions of dollars

U.S.	2007	2008	2009	2010	2011
Acid rain and smog precursors	$11,524	$10,894	$8,608	$8,860	$8,880
Dust and particles	$9,747	$8,974	$9,317	$8,233	$10,010
Ozone-depleting substances	$455	$73	$67	$71	$67
Volatile organic compounds	$3,791	$4,397	$3,955	$3,410	$3,737
Metal emissions to air	$455	$410	$376	$328	$350
Global					
Acid rain and smog precursors	$27,966	$27,691	$23,770	$22,995	$24,654
Dust and particles	$23,488	$24,043	$25,206	$22,774	$26,738
Ozone-depleting substances	$569	$418	$406	$486	$309
Volatile organic compounds	$6,222	$7,899	$6,795	$5,981	$6,183
Metal emissions to air	$7,082	$4,053	$4,416	$816	$830

Source: Trucost data

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Waste intensity

Metric tons per million dollars revenue

U.S.	2007	2008	2009	2010	2011
Landfill	3.96	3.76	6.15	5.83	5.50
Incineration	0.91	0.86	0.67	0.57	0.50
Company-reported recycling	1.47	1.03	1.41	2.05	1.84
Global					
Landfill	10.64	15.61	13.15	10.85	11.42
Incineration	0.95	1.90	2.57	0.79	1.10
Company-reported recycling	8.15	8.24	7.97	7.85	7.71

Source: Trucost data

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Paper recycling
Metric tons

	2007	2008	2009	2010	2011*
Global recovered paper	186,042,843	199,517,246	200,280,772	208,004,105	210,143,319
Percent of paper production	50%	51%	53%	52%	52%

Source: United Nations Food & Agriculture Organization Forestry Database (FAO-STAT) *Preliminary data

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Company reporting on sustainability

Number of Companies Reporting					
Standalone reports	**2007**	**2008**	**2009**	**2010**	**2011**
U.S.	62	80	108	132	163
Global	375	427	502	567	636
Other sustainability disclosures					
U.S.	177	164	262	284	289
Global	426	517	709	776	824
Percent of Companies					
Standalone reports	**2007**	**2008**	**2009**	**2010**	**2011**
U.S.	12.5%	16.1%	21.8%	26.6%	32.9%
Global	23.5%	26.7%	31.4%	35.5%	39.8%
Other sustainability disclosures					
U.S.	35.7%	33.1%	52.8%	57.3%	58.3%
Global	26.7%	32.4%	44.4%	48.6%	51.6%

Source: Trucost data

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Greenhouse gas reporting by scope

Number of Companies Reporting					
U.S.	**2007**	**2008**	**2009**	**2010**	**2011**
Scope 1	162	179	232	255	272
Scope 2	128	132	185	200	240
Scope 3	48	62	144	154	196
Global					
Scope 1	602	669	808	852	870
Scope 2	488	528	642	689	732
Scope 3	181	231	425	489	589
Percent of Companies					
U.S.	**2007**	**2008**	**2009**	**2010**	**2011**
Scope 1	34%	38%	49%	54%	58%
Scope 2	27%	28%	39%	42%	51%
Scope 3	10%	13%	31%	33%	42%
Global					
Scope 1	43%	47%	57%	60%	62%
Scope 2	35%	37%	45%	49%	52%
Scope 3	13%	16%	30%	35%	42%

Source: Trucost data

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Water reporting

Reporting on general water risk						
	2009		2010		2011	
	Number	Percent	Number	Percent	Number	Percent
U.S.	40	8.5%	60	12.7%	98	20.8%
Global	97	6.8%	153	10.8%	189	13.3%
Reporting on operations in regional water-stressed areas						
	Number	Percent	Number	Percent	Number	Percent
U.S.	40	8.5%	60	12.7%	93	19.7%
Global	97	6.8%	151	10.6%	179	12.6%
Reporting on key inputs from water-stressed regions						
	Number	Percent	Number	Percent	Number	Percent
U.S.	9	1.9%	13	2.8%	40	8.5%
Global	33	2.3%	46	3.2%	85	6.0%
Reporting on awareness of supply-chain water risk						
	Number	Percent	Number	Percent	Number	Percent
U.S.	13	2.8%	13	2.8%	27	5.7%
Global	33	2.3%	44	3.1%	67	4.7%

Source: Trucost data

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Number of companies reporting on environmental management systems

	2007		2008		2009		2010		2011	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
U.S.	154	32.6%	156	33.1%	209	44.3%	278	58.9%	292	61.9%
Global	676	47.6%	756	53.3%	824	58.1%	978	68.9%	1,012	71.3%

Source: Trucost data

Disclosure Score

Percentage of total environmental costs disclosed

	2007	2008	2009	2010	2011
U.S.	24%	29%	36%	41%	46%
Global	34%	38%	44%	48%	51%

Source: Trucost data

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Companies using third-party assurance for sustainability reporting

	2007		2008		2009		2010		2011	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
U.S.	8	1.7%	13	2.8%	15	3.2%	17	3.6%	27	5.7%
Global	95	6.7%	130	9.2%	148	10.4%	193	13.6%	234	16.5%

Companies using third-party assurance for greenhouse gas reporting				
Scope 1				
	2008	**2009**	**2010**	**2011**
U.S.	10.0%	22.7%	29.2%	37.1%
Global	12.5%	25.1%	31.6%	38.5%
Scope 2				
U.S.	10.2%	18.4%	25.0%	33.3%
Global	13.0%	21.2%	28.5%	35.4%
Scope 3				
U.S.	4.9%	7.2%	13.3%	16.5%
Global	7.0%	11.4%	16.8%	21.1%

Source: Trucost data

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Global cleantech patent filings

	2006	2007	2008	2009	2010
Biofuels	774	1137	1451	1699	1636
Solar Energy	695	1187	1922	2857	3680
Wind Energy	358	566	914	1240	1477
Hydropower	131	148	275	436	361
Geothermal	38	59	89	61	125
Water Desalination	112	135	157	213	211
Water Filtration	193	250	196	145	260
Advanced Batteries	606	678	698	799	1041
Fuel Cells	1566	1669	1374	1004	1131
TOTAL	**4473**	**5829**	**7076**	**8454**	**9922**

Source: GreenBiz Group research from World Intellectual Property Organization and other national patent office databases

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Companies reporting on environmental R&D or investments

	2007	2008	2009	2010	2011
Number					
U.S.	67	66	77	93	151
Global	158	162	203	270	383
Percent					
U.S.	14.2%	11.4%	14.3%	19.0%	27.0%
Global	11.1%	14.0%	16.3%	19.7%	32.0%

Source: Trucost data

Companies reporting on environmental profits or savings

	2007	2008	2009	2010	2011
Number					
U.S.	47	36	59	47	76
Global	105	107	171	182	252
Percent					
U.S.	10.0%	7.6%	12.5%	10.0%	16.1%
Global	7.4%	7.5%	12.1%	12.8%	17.8%

Source: Trucost data

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Global green power production as percent of total

	2007	2008	2009	2010	2011	2012
Hydropower	15.89%	16.19%	16.51%	16.46%	16.39%	16.41%
Solar PV	0.04%	0.06%	0.11%	0.16%	0.16%	0.18%
Solar CSP	0.00%	0.00%	0.00%	0.01%	0.01%	0.01%
Wind onshore	0.84%	1.06%	1.32%	1.58%	1.69%	1.85%
Wind offshore	0.02%	0.02%	0.03%	0.04%	0.04%	0.05%
Bioenergy	1.19%	1.24%	1.37%	1.38%	1.44%	1.50%
Geothermal	0.31%	0.32%	0.35%	0.33%	0.34%	0.35%
Ocean	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TOTAL	**18.30%**	**18.89%**	**19.69%**	**19.97%**	**20.07%**	**20.35%**

Source: International Energy Agency

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Global commercial LEED space

Gross square feet

	2007	2008	2009	2010	2011	2012*
Registered						
New Construction	503,592,249	859,489,543	1,051,178,165	281,485,512	502,872,205	487,399,547
Commercial Interiors	30,756,549	54,703,103	161,496,755	53,643,586	55,556,567	53,965,022
EB:O&M**	170,529,351	455,844,838	625,661,725	290,776,098	356,025,431	500,676,797
Certified						
New Construction	37,423,890	63,736,511	139,109,240	163,098,829	185,991,453	217,360,953
Commercial Interiors	3,569,877	8,594,159	21,709,280	32,757,264	36,074,982	37,406,377
EB:O&M**	14,300,374	25,431,292	140,467,756	232,265,053	247,198,359	188,106,098

*Through November 2012 ** Existing Buildings: Operations & Maintenance | Source: U.S. Green Building Council

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