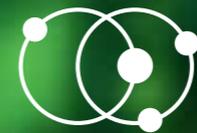


STATE OF GREEN BUSINESS 2015

By Joel Makower and the editors of GreenBiz.com



GreenBiz
group


TRUCOST^{PLC}



Introduction

Our eighth annual State of Green Business report continues our tradition of opening a window into how, and how much, companies are improving their environmental performance and how much their efforts are making a difference. This year's report, produced in partnership with Trucost, a leading research firm focusing on natural capital and sustainability metrics, offers a sobering reality: For all the impressive work that companies are doing to embed sustainability into their operations, from the planetary perspective it's not really changing much. The details can be found in the pages that follow.

It's not all doom and gloom. The world of sustainable business remains vibrant, innovative and maturing, as companies take on new and bigger challenges. Notable in our annual depiction of 10 trends for the year ahead are both risks (stranded assets could wreak havoc on some companies' balance sheets) and opportunities (open and distributed energy, agriculture and other technologies stand to disrupt markets, creating sizeable opportunities for innovators).

And there are continued signs of hopeful progress, such as the growing number of corporate commitments around renewable energy purchases, and the burgeoning trend of companies adopting science-based sustainability goals.

All of which makes the world of sustainable business fascinating and dynamic.

Watch this space.



A handwritten signature in black ink, appearing to read 'Joel Makower', with a long, sweeping horizontal line extending to the right.

Joel Makower
Chairman and Executive Editor
GreenBiz Group



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Foreword

Warning: The 2015 State of Green Business Index may make sobering reading.

The costs of pollution, ecosystem depletion and health impacts have grown steadily over the past five years and now exceed \$1 trillion per year for U.S. companies — equal to 6.2 percent of national GDP — and almost \$3 trillion for global companies, according to Trucost data. If businesses had to pay these costs, they would more than wipe out their profits.

Recent improvements in resource efficiency, although welcome, are not enough to break the link between economic growth and environmental decay. As a result, the business risks of unsustainable natural capital consumption are increasing.

So should we give up and go home? Of course not. While achieving sustainability may seem an insurmountable task, the solution is to break down the problem into manageable pieces. For a company, the starting point is to understand how it depends on natural capital, what the most material impacts are and which business

activities are involved. It can then identify the risks and opportunities it faces, and work out the most effective way to take action.

This report reveals a hive of activity among companies taking these practical steps along the way to developing more sustainable business models. In particular, more and more companies are using the concept of natural capital in order to integrate sustainability into their businesses. The number of companies involved in natural capital initiatives has grown by 85 percent to reach 300 over the past year. It has been Trucost's privilege and pleasure to work with many of them.

Natural capital refers to the stock of resources and ecosystem services on which all companies depend for their success. But natural capital is usually undervalued by the market, with the result that companies use it unsustainably. As environmental problems worsen, tougher regulations imposed or catastrophic events

occur, companies may be forced to pay some or all of these costs. By acting now to value natural capital in financial terms, companies can prepare for these challenges and capture opportunities in the market as they arise.

For example, water scarcity has emerged as one of the biggest business risks in some regions, threatening to increase costs, disrupt production and even force sites to close. Trucost has collaborated with Ecolab to create the Water Risk Monetizer, a free web-based tool that allows companies to put a price on their use of water, which reflects its true value to sustaining natural capital. Companies can then take action at a strategic and operational level to reduce risks by making the business case for water efficiency or stewardship.

The State of Green Business report shows that, for many sectors, the biggest natural capital impacts are in their supply chains. General Mills worked with Trucost to understand the impacts of its supply chain, especially greenhouse gas emissions and water use from agriculture. The company has used the insights to support its new goal to sustainably source its top 10 ingredients.

Monsanto and Natura worked with Conservation International and Trucost in Brazil to compare monocultural soy and palm oil production techniques with ones that conserve local ecosystems. The study proved that methods that protect natural capital have much greater value for the companies, their suppliers and the environment than more intensive production methods.

For some companies the focus is on creating opportunities from developing greener products. Carpet tile manufacturer Interface, a sustainability leader for years, is pushing the boundaries again by using natural capital valuation expertise to enhance LCA data. Putting a monetary value on different impacts allows the company to be clearly differentiated and compared with other companies, and its environmental programs to be prioritized and communicated.

Interface is not alone. Ten other companies including Puma, Construction Specialties and Shaw Industries worked with the Cradle to Cradle (C2C) Innovation Institute and Trucost to demonstrate improvements in product sustainability across a range of criteria including waste, chemicals, energy and water use achieved through C2C certification.

Puma's environmental profit and loss (EP&L) report made headlines in 2011; the framework continues to be adopted in other industry sectors because an EP&L provides an overview of a company's environmental impacts in a way that can be easily understood by everyone. Some companies are using natural capital valuation to communicate the strategic importance of sustainability to investors, regulators and other stakeholders. Trucost helped UK water utility Yorkshire Water and Danish pharmaceutical company Novo Nordisk become the latest companies to disclose an environmental profit and loss account for their businesses.

Be on the lookout for more leaders who will be announcing their EP&L results in 2015. As they do, and devise strategies and programs based on that increased self-knowledge, I expect the results will be reflected in the findings of future State of Green Business reports.



Dr. Richard Mattison
CEO
Trucost Plc

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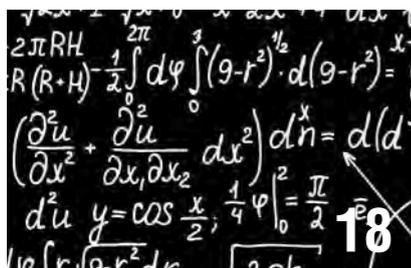
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TOP SUSTAINABLE **BUSINESS TRENDS** of 2015

The question, as always, is whether this inexorable march of progress is making enough of a difference. Arguably not. And few corporate sustainability executives would argue otherwise.

Year after year, through boom and bust, war and peace, oil price swings and zeitgeist shifts, the business of sustainability continues apace, well under the radar of the public — and the media, mainstream and otherwise.

Like that famous drum-beating bunny of battery commercials, corporate sustainability professionals keep going and going and going, through thick and thin. (That's a bit hyperbolic: During "thin" times, sustainability budgets are among the first to get trimmed, though they rarely disappear altogether.) Their jobs and missions have become woven indelibly into the fabric of commerce.

The question, as always, is whether this inexorable march of progress is making enough of a difference. Arguably, not. And few corporate sustainability executives would argue otherwise.

Still, what's taking place behind the scenes inside most companies is nothing short of remarkable. As the field grows and matures, companies are taking on new aspects of corporate social and environmental responsibility — lumped together these days into the term of art called "sustainability."

Consider water. It has long been a subject of concern, seen as a risk factor in many parts of the world, but bemoaned because it is underpriced in most markets, hamstringing investments in efficiency measures and advanced technologies such

as water recycling or desalination. Despite such obstacles, companies are finding innovative ways to measure and manage water risks, and making the finances pencil out.

Another example: corporate pledges to reduce or eliminate deforestation, made increasingly over the past year and given a boost last fall in the [New York Declaration on Forests](#), signed by 34 mostly global companies. Cargill, General Mills, Johnson & Johnson, Kellogg's, Nestlé, Procter & Gamble, Unilever and Walmart were some of the notable brands to sign the declaration, which also calls for concrete action to restore hundreds of millions of acres of degraded land.

SHIFTING MORAL GROUND

The push to reduce deforestation was driven in large part by companies procuring palm oil, a major ingredient in many processed foods, and a particularly vexing source of deforestation; old-growth forests in Indonesia and Malaysia have been ravaged by the rise of palm oil plantations. During 2014, many of the world's biggest food companies, from Danone to Dunkin' Donuts, committed to palm oil purchases from sustainable sources.

Granted, few of these companies decided to do this simply because it was the right thing to do. Most were brought to the table under pressure from activists and institutional investors, who continue to



drive corporate behavior changes on many fronts. Still, tipping points seem to come more swiftly these days, as companies are quicker to recognize when the moral ground has shifted under their corporate feet.

Palm oil and deforestation are just part of a larger move by companies to track and trace their supply chains across a range of commodities. Some of this is enabled by technological advances — cheaper and smaller sensors, for example, and the increasingly ubiquitous Internet of Things, which allows almost anything to communicate with almost anything else; and new technologies and tools that enable companies to more easily and effectively assess risks, revise strategy and implement solutions.

But it's not just about increasingly higher tech. As companies have maxed out on addressing the easy, low-hanging fruit — that is, the things they control inside their operations, such as facilities and fleets, and which have attractive financial

paybacks — they are finding that the bigger impacts lie in their supply chains, sometimes thousands of miles and several intermediaries removed from their direct control or influence. That's creating new, deeper levels of awareness — and, in some cases, action. But it's only just beginning. Most companies have yet to fully understand their supply-chain sustainability impacts, let alone how to address them.

THREE KEY STORIES TO WATCH

Amid all this is the rethinking of corporate sustainability goals — specifically, whether the ones companies are choosing are actually making a difference. Up to now, no one has really known. Companies typically devise their own goals based on what they think they can accomplish. Years later, many companies achieve those goals and tell the world about it.

But that old model is beginning to be questioned. On what basis are the goals chosen? Are they enough to actually address the company's share of the problem? If not, why not? (And, if not, are they greenwash?)

Increasingly, companies will be asked — by activists, investors and others — to provide the scientific rationale for their sustainability goals. As they are, companies could find that for all their good intentions, commitments and achievements, they're simply missing the mark. Will they be held accountable if they are? It's a story we'll be watching.

A bigger, related story is whether and how companies step up to the plate (to use an American baseball idiom) on the world's most pressing sustainability issues. Arguably, companies collectively have been nibbling at the edges of challenges like climate change, food security, ecosystems preservation, resource efficiency and the like. Whether and how they take on the big problems will be another critical story to watch.

One measure of company engagement going forward will be their proactive involvement on political issues that could accelerate the transition to a low-carbon and more sustainable economy. Can companies afford to sit on the sidelines, letting the political process unfold — or worse, playing defense against changes that might roil the status quo? Or will they start lobbying, individually and collectively, for carbon pricing, for example, or for removing the various roadblocks to accelerating deployment of renewable energy and other clean technologies? That's a third story we'll be tracking.

Put it all together and 2015 is going to be an interesting year on multiple fronts. Chief among them will be the launch of the new sustainable development goals in New York this fall, along with the United Nations climate talks in Paris in December. Both will be a test of corporate engagement and resolve in driving the kinds of change many of their CEOs publicly call for, though don't always back up in action.

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How else will the year play out? Here, in no particular order, are 10 trends we'll be watching in 2015.



STRANDED ASSETS BECOME A CORPORATE LIABILITY

Lauren Hepler, Associate Editor, GreenBiz



The concept of “stranded assets” isn’t a particularly new concept in financial circles, but in the sustainability world, it is gaining currency. And it could have multitrillion-dollar implications for companies and their investors. At issue is a simple but profound question: What happens to all the money that’s been sunk into unsustainable business prospects?

Take coal and oil as exhibits A and B. Fossil-fuel companies have for decades vied for mining, drilling and, more recently, fracking rights to access coal and oil reserves — an arrangement that, in a future including new carbon taxes or regulations, could make it economically unviable to extract those assets. Oil and coal would be stranded both physically in the ground and financially on company balance sheets.

[By one calculation](#), 60-80 percent of coal, oil and gas reserves for the world’s publicly listed companies

are “unburnable” if the planet has a shot at staying below the 2° Celsius global temperature increase that experts believe is a tolerable threshold for the global economy. That includes 90 percent of U.S. and Australian coal and almost all Canadian tar sands. Though fossil fuel companies such as ExxonMobil [have taken heat from shareholders](#) for being slow to disclose the potential impacts of such scenarios, one former JP Morgan director estimated in a 2012 *Rolling Stone* article on [“Global Warming’s Terrifying New Math”](#) that giving up 80 percent of fossil fuel reserves would mean writing off \$20 trillion in assets. In other words, real money.

Increasingly, the question for some of the biggest energy companies in the world is when, not if, they’ll have to come to grips with the uncertainty surrounding stranded assets — which, by definition,



are assets that must be recorded as a loss after under-performing, or which become obsolete prior to the end of their expected value cycle. Instead, the questions at hand become when the financial storm might hit, who will be impacted, how severe the losses could be and where the potential upsides are.

It's not just carbon taxes. Dwindling supplies of non-renewable natural resources, high-profile institutional fossil-fuel divestment and increasingly affordable and reliable clean energy alternatives all [undermine the long-term value](#) of today's predominant energy assets.

And what if accounting for stranded assets catches on outside of the energy sector? Trees purchased by pulp and paper companies, or water relied on in the agricultural supply chain, for example, could become untenable investments due to ecological concerns, undercutting the balance sheets of multibillion-dollar industries.

In all of these sectors, financial disincentives for investment in unsustainable assets have become an increasingly tangible argument for environmentalists and economists alike. It's a topic that dovetails with discussions about [building for a climate-resilient economy](#), which manifests in everything from planning for smart cities to investing in natural infrastructure to businesses transitioning to renewable energy technologies.

Al Gore attempted to paint the big picture on the issue of stranded assets in a mid-2013 *Wall Street Journal* op-ed with business partner David Blood on ["The coming carbon assets bubble."](#) Comparing businesses that turn a blind eye to carbon risk to companies complicit in the sub-prime mortgage scandal that belied the global financial crisis, Gore and Blood call investment strategies that ignore the [potential risk associated with stranded assets](#) "unwise and increasingly reckless."

One big problem: No one has figured out how to account for the possibility of large-scale stranded assets. Part of the reluctance to hammer out detailed forecasts probably lies in denial; fossil fuel companies in particular have billions of dollars to spend on lobbying efforts designed to beat back aggressive carbon pricing schemes.

But Gore & Co. argue that approach, too, is only a short-term distraction compared to market forces like improving clean energy technology and shifting public sentiment that undercuts fossil fuel companies' "license to operate."

As stranded assets [become part of the investment lexicon](#), the next step becomes outlining what sorts of actions might be taken to mitigate financial fallout — a rapidly-evolving field that leaves much to be desired: "These risks are poorly understood and are regularly mispriced," notes a [report on the topic](#) (PDF) by academics and financial analysts with the Smith School of Enterprise and the Environment at the University of Oxford.

One major issue with understanding how stranded assets stand to impact businesses in different niches of the energy sector is a nagging lack of data on how scenarios for coal, oil, water, pulp or other natural resources may play out over the next few years.

One big problem: No one has figured out how to account for the possibility of large-scale stranded assets.

[A separate paper published in 2014](#) (PDF) by Oxford's specialized Stranded Assets Programme — a program, it's worth noting for those doubting the staying power of stranded assets, that has been around since 2012 — recommends that companies focus on carbon-related asset projections 5-15 years out. Quantitative data and commodity-specific forecasts will also be increasingly important to fully understanding the potential implications of this phenomenon.

When considering how ill-equipped companies appear to confront the reality of stranded assets, it's also worth underscoring that it's not only energy conglomerates like BP, Shell, Exxon and Peabody that have a financial interest in the market value of minerals like shale, coal and other non-renewable energy sources.

American universities and public pension funds, for instance, have [on average committed 2-5 percent of their assets](#) to fossil fuel-related public equities, according to the Oxford report. All told, fossil fuel-dependent assets make up an average of 10-30 percent of most major exchanges, throwing even more investors into the mix.

The theoretical exposure of those and other shareholders to financial losses from stranded assets is one possibility to evaluate. But another increasingly important dynamic is how institutional divestment campaigns might exacerbate financial uncertainty.

The [Oxford report](#) compares fossil-fuel divestment campaigns to precedents in other industries where profits have suffered due to a combination of bad PR and short-sighted investment, like the tobacco industry.

With pension funds and universities alone, which have a combined \$12 trillion in assets under management, Oxford pegs the possible upper range for divestment in oil and gas companies at \$240-\$600 billion. Keeping in mind that the market cap for Exxon is currently in the neighborhood of \$395 billion, that's no rounding error for fossil-fuel companies.

While the uncertainty around stranded assets is enough to cause more than a headache for those with a vested interest in fossil fuels, there is a potential silver lining. It's a thread that underlies many discussions about a future



economy marked by climate volatility: With financial risk comes potential financial reward for those who manage to get ahead of the curve and establish new revenue streams.

Groups like the analysts at the Carbon Tracker Initiative are [already preaching “unburnable carbon”](#) strategies, including directing fossil fuels toward uses that don't involve combustion, like petrochemical feedstocks. The concept gained currency late last year, when the Bank of England [announced an unprecedented move](#) among central banks and financial regulators to open an inquiry into the potential cost of stranded assets.

That's a niche example, but companies facing a future in which stranded assets affect balance sheets would be well served to start viewing the issue through the steely-cold eyes of their shareholders.



SUSTAINABILITY SOLUTIONS BECOME OPEN AND DISTRIBUTED

Joel Makower, Chairman & Executive Editor, GreenBiz

In a world where information is power and sharing is the new currency, it makes sense that companies would open up the kimono to share their insights and intellectual property for solving big sustainability challenges.

That's exactly what's happening, more so than most people recognize.

The idea of "open innovation" — the organized exchange of knowledge to accelerate innovation that benefit companies and markets — has been around for years; the term was coined more than a decade ago by University of California at Berkeley business professor Henry Chesbrough. It represents a paradigm shift from "closed innovation," in which companies tightly control their own ideas, as well as their execution, which was the chief strategy of companies throughout the 20th century.

Open innovation took off initially in the software world, where systems like Linux and Apache were built by thousands of individuals, all of who ceded ownership of the basic code, but were able to use the collective creation to create their own products and services.

Today, that mindset is imbuing the sustainability marketplace — everything from electric cars to agriculture to water systems. And it is being employed by some of the world's biggest companies — among them, GE, GM, Siemens and Unilever — to create the next generations of low-carbon technologies.

It's not just about being "open" — it's also about being "distributed." Industries are moving from centralized to distributed systems — think rooftop solar energy systems instead of centralized power plants, or 3D printing that can move manufacturing to wherever in the world customers are. In many cases, open and

distributed systems can drive new efficiencies, dramatically reducing time, energy, materials and waste. Perhaps more important, they can make systems safer and more resilient against a wide range of threats, from economic swings to terrorism to Mother Nature's wrath.

It is hard to overstate the potential for all this to disrupt markets. Consider the growing conversation over "open" versus "closed" agriculture. Indeed, the original open source entrepreneurs weren't software developers — they were farmers. They routinely innovated and optimized crops and breeds, sharing seeds or offspring with other farmers, who similarly improved on them.

During the late 20th century, seeds and breeds became patented and privatized. This incentivized companies like Dow, Dupont, Monsanto and Syngenta to develop innovative crops, including genetically modified varieties with unique characteristics. It also placed the agricultural genome in the hands of a handful of large companies. For some, that's proved problematic.

Perhaps as a backlash, open-source ag platforms are sprouting. For example, [the Open Source Seed Initiative](#), born in 2012 at the University

of Wisconsin, aims to provide an alternative to the patent-protected seeds — a free exchange of seed that can't be patented. There's [Farm Hack](#), an open-source community focusing on "resilient agriculture"; [FarmBot](#), an open-source precision farming software package; and Rural Advancement Foundation International, or [RAFI](#), which along with FarmBot created an open source online library of agricultural innovations.

Can open-source ag disrupt the dominance of a few big corporations? It's very early in the game, but it will be interesting to watch.

It's not just farming. A wide range of companies in sustainability-related industries as varied as minerals and mining, energy systems, electric vehicle charging and water management are turning to open innovation platforms for new sources of innovation and inspiration. Philips International B.V., the Dutch electronics giant, created the [simplyinnovate](#) platform to drive new levels of innovation and efficiency in lighting products. Unilever launched [an online platform](#) offering experts the opportunity to help the company find the technical solutions it needs to achieve its ambition of doubling the size of its business while reducing its environmental impact. ABB, the Swiss-based global power



MARK "PUCK" MYKLEBY, STRATEGIC INNOVATION LAB **ON RETHINKING SECURITY**

and automation technologies company, is launching [open innovation partnerships](#) with universities, research institutions and others to develop an open smart grid ecosystem. Last year, GE [launched an open innovation challenge](#) aimed at improving the energy efficiency, decreasing emissions and reducing overall the environmental footprint of mining tar sands oil.

Such ideas are nearly limitless, extending beyond companies and markets. For example, in 2010 the design firm IDEO created an online platform called [OpenIDEO](#) to help solve pressing societal challenges by engaging the masses. In 2012, Steelcase, the office furniture giant, sponsored an IDEO challenge to help cities like Detroit find their way back from the brink. [The challenge asked](#), "How might we restore vibrancy in cities and regions facing economic decline?" The response to the challenge was overwhelming.

Nonprofits are getting into the act. The Rocky Mountain Institute's [Project Get Ready](#) acts as a platform for open innovation and information exchange aimed at accelerating the recharging infrastructure for electric vehicles. It has helped a network of 30 North American cities share information and identify best practices for making EV charging seamless and ubiquitous.

And then there's Nike, whose many [sustainability innovation projects](#) have resulted in innovative tools that the company has shared widely. For example, the company launched the [GreenXchange](#), a pioneering platform for sharing intellectual property; an [Environmental Apparel Design Tool](#), released publicly to help clothing designers make more sustainable choices; and the [Nike Materials Sustainability Index](#), which the

company developed to select "environmentally better materials," then released the tool to the world.

Granted, open innovation initiatives don't always work. The website for Nike's aforementioned GreenXchange, launched with great fanfare at the World Economic Forum in 2010, no longer exists; it didn't get the participation of enough other companies. Similarly, BioForge, a set of online tools for scientists to collaborate on genetic research, created in 2005 by [Cambia](#), an Australian nonprofit at the center of open innovation in agriculture, shut down after three years. Like Nike's project, BioForge didn't get enough participation to create a critical mass of ideas and users. Arguably, both initiatives were ahead of their time.

Whether individual efforts succeed or fail is beyond the point. Innovation is like that. Some things work and others don't. What's exciting, and potentially revolutionary, is the growing ability of diverse, distributed communities to upend the status quo, potentially making products and services cleaner, more efficient and socially equitable, all while creating profitable new markets.

Cann open-source agriculture disrupt the dominance of a few big corporations. It's very early in the game, but it will be interesting to watch.

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SUPPLY CHAINS BECOME MORE TRANSPARENT

Heather Clancy, Senior Writer, GreenBiz



Corporate supply chains, long opaque, even to the companies themselves, are becoming clearer. One reason: the rise in traceability and transparency technologies, along with the management practices that make them work.

Traceability, says a [guide published last year](#) by the UN Global Compact and sustainability advisory firm BSR, means:

The ability to identify and trace the history, distribution, location and application of products, parts and materials, to ensure the reliability of sustainability claims, in the areas of human rights, labor (including health and safety), the environment and anti-corruption.

The field isn't exactly new. Companies have been tracking agricultural commodities and forest products for years, for example. But new technologies such as sensors, data analytics and the so-called Internet of Things are enabling companies to more easily

and affordably account for the environmental and social impacts of their materials and products — all the way upstream to farms, forests, mines and individual factories.

The growth of third-party verification is another factor, along with a small army of professionals available to verify the provenance of products and raw materials. Increasingly, global organizations, such as Big Four auditors and assurance firms like DNV GL are growing global practices around supply-chain transparency and traceability. For companies, there's no longer an excuse for not knowing.

Increasingly, companies do know, and they're sharing that information with anyone who cares. Example: If you inspect a can of Ocean Naturals tuna, the house brand from Tri Marine Group, you'll find numeric or QR codes emblazoned on every package. Enter that information on the company's Web site, and



you get detailed information about what sort of fish contributed the meat, plus where and when it was “responsibly caught.” That data is collected from every boat in the company’s fishing fleet.

Tri Marine is able to pull this off because its business model is vertically integrated: it has tight control over both the source of its tuna, as well as how it is processed. And in early this year, it [allied with the Marine Stewardship Council](#) (MSC) to add even more weight to its data.

Most supply chains are more complicated, with commodities or raw materials changing hands multiple times, or commingled with those from other sources, often originating at hundreds or even thousands of locations around the world.

Consider [McDonald’s quest to start buying verified sustainable beef](#) for its hamburgers by 2016. That pledge has forced it to engage far more closely with stakeholders across the industry — including more than 400,000 ranchers, plus feedlots, supermarkets and restaurants, not to mention environmental groups and the company’s own senior management.

The process started more than five years ago, when McDonald’s teamed with the World Wildlife Fund to research solutions for everything from animal welfare to land management practices by beef producers, especially in places like Brazil where cattle ranch development has been linked to deforestation.

McDonald’s journey reached a significant milestone in November 2014, when the industry approved a set of principles for sustainable beef standards.

Cameron Bruett, president of the Global Roundtable for Sustainable Beef and chief sustainability officer for beef processor JBS USA, [told GreenBiz](#): “It necessarily was a negotiation, a lengthy discussion, and sometimes a difficult discussion depending upon the issue that was being addressed... I think we arrived at a product that probably doesn’t meet 100 percent of any member’s needs, but certainly represents a negotiated, transparent outcome that everyone agrees is an outstanding vehicle by which to move forward.”

McDonald’s and others may learn from companies that have already succeeded in gaining visibility into supply chains. For example, there are more than 20,000 seafood products certified under the MSC certification program, which is at the center of [Whole Foods’ rigorous aquaculture initiative](#). About 10 percent of global forests have been covered by the Forest Stewardship Council (a program that [Kimberly-Clark has used to great effect](#)) and 8 percent of the world’s cotton supply is now certified under the [Better Cotton Initiative](#). Other global programs exist for biofuel, cocoa, leather, minerals and diamonds, [palm oil](#) and sugar.

These things don’t happen overnight. Policies adopted by apparel maker [Patagonia](#) to document its evolution to 100 percent traceable down took more than six years to develop. The process involves a physical inspection of every supplier, from farm to factory, by a third-party expert. That’s a far cry from typical supply-chain practices, which rely on affidavits signed by suppliers attesting to adherence with sustainability practices, but which aren’t usually independently verified.

Companies like Patagonia and McDonald’s are finding that there’s strength in numbers — that by joining forces they can leverage their

collective clout while gaining the economies of scale that come from standardized practices and reporting. One great recent example of progress is the [2014 pledge by four of the world's biggest palm oil producers](#) — Asian Agri, Cargill, Golden Agri Resources and Wilmar International — to drive sustainable procurement policies that shun deforestation deep into the Indonesian supply chain.

Elsewhere, many food and beverage companies — including Coca-Cola, [General Mills](#), and [Mondelez](#) — are partnering with their growers and other agricultural partners to push for sustainable business practices.

Coke, for example, published sustainable agricultural guiding principles that include requirements for soil management, water management and biodiversity. General Mills piloted an innovative program with vanilla farmers in Madagascar that supply its Haagen-Dazs ice cream division.

Mondelez is making perhaps the biggest statement of the three with its [Coffee Made Happy](#) initiative, which could reach 1 million small coffee growers “successful entrepreneurs” by 2020. It isn't just training farmers, it is measuring results.

“As the second largest coffee company in the world, we can have real impact on the ground — inspire, train and build capacity to improve coffee farmers' livelihoods and attract new generations to small-scale farming,” said Roland Weening, president of coffee at Mondeléz International.

It also ensures that more stakeholders deep within the supply chain associate sustainable resource management with improved economic opportunity — and that traceability and accountability can be smart business choices.

Companies like Patagonia and McDonald's are finding that there's strength in numbers — that by joining forces they can leverage their collective clout while gaining the economies of scale.



WATER RISK TRICKLES FROM AWARENESS TO ACTION

**Libby Bernick, Senior Vice President,
North America, Trucost**

Water scarcity has been on companies' radar for some time. But turning awareness into action by incorporating water risk calculations into company decision making and strategic planning has been another matter. Suddenly, there seems to be a trickle of progress.

The [latest results from CDP's water program](#) are telling. They found two-thirds of the world's largest companies acknowledging that they are exposed to water-related risks, with almost a quarter saying such risks could limit their growth — for some, within the next year.

For example, beverage giant Diageo says growth of its operations in Nairobi is likely to be constrained within five years by water scarcity. Last year, Coca-Cola had to shut down a bottling plant in India due to community concerns over water use. Mining companies Barrick Gold and Rio Tinto both walked

away from planned developments in 2014 as a result of water impact issues, while BHP Billiton invested almost \$2 billion in a desalination plant to ensure water availability for its mine in Chile's Atacama Desert.

Despite increased awareness, many firms struggle to find effective ways to measure and manage water risks. The CDP survey found that the risk assessments carried out by many companies may be inadequate, as 60 percent do not require key suppliers to disclose water risks they face, and only 25 percent conduct an assessment at the river-basin level.

Nevertheless, some firms are forging ahead with water infrastructure investments. Nestlé, for example, announced a "[zero water](#)" [powdered milk plant](#) in Lagos de Moreno, Mexico, which recycles water extracted from milk for use as cleaning water instead of abstracting groundwater. The innovation saves some 1.6 million liters of water per year, equivalent



to 15 percent of Nestlé’s water use in Mexico, and was part of a \$15 million plant upgrade. Nestlé also applies an internal [“shadow price”](#) to water to spur more efficient use in its factories. Initiatives such as these have helped the company cut its water consumption by a third over the past 10 years.

Other companies are looking beyond their own operations to understand water risks in their supply chain. For example, [General Mills](#) measured its dependence on natural capital — including water — across the value chain for 17 of its top commodities. The results identified “hotspots” of water consumption, dominated by upstream sources such as agriculture, packaging and ingredient processing, which combined

accounted for 99 percent of water use. This robust, quantitative assessment helped inform the company’s commitment to sustainably source 100 percent of its 10 priority ingredients by 2020.

Companies are being helped in their efforts by new tools and standards. For example, the [Alliance for Water Stewardship’s](#) new standard guides businesses in working with other stakeholders to safeguard future supplies at a local site or catchment. Its six-step framework provides businesses with a road map to tackle the complexity of dealing with water as a shared resource, where businesses need to move beyond water efficiency within their own operations.

The launch of the free, online [Water Risk Monetizer](#) tool takes water assessment to a new level by providing businesses with actionable site-specific water scarcity data — in monetary terms. Being able to quantify risk into dollars, euros and the like is much more likely to drive effective action towards water stewardship. Developed through a collaboration between Ecolab and Trucost, the tool takes into account the full value of water and business value at risk from water scarcity. Companies are able to use the tool to make the business case for water efficiency and treatment, assess how future operating costs could affect profitability, or compare growth strategies in different regions.

Such tools represent a growing recognition of the need for companies and governments to account for the “true value” of water. In most markets, the price of water does not obey the law of supply and demand, with water bills in some [drought-prone areas of the United States](#) actually lower than in regions with higher rainfall. In some developing countries, abstracting water is almost a free-for-all.

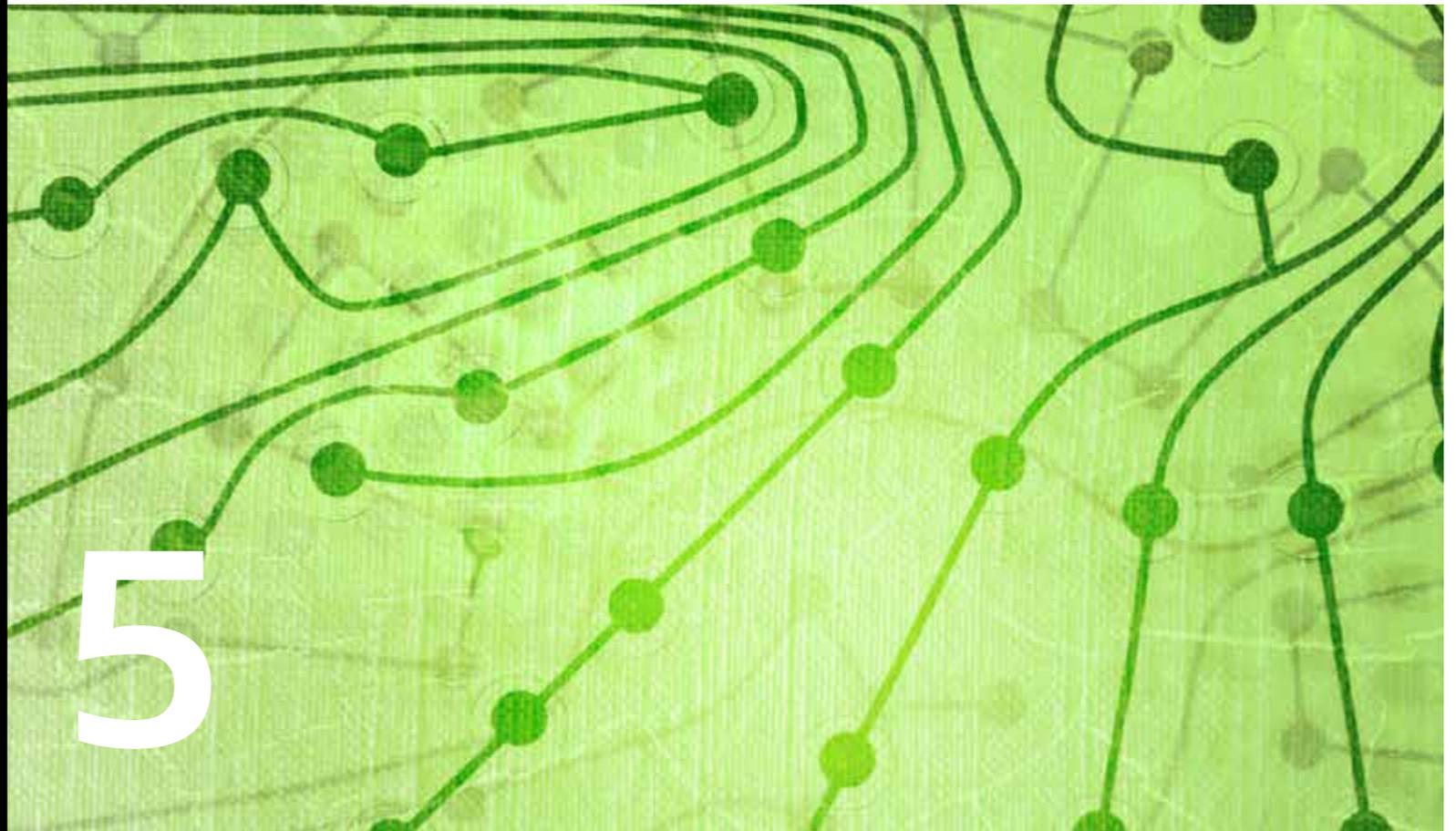
Incorporating the full cost of water into decision-making was the recurring theme at the 2014 [World Water Week](#) in Stockholm, as well as the Economist World Water Summit in November. At the summit, environment ministers from Uganda and Singapore discussed the potential for water pricing in their countries, showing that water scarcity is rising up the agenda of the world’s politicians. This elevates the regulatory risks for companies that do not respond by managing their water impacts.

Location matters. Christophe Beck, Ecolab international president, points out that if companies in China had to pay Danish water prices, it would cost them an additional \$130 billion annually, equivalent to 1.5 percent of Chinese GDP. He argued that as problems due to water shortages become ever more acute, low water prices tarnish the business case for taking action. Accounting for water’s full value helps businesses transform their operations to be more risk-resilient and resource-efficient — whatever water’s cost.



BIG BUSINESS LEADS THE CHARGE FOR RENEWABLE POWER

Heather Clancy, Senior Writer, GreenBiz



After years of purchasing renewable energy credits (RECs) to meet clean power sourcing goals, dozens of big global businesses across multiple industry sectors — from consumer products to retail to high-tech — are taking matters into their own hands.

Their mission: Inspire local and national governments, along with utilities, to fast-track policies that place renewable energy alternatives on a level playing field with fossil fuels — and then let economics guide the way.

Their motivation: lack of progress by government policy-makers and frustration with rising bills from utilities that have been slow to invest in clean power infrastructure.

“Renewable energy is common sense energy,” said Steve Howard, chief sustainability officer for IKEA

Group, participating in an event during Climate Week New York last September. “There is no peak sun, no peak wind. We struck sun, we struck wind long before we struck oil.”

IKEA isn’t waiting around for policymakers, many of whom have been slow to figure this out. Instead, it has committed close to \$1.9 billion to renewable energy technologies through 2015. For example, the retailer supports rooftop solar panels at almost 90 percent of its U.S. stores. Many of those installations happen to be the largest of their kind in their home states. Along the way, IKEA also has bought two wind farms.

Clearly, most small and midsize businesses don’t exactly have the sort of buying power that IKEA does. But the Swedish retailer is far from alone in demonstrating its serious interest in renewables

through direct investments — a trend that accelerated significantly during 2014 and continues to gain momentum.

Other leaders include Adobe Systems, Apple, BMW, Coca-Cola, eBay, Google, Kohl's, S.C. Johnson, Volkswagen and Walmart. All stand apart in supporting on-site installations of significant generating capacity, rather than relying on RECs to meet their clean power procurement targets.

Managed healthcare company Kaiser Permanente ties its investments in solar (in Hawaii and California) to a long-term plan to keep the price it pays for electricity in check. "Pursuing clean energy opportunities is not only the right thing to do for our communities, it makes good business sense," said Rame Hemstreet,

vice president of facilities operations and Kaiser's chief energy officer, explaining his strategy.

Last fall, during ClimateWeek NYC, more than a dozen companies disclosed multiyear pledges to transition to 100 percent renewable power.

Their declaration:

Accelerating the scale-up of renewable energy will help us deliver a better, healthier more sustainable world for what will soon be 9 billion people.

Renewable energy investment is also a smart business opportunity. In addition to providing clean power for a business, renewable energy investment can provide financial returns compatible with — and in some cases even higher than — other mainstream investment options.

The founding sponsors of the campaign, called [RE100](#), were IKEA and Swiss Re. (The Climate Group and CDP are also behind the initiative.) "We decided on a 100 percent renewable power approach because as a leading provider of reinsurance and insurance, we believe that tackling climate change while meeting the energy needs of a growing and development world is an urgent matter," said Jurg Trub, head of environmental and commodity markets for Swiss Re.

Initial supporters for the pledge included BT, Commerzbank, FIA Formula E, H&M, KPN, Mars, Nestle, Philips, Reed Elsevier, J. Safra Sarasin, and Yoox. Walmart made a similar pledge long ago. The goal is to get 100 companies on board with this idea before 2020 — although companies may take additional years to meet this target.

Why aren't more businesses ordering up more renewable power? For one thing, it's a pretty difficult process. Last summer, a dozen companies (the number is now 19) got together to encourage utilities to reconsider their current policies and generating mixes. "Even though cost-effective project opportunities currently exist, with billions of kilowatt-hours still needed to meet their renewable energy goals, businesses face a variety of challenges accessing cost-effective projects on favorable terms," the companies wrote as part of the [Corporate Renewable Energy Buyers' Principles](#).

Among those joining the push for better choices and procurement methods were Adobe, Sprint, eBay, Volvo, Cisco, Facebook, Walmart, Hewlett-Packard, 3M, Johnson & Johnson, Procter & Gamble, Novo Nordisk, Intel, EMC, Aditya Birla Novelis, Mars, General Motors and REI. They represent a combined demand of more than 10 million megawatt hours per year — enough power to run a million homes for a year.



The changes they're seeking include access to longer-term, fixed-price contracts; the opportunity to invest in new renewable power generation; and more financing options. "If we can buy renewable energy for less, we can operate for less, and we can pass on the savings," said David Ozment, senior director of energy for Walmart.

Marco Krapels, partner with private equity firm Pegasus Capital Partners, and an expert in renewable energy issues, said utilities stand to benefit substantially from solar and wind development — especially when they compare these investments to those for unsubsidized fossil fuels projects.

"The cost of those technologies is expected to drop between 60 and 80 percent," Krapels said [during a session at the VERGE 2014](#) conference last October. "If you approach this from the standpoint of the return on taxpayer money, that's a great return on investment. Also, it achieves price stability. The 10 U.S. states with the highest penetration of wind ... actually saw their retail electricity rates flatten or even decrease in the last five years, whereas the other states that have a lower penetration of renewables saw a continued rise in retail electricity rates."

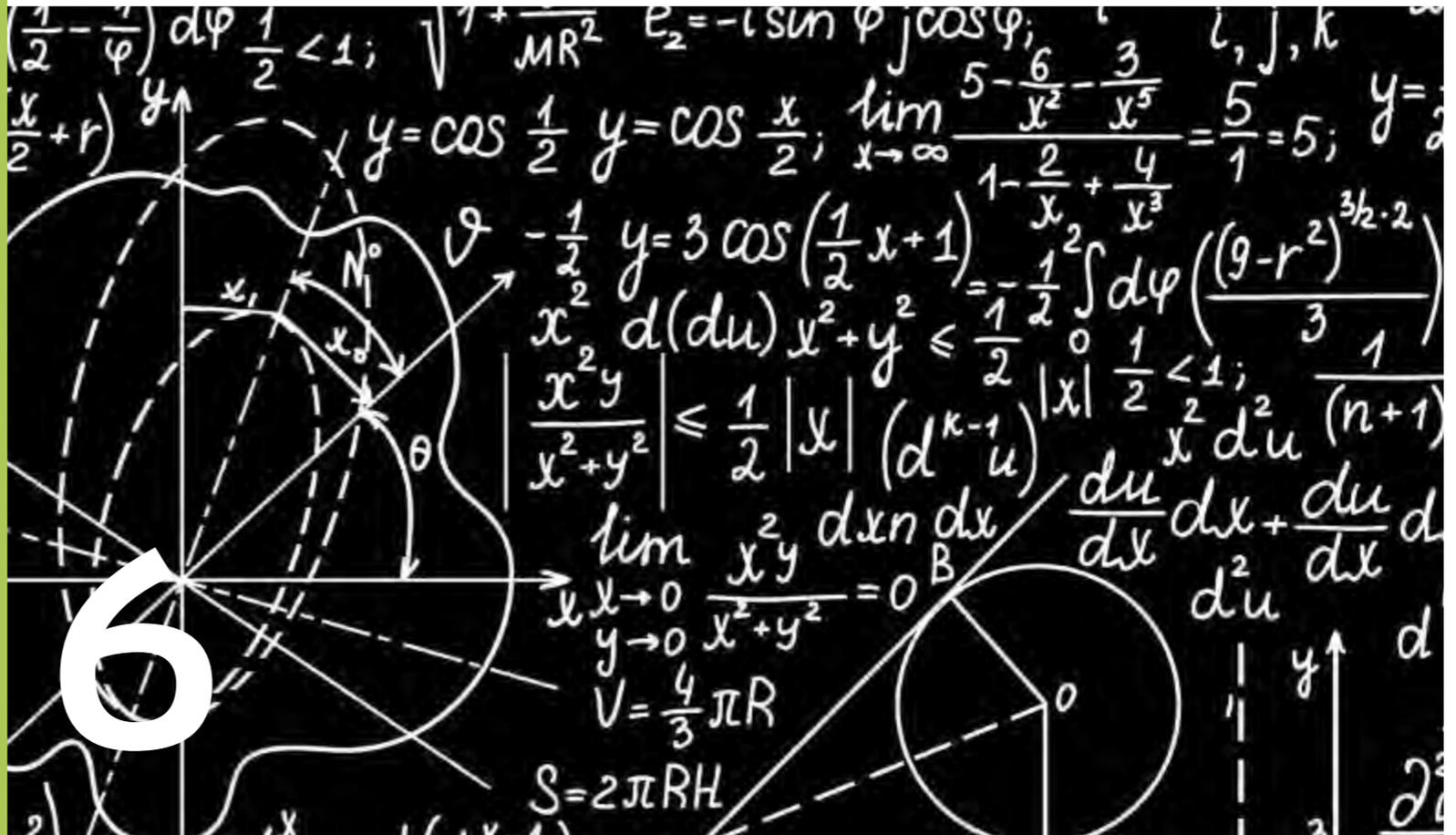
One of the biggest wild cards in the push toward more renewable generating sources, at least in the United States, is the country's lack of a national mandate on this issue. The Environmental Protection Agency's Clean Power Plan comes closest to offering guidance for the future, since it advocates using more clean energy as a means of reducing carbon emissions by 30 percent before the 2030.

By the end of 2014, following the comment period on the proposed rule, 223 companies had announced their support in a joint letter, noting that 60 percent of Fortune 100 and Global 100 have now set renewable energy goals, greenhouse gas emissions reduction targets, or both. They wrote: "We are especially pleased to see an approach that catalyzes energy efficiency and renewable energy deployment. Clean energy policies are good for our environment, the economy, and companies."

With many of the business world's most powerful voices joining the call for clean power choices, the dialogue is gaining more energy than ever and the volume is sure to increase over the coming months.



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COMPANIES TURN TO SCIENCE-BASED GOALS

Joel Makower, Chairman & Executive Editor, GreenBiz

One of the dirty secrets of corporate sustainability commitments is the lack of any standard against which to assess them. That is, without understanding how “good” a company has to be to address its fair share of environmental and social challenges, a company can pretty much self-assign its own goal, meet that goal and declare victory. And a lot of companies do exactly that.

A casual observer might glibly conclude, “It’s all good.” But the reality is, it isn’t good enough. As the clock ticks away at a changing climate, water shortages, disappearing species and other environmental pressure points, as well as several social ones, it seems logical and imperative that companies commit to addressing their impact by an amount that will actually make a difference.

That is, in the argot of sustainability, that they use “science-based” goals, also referred to as “context-based” or “reality-based” metrics or goals. By whatever name, it begins with some hard-nosed calculations.

Until recently, only a small handful of companies have bothered to do the math. One of the earliest was BT, the British telecom giant, which in 2008 created a [Climate Stabilization Intensity target](#), tied to GDP, not absolute emissions reductions. That means BT’s greenhouse gas reduction goal was linked to its economic contribution, allowing the company to seamlessly adapt its target to events such as acquisitions or divestments that materially change its circumstances.

[Another exemplar is Autodesk](#), which several years ago [created C-FACT](#) (for “Corporate Finance Approach to Climate-Stabilizing Targets”), a methodology for setting corporate targets that the company calls a “business-friendly, science-driven and transparent approach” to setting corporate greenhouse gas reduction goals.

The development of C-FACT began with the scientific consensus of the United Nation’s Intergovernmental Panel on Climate Change, which calls for industrialized countries to achieve an absolute emissions reduction of 85 percent by 2050 in order to keep the climate from rising more than 2° C. The resulting tool allows companies to set a target in line with that goal, but to also do so proportional to their relative contribution to the economy.

Another approach came from a 2013 study produced by two nonprofits, WWF and CDP, in collaboration with McKinsey & Co., Deloitte Consulting and Point380, a technical strategy firm. The study, called [The 3% Solution](#), started with the carbon reductions scientists say are needed and showed the financial opportunity available to each sector for achieving those goals. It’s a nice mash-up of science-based

goals with financial-based outcomes that makes a compelling case: Some of the most bold and audacious corporate goals are hugely profitable — in many cases, outperforming other corporate investments.

A growing cadre of companies are approaching sustainability goal-setting in this way. CDP [lists more than 30 companies](#) from around the world that have set GHG reduction targets that limit global warming to below 2° C. Still other companies have set goals to be 100 percent renewably powered and remove commodity-driven deforestation from all supply chains, among other commitments.

There’s more. When author and consultant Andrew Winston [developed a database](#) of the environmental and social goals of the world’s largest public companies, he found more than 50 among the Fortune Global 200 — including Coca-Cola, Mitsubishi Chemical, Nokia, UBS, Unilever, Vodafone and Volkswagen — that had goals on par with what scientists say we need to do. Most of the goals target greenhouse gases, followed by water and a smattering of goals related to toxics, chemicals, forest products, packaging and waste. Another group of companies, including Deutsche Bank,



REBECCA MOORE, GOOGLE EARTH **ON DATA AND CLIMATE CHANGE**

Until recently, only a small handful of companies have taken the time to do the math.

Noble Group, Procter & Gamble and Walmart, have carbon-neutral or 100 percent renewable energy goals, but without a specific deadline. Beyond these companies, “Our corporate carbon goals are wholly inadequate to the task at hand,” Winston concluded.

It’s easy to throw stones at companies that pursue inadequate goals. It’s much harder on the company side: the term “science-based” notwithstanding, choosing appropriate environmental goals can involve as much art as science. That’s especially true outside the climate change arena, where there exists an international scientific consensus on the levels of greenhouse gas emissions to which we need to be aiming.

It’s a different story when it comes to goals for water, biodiversity, land use or ecosystem services, for example. As reporter [Amy Westervelt points out](#), “What is most important to a company might not be crucial to the public good, and focusing on any one ecosystem service often comes with tradeoffs in other areas. The global emphasis on CO2 and climate change, for example, has sometimes led to environmental tradeoffs in other areas, like water.”

Such subtleties may be of little concern to activists, who are beginning to press companies to provide transparency into the nature of the goals they are setting. And in lieu of company action, some NGOs are stepping in to provide that kind of transparency on companies’ behalf.

In 2013, for example, [Climate Counts and the Center for Sustainable Organizations](#) analyzed the greenhouse gas emissions of 100 companies against science-based targets that seek to limit climate change to 2° C. Half of the companies studied — 49 out of 100 — were on the right path, with Autodesk, Unilever and Eli Lilly earning the three top spots. Of those 49 companies, 25 saw their revenue grow during that same eight-year period, showing that it is possible to decouple growth and emissions.



The companies were chosen from among those that submitted data voluntarily through sustainability reports and through organizations such as CDP and the Climate Registry, so they aren’t a representative cross-section.

There are growing signs that NGOs will continue to drive this movement forward. Last year, CDP joined with WWF and the World Resources Institute to [develop a guidance document](#) that “will review available science-based goal-

setting methods, recommend how to choose the most appropriate approach and describe ways to practically implement the method within a company.”

It’s only a matter of time before such “guidance” morphs into activist campaigns insisting that companies raise the bar on their commitments. After all, it’s hard to argue with science, however it is measured.



FOOD WASTE EMERGES FROM THE DUMPSTER

Kai Robertson, Senior Corporate Sustainability Advisor



The question of how to feed 9 billion people in 2050 has become a ripe conversation in sustainability circles. As it has, the issue of food waste has found a seat at the table at many companies. The reason: The United Nations Food and Agriculture Organization (FAO) [calculated](#) that roughly 1.3 billion tons — about a third of all food produced globally — was lost or wasted in 2009, the most recent year for which data is available.

How much is that? The [World Resources Institute](#) converted the FAO figures into calories and calculated that if it were cut in half, the world would need about 1,400 trillion kilocalories (kcal) less food production annually. That's roughly a fifth of the 6,500 trillion kcal per year gap between the food available today and what's needed in 2050.

While these are estimates, it is clear that reducing the amount of food lost across the supply chain is part of the solution for

addressing not only today's food security concerns, but also the anticipated need for larger quantities of food in the future.

The causes of food loss and waste range from consumer behavior and marketing practices to distribution challenges and inadequate cold-chain storage at the farm level and beyond. It's also food that spoils in the fridge or that's left on our plates. And it's what's left unharvested in the field and the losses that take place up the supply chain, whether a result of cosmetic standards, lack of a market or poor roads. (The latter is sometimes referred to as "food loss," though we'll lump it all together as food waste, recognizing this term is defined in many different ways.)

There are economic and environmental benefits to be found in this bounty. Economic gains include savings for companies, including improved inventory management and reduced disposal costs, and greater income for growers.



New revenue can also be realized from innovative solutions that help either to reduce food waste in the first place or to divert “waste” into productive uses. In many countries, there are also tax deductions for donations of “wholesome unsold food,” the industry’s term of art for recovering food that would otherwise go to waste.

Environmental benefits come from reducing the amount of methane, a potent greenhouse gas, produced when food decomposes, and saving embedded inputs — water, energy and fertilizer — in food that is grown, transported, processed and distributed but never eaten, along with the greenhouse gas emissions such activities produce. As the FAO’s [Food Wastage Footprint report noted in 2013](#), the estimated greenhouse gas footprint of food waste is larger than that of all countries except for China and the United States.

There is a sizeable menu of proven ways to prevent and reduce food waste, many of which are outlined in a recent report by the [United Nations High Level Panel of Experts on Food Security and Nutrition](#). However, taking action requires a better understanding of where and why food waste occurs. Several studies analyze how food waste varies by region, in the food supply chain, and across food groups. For example, FAO found that in middle- and high-income countries, a significant portion of the waste occurs among households — that is, at the point of consumption. In lower-income countries, it is concentrated at production and post-harvest stages.

Since “what gets measured, gets managed,” many companies have begun quantifying their food waste. Data released in 2014 by the industry-led [Food Waste Reduction Alliance](#) (FWRA) highlights the opportunities

for food manufacturers, retailers and restaurants in the United States and underscores that the appropriate set of actions to reduce food waste depend on a company’s product mix and where one sits in the food chain. Across the proverbial pond, supermarket members of the British Retail Consortium committed last year to publishing their food waste figures as a sector and reporting on progress.

The quantification of food waste will continue to pick up steam (expanding beyond the private sector), through the efforts of two significant multi-stakeholder initiatives: the [Food Loss & Waste Protocol](#), which is developing a global accounting and reporting standard, and the [EU FUSIONS](#) partnership, which supports the [European Commission’s](#) ambitions of reducing food waste in the EU by at least 30 percent by 2025.

There are [four key steps companies and public agencies](#) can take to identify the most relevant solutions: assessing food waste and its causes; identifying the business case for reducing, donating and recycling the waste; identifying actions within one’s direct control; and finding upstream and downstream partners for the rest. Targeted guidance and best practices have been compiled in many of the reports produced in response to the mushrooming interest in food waste.

The [FWRA’s toolkit](#), for example, highlights ConAgra Foods’ efforts to rethink what was previously thought of as waste and better use bulk semi-finished goods by partnering with a nonprofit to “rescue” meat snacks. It also calls out efforts by retailers to divert waste differently. From [Kroger](#) and Walmart, to [Wegmans](#) and [Weis Markets](#), supermarket operators are leveraging anaerobic digestion systems, diverting material from landfill to create a valuable biogas and soil amendment, all while finding financial benefit. [Startup Wiserg outfits an appliance with sensors](#), turning grocery store food waste into fertilizer and collecting data in the process.

As with so many sustainability challenges, tackling food waste effectively requires thinking outside the box (or “bin”) as well as strong cooperation within and across the supply chain. In Minnesota, for example, [a diverse group](#) — Cargill, Seneca Foods, Pinnacle Foods Inc., General Mills, C.H. Robinson, SUPERVALU, other growers and a team of hunger-relief organizations — partnered to rescue 860,000 pounds of sweet corn.

As the [World Economic Forum](#) highlights in a recent report, public-private collaboration is also critical for supply-chain improvements. Unilever, for example, is testing the use of CHEP's plastic crates in India for transporting tomatoes, as this significantly reduces losses. The Indian government's work with the private sector is also important to promote the development of this value chain.

The Continent's industry organization, Food Drink Europe, has prioritized food waste and calls out in its toolkit [Nestlé's](#) work downstream, partnering with the milk supply chain to provide cooling facilities to farmers in developing countries. This not only improves food safety and quality but has also cut milk losses — saving water, energy and greenhouse gas emissions — and increases farmer income. Focusing upstream, [Sodexo](#) has successfully encouraged college students to consume differently through tray-less dining and developed a creative awareness campaign that reduced food waste produced (and food dollars spent) by roughly half. France's third-largest supermarket chain [Intermarche](#) launched a savvy campaign in 2014 that put "ugly" fruits and vegetables front and center, generating significant media attention as well as revenue.

While there is a practical limit to how much food waste can be prevented, reduced or recovered, the opportunity is nonetheless ripe for [innovative forward-looking companies](#). Food waste has emerged from the dumpster and into the mainstream, harvesting a cornucopia of benefits for business and society.

As with so many sustainability challenges, tackling food waste effectively requires thinking outside the box (or "bin") as well as strong cooperation within and across the supply chain.



MONEY FLOWS WHERE SUSTAINABILITY GROWS

Libby Bernick, Senior vice president,
North America, Trucost



Last year saw a number of encouraging developments that are increasing the flow of capital toward more sustainable business models—a trend with interesting implications for corporate sustainability executives, chief financial officers and investor relations teams. A fundamental shift has been the growing recognition by investors that environmental issues can be a risk to company profitability, as well as an opportunity to discover firms with better business models that outperform the market.

The double-digit growth in so-called “responsible investment” in the United States and Europe during 2014 continues to bring mainstream investors into the fold of what was historically a niche market. More than one in six dollars under professional asset management in the United States are now part of a responsible investment strategy, reports [the Forum for Sustainable and Responsible Investment](#) (US SIF).

This isn’t just about excluding sectors like tobacco or firearms. Money managers and community investing institutions with combined \$2.9 trillion in assets under management now explicitly incorporate environmental issues into their investment decisions.

For corporate sustainability executives, this means there are a lot more investors scrutinizing their companies’ publicly disclosed environmental data, and using that data to calculate the environmental footprint of their portfolios to understand business value at risk.

In 2005, Trucost quantified the world’s first investor portfolio carbon footprint for Henderson Group, a \$118 billion U.K.-based asset manager. Less than a decade later, 25 large institutional investors representing \$500 billion in assets signed the [Montreal Pledge](#), the U.N. Principles of Responsible Investment’s initiative

whereby investors commit to measure and disclose the carbon footprint of listed equity in their portfolios. For publicly listed companies, the pledge is important because it will ratchet up the pressure from shareholders to reduce carbon emissions.

Fossil-fuel divestment policies, which US SIF says account for \$42.9 billion in assets, are a small but growing fire behind investors' motivations. While the amount is relatively small, the movement to divest capital away from carbon-intensive companies has led to an interesting conversation: Where will capital be reinvested? Companies with best-in-class financial and environmental performance benchmarked to their sector peers will be the first place to look.

Another example of growth in more sustainable investment is [the rise of green bonds](#) — a type of financial asset that companies can use to raise money to fund their environmental projects. The green bond market was on course to exceed [\\$40 billion by the end of 2014](#), compared to just under \$11 billion one year earlier. Forecasts suggest it will hit \$100 billion in 2015. One of the

reasons for growth is the new Climate Bonds Standard, which sets out requirements for issuers, such as reporting the environmental benefits of projects they fund, to ensure that green bonds truly live up to their name.

Once the province of development banks and utilities, green bonds are moving into the mainstream corporate arena. Unilever's \$389 billion green bond, which will be invested in [more efficient factories](#), made headlines when its finance director Jean-Marc Huët said it demonstrated the centrality of sustainability to the group's business model.

Regency Centers, a \$4.9 billion developer of retail shopping centers, became the [first non-bank corporate borrower to issue a green bond](#) in the United States. The company will use the \$250 million it raises to build or renovate shopping malls that meet the LEED green building standards from the U.S. Green Building Council.

There are a myriad of benefits accruing with such projects. For the investor relations team, a green bond brings in new investors by accessing the growing pool of responsibly



managed assets. Green bonds are also quickly oversubscribed, providing faster access to capital. For the sustainability director, green bonds move the sustainability agenda squarely into the CFO's arena, thereby increasing awareness within the enterprise. Employee engagement is an unexpected benefit, since a green bond acts as a mark of pride for employees in their company's sustainability commitment. There is also a marketing opportunity to demonstrate the company's commitments and achievements to the rest of the world.

But P.R. and marketing may be the least of it. The growing perception is that there is money to be made from outperforming companies providing greener products and services. And that is spurring investors to find data that will help them identify such companies.

Established indices like the Dow Jones Sustainability Index and S&P Carbon Efficient Index have been joined by new arrivals such as [VIS Essential Investment's Energy, Food and Water \(EFW\) Efficiency Index](#), which comprises

150 companies best positioned to generate long-term growth with lower impacts. Such indices provide an incentive for companies to publicly disclose their products' environmental performance data and improve their overall corporate environmental performance. That's because few companies (and their boards of directors) are content to be ranked last.

One encouraging business response to resource constraints is innovation. Clean-tech investments surpassed the \$500 billion mark in 2014, with [venture capital investment](#) in agriculture and food technology totaling \$269 million across 41 deals in the third quarter alone, according to the Cleantech Group. The total was 29 percent higher than in the previous quarter, continuing the trend of higher investment since 2013.

Large, established companies in all sectors need to watch out for startups with new technologies and business models that address sustainability challenges. To stay on top, established companies will need to acquire or adopt these innovations themselves. In so doing, they will bring more sustainable business opportunities to the mainstream.

The increasing flow of green finance shows there will be three types of winners in tomorrow's economy: companies that use resources more efficiently, those that make products or services to help their customers become more resource efficient, and investors that provide the capital to make it all happen.

Once the province of development banks and utilities, green bonds are moving into the mainstream corporate arena.



COMPANIES CATALYZE CLIMATE ACTION IN CITIES

Lauren Hepler, Associate Editor, GreenBiz

From water shortages in Rio de Janeiro to post-Hurricane Sandy flooding in Manhattan to growing food insecurity in Fiji's capital city, almost every corner of the globe now offers its own grim reminder of day-to-day climate volatility.

One term increasingly being used in connection with super storms, water wars and failing food systems is [“resilience”](#) — the capability of infrastructure, communications systems, populations and economies to absorb shocks of all kinds, including from climate change.

What remains murkier, however, is who will take the lead in building for climate resilience — or, better yet, in taking proactive steps to curb emissions and shift to sustainability-minded practices before new problems manifest.

In a growing number of cities, businesses are the ones taking the lead.

Welcome to one facet of the increasingly interconnected world economy, where all sustainability is local. With national and international government bodies routinely paralyzed by the politics surrounding climate change, much of the concrete action in the field is emerging from public-private partnerships taking root in cities.

Local governments, along with NGOs and businesses, are employing a variety of tactics to counter the negative physical and financial impacts of a volatile climate. These range from the macro-level — aggressive emissions reductions and renewable energy deployment — to micro-level pilot projects, such as [green building zoning](#)



JANINE BENYUS, BIOMIMICRY 3.8
ON CITIES AS ECOSYSTEMS



[programs](#) (PDF) or certifications for environmentally responsible businesses.

It's not hard to see why market-driven local climate action makes sense. Companies are able to move far faster than the glacial pace of political bodies brokering multilateral agreements. Businesses can also help tailor climate solutions to suit on-the-ground realities.

Still, practical and logistical challenges abound, starting with forming partnerships with public-sector agencies and other companies. Another challenge is the already-turbulent social dynamics in many regions, where tight government funding often isn't prioritized for disaster preparedness or infrastructure upgrades.

But the public sector will need the help of the private sector to meet the ambitious carbon-reduction goals being set by many cities.

More than 20 of the world's largest cities — all members of climate leadership organization [C40](#) — have committed to 80 percent carbon reductions by 2050. Many of those cities' leaders confess that they don't yet know how they'll get there, acknowledging that it will take a new generation of technologies, combined with policy changes and leadership, to achieve such ambitious emissions reductions.

For the private sector, this represents a massive business opportunity. Analysts now expect smart cities to become [a \\$1 trillion market](#) by 2019, driven

largely by demand for data analytics and IT services, residential and commercial energy, transportation and other forms of resource management.

More specifically, the rapid growth of smart technologies is creating vast markets to sell cities [smart parking](#), lighting and [traffic systems](#); electric vehicles and recharging networks; renewable and distributed energy systems; locally-sourced food; advanced electric metering systems and other components of smart grids; plus hundreds of other products and services.

The opportunity already is leading companies to develop city-focused offerings, sometimes through partnerships, such as the one between IBM and AECOM to develop a ["disaster resilience scorecard"](#) for cities. Technology companies like [Silver Spring Networks are finding themselves adept](#) at tackling specific elements of smart cities — in this case [more efficient lighting](#) that can serve as a "gateway drug" to bigger smart grid initiatives.

But the shift to local, business-led smart city and climate solutions is not just about selling more stuff. Companies recognize that investing in cities can yield other dividends. A full 60 percent of the global population is [expected to live in cities](#) by 2030, which means that urban areas will be the source of most companies' employees and customers. With that in mind, progressive companies are coming to understand that you can't have a healthy company in an unhealthy community.

Of course, public-private partnerships are easier said than done. In fact, there can be mountainous challenges facing companies seeking to work with cities — even cities with aggressive climate-reduction targets. At [City Summit](#), held last fall as part of the VERGE 2014 conference, more than 30 North American cities came

together with similar-sized groups of companies and thought leaders to examine the challenges and how to overcome them.

The daylong conversation revealed big differences between the two sectors. For example, cities tend to have longer time horizons for implementing projects, typically moving much more slowly than companies' technology cycles, which are continually evolving. Companies, meanwhile, have found that cities often get stuck dealing with short-term problems at the expense of addressing the "big picture."

When it comes to actually hammering out the specifics of new pilot programs or purchase orders, cities complain that companies offer systems far more advanced and complex than bureaucrats are able to understand. And with city budgets being what they are, local governments say companies need to find creative financing and innovative business models to make the sale.

All that's to say that a lot of legwork has to be done even before cities and companies can get to the real work to be done.

The opportunities — and challenges — are only going to increase in the coming years. The Rockefeller Foundation, for instance, has committed \$100 million to its [100 Resilient Cities program](#), which seeks to help 100 cities hire chief resilience officers. San Francisco [hired the world's first Chief Resilience Officer](#), Patrick Otellini, in 2014, and a score of cities have since followed.

Dozens of other cities, businesses and nonprofits are experimenting with innovative public-private partnerships that prioritize climate issues. Duke Energy and the City of Charlotte, N.C., for example, launched the [Envision Charlotte](#) program focused on air quality, energy, water and waste.

All of these initiatives, and hundreds of others, will engage the business sector in new ways, large and small. There's a role for almost any company to play — including building energy retrofits that help cities meet their carbon-reduction goals, encouraging employees to use climate-friendly commuting options, and getting involved with local policy initiatives that take a leadership stance on climate action.

It's not a matter of whether climate initiatives will come to your city. It's really a matter of when — and whether your company will view these developments as opportunity or threat.

Cities tend to have longer time horizons for implementing projects, typically moving much more slowly than companies' technology cycles, which are continually evolving.



CONSERVATION INVESTING'S STOCK RISES

Mike Hower, Senior Writer, GreenBiz

The idea that investing “for good” can garner environmental and social benefits alongside financial ones has deep historical roots in partnerships among investors, foundations and the U.S. government over several decades. But the concept has taken on new dimensions in recent years, providing much-needed capital to address the world’s biggest environmental conservation challenges.

[Conservation investing represents a subset](#) of “impact investing” — capital invested in companies, organizations and funds with the intention to generate measurable social and environmental impact alongside a financial return. (Social investing, impact investing’s other principal category, focuses on people by supporting such programs as childhood education and preventive health care services.)

Conservation investing finances initiatives such as those aimed at promoting sustainable food production and water quality. Although social investing has received the most investor attention (and money), the pendulum may be about to swing.

An estimated \$300 billion is needed each year to meet the world’s environmental conservation challenges, according to the [Global Canopy Programme](#). However, current levels of investment, coming primarily from governments, multilateral agencies and philanthropy, total only around \$50 billion. With many of the world’s developed economies enacting economic austerity measures, it may be up to the private sector to bridge the gap.

The market to date has been pretty small. Conservation impact investing [totaled \\$23 billion from 2009 to 2013](#) and is expected to increase to \$37



An estimated \$300 billion is needed each year to meet the world's environmental conservation challenges, according to the Global Canopy Programme.

billion over the next five years, according to a [report](#) released late last year by The Nature Conservancy's [NatureVest](#) division and EKO Asset Management. [Launched](#) earlier in 2014 with support from JPMorgan Chase, NatureVest plans to deploy \$1 billion in impact capital for conservation over the next three years by convening investors, creating innovative financial transactions and building an investment pipeline across multiple sectors.

The capital committed to conservation impact investments from 2009 to 2013 was invested in three main categories:

Water quantity and quality conservation: Investments in watershed protection, water conservation and stormwater management, as well as trading in credits related to watershed management accounted for a majority of direct

finance institutions (DFI) investments (\$15.4 billion). Only 11 percent of private investment (\$209 million) went to these types of projects.

Sustainable food and fiber production: Investments in sustainable agriculture, timber production, aquaculture and wild-caught fisheries made up roughly \$3 billion of DFI investments. However, this accounted for a two-thirds of private conservation investment (\$1.2 billion).

Habitat conservation: DFIs invested close to \$3 billion to protect shorelines and reduce coastal erosion, projects to Reduce Emissions from Deforestation and Degradation (REDD+), and provide for land easements and mitigation banking. Twenty-three percent of private investment (\$43.7 million) went towards these priorities.

One growing segment of conservation investing is "green bonds." These offer investors comparable risk to mainstream bonds, along with the opportunity to

help finance green projects aimed at addressing environmental challenges, such as clean air and water, or advancing environmental solutions, like climate resilience and energy efficiency. Similar to conventional bonds, the issuing entity guarantees to repay the Green Bond over a set period of time, plus either a fixed or variable rate of return. Over \$40 billion in Green Bonds were issued in 2014, expected to grow to \$100 billion in 2015, according to the [Climate Bonds Initiative](#).

Such growth notwithstanding, impact investors note a shortage of investable projects and opportunities with appropriate risk-return expectations. For starters, investors bemoan a lack of standardized metrics, stymying the growth of viable projects. Government policy can help. Moves like putting a price on a broader range of ecosystem services, can reduce uncertainty about the future value of investments in ecosystem-services markets.

The world's largest impact investors expected to increase capital committed to impact investments to \$12.7 billion in 2014, up 19 percent from 2013, according to a 2014 [survey](#) by J.P. Morgan and GIIN. Those surveyed, including fund managers, banks, foundations, development finance institutions and pension funds, collectively managed \$46 billion in impact investments. The report attributes the significant increase in capital to high satisfaction with both the financial returns and the social or environmental impacts of such investments. Investors are

also encouraged by greater government support, new product and fund launches and widespread impact measurement.

More investors planned to increase the percentage of their portfolios invested in Sub-Saharan Africa, Asia and North America, relative to other regions. Although [microfinance](#) has long been the darling of impact investing, the highest number of investors plan to decrease the percentage of their portfolios allocated to the field, relative to other sectors. Investors also plan to increase the percentage of their portfolios allocated to food and agriculture, healthcare, and financial services (excluding microfinance).

For impact investing to reach scale sufficient to bring private capital sufficient to address major environmental challenges will require a more intentional and proactive partnership between government and the private sector, according to the [U.S. National Advisory Board on Impact Investing](#), known as NAB. Although impact investments still represent a tiny 0.02 percent of the \$210 trillion in global financial markets, many believe it could reach 10 or even 20 times its current size — still a pittance, but a significant one in terms of its potential impact. Achieving that level of growth, says NAB, will require the

removal of regulatory barriers that stand in the way, such as those governing foundation investments in for-profit enterprises.

Also needed, according to NAB, are new incentives to lure private capital. For example, NAB would like to see government agencies replicate successful impact investing programs, such as the Community Development Finance Institution Fund, for example, marshals \$20 of private capital for every \$1 of government funds invested.

Although DFIs such as the International Finance Corporation and European Investment Bank account for a majority of investments (\$21.5 billion), private investments comprise \$1.9 billion of the \$23 billion market — an amount growing at an average of 26 percent annually, which is expected to reach more than \$5.6 billion by 2018. Private investors include fund managers, corporations, foundations, nonprofit organizations, family offices and representatives of high-net-worth individuals.

Opportunities for conservation impact investing also exist in the real estate sector through conservation banks, which sell credits in exchange for protecting habitats of



endangered species. In exchange for permanently protecting the land and managing it for these species, the U.S. Fish and Wildlife Service approves a specified number of habitat or species credits that bank owners may sell. Developers or other project proponents who need to compensate for the unavoidable adverse impacts their projects have on species may purchase the credits from conservation bank owners to mitigate their impacts.

Such mechanisms can provide the financial incentives needed to commit land to conservation, enhancement, restoration and habitat for species. [Conservation banks already protect](#) nearly 25 endangered species and cover around 40,000 acres. In California, which pioneered the concept, a landowner received \$125,000 for protecting the habitat for a small bird called Least Bell's Vireo. In Texas, a rancher sold credits for \$5,000 per acre of Golden-cheeked warbler habitat.

That's big money for such a small bird.



The Index

Welcome to the annual State of Green Business Index, an assessment of sustainability performance over the past five years for the largest 500 U.S. companies, as well as the largest 1,600 companies globally. Produced in collaboration with natural capital analysts Trucost, the 2015 assessment includes more than 20 corporate sustainability performance indicators.

The infographics shown on these pages are backed by detailed data sets and methodology, explained in the Appendix. Readers of the PDF edition will find this supporting data in the back of this report. (Each graphic is linked to its corresponding data set in the Appendix.) Readers of the iPad edition can simply tap each graphic to view its underlying data.

Sections:



THE BIG PICTURE

The metrics included in this section aim to answer an overarching question — are companies making meaningful progress towards environmental sustainability? — through indicators that provide the big picture. They examine whether companies are succeeding in reducing the total cost of corporate natural capital impacts, how much corporate profit is at risk from natural capital impacts, what these impacts are and where in the value chain they arise.

Corporate environmental sustainability can be defined as the sustainable use of the world’s available natural capital. “Natural capital” refers to the limited stock of the Earth’s natural resources upon which people and businesses depend for prosperity, security and well-being. It includes things such as clean air and water, land, soil, biodiversity and geological resources.

The natural capital costs and environmental impact data, as measured by Trucost, combine hundreds of natural capital indicators related to the resources consumed (inputs) to create goods or services

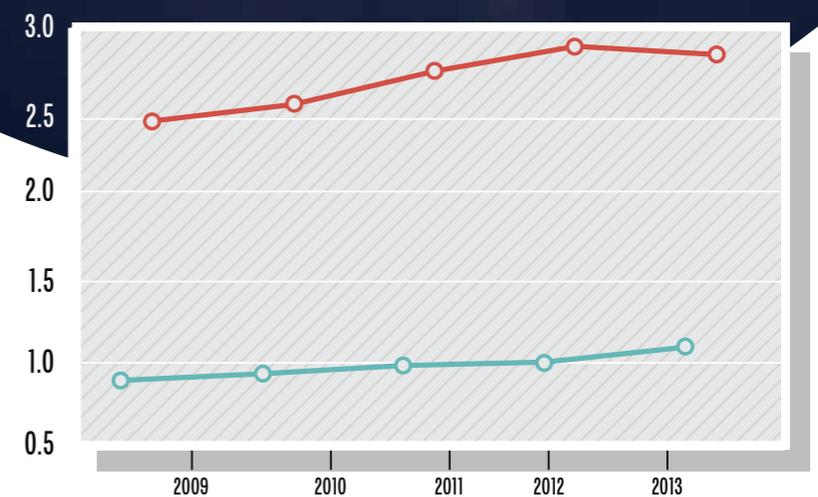
sold (outputs), as well as the pollution and waste impacts related to the production of those goods and services, both internally and throughout a company’s value chain. (A full description of Trucost’s methodology is available in the Appendix.)

Overall, the indicators show that business risk is increasing. The corporate use of natural capital has grown steadily over the past five years. In the U.S., this value now exceeds \$1 trillion per year — about 6.2 percent of national GDP — in terms of the environmental and social impacts associated with pollution, ecosystem depletion and related health costs. This number is almost \$3 trillion for the global companies we assessed. If businesses had to internalize and pay for these costs, they would more than wipe out corporate profits. This has been true even while aggregate company profits have increased by more than 50 percent since 2009.



Cost of Corporate Natural Capital Impacts

(Trillions U.S. Dollars)



Source: Trucost

■ U.S. ■ Global

Cost of corporate natural capital impacts

Companies depend on nature to make the products and services that we buy every day. Of course, they also create waste and pollution during the production and distribution of those goods.

For this metric, Trucost calculated the value of hundreds of inputs (such as water or commodities like fossil fuels) consumed, and outputs (such as waste and pollution like greenhouse gas emissions) produced, by companies' operations and supply chains over the past five years. Trucost calculates these values from a wealth of peer-reviewed academic research and data from a long list of national government sources. All of this is supported by an international advisory panel of leading academics in the fields of economics and the environment.

This natural capital valuation data is applied to environmental impact data for the largest U.S. and global companies taken from the Trucost Environmental Register. Company data includes validated disclosure data typically sourced from sustainability reports, and applies a proprietary Environmentally Extended Input-Output Life-Cycle Assessment Model to calculate supply chain impacts and fill any gaps where companies do not disclose environmental performance data. (For more on this assessment process, please visit the methodology section.)

During 2013 alone, the largest 500 companies in the United States had a natural capital cost of more than \$1 trillion in terms of the environmental and social impacts associated with pollution, ecosystem depletion and related health costs. This is equal to 6.2 percent of the national GDP.

The trend is not good. Since the economic downturn that began at the end of 2007, corporate natural capital impacts have increased by over 15 percent in the U.S. and 17 percent globally.

In 2013, there was one seemingly positive result. Growth in natural capital impacts slowed, from an annual average of more than 5 percent over the previous four years to just 0.6 percent for the U.S. and no increase globally.

Does this mean we have started to turn the corner toward containing the cost of natural capital impacts? The data for 2013 is a hopeful sign, and we will continue tracking whether this is the beginning of a positive trend.

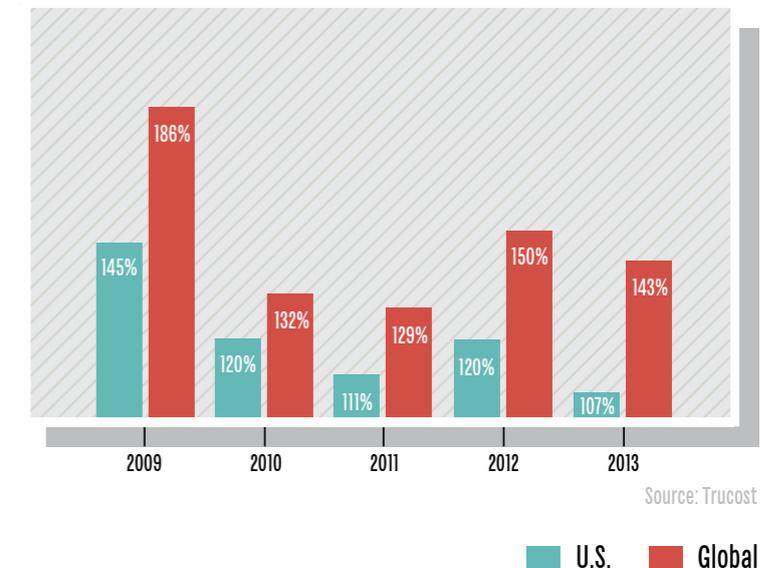
Profit at risk from natural capital impacts

This metric examines corporate profit at risk as a result of companies having to pay for their natural capital impacts.

Many of these costs are not included on company balance sheets because they are not annual fees or taxes that the company actually pays. However, they are a real indication of business risk and costs that companies

Profit at Risk from Natural Capital Impacts

(Percent of annual company net income)



may face in the future because of droughts or adapting to a changing climate, or from increased energy prices or taxes on pollution.

The story that this metric tells is concerning. Over the past five years, the proportion of company profit at risk consistently exceeds 100 percent of their profit. This means that, on average, companies would be unprofitable if they had to pay the actual costs associated with the commodities they consume and pollution they generate. This has continued to be true even while company profit has increased by more than 50 percent since 2009.

The business risk does not fall evenly across sectors. In 2013, companies in about half of industry sectors would remain profitable after internalizing the cost of corporate natural capital. Healthcare, media, technology and telecommunications have 25 percent or less of their profit at risk, whereas sectors like utilities, food and beverage, and mining and forestry face natural capital costs of 10 to 25 times their profits.

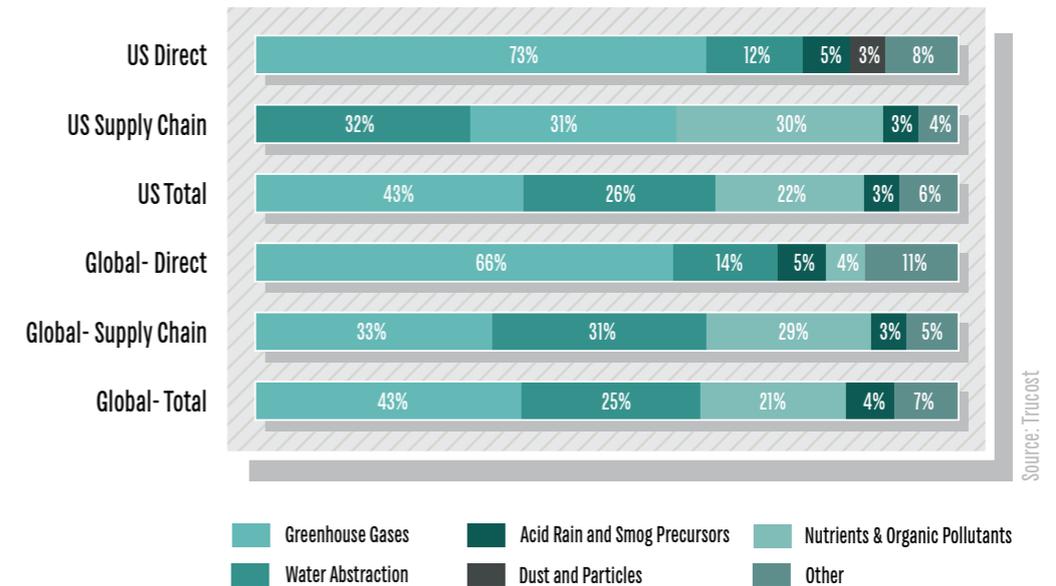
The bottom line is that companies' dependence on natural capital is a significant business risk that should be addressed by better understanding and communicating to stakeholders a company's understanding of those risks and what it plans to do about them.

Where natural capital impacts occur in the value chain

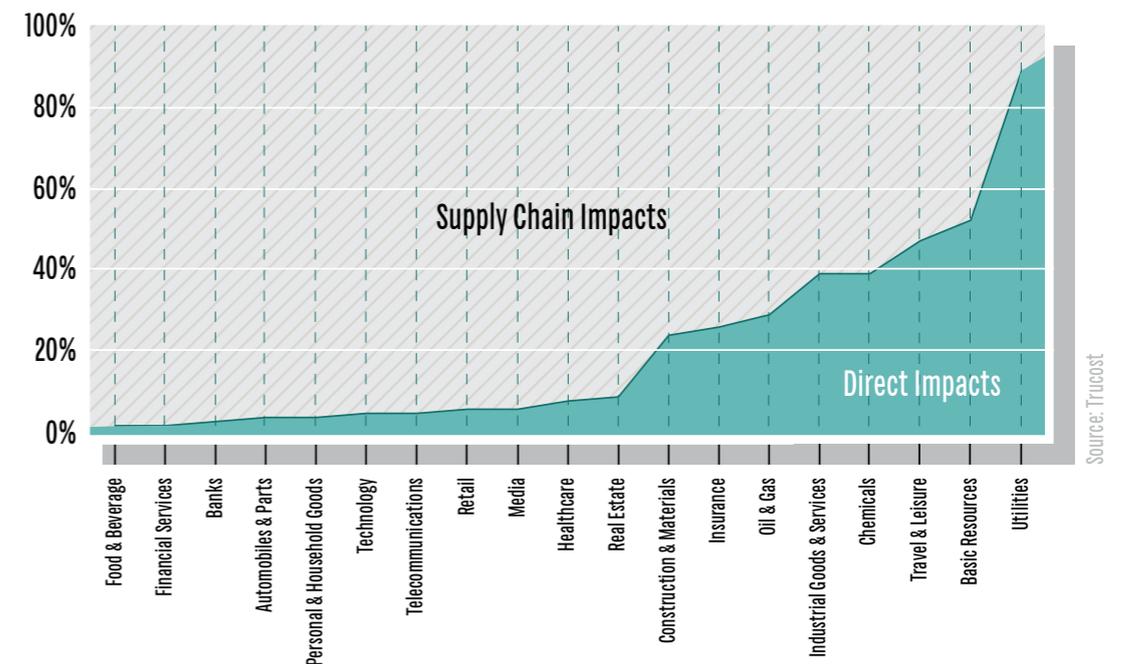
Companies are increasingly focusing on environmental impacts in their supply chains, such as greenhouse gas emissions associated with the goods and services that a company purchases from its suppliers.

This metric shows the average proportion of environmental impacts coming from the supply chains of 19 industry sectors compared to the sectors' direct operations.

Largest Natural Capital Impacts



Where Natural Capital Impacts Occur in the Value Chain



Knowing where the biggest environmental impacts lie is a key first step to uncovering opportunities for environmental improvements, risk reductions and innovation.

This metric on the previous page shows that of the 19 sectors, 17 have more than half of their environmental impacts embedded in their supply chains. — more than 90 percent for 11 sectors. Only water and electric utilities, mining, metal production and forestry have the majority of environmental impacts within their own operational control. These sectors are at the front end of many other sectors' supply chains, as they provide the raw materials for products and packaging, as well as the energy to run factories, buildings and transportation systems.

This data reveals that for the majority of sectors, environmental impact reduction initiatives should be focused on the supply chain to have a significant effect. This should start with a sustainability-spend analysis to quantify impacts, then include green procurement initiatives to purchase from the most efficient suppliers, or identifying green product alternatives.



The top four environmental impacts account for over 90 percent of companies' overall footprint, with greenhouse gas emissions accounting for the largest share.

KEY ISSUES

This research uses greenhouse gas emissions, water use and waste as three key measures of progress on corporate sustainability. Total quantities of GHG emissions, solid-waste generation and water use in 2013 have all increased from 2009 levels. On the positive side, recycling of solid waste also grew.

Some of these increases can be explained by the economic recovery, which boosted spending and resource use, leading to more emissions and waste. While the economic growth was good for the bottom line, it has not been good for the environment.

However, companies are becoming more efficient, generating fewer greenhouse gases, using less water and, in the case of U.S. companies, generating less waste per dollar earned in 2013 compared with 2009.

Taken together, our findings show that business is becoming more efficient, but not quickly enough to counter growth, leading to an overall rise in resource use and emissions. This is bad news. Clearly, there are new strategies needed to shift away from “business as usual” to a model that decouples economic growth from consumption of natural capital.

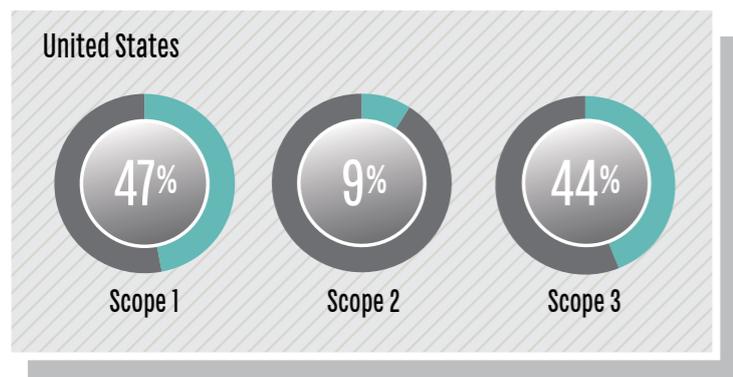
Greenhouse gas emissions

Greenhouse gas emissions are largely a byproduct of burning fossil fuels to produce electricity, generate heat, produce food and provide transport. GHG emissions were identified earlier in this report as the most significant contributor to overall corporate environmental impact (see: Largest natural capital impacts, page **36**). The effect of the growth in GHG



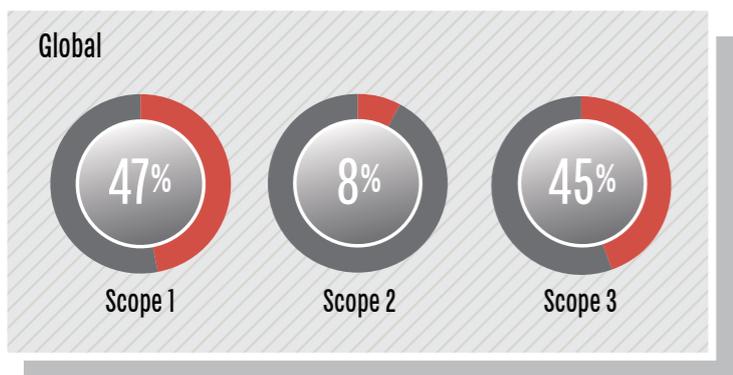
Our findings show that business is becoming more efficient, but not quickly enough to counter growth.

Source of Greenhouse Gas Emissions, 2013



Source: Trucost

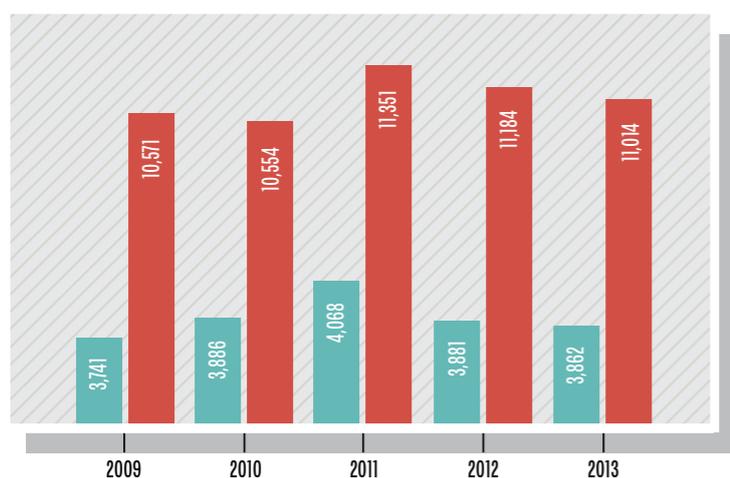
Source of Greenhouse Gas Emissions, 2013



Source: Trucost

Total Annual Greenhouse Gas Emissions

(Millions Metric Tons)



Source: Trucost

emissions may lead to changes in weather, sea levels and water availability, and may affect how land can be used for food production.

In its [Fifth Assessment Report](#), released in 2014, the Intergovernmental Panel on Climate Change estimates that without significant reductions in greenhouse gas emissions, society's cost of adapting to climate change will be as high as \$250-500 billion per year by 2050.

The GHG emission metrics show some positive trends. Our analysis found that total GHG emissions peaked in 2011 for both U.S. and global companies. Since that peak, total emissions are down 5 percent for the U.S. and 3 percent globally. However, total GHG emissions are still higher than they were in 2009 following the economic collapse that resulted from the subprime mortgage crisis (3 percent U.S., 4 percent global).

Also, it is worth noting that emissions tend to rise and fall based on such factors as the economy, the price of fuel and weather changes; corporate practices are only one factor.

One key reason for the decrease in GHG emissions is the transition toward less polluting fuels to generate electricity, notably natural gas and hydropower. In the U.S., coal consumption has decreased, while natural gas consumption and the use of hydropower have increased. The results are shown by the change in GHG emissions from companies' direct operations ("Scope 1," according to the Greenhouse Gas Protocol Corporate Standard, which provides greenhouse gas measurement and reporting guidance to companies). In the United States, Scope 1 emissions have decreased by 1 percent since 2009, and by 6 percent since the peak in 2011. Worldwide, they have increased by 2 percent since 2009, but decreased by 3 percent since the 2011 peak.

WHERE GHGs COME FROM

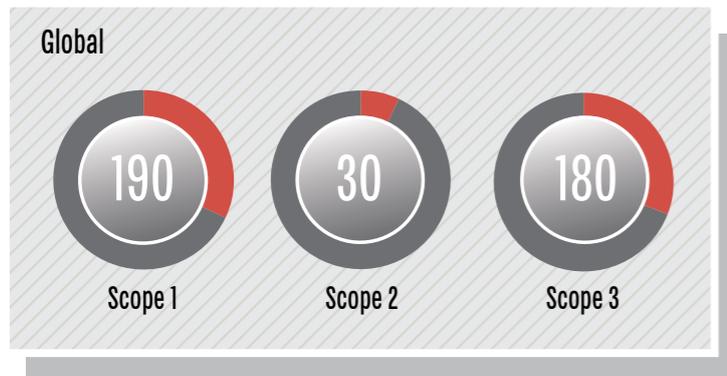
Electricity-generating utilities release a large percentage of total corporate GHG emissions by directly burning fossil fuels. This is reflected in our findings that the largest source of emissions (47 percent both U.S. and global) comes from direct operations from owned or controlled electricity sources (Scope 1).

Supply-chain emissions are the second-largest source of GHGs (44 percent U.S. and 45 percent globally). However, as we noted in "Where natural capital impacts occur in the value chain" (page 36), the majority of impacts come from supply chains (Scope 3) for most sectors. Purchased electricity (Scope 2) accounts for the remaining 9 percent of emissions in the U.S., and 8 percent for global companies.

This data does not reflect all greenhouse gas emissions, but only those emissions reported by large, publicly traded companies. As such, the data does not necessarily take into account such things as GHG releases through electricity purchased by residential consumers and other sources.

Greenhouse Gas Emission Intensity, 2013

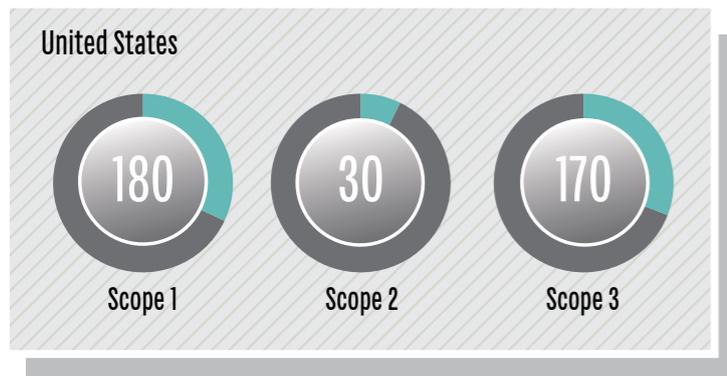
Metric tons of CO₂e per million dollars of annual revenue



Source: Trucost

Greenhouse Gas Emission Intensity, 2013

Metric tons of CO₂e per million dollars of annual revenue



Source: Trucost

Another positive sign is the trend in corporate GHG emission intensity, defined as emissions per unit of revenue. Overall, U.S. companies emitted 16 percent less GHGs per dollar in 2013 than they did in 2009; and globally, emissions were 13 percent less. Stated in a slightly different way, corporate U.S. emissions grew by 3 percent since 2009 while the annual revenue of those companies grew by 23 percent. Globally, corporate GHGs grew 4 percent while revenue grew 20 percent.

Green power use

The use of electricity from renewable sources, expressed as a percentage of overall energy use, continues to inch upward, year over year. But those incremental advances don't tell the whole story.

Renewable energy consumption worldwide reached a record 4.7 million gigawatt-hours during 2012, the most recent year for which global data is available. The increases were across nearly all technologies; only power from ocean waves and currents, still in its infancy and limited to a relative handful of pilot projects, dropped slightly from the previous two years, according to the International Energy Agency.

As in previous years, hydropower represented the lion's share of renewable power — about 77 percent, down from 79 percent one year earlier. All told, the numbers represent a steady, if not heady, march forward.

But the numbers belie a bigger story about renewable power's growth. According to the Renewables Global Status Report, released by the Paris-based Renewable Energy Policy Network, renewable energy capacity jumped more than 8 percent in 2013, accounting for over 56 percent of net additions and now has the

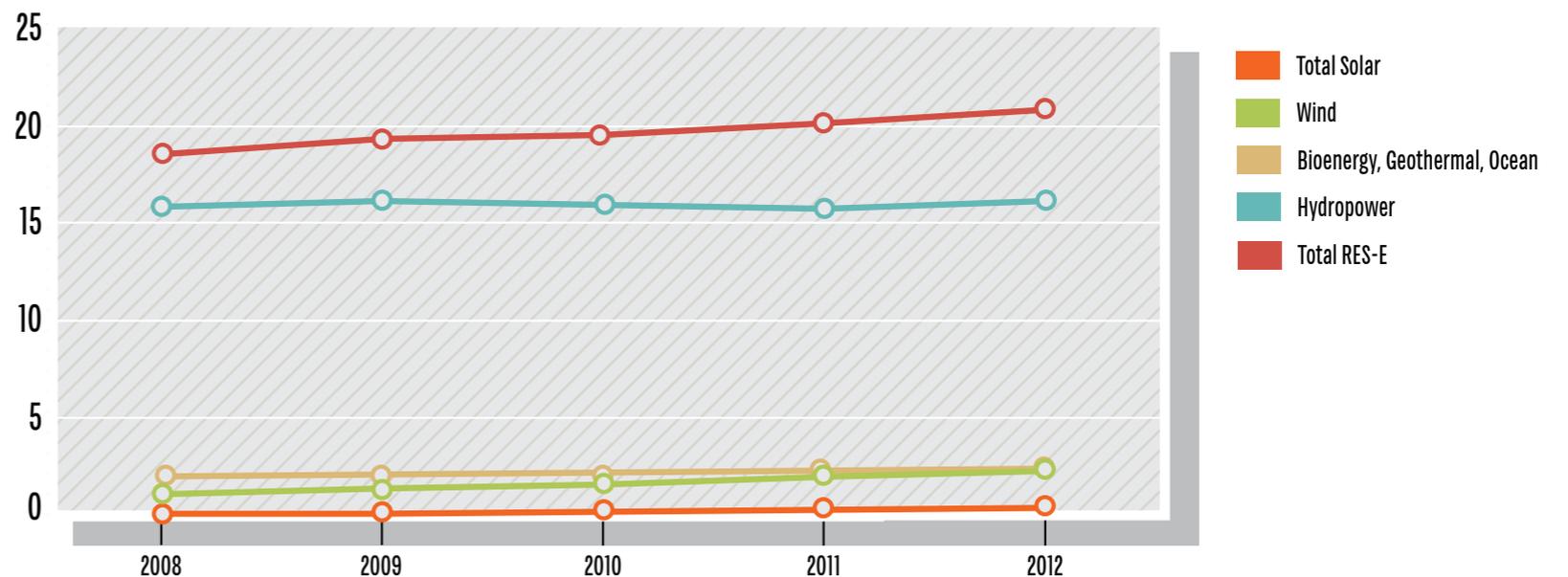
potential to account for over a fifth of world electricity generation.

Such growth notwithstanding, renewable energy markets and industries are facing new and different challenges, including declining policy support, electric-grid constraints, competitive concerns from utilities and, most recently, low fossil-fuel energy prices, which make renewables less competitive in some markets.

To a large extent, such challenges represent the machinations of an industry undergoing disruptive change, as renewable, distributed and smart energy technologies compete with fossil fuels and incumbent companies and business models. One key question is how much — and how long — to subsidize renewable energy before it can compete on its own with fossil fuels, which themselves have been heavily subsidized in most countries.

Use of Green Power

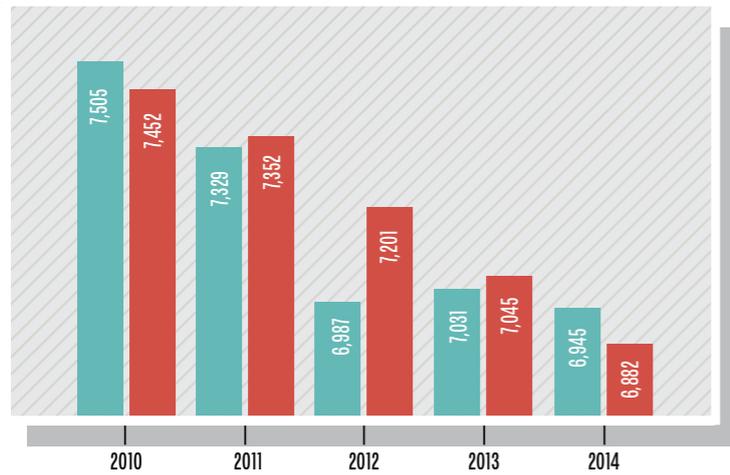
Percent of Total Renewable Production



Source: International Energy Agency

Energy Efficiency

BTUs Per Millions U.S. Dollars of GDP



Source: John A. "Skip" Laitner, using Energy Information Administration and International Energy Outlook data

■ U.S. ■ Global

Overall, the outlook remains bright. For example, China has become the world's fastest growing wind industry and is on track to surpass the United States. According to Bloomberg New Energy Finance's Climatescope 2014, a country-by-country assessment focused on the developing world, renewable energy markets are seeing steady growth, somewhat in line with that in developing countries. Global investments in renewables exceeded \$214 billion in 2013, with China and the United States heavily investing in wind, hydro, solar and biofuels.

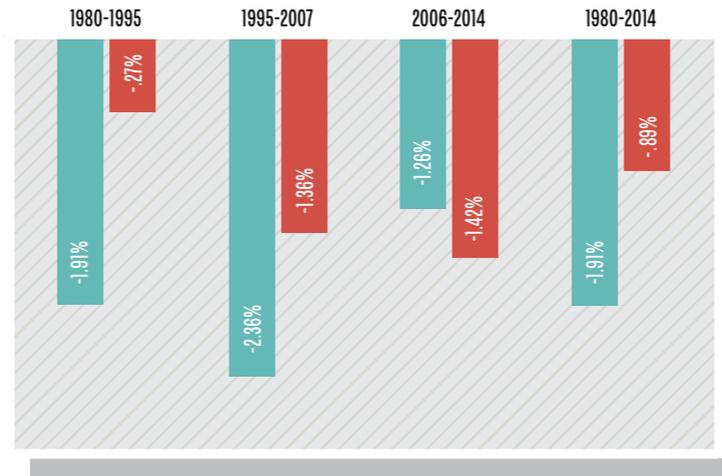
Energy efficiency

Energy efficiency — defined as the amount of energy needed to produce a million dollars of gross domestic product, also known as energy intensity — continued to improve in 2014, resuming a steady trend interrupted only briefly, and only in the United States, the year before.

In 2014, energy intensity ticked downward a little over 1 percent in the United States, compared with one year

Energy Efficiency Growth

Compound Annual Growth Rate



Source: John A. "Skip" Laitner, using Energy Information Administration and International Energy Outlook data

■ U.S. ■ Global

earlier, and about 2.5 percent globally over the same period. The global number in particular is encouraging, given that the U.S. economy has long been a leader in energy-efficiency technologies and practices.

One key contributor to the continued improvement is the growth of information technology in many sectors, notably in manufacturing, where the convergence of such things as sensors, software and data analytics is allowing that sector to enjoy new levels of efficiency. This is no small matter: Manufacturing activities account for around one-third of the world's total energy consumption.

Some of the world's largest companies see this as a huge business opportunity. For example, General Electric's "Industrial Internet" initiative envisions billions of dollars in future revenue by leveraging information technologies to make jet engines, locomotives, power plants and other machines more efficient and productive. GE's competitors, such as ABB and Siemens, have similar visions.

Much of this is just getting going. Around three-fourths of manufacturers say that energy efficiency will be a critical success factor for manufacturers' profitability in the next 20 years, according to a 2013 survey by the Economist Intelligence Unit. This is because of the high cost of energy, but it is also because of volatility of energy prices and concerns about security of energy supplies.

Of course, these efforts are requiring a significant ramp-up in the growth of data centers, which are needed to crunch all the data streaming from these machines and other devices. Today's data centers can be gluttonous energy users, thereby offsetting some of the efficiency gains. According to Cisco's Global Cloud Index, annual global data center traffic will reach 8.6 zettabytes by the end of 2018, up from 3.1 zettabytes per year in 2013. (A zettabyte is one sextillion, or 10^{21} , bytes.) According to NRDC, U.S. data centers consumed



about 91 billion kilowatt-hours of electricity in 2013, equivalent to the annual output of 34 large coal-fired power plants.

In some respects, our energy future is a race between data intelligence and the data infrastructure needed to bring that technology to the world. For now, efficiencies are winning, but the race is far from over.

Water use

Many sectors use large quantities of water in their operations and supply chains. These include agriculture, textiles, mining, energy generation, electronics, and food and beverage companies.

Water scarcity is a significant business risk due to climate change, population growth and economic development. The World Economic Forum has identified water scarcity as one of the top three global risks to business. Earlier in this report, we identified water use as the second most significant contributor to overall corporate environmental impact after greenhouse gas emissions (see “Largest natural capital impacts,” page 36).

Water use has continued to grow slightly for both U.S. and global companies. Total water use grew by 2 percent between 2009 and 2013 for U.S. companies, 7 percent for global companies.

There have been small improvements. For example, direct water withdrawals from surface or groundwater sources by U.S. companies decreased by almost one-quarter between 2009 and 2013. However, this was more than offset

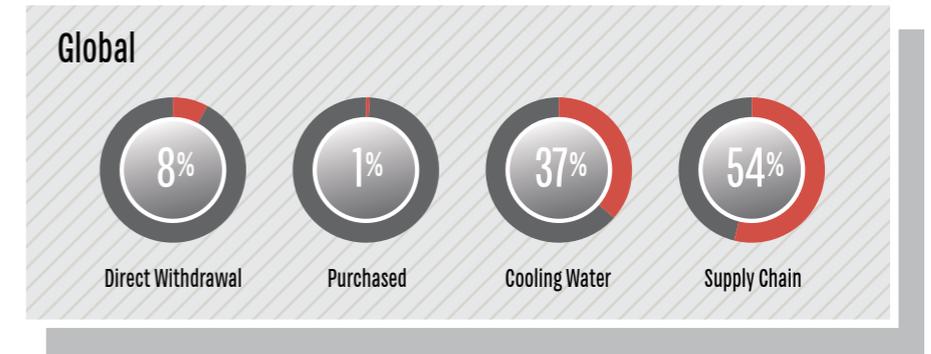
by increases in water purchased from local government municipalities and by water used in companies’ supply chains.

For global companies over the last five years, there has been a small decrease in the use of water purchased from local government municipalities, but a far greater increase in direct water withdrawals from surface or groundwater sources, and water used in companies’ supply chains.

In response to water scarcity, many companies focus their initial water management efforts on their own operations, where they have most control. But often the greater risks of business disruption or increased costs come from the company’s supply chain. Over half of the water use of the researched companies comes from their supply chains (56 percent U.S., 54 percent global).

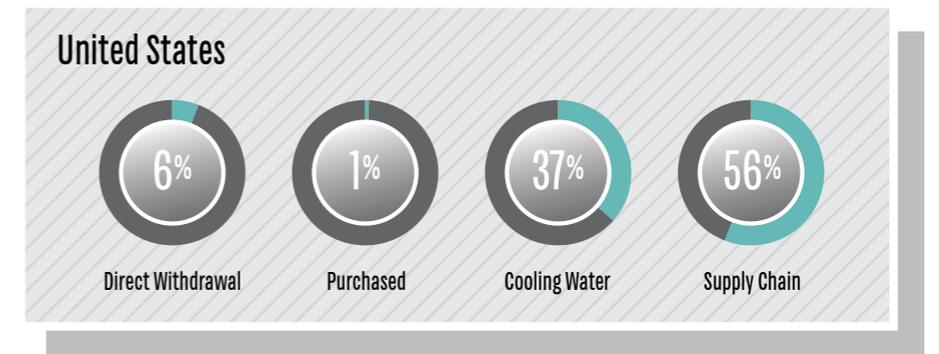
The trend in water-use intensity, measured in cubic feet of water per million dollars of revenue, was generally positive over the last five years, with both U.S. and global companies showing some improvement — that is, less water used for each unit of revenue. The amount of water required to generate each dollar of revenue decreased 17 percent between 2009 and 2013 for U.S. companies, 10 percent for global companies. The fact that companies are becoming less water intensive is very good news, but it is tempered by the significant increase in economic activity and growth in revenue generation over the last five years.

Sources of Water Use, 2013



Source: Trucost

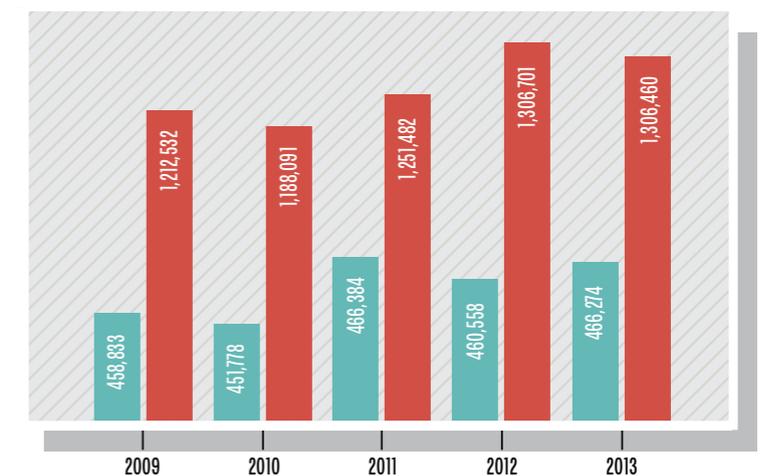
Sources of Water Use, 2013



Source: Trucost

Water Use

Million Cubic Meters

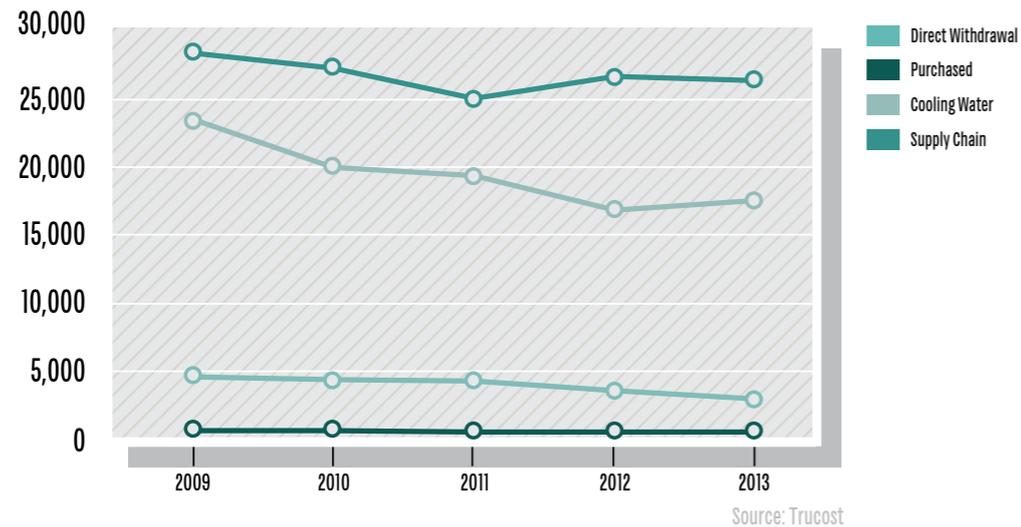


Source: Trucost

■ U.S. ■ Global

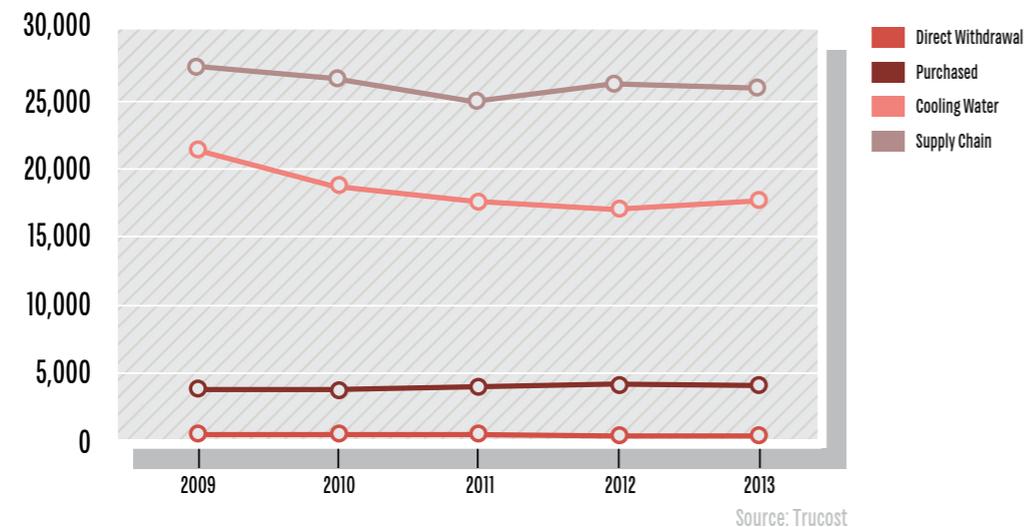
Intensity of Water Use-United States

(Cubic Meters Per Million Dollars of Revenue)



Intensity of Water Use-Global

(Cubic Meters Per Million Dollars of Revenue)



In sum, the absolute amount of water consumed by businesses has continued to increase each year. This continued trend suggests that business has not yet figured out how to grow revenue and profits without increasing overall water use. This is bad news, particularly given that scientists project that climate change will bring more extreme weather, including extended droughts and heavy rainfall events, which can increase business uncertainty and risk.

Solid waste

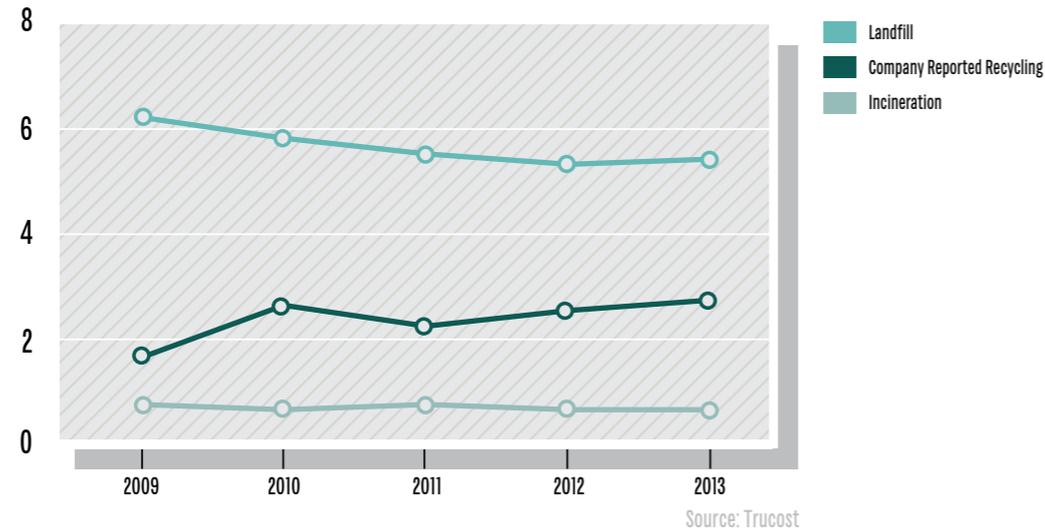
Solid waste has historically been one of the first areas where companies focused their

environmental management efforts. This is because waste disposal incurs a cost that companies must pay. If less waste is produced, fewer tipping fees are incurred, which means more money will remain in the company coffers. In addition, stakeholders broadly recognize reductions in waste disposal as a positive action that a company can take.

Given the above, our findings for this metric are surprising. Solid waste generation is up across the board. Over the last five years, waste sent to landfills increased by 8 percent in the United States and 41 percent globally. Waste incineration is up 9 percent in the U.S. and 17 percent globally.

Intensity of Waste Generation-United States

(Metric Tons Per Million Dollars Revenue)



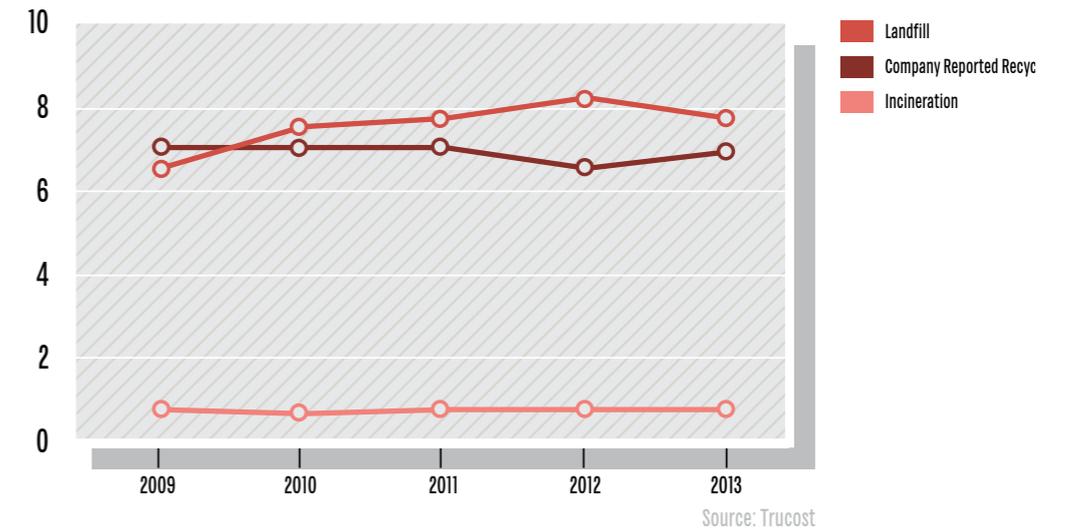
And the volume of waste that companies report they are recycling is up significantly—111 percent in the U.S. and 18 percent globally.

On an intensity basis, or metric tons of waste disposed per million dollars of revenue generated, things in the U.S. appear to be moving in a more sustainable direction. Among the U.S. companies researched, waste sent to landfill and incineration per dollar earned was down 12 percent and 11 percent respectively. At the same time, waste being recycled in the U.S. per dollar earned was up 71 percent. This suggests that U.S. companies are finding more ways to generate savings from waste by disposing of it as recycled content, as opposed to paying for its disposal as a waste stream.

International companies appear to be less focused on waste, or at least have been less successful at reducing their waste intensity. The amount of waste sent to landfill per dollar earned increased over the five-year period by 18 percent, whereas recycling and incineration per unit of revenue remained static between 2009 and 2013.

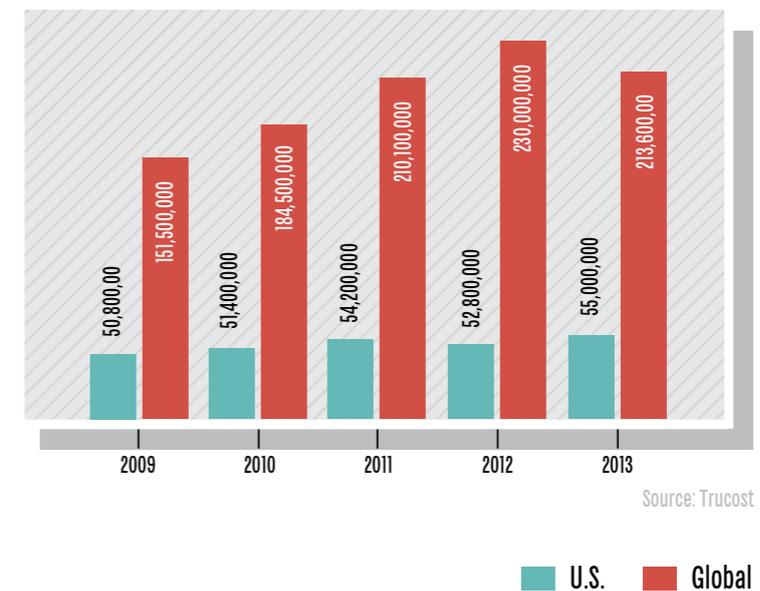
Intensity of Waste Generation-Global

(Metric Tons Per Million Dollars Revenue)



Waste to Landfill

Metric Tons



S O G I B CORPORATE LEADERSHIP

In the final section of the State of Green Business Index we examine different measures of corporate leadership in environmental sustainability. This is largely good news: Companies are more broadly addressing natural capital and reporting their impacts, including their water risk, greenhouse gas emissions from their products, environmental R&D or investments, and environmental profits or savings. Although the improvements remain small for some of these metrics, the trends are quite positive.

Companies continue to widen and deepen their focus on environmental improvement. For example, more and more companies are voluntarily disclosing their carbon emissions to the CDP and other reporting bodies. Many are measuring carbon impacts beyond their immediate operations and calculating emissions throughout their value chains. Furthermore, companies are diversifying

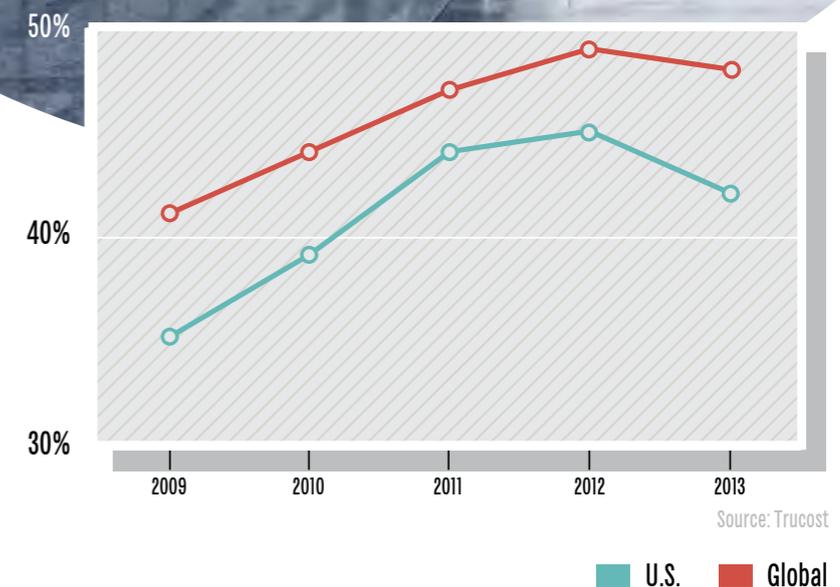
the environmental impacts they track. While carbon emissions continue to be in the spotlight, other measures are increasingly being reported, such as water use.

Disclosure of natural capital impacts

This metric reflects the extent to which companies are publicly disclosing their total environmental impacts. Trucost annually reviews and measures company performance, including greenhouse gas emissions, air pollutants, solid waste, water use and water pollutants, and natural resource use. This data is used to estimate the total financial cost of corporate natural capital impacts.

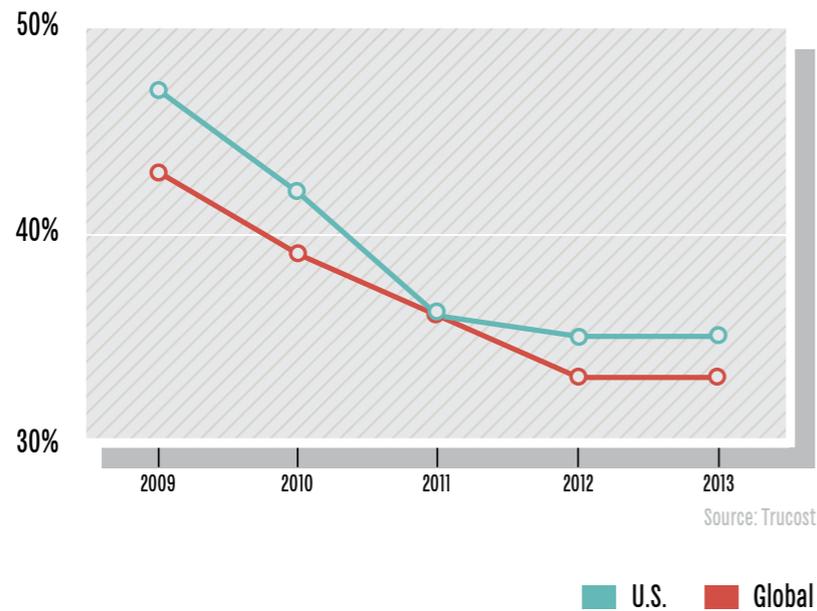
During the past five years, companies' disclosure of natural capital impacts has increased, but they still reported only a portion of their overall impacts.

Disclosure of Natural Capital Impacts
Percentage of Total Environmental Costs Disclosed

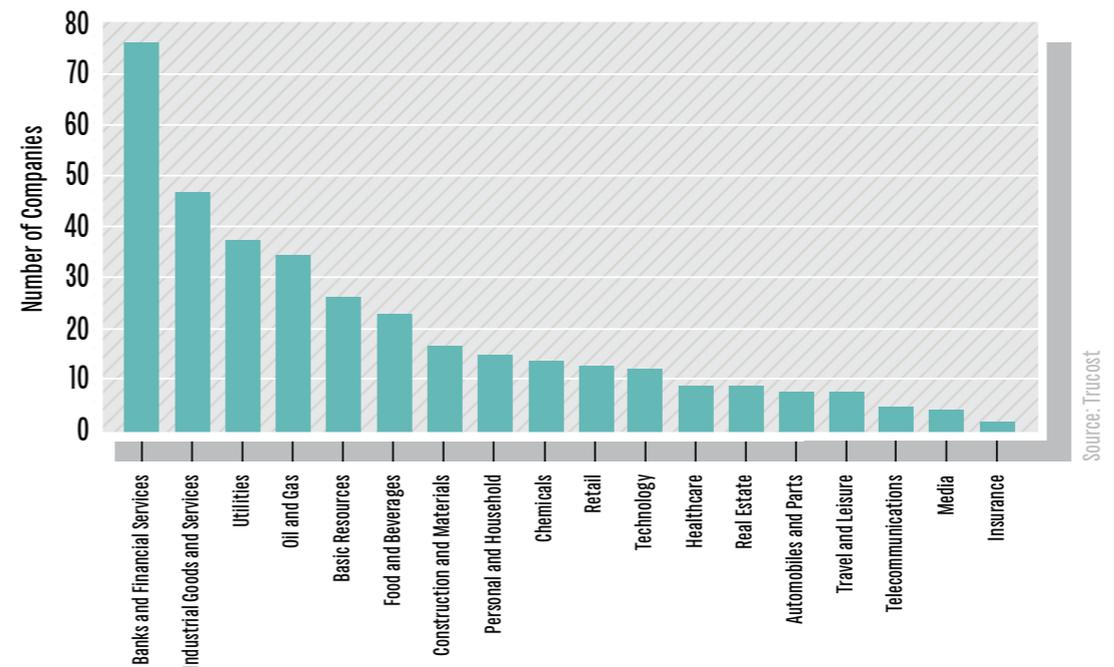


Non-Disclosure of Natural Capital Impacts

Percentage of Companies Reporting No Environmental Impact Data



Participation in Natural Capital Valuation Initiatives



In 2013, approximately 65 percent of U.S. companies and 67 percent of global companies reported on one or more of their environmental impacts, which is consistent with the ratio in previous years.

However, companies have been reporting fewer than half of their total natural capital costs. While the majority of companies are reporting on their environmental performance, they are not necessarily reporting on the most material issues. It may be that companies are measuring and managing more of their natural capital impacts but not reporting the information, but we have only their reporting by which to evaluate their attention to these issues.

If, as the data suggest, many companies are not measuring and managing their most material natural capital impacts, this is a business risk if their access to natural resources becomes more constrained by

legislation, increased prices, competing demands for the same resource or other limitations. As water scarcity, natural resource shortages or climate change impacts become more evident, we expect that more companies will measure and report their dependence on natural capital.

Participation in natural capital valuation initiatives

Businesses of all types are beginning to understand how they depend on nature for raw materials and services, such as filtering emissions to water and air or regulating stormwater flows. Last year's report identified nearly 200 companies addressing natural capital, which has since grown 85 percent, to more than 350.

One measure of companies' attention to how they depend on natural capital is the growing participation

in initiatives working to value natural capital, such as the Corporate Eco Forum, the Natural Capital Business Hub, the Natural Capital Coalition, the Natural Capital Declaration, the Natural Capital Leadership Compact and the Waves Initiative.

Industry sectors with the greatest representation within these groups include banks and financial services, industrial goods and services, utilities, and oil and gas. These are some of the sectors most likely to suffer when natural resource constraints develop, so it is logical that they are leading the way in factoring natural capital considerations into business planning. What's a bit surprising is the lower participation of apparel and food and beverage companies, given their dependency on natural resources, in particular water, that are required to sustain their business growth.

As another form of natural capital valuation, more companies are adopting internal pricing for carbon and water. For example, more than 150 companies reported to CDP that they use an internal price of carbon. These organizations are using so-called “shadow prices” to integrate climate change emissions into business planning, create incentives for decreasing emissions or measure the return on investment of carbon footprint reductions. (Shadow pricing was one of the key sustainable business trends in the 2014 State of Green Business report.) As another example, the Water Risk Monetizer tool launched in 2014 allows businesses to estimate a shadow price for water (See “Water risk trickles from awareness to action,” page 13). The key driving forces have been the risk to business value posed by climate change, water scarcity and disruptions to production, as well as tougher environmental regulation.

Third-party assurance of sustainability data

Sustainability leadership by companies includes any trends toward assurance of their reporting, which enhances stakeholder acceptance of the data as well as its reliability.

For this metric, Trucost reviewed companies that had separate organizations validate their greenhouse gas emissions data. Although the percentage of organizations assuring their emissions data has increased over the past five years, the recent trend has been relatively flat. In 2013, approximately 38 percent of U.S. companies had their Scope 1

emissions assured, 36 percent had their Scope 2 emissions assured and 27 percent had their Scope 3 emissions assured; the proportions for global firms were 39 percent, 37 percent and 27 percent, respectively.

This lull may signal that sustainability reporting has plateaued, as we noted in last year’s report. However, the data also may signal increasing capacity and comfort within organizations to internally verify their own environmental measurements. This is a trend that needs to be monitored to understand whether companies are looking outside for reporting assurance or performing that role themselves.

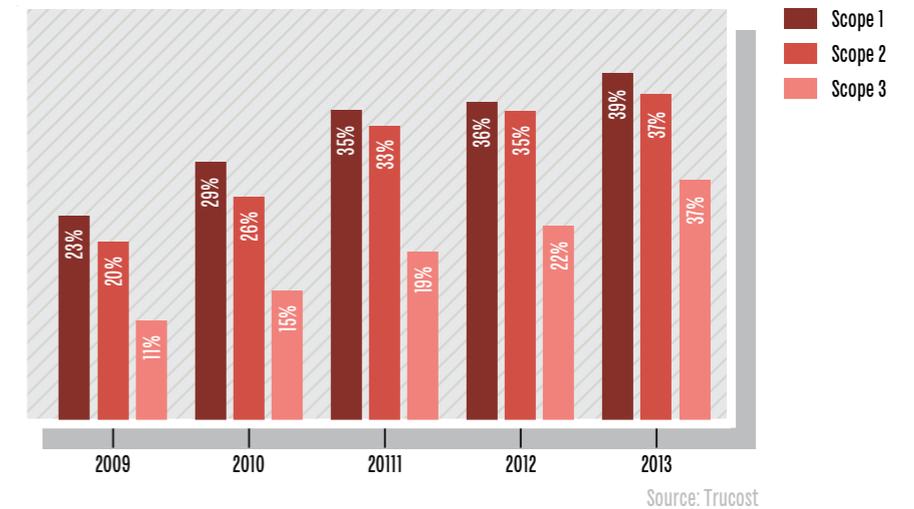
Reporting of water risk

Water-risk reporting by companies has continued to grow. Although only a minority of businesses report their water risk, the number is rapidly rising, at least in the United States. In 2013, approximately 22 percent of U.S. companies reported on their water risk, up from less than 10 percent in 2009. For global corporations, the 2013 percentage was 15 percent, holding relatively steady over the past several years.

In light of the cost that businesses in drought stricken areas like California, the southeastern United States, and São Paulo, Brazil incurred in 2014 — and the recognition that business growth will continued to be constrained by a lack of water — more companies should measure the water risk within their operations and their supply chains in order to make better decisions about sourcing, targeting where growth can occur and water-efficiency plans.

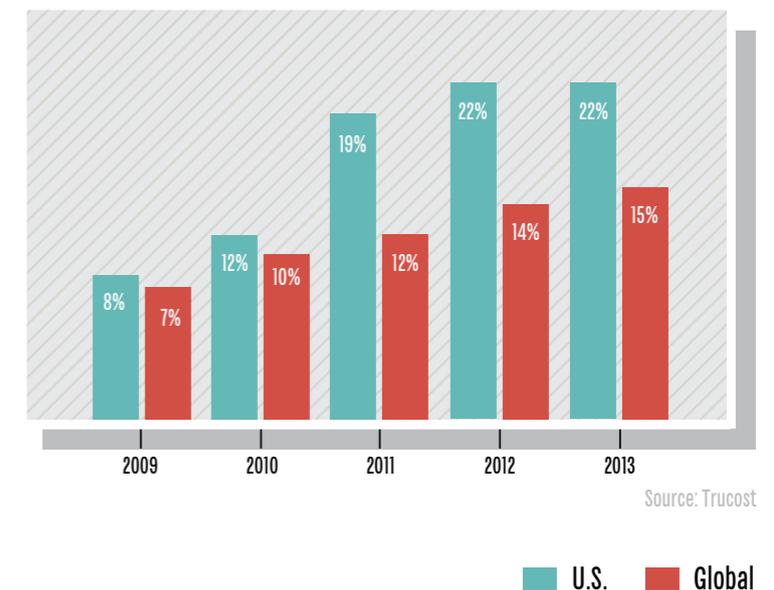
Global Third Party Assurance of Sustainability Data

Percent of Companies Assuring GHG Emission Data



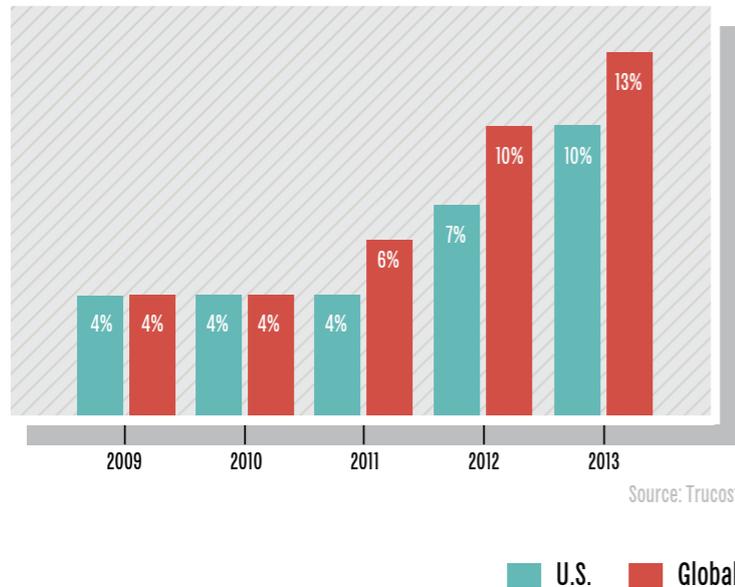
Reporting of Water Risk

Percent of Companies Reporting



Reporting of Greenhouse Gas Emissions From Products

Percent of Companies



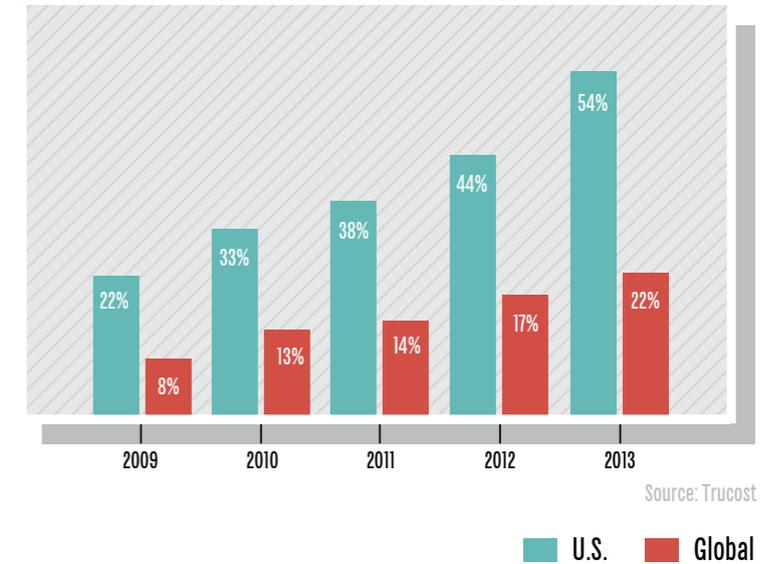
As more companies see opportunities to profit from greener product offerings, the number of companies reporting product-level data is expected to increase, in response to investors seeking companies that outperform their peers, and to executives paying increasing attention to the costs and impacts associated with a product's entire value chain.

Reporting of natural capital R&D or investments

A substantial and growing number of companies are investing in natural capital research and development, exploring how they can bring green innovation to the marketplace or into their own operations. For U.S. firms, the proportion reporting such green R&D or investments has increased from 33 percent in 2009 to

Reporting of Natural Capital Profits or Savings

Percent of Companies



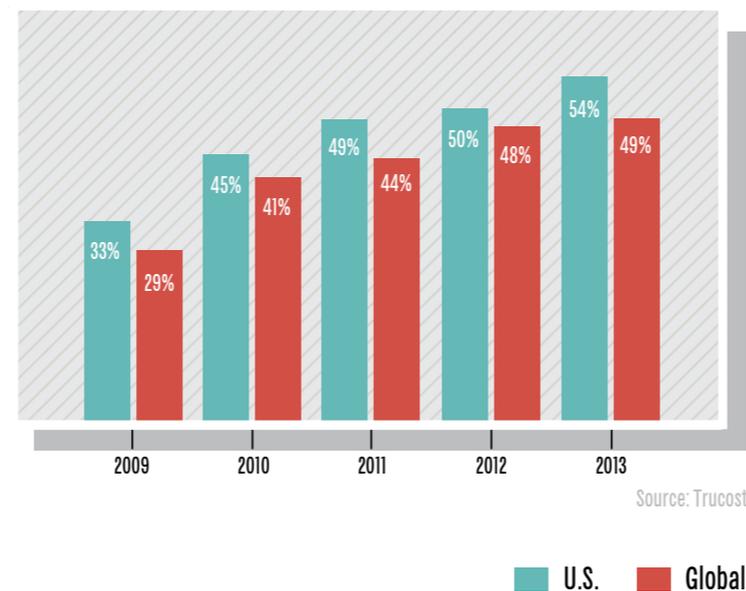
Reporting of greenhouse gas emissions from products

Companies' reporting of greenhouse gas emissions associated with the use of the products they sell has doubled, from less than 5 percent of U.S. companies as recently as 2011, to 10 percent in 2013. For global companies, the ratios also doubled between 2011 and 2013, to approximately 13 percent.

Businesses report on various aspects of their products' emissions, such as emissions from the use of the products or their end-of-life treatment. Determining emissions for the use of sold products can be complex, as it requires quantifying direct and indirect emissions — for example, energy consumption during their use — assembling data about how the products are used by customers, developing assumptions and collecting unit sales information.

Reporting of Natural Capital R&D or Investments

Percent of Companies



54 percent in 2013. The growth also has been significant for global companies, from 29 percent in 2009 to 49 percent in 2013.

This data is based on companies' self-reporting, which is subjective and may be influenced by an interest in presenting themselves as leaders or innovators. Clearly defining what qualifies as green R&D or investments would help improve the reliability of these observations.

Nonetheless, these mounting investments are encouraging and demonstrate the value that companies are placing on advancing environmental improvements over the longer term. These efforts will also produce ripple effects throughout value chains, generating environmental innovation for both suppliers and customers. It is encouraging that these activities today can spur far-reaching and long-lasting impacts on the larger economy.

Reporting of natural capital profits or savings

This metric evaluates the number of companies disclosing their profits or savings from environmental activities. For example, a business may launch a greener product into the market or tackle a project to improve its own operational efficiency. Companies want to demonstrate their successful initiatives in these areas by reporting their achievements.

Our review found that just over half (approximately 54 percent) of U.S. companies reported environmental profits or savings in 2013, up from 22 percent in 2009, while around 22 percent of global corporations reported environmental profits or savings in 2013, up from less than 10 percent in 2009. Most companies do not yet reveal the actual numerical cost or investments, let alone the returns on those investments. This suggests that there is an opportunity for companies to demonstrate leadership by quantifying their sustainability return.

These ratios have increased rapidly and the environmental cost savings may flatten over the next several years, as additional operational efficiencies may become harder to achieve. However, the significant increase in environmental profits and savings demonstrates that opportunities exist, and this may encourage more companies to pursue them.

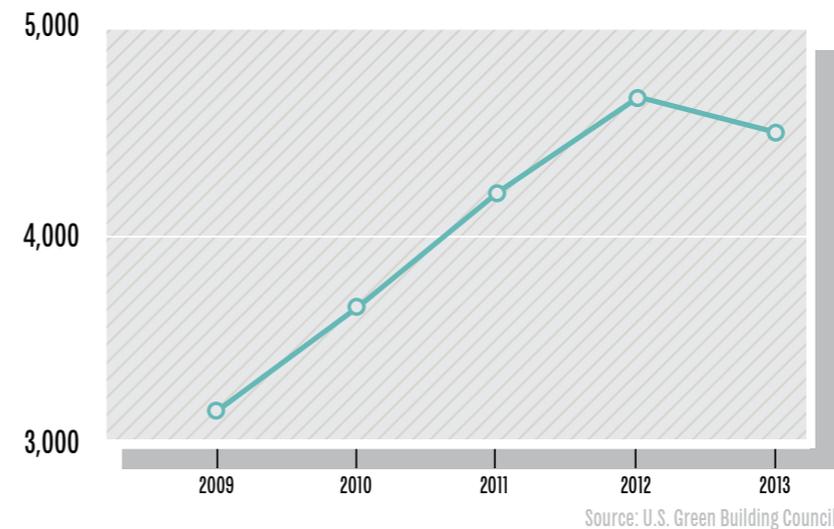
Green Office Space

From better software tools to measure and adjust the amounts of energy used in offices to evolving standards for retrofitting existing structures with green features, 2014 was all about recalibrating for a new phase in sustainable building.

Data provided by the U.S. Green Building Council shows that the total number of global LEED-certified commercial projects dropped 2 percent from 2013 to 2014. Both

Use of Green Office Space

Number of LEED Certified Projects



registrations and certifications for new construction and commercial spaces dipped, while LEED retrofits of existing building increased.

The way the USGBC tracks these trends is also changing. While gross square footage of green office space used to be the go-to metric, the organization now prefers to count the number of projects in play instead of the precise amount of space involved. This avoids inflated square footage projections that often don't materialize in the final product, says the council.

Though any year-over-year decrease in green office space hurts overarching goals, like driving down corporate energy footprints or transitioning to more sustainable building materials, the industry as a whole is also undergoing a period of significant change, thanks in large part to technology innovations. For example, big data analytics applied to energy usage

— a significant component of the broader push to add sensors to anything and everything in smart buildings — is one example of the kinds of evolving building products and information now at the disposal of businesses, governments and consumers.

Such technology promises continued evolutions in buildings. Still to come: More targeted methods to slice and dice building data to extract maximum value, and new mechanisms to better store and integrate on-site renewable energy and more effectively harnessing natural capital to help scale the passive or living building trends.

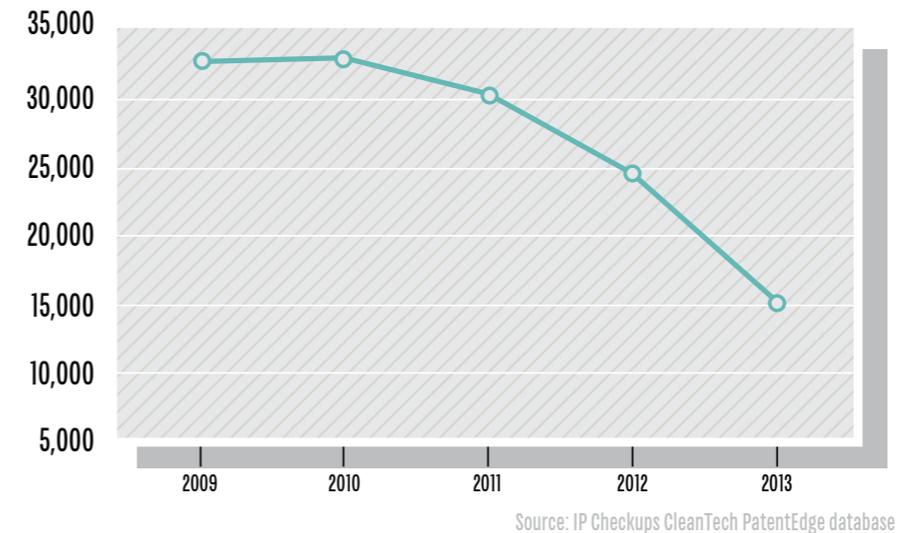
Such innovations will contribute to reducing the environmental performance of buildings overall — regardless of whether those buildings are ever certified as “green.”

Cleantech Patents

The market basket of products and technologies that fall under the rubric of clean technology continue to be a bright spot of innovation, enabling further reductions in emissions, resource extraction and other natural capital degradation, and promising higher levels of resource efficiency and productivity.

Each year, we turn to IP Checkups, a patent research and analysis firm, to count the number of patents filed at the world's major agencies governing intellectual property: the United States Patent & Trademark Office, the European Patent Office, the Japan Patent Office, the United Nations-created World Intellectual Property Organization. IP Checkups looks at patent applications and publications across nine cleantech categories: advanced batteries, biofuels, fuel cells, geothermal energy, hydropower, solar energy, water desalination, water filtration and wind energy.

Filing of Cleantech Patents



Top Cleantech Patent Companies, 2009-2013

Toyota	12,347
General Electric	7,377
Honda Motors	6,854
Samsung	7,090
Panasonic	6,309
Robert Bosch	5,023
BASF	4,905
Siemens	4,754
Phillips Electronics	4,350
Dupont	4,284

Source: IP Checkups CleanTech PatentEdge database

S O G B METHODOLOGY

Trucost researches and standardizes the environmental performance disclosures of more than 4,800 companies worldwide (representing 93 percent of global markets by market capitalization) to inform public research addressing complex sustainability challenges as well as to support companies in better understanding and managing their direct and supply-chain environmental impacts.

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 a total of more than 1,600 companies in 24 developed markets. Trucost also applies natural capital valuations to traditional environmental performance metrics to provide insight into the economic consequences of environmental impacts.

Modeling Environmental

For this research, Trucost applied environmentally extended input-output lifecycle analysis (EEIO-LCA) modeling to complete data gaps in

company disclosure, allowing comparison of environmental impacts across companies, supply chains, regions, sectors and investment benchmarks.

Trucost draws on extensive government and academic data sources to quantify more than 700 environmental indicators.

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 EEIO-LCA model analyzes business activities at a global or regional level. The model includes data from sources like the U.S. Toxics 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' emissions 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 business sectors, based on the North American Industrial Classification System. The Trucost model has been enhanced to provide additional detail for environmentally intense sectors. The environmental impacts modeled for each sector are allocated to a company according to its proportion of total revenue. Trucost primarily uses data from FactSet and company reports to segment revenues and map each company to a set of sectors. The Trucost EEIO-LCA model estimates the amount of resources a company uses (the inputs) to produce goods or services (outputs) and the related level of pollutants.

The Trucost EEIO-LCA model also 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 accounts for impacts from a company's own operations and its supply chain. 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 environmental impacts. This analysis can be extended to include first-tier suppliers that the company buys from, through subsequent tiers of suppliers until the supplier of the raw material is reached. In this way, Trucost can put a

price on the supply chain impacts. This provides a means to understand business risk, and differentiate between low-impact supplied goods, such as renewable energy, and high-impact supplied environmental goods, such as fossil-fuel energy.

Company Disclosures

Trucost maintains the Trucost Environmental Register, the world's largest database of corporate environmental performance metrics, which businesses use to measure footprints or benchmark performance of operations, supply chains or investment portfolios. Trucost reviews and incorporates information from companies' annual reports and accounts, environmental reports, sustainability or corporate social responsibility reports, company websites and other publicly disclosed data. Trucost conducts an annual engagement program to provide companies with the opportunity to review and verify its research.

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. 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 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.

External costs are incurred whenever a natural resource is used or pollutants are released to air, land or water.

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.

Valuing Environmental Impacts

In addition to measuring environmental performance in physical units, such as metric tons of greenhouse gases or cubic meters of water, Trucost is also able to value in monetary terms the costs of these impacts. Once the environmental impact profile of a company has been calculated, an environmental damage cost (natural capital 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 pollutants are released to air, land or water. The external cost of using a 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 external to the books of the firm that uses the resource or emits the pollutant.

For example, the European Commission estimates that dust and particles from fuel use and other sources cause the premature deaths of almost 370,000 people every year and reduce life expectancy by eight months. Air pollutants could result in between \$246 billion and \$792 billion in societal health costs by 2020.

Measures to reduce pollution could cost the market economy around \$9.2 billion annually, saving at least \$55 billion 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 taxes 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. Trucost prices the damage that is done to society by pollution and natural resource use, including quantifying associated human health costs.

Trucost, along with many leading academics and a growing number of industry stakeholders, believe that pricing resource use and pollution in monetary 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.

Expressing 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 sector.

The costs provide a good proxy for potential exposure to policy measures that seek to apply the "polluter pays" principle.

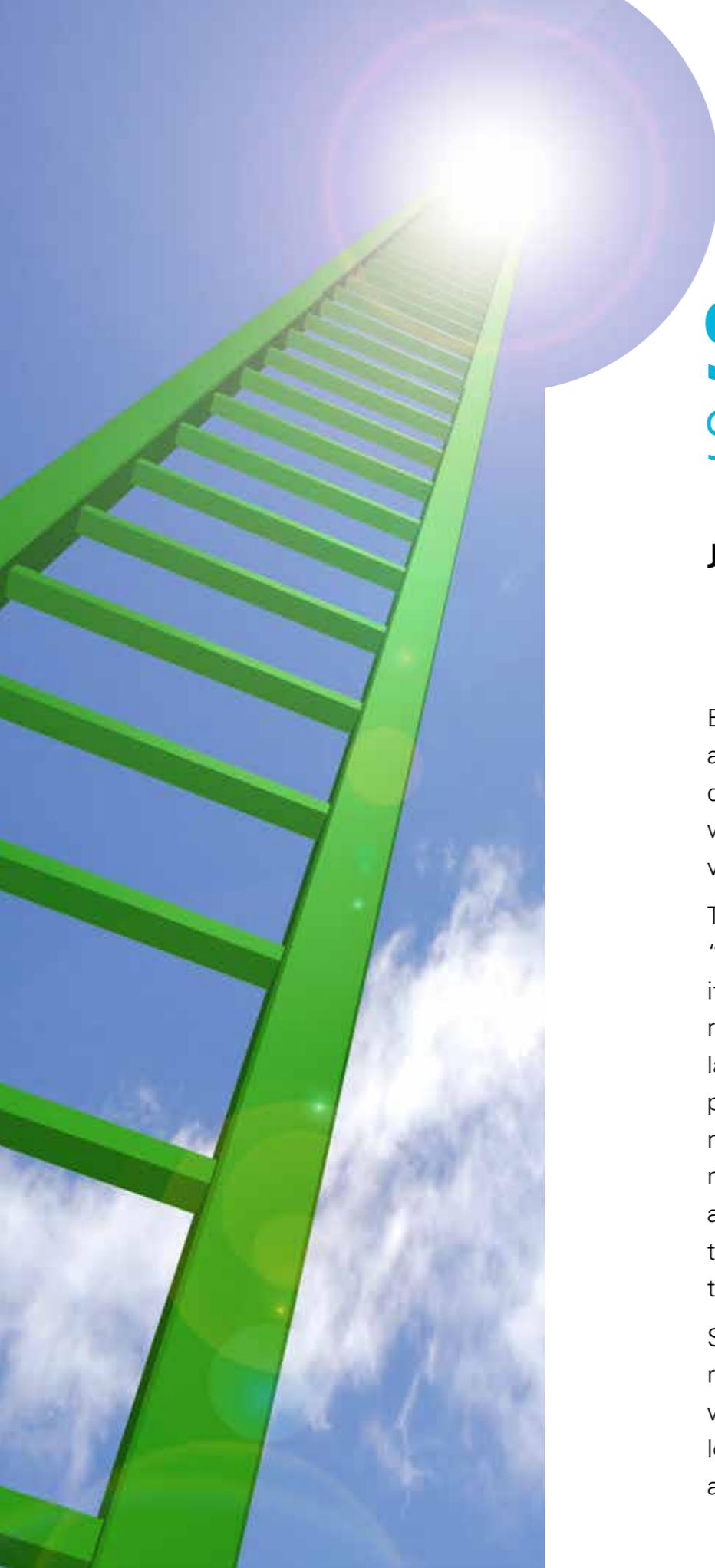


Companies are increasingly required to contribute to external costs through regulations or economic instruments such as carbon taxes or allowances, which "internalize" costs per unit of resources used and emissions released. The external environmental costs of a company's operations give a good long-term indicator of the environmental sustainability of the company's activities.

Trucost's methodology addresses a significant gap in rigorous, comparable and quantified environmental research. Trucost's 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. Trucost has compiled

a library of valuations for over 700 different natural inputs and outputs. For example, Trucost applies the social damage cost of \$115 for each metric ton of greenhouse gases in its analysis. The costs in Trucost's model are derived from a wealth of peer-reviewed environmental economics literature.

Trucost's damage costs differentiate between methods used to manage resources or emissions. 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.



State of the Profession

Sustainability Turns 10

John Davies VP & Sr. Analyst, GreenBiz Group

Boldly declaring sustainability's 10th birthday might seem a fool's errand. The term itself can engender interminable discussions as to whether it is really the correct word for what we do. But as a profession, it seems appropriate to view it on the cusp of its awkward teenage years.

Two years ago we identified a phenomenon called "peak sustainability." In 2005, Walmart launched its sustainability strategy (powered by 100 percent renewable energy, zero waste, etc.) and General Electric launched ecomagination. In terms of hiring sustainability professionals, 2005 was truly a watershed year: It marked the first time that this new role was created in more than a handful of companies. Three years later, the aggregate number of companies hiring their first full-time sustainability manager increased from 67 in 2005 to 145 in 2008.

Since 2008, the number of companies adding that new role has declined every year. To paraphrase Yogi Berra, when it comes to having a career in sustainability it might look like we're at a point where "Nobody goes there anymore because it's too crowded."

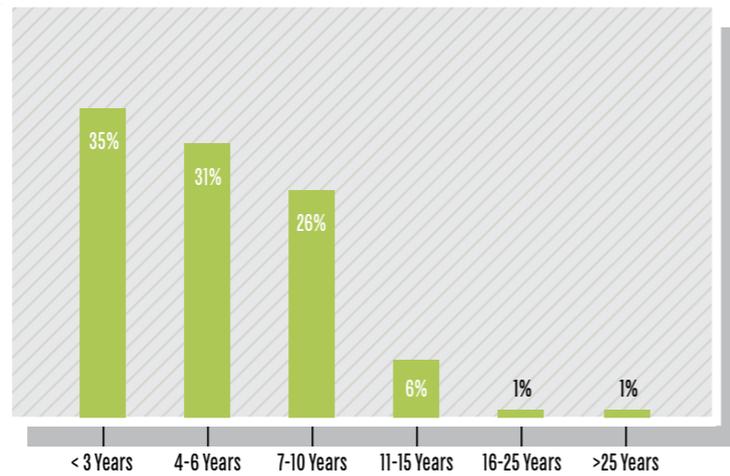
Budgets Remain Flat But Teams Grow

Last year, we surveyed the 5,600-plus members of the GreenBiz Intelligence Panel and 945 responded to our annual State of the Profession survey. Of those, 46 percent were employed in large companies (those with revenues greater than \$1 billion). Perhaps the most intriguing finding was that 89 percent of those in large companies have been in the work force more than a decade, but only 8 percent have worked in sustainability at their present company for more than 10 years.

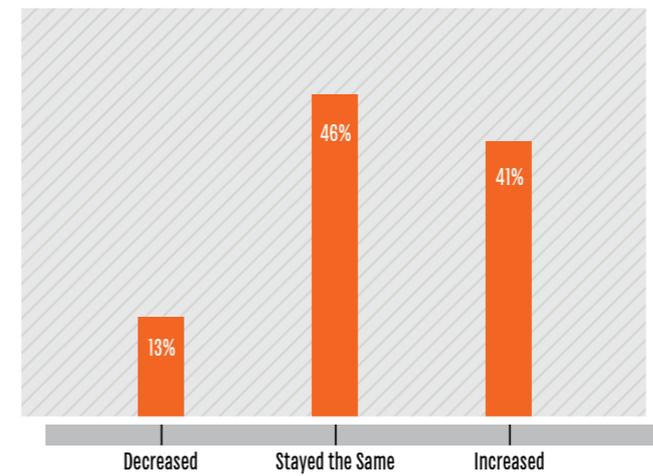
The results indicate that sustainability budgets are growing, but not by much. Three quarters of large companies have budgets of less than \$1 million; 36 percent have no dedicated budget at all. It should be noted that "sustainability" budgets can be misleading, since embedded efforts such as packaging redesign projects or energy reduction efforts may be accounted for under different cost centers.

While budgets appear stagnant, teams are growing. Headcount has increased for four in 10 large companies over

Years in Sustainability at Present Company



Has the Headcount Number Increased or Decreased in the Past Two Years?



the past two years; 46 percent of respondents indicated that headcount has stayed the same. According to Wanted Analytics, which tracks hiring data, sustainability jobs have more than doubled in demand over the past four years — at least in the United States. At the dawn of 2010, there were about 300 jobs available online. Four years later, there were more than 700 unique positions available, a new high in demand.

How to Get Away with a Job in Sustainability

In the large companies we surveyed, there was almost an equal split between those hired from the outside (49 percent) and those promoted from within (51 percent). We asked how external hires heard about the job and 35 percent were directly contacted by someone from the hiring company, 23 percent found the position on an online job board, and 20 percent learned about it from word of mouth.

One of the more interesting findings is how internal candidates came to their jobs. Thirty-eight percent of sustainability managers, directors and vice presidents

were contacted by someone within their company while only 12 percent learned via word of mouth and 7 percent from an online job board. As a testament to the nascent nature of the profession, 23 percent of internal candidates created their position themselves.

Another key hiring trend in large companies is that 75 percent of those surveyed have dedicated sustainability resources embedded elsewhere in the organization, ranging from EH&S (41 percent) to procurement (29 percent) to marketing/communications (28 percent).

Approaching the Awkward Years

Sustainability as a profession continues to evolve rapidly. Corporate social responsibility and sustainability departments are converging, with 47 percent of respondents locating those efforts in the same department and another 12 percent in different departments but reporting to the same senior leader. But there are challenges if the profession is going to blossom as it approaches its teenage years.

One of the more significant challenges involves reporting. Each year, our survey identifies these efforts as the second-most shared task for sustainability professionals, after strategy development. Many of the comments we received during this year's survey expressed concern as sustainability rankings and supply-chain questionnaires continue to mushroom, consuming more and more of professionals' time and resources.

Said one survey respondent: "As NGOs, consultants and activists continue to push for more data, transparency and reporting, they are transforming sustainability from being a proactive and strategic approach to business to becoming a series of reactive and compliant functions. This risks reducing sustainability's relevance and importance in the corporate world."

Can sustainability professionals redouble their efforts in proactive strategy? To be sure, the profession is at a crossroads. A rapidly recovering economy bodes well for investment in corporate sustainability efforts. However, progress doesn't come from checking boxes. The next few years should define whether the profession matures or remains in arrested development.



About GreenBiz

GreenBiz Group advances the opportunities at the intersection of business, technology and sustainability. Through its websites, events, peer-to-peer network and research, GreenBiz promotes the potential to drive transformation and accelerate progress — within companies, industries and in the very nature of business.

In addition to the annual GreenBiz Forum, GreenBiz's VERGE global event series focuses on the technologies and systems that accelerate sustainability solutions across sectors in a climate-constrained world. The event focuses on transformative but practical, scalable, solutions-oriented exchanges through six program tracks: distributed energy systems, next-gen buildings, resilient cities, sustainable mobility, smarter supply chains, and food and water systems. Participants come from a broad range of sectors and job functions, including buildings and facilities, fleets, IT, energy, sustainability, and the public sector. VERGE 2015 will be held in San Jose, CA October 26-29.

www.greenbiz.com

About TRUCOST^{PLC}

Trucost has been helping companies, investors, governments, academics and thought leaders to understand the economic consequences of natural capital dependency for over 14 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

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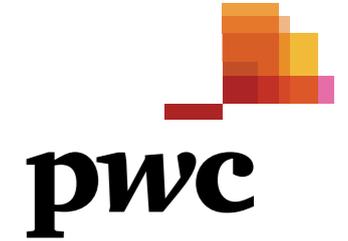
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Cost of corporate natural capital impacts

(Million U.S. dollars)

	2009	2010	2011	2012	2013
U.S.	\$901,000	\$944,000	\$987,000	\$1,030,000	\$1,036,000
Global	\$2,514,000	\$2,556,000	\$2,771,000	\$2,952,000	\$2,951,000

Source: Trucost data

Profit at risk from natural capital impacts

	2009	2010	2011	2012	2013
U.S.	145%	120%	111%	120%	107%
Global	186%	132%	129%	150%	143%

Source: Trucost data

Where natural capital impacts occur in the value chain		
	Direct	Supply Chain
Food & Beverage	2%	98%
Financial Services	2%	98%
Banks	3%	97%
Personal & Household Goods	4%	96%
Automobiles & Parts	4%	96%
Technology	5%	95%
Telecommunications	5%	95%
Retail	6%	94%
Media	6%	94%
Healthcare	8%	92%
Real Estate	9%	91%
Construction & Materials	24%	76%
Insurance	26%	74%
Industrial Goods & Services	29%	71%
Chemicals	39%	61%
Oil & Gas	39%	61%
Travel & Leisure	47%	53%
Basic Resources	52%	48%
Utilities	88%	12%

Source: Trucost data

Largest natural capital impacts								
	Impact 1		Impact 2		Impact 3		Impact 4	
U.S.								
Direct	Greenhouse Gases	73%	Water Abstraction	12%	Acid Rain and Smog Precursors	5%	Dust and Particles	3%
Supply Chain	Water Abstraction	32%	Greenhouse Gases	31%	Nutrients and Organic Pollutants	30%	Acid Rain and Smog Precursors	3%
Total	Greenhouse Gases	43%	Water Abstraction	26%	Nutrients and Organic Pollutants	22%	Acid Rain and Smog Precursors	3%
Global								
Direct	Greenhouse Gases	66%	Water Abstraction	14%	Acid Rain and Smog Precursors	5%	Nutrients and Organic Pollutants	4%
Supply Chain	Greenhouse Gases	33%	Water Abstraction	31%	Nutrients and Organic Pollutants	29%	Acid Rain and Smog Precursors	3%
Total	Greenhouse Gases	43%	Water Abstraction	25%	Nutrients and Organic Pollutants	21%	Dust and Particles	4%

Source: Trucost data.

GHGs emissions and percentages by scope					
Total emissions (million metric tons)					
	2009	2010	2011	2012	2013
U.S.	3,741	3,886	4,068	3,881	3,862
Global	10,571	10,554	11,351	11,184	11,014
Percent of emissions					
U.S.	2009	2010	2011	2012	2013
Scope 1	50%	49%	48%	47%	47%
Scope 2	9%	8%	9%	9%	9%
Scope 3	42%	42%	43%	44%	44%
Global					
Scope 1	48%	49%	47%	47%	47%
Scope 2	8%	8%	8%	8%	8%
Scope 3	44%	44%	45%	45%	45%

Source: Trucost data

GHGs intensity by scope

Metric tons CO₂e per million dollars of revenue

U.S.	2009	2010	2011	2012	2013
Scope 1	220	220	200	180	180
Scope 2	40	40	40	30	30
Scope 3	190	180	180	170	170
TOTAL	450	440	420	390	380
Global					
Scope 1	220	210	200	190	190
Scope 2	40	30	30	30	30
Scope 3	200	190	190	180	180
TOTAL	460	440	420	410	400

Source: Trucost data

Global green power production as percent of total					
	2008	2009	2010	2011	2012
Hydropower	15.9%	16.2%	16.0%	15.8%	16.2%
Solar PV	0.1%	0.1%	0.1%	0.3%	0.4%
Solar CSP	0.0%	0.0%	0.0%	0.0%	0.0%
Wind	1.1%	1.4%	1.6%	2.0%	2.3%
Bioenergy	1.3%	1.4%	1.5%	1.6%	1.7%
Geothermal	0.3%	0.3%	0.3%	0.3%	0.3%
Ocean	0.0%	0.0%	0.0%	0.0%	0.0%
TOTAL	18.6%	19.4%	19.6%	20.0%	20.9%

Source: International Energy Agency

Total primary energy consumption per dollar of GDP					
BTUs per year 2005 U.S. dollars at purchasing power parities					
	2010	2011	2012	2013	2014
U.S.	7,505	7,329	6,987	7,031	6,945
Global	7,452	7,352	7,201	7,045	6,882

Average annual efficiency growth rate				
	1980-95	1995-07	2006-14	1980-2014
U.S.	-1.91%	-2.38%	-1.26%	-1.91%
Global	-0.27%	-1.36%	-1.42%	-0.89%

Source: John A. "Skip" Laitner, using Energy Information Administration data

Water use					
Million cubic meters					
U.S.	2009	2010	2011	2012	2013
Direct withdrawal (surface/ground)	35,860	36,750	39,456	32,797	27,255
Purchased (municipality)	3,160	3,809	3,114	3,157	3,254
Cooling water	190,218	173,533	184,965	164,305	173,787
Supply chain	229,595	237,686	238,849	260,299	261,978
TOTAL	458,833	451,778	466,384	460,558	466,274
Global					
Direct withdrawal (surface/ground)	84,504	88,150	103,800	113,859	109,164
Purchased (municipality)	9,088	9,557	9,521	8,856	8,743
Cooling water	489,845	449,366	471,524	465,690	481,088
Supply chain	629,095	641,018	666,637	718,326	707,465
TOTAL	1,212,532	1,188,091	1,251,482	1,306,731	1,306,460

Source: Trucost data

Water intensity					
Cubic meters per million dollars of revenue					
U.S.	2009	2010	2011	2012	2013
Direct withdrawal (surface/ground)	4,300	4,100	4,000	3,300	2,700
Purchased (municipality)	400	400	300	300	300
Cooling water	23,000	19,500	18,900	16,400	17,100
Supply chain	27,800	26,700	24,500	26,100	25,800
Global					
Direct withdrawal (surface/ground)	3,700	3,700	3,900	4,100	4,000
Purchased (municipality)	400	400	400	300	300
Cooling water	21,300	18,600	17,500	16,900	17,500
Supply chain	27,400	26,500	24,800	26,100	25,800

Source: Trucost data

Waste intensity					
Metric tons per million dollars revenue					
U.S.	2007	2008	2009	2010	2011
Landfill	6.2	5.8	5.5	5.3	5.4
Incineration	0.7	0.6	0.7	0.6	0.6
Company-reported recycling	1.6	2.6	2.2	2.5	2.7
Global					
Landfill	6.6	7.6	7.8	8.3	7.8
Incineration	0.8	0.7	0.8	0.8	0.8
Company-reported recycling	7.1	7.1	7.1	6.6	7.0

Source: Trucost data

Waste generation					
Thousand Metric tons					
U.S.	2007	2008	2009	2010	2011
Landfill	50,800	51,400	54,200	52,800	55,000
Incineration	5,500	5,000	6,500	5,900	6,000
Company-reported recycling	13,000	22,800	21,600	24,600	27,400
Global					
Landfill	151,500	184,500	210,100	230,000	213,600
Incineration	17,700	17,900	21,600	21,100	20,700
Company-reported recycling	163,400	171,300	189,800	182,300	192,500

Source: Trucost data

Disclosure of natural capital impacts

(Disclosed Environmental Cost USD/ Total Environmental Cost USD)

	2009	2010	2011	2012	2013
U.S.	35%	39%	44%	45%	42%
Global	41%	44%	47%	49%	48%
Companies Disclosing No Environmental Impact Data					
U.S.	47%	42%	36%	35%	35%
Global	43%	39%	36%	33%	33%

Source: Trucost data

Participation in natural capital valuation initiatives	
Banks & Financial Services	76
Industrial Goods & Services	46
Utilities	37
Oil & Gas	33
Basic Resources	26
Food & Beverage	23
Construction & Materials	17
Personal & household goods	15
Chemicals	14
Retail	13
Technology	12
Healthcare	9
Real Estate	9
Automobiles & Parts	8
Travel & Leisure	8
Telecommunications	5
Media	4
Insurance	2
TOTAL	357

Source: Trucost data

Companies using third-party assurance for greenhouse gas reporting

Scope 1					
	2009	2010	2011	2012	2013
U.S.	23%	28%	35%	37%	38%
Global	21%	29%	35%	36%	39%
Scope 2					
U.S.	17%	23%	32%	34%	36%
Global	20%	26%	33%	35%	37%
Scope 3					
U.S.	7%	13%	16%	22%	27%
Global	11%	15%	19%	22%	27%

Source: Trucost data

Reporting of water risk										
Reporting on general water risk										
	2009		2010		2011		2012		2013	
	Number	Percent								
U.S.	39	8%	59	12%	90	19%	104	22%	106	22%
Global	95	7%	149	10%	182	12%	197	14%	219	15%
Reporting on operations in regional water-stressed areas										
	Number	Percent								
U.S.	39	8%	59	12%	85	18%	98	20%	106	22%
Global	95	7%	147	10%	172	12%	184	13%	219	15%
Reporting on key inputs from water-stressed regions										
	Number	Percent								
U.S.	9	2%	12	3%	37	8%	44	9%	106	22%
Global	32	2%	44	3%	82	6%	102	7%	219	15%
Reporting on awareness of supply-chain water risk										
	Number	Percent								
U.S.	13	3%	12	3%	24	5%	26	5%	33	7%
Global	32	2%	43	3%	66	5%	75	5%	73	5%

Source: Trucost data

Reporting of greenhouse gas emissions from products					
Number of Companies					
	2009	2010	2011	2012	2013
U.S.	19	17	20	35	48
Global	62	55	82	148	190
Percent of Companies					
U.S.	4%	4%	4%	7%	10%
Global	4%	4%	6%	10%	13%

Source: Trucost data

Reporting of natural capital R&D or Investments					
Number of Companies					
	2009	2010	2011	2012	2013
U.S.	158	215	234	240	257
Global	430	599	646	694	721
Percent of Companies					
U.S.	33%	45%	49%	50%	54%
Global	29%	41%	44%	48%	49%

Source: Trucost data

Reporting of natural capital profits or savings					
Number of Companies					
	2009	2010	2011	2012	2013
U.S.	106	156	183	211	259
Global	116	191	208	250	318
Percent of Companies					
U.S.	22%	33%	38%	44%	54%
Global	8%	13%	14%	17%	22%

Source: Trucost data

LEED Projects					
	2010	2011	2012	2013	2014
Project Registrations					
Building Design + Construction	3,730	4,509	4,194	4,423	3,944
Building Operations + Maintenance	1,910	1,636	971	774	997
Interior Design + Construction	1,236	1,327	1,354	1,376	1,340
TOTAL	6,876	7,472	6,519	6,573	6,281
Project Certifications					
Building Design + Construction	1,989	2,230	2,656	2,867	2,631
Building Operations + Maintenance	460	649	539	607	692
Interior Design + Construction	705	778	1,021	1,203	1,179
TOTAL	3,154	3,657	4,216	4,677	4,502

Source: U.S. Green Building Council

Global cleantech patent filings					
	2009	2010	2011	2012	2013
Biofuels	4,272	5,219	5,074	3,882	2,712
Solar Energy	7,184	10,474	9,831	7,908	4,599
Wind Energy	2,824	4,917	4,328	3,546	1,925
Hydropower	1,081	1,263	1,084	825	436
Geothermal	331	396	300	118	43
Water Desalination	571	834	709	660	416
Water Filtration	1,072	770	777	575	387
Advanced Batteries	4,709	5,338	5,440	4,775	3,315
Fuel Cells	11,166	4,274	3,307	2,735	1,854
TOTALS	33,210	33,485	30,850	25,024	15,687

Source: IP Checkups CleanTech PatentEdge database