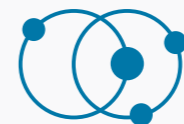




# STATE OF GREEN BUSINESS 2014

By Joel Makower and the editors of GreenBiz.com



**GreenBiz**  
group

In partnership with:



**TRUCOST**<sup>PLC</sup>

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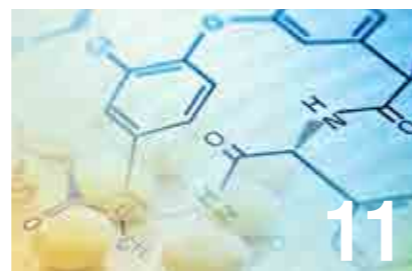
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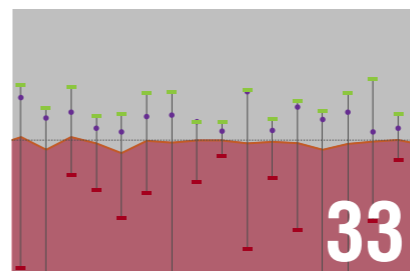
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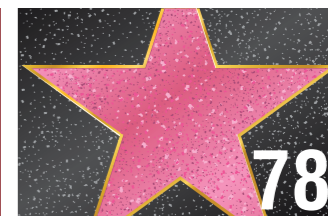
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# Introduction

Each year, we hold up a mirror to the world of business and sustainability to take an accounting of how well it is, or isn't, doing. In this, our seventh annual *State of Green Business* report, we continue that effort, in partnership with Trucost, a leading research firm focusing on natural capital and sustainability metrics. As you'll see, the results are decidedly mixed. As the data shows, corporate environmental progress seems to have stalled.

This year's report includes the launch of the Natural Capital Leaders Index, the first-ever assessment of which companies are doing the best at decoupling environmental impact from economic growth. We believe that this will become a new standard for assessing which companies are truly leaders in sustainability. As you'll see, the list doesn't necessarily include the "usual suspects." We are excited to put this out there and look forward to your comments.

As in past years, we include the Top Trends for the coming year — some of the key story lines we'll be following and which we encourage you to track. And we've embedded short video clips throughout, to bring you voices of some of the leaders in the field.



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

# Foreword

There is an elephant in the room. The elephant's name is *Sustainable Growth*.

According to the World Bank, we expect global economic growth of 3.3 percent to 2015; 3.0 percent from the U.S. and 7.9 percent from China, a region that uses three times more natural resources than the rest of the world to create each unit of GDP.

But the environmental impacts of business – air pollution, biodiversity loss, ecosystem degradation and water scarcity – are threatening the ability of our finite stock of natural capital to deliver *Sustainable Growth*.

The challenge for sustainable business is to identify growth models that result in reduced environmental impact.

*So how do we identify these business models? And how do we measure our progress along the journey? Are our current sustainability metrics up to the job?*

At Trucost we believe a new era of sustainability metrics is needed — sustainability metrics that can be assessed alongside financial metrics. Sustainability metrics that everyone in an organization, from board members and financial managers to supply chain managers and product decision makers, can understand — and act on.



**Dr. Richard Mattison**  
 CEO  
 Trucost Plc

So this year, in addition to the traditional sustainability metrics we contribute annually to the *State of Green Business*, we present a new series of sustainability metrics — the Natural Capital Leaders Index — to illustrate how companies can measure their progress in decoupling growth from environmental impact. As the results demonstrate, meeting this challenge is far from easy. We identified just 34 companies within our research universe (representing 93 percent of global markets by market capitalization) that have successfully decoupled over the last five years.

We note our thanks to the many companies that responded to our call for collaboration in developing these metrics when we published our initial methodology on GreenBiz.com in October 2013. We've responded to this feedback along the way — most significantly by developing an additional performance metric to help companies understand how efficiently they are using natural capital to generate revenue. This can be seen in the appendix at the end of this report, and in more detail at [www.trucost.com/naturalcapitalleadersindex](http://www.trucost.com/naturalcapitalleadersindex).

**The challenge for sustainable business is to identify growth models that result in reduced environmental impact.**

This is the start of a journey towards exploring the right indicators to effectively align business strategies with sustainable development imperatives. Our objective has been to demonstrate the power of financially orientated sustainability metrics. We trust in the innovation of the companies we work with to adapt these metrics to address more specific sustainability goals and objectives.

Sustainability issues are already creating winners and losers. Challenges such as commodity price volatility, natural resource shortages, pollution impacts, regulatory costs and extreme weather patterns are already leading to profit reductions, reputational damage and supply chain hiccups. Our challenge is to develop new sustainability metrics that support sustainability winners.

**We look forward to your feedback and continued collaboration.**



**IN A WORLD WHERE TECHNOLOGY CONNECTS EVERYTHING, PEOPLE ARE CONNECTING THE DOTS BETWEEN THE WELL-BEING OF SPECIES AND ECOSYSTEMS AND THAT OF THEIR COMPANIES, COMMUNITIES AND FAMILIES.**

# TOP SUSTAINABLE **BUSINESS TRENDS** of 2014

It's easy to look at the year just passed as a series of disappointments and frustrations, at least through the lens of sustainable business. Companies continued to tinker with incremental changes in their products and operations to reduce their carbon emissions, energy use, waste, chemicals of concern and other aspects of their environmental "footprint." All told, they were necessary but wholly insufficient to address their fair share of environmental impacts. Meanwhile, scientists reported that the climate continues to cross new thresholds of carbon concentration and temperature rise, while the global growth of middle-class consumers continues unabated. Political leaders around the world continued to dither on decisive action on climate and other pressing environmental and social challenges. And citizens around the world demonstrated relatively little concern over the fate of their planet's environment — at least not enough to make significant changes — focusing instead on the daily realities of getting by in still-shaky economic climes.

That would be the easy assessment. But it's hardly the full story.

Our assessment is somewhat more optimistic, powered by significant shifts in attitudes and outlooks among companies and their investors and customers, the growth of technology poised to leapfrog progress and accelerate change and a growing recognition among the public that "sustainability" isn't just about preserving icebergs, rainforests and charismatic megafauna. It is also about public health, community well-being, food security,



**People tend to overestimate what can be achieved in the short term, but underestimate what can be achieved in the long term.**

eration capacity added globally between 2012 and 2030 will be from renewable technologies (including large hydro), according to Bloomberg New Energy Finance. Only 25 percent will be from coal, gas or oil, with the remainder from nuclear. Solar installations are growing at 30 percent annually in the United States, and are on track to reach a million installations by 2016, generating the equivalent of more than 14 coal-fired power plants, according to GTM Research. Clearly, renewables are no longer niche.

Electric vehicles may be on a similar path, though they are several years behind solar. Just five years ago, no one foresaw EVs having any significant market uptake. Technological advances — not to mention the cool, high-performance image created by Tesla Motors — has led every major car company to promise one or more EV models in the next year or two, many during 2014. They still represent a tiny fraction of sales in the sector — but so did solar not that long ago. We expect EVs, too, will reach an inflection point in the near term.

Will other technologies and trends — advanced biobased materials, green chemicals, plant-based protein alternatives, battery storage for renewables, ultra-efficient appliances, and many others — abide by Kurzweil's law? Some, perhaps many, will. And each that does will advance the global economy further towards a low-carbon and sustainable future.

### **COLLABORATING FOR A CHANGE**

It's not just technology. Corporate supply chains are transforming as companies look farther upstream, beyond what they control to what

affordable housing and alleviating poverty. In a world where technology enables pervasive and persistent connectivity of just about everyone and everything, there are signs that people — from business and political leaders to everyday citizens and consumers — are themselves making connections between the well-being of species and ecosystems and that of their companies, communities and families. And that is being reflected by an upsurge of concern and action by the private sector.

### **THE FUTURE, FASTER**

Some of our optimism is reflected in the Law of Accelerating Returns, promulgated by Ray Kurzweil, an Ameri-

can author, inventor, futurist and a director of engineering at Google. It describes the notion that people tend to overestimate what can be achieved in the short term (because we conveniently tend to leave out necessary details and simplify complexity), but underestimate what can be achieved in the long term (because the effects of exponential growth of technology and ideas are misunderstood or overlooked).

Kurzweil's law can be seen in a number of sustainability-related inflection points, some of which took longer than expected but are now on steep, upwards trajectories. Consider renewable energy, long considered a niche technology: It is on a growth path many experts didn't see coming. Seventy percent of new power gen-



**In some sectors, the threats to companies extend beyond environmental concerns to social ones — human rights, livable wages, working conditions, economic inequality and other issues.**

they can influence. Collaboration is spreading as industries and value chains come together to understand how to shift entire ecosystems of players. That's especially true in agricultural commodities — soy, palm oil, cotton and more — whose supply-chain tentacles can extend to hundreds of thousands of enterprises around the world. These collaborations aren't just talk-fests. They're leading to systemic changes.

Some of these ambitious efforts are due to the rise of sustainability within companies, once seen as a nice-to-do, corporate responsibility initiative, but increasingly as a core corporate value. In sectors as varied as finance and fast food, companies are recognizing that elevating sustainability leads to innovations, efficiencies and improved resilience amid turbulent markets — not to mention enhanced reputations. It is seen as a business continuity issue in some sectors, as competition for natural resources sometimes pit households, farmers and small businesses with the world's biggest corporations for access to resources. Where communities compete with big business for access to water or power, communities often win.

In some sectors, the threats to companies extend beyond

environmental concerns to social ones — human rights, livable wages, working conditions, economic inequality and other issues. As a result, social and environmental issues, once seen as separate, are coming together inside some companies. They recognize that improving people's lives — whether through promoting early childhood education, empowering women, investing in local economies or mentoring marginalized youth — is part of the sustainability equation. Equally important, it can have salutary business benefits, such as educating the future workforce, bolstering the economic well-being of customers and employees and creating healthy communities — in every sense of the word — in which to operate. That is to say: It's just good business.

### **SCALE, SPEED AND SCOPE**

Such positivity notwithstanding, progress remains incremental and slow. The scale, speed and scope of change appears to be inadequate to the challenges we face. Case in point: A 2013 study of 100 companies' climate commitments by Climate Counts and the Center for Sustainable Organizations found that only about half of those companies' goals were sufficient to address the companies' fair share of carbon emissions reductions needed to limit climate change to what scientific consensus deems to be tolerable. Indeed, that

study was novel merely for the fact that it weighed corporate climate actions against the realities of science. That had never been done.

Water is another area where corporate activity is timid and inadequate. As droughts accelerate and population and economic growth lead to overpumping of groundwater supplies around the world, the need for corporate action on water use (and reuse) is growing from a trickle to a flood. One big problem: The price of water (cheap) doesn't reflect its value (priceless), especially when a shortage can all but put a company out of business.

As always, it's a mixed bag of progress, with inspiring stories of leadership weighed against sobering environmental realities.

In this seventh annual State of Green Business report, we assess the current state of sustainable business activity, taking stock of the trends and indicators that tell how, and how well, the world of business is addressing these concerns.

Where are we headed? Here, in no particular order, are 10 key trends for 2014. **E**





# 1 | COLLABORATION BECOMES AN ACCELERATOR

One of the challenging realities of sustainable business is of companies reinventing wheels. Nearly every company, it seems, finds its own solution to its environmental challenges and opportunities, sometimes creating out of whole cloth programs and processes that have previously been created by dozens, if not hundreds, of other firms.

There's good reason for this. Every company comes to sustainability with a different set of drivers and challenges. In some cases, sustainability is driven by competition — head-to-head combat among competitors to tell the greener story. In other cases, it's customers, particularly B-to-B customers or large institutional purchasers, that are driving suppliers to reduce environmental impacts. In still others it's the ability to attract and retain talent, to be seen as the “employer of choice” in a given industry, or the desire to head off regulations by creating voluntary initiatives, or the desire to be seen as an innovator. Some leadership companies are driven by their CEOs' passions

and commitments. Every company has a different appetite for change, or is starting their “sustainability journey” from a different place.

With such a diversity of factors, corporate sustainability is rarely a one-size-fits-all or cookie-cutter approach, despite the insatiable appetite companies seem to have for “best practices” on any number of topics.

In that context, company collaboration would seem challenging, if not impossible. But it's proving to be a potent tool for accelerating change within a sector, and particularly within a supply chain.

Consider McDonald's, which recently set itself on a course to source “sustainable beef” in the coming years, despite the fact that there's no definition yet. Given that the beef supply chain is one of the most complex — there are more than a million ranches worldwide that raise cattle for meat and dairy — and given that McDonald's represents only

1-2 percent of beef purchases in most countries where it operates, it couldn't act alone.

The result: the Global Roundtable on Sustainable Beef, involving members of the entire beef value chain, along with leading nonprofit groups like WWF and the Rainforest Alliance. In late 2013, the group sent out the first draft of principles and criteria for sustainable beef.

That's just one example of the growing collaboration by and among companies to address systemic challenges. In recent years we've seen the Round Table on Responsible Soy, Roundtable on Sustainable Palm Oil, Roundtable on Sustainable Forests, Better Cotton Initiative, Initiative for Responsible Mining Assurance and Sustainable Manufacturing Roundtable. The trade group BSR boasts more than a dozen collaborative initiatives on everything from pharmaceuticals to fuels. And, of course, The Sustainability Consortium, more than 100 consumer goods



KIM MAROTTA, MILLERCOORS  
**ON COLLABORATION**



**Few of these alliances are simple or easy. They require the right people, clear visions, effective governance and the right goals.**

companies, along with suppliers, advocacy groups, government and academic institutions, collaborating to design systems and metrics to effectively and consistently assess consumer products through the lens of sustainability.

Talk about a collaborative economy!

Few of these alliances are simple or easy. They require getting the right people and organizations to the table, having a clear vision, creating effective governance and setting the right goals. They take leadership, patience, perseverance and lots of communication. They don't always work: Collaborations can spin their wheels, perhaps for years, before running out of gas.

When they work, they can advance the field and accelerate progress. The Roundtable on Sustainable Palm Oil, the largest such group, with 1,300 members — growers, processors, traders and retailers along with environmental activists and banks — has become the model for the multi-stakeholder approach to sustainability. The group has helped several European countries pledge to import 100 percent certified palm oil by 2015.

Still, even successful collaborations have limits. RSPO represents only about 15 percent of the global palm oil market, and the group has professed barriers to selling certified palm oil at a premium sufficient to persuade industry players to become sustainably certified. But it continues to push the rock uphill far more effectively than any single player could.

Such collaborations are becoming a standard tool for business. According to a 2013 survey by MIT and the Boston Consulting Group, nearly 40 percent of respondents report increasing collaboration with customers and suppliers on sustainability matters. Thirty-four percent said their companies have stepped up collaboration with governments, policy makers and regulators. “Working collectively, organizations can be more systematic and sophisticated in tackling significant sustainability issues across the value chain — from supply to finished product,” it concluded.

In some cases, companies are working with competitors, once unheard of. General Motors and Honda have partnered to develop hydrogen fuel cells for their cars. Ocean Spray and Tropicana, beverage companies based in Massachusetts and Florida, respectively, found ways to take advantage of empty delivery trucks to back haul each other's product along the U.S. East Coast, saving fuel and money. Nestle has partnered with Coca-Cola, Danone, Ford, H.J. Heinz, Nike, P&G and Unilever to form the Bioplastics Feedstock Alliance, encouraging the development of plastics from plant matter.

It's the new reality and it's, frankly, refreshing: companies recognizing that progress accelerates when companies pool their best ideas, resources and clout. If only we could teach our public officials to do the same.

## 2

## CHEMICAL TRANSPARENCY CREATES A WINDOW OF OPPORTUNITY

Concerns over toxic substances — the new term seems to be “chemicals of concern” — in our everyday lives have been around since Rachel Carson penned *Silent Spring* more than a half-century ago. But getting the most problematic chemicals out of products and supply chains has been slow going, especially since government regulation of such chemicals has been timid.

Regulation by the marketplace is another matter. Over the past year, big retailers like Walmart and Target have approached the issue head-on, pushing suppliers to disclose ingredients or simply vowing to phase out use of some chemicals in the products they sell.

Walmart announced a policy to require manufacturers of cosmetics and cleaning products to disclose ingredients in their products and remove priority hazardous chemicals. The company said it would start with 10 priority chemicals, though it isn't yet disclosing which ones, and some critics

both praised the policy and pointed to its flaws. Target, for its part, announced a partnership with UL's GoodGuide to establish sustainability standards for some 7,500 products, focusing on personal care and household cleaning products — “direct-exposure chemical products” with a strong focus on toxic or otherwise problematic ingredients.

These and other initiatives are aimed at driving manufacturers of these products to know more about the chemicals in their products, supply chains and buildings, be more transparent about what's in their products, avoid chemicals of concern, shift to inherently safer chemicals and commit to continuous improvement toward greener chemistry in their products.

It won't be easy. There are more than 85,000 chemicals in commerce in the United States alone, according to the California Department of Toxic Substances Control, including 2,500 “high production volume” (HPV)

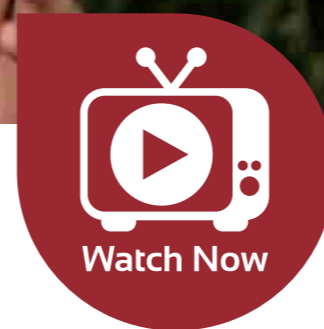
chemicals, which are manufactured at a rate of more than one million pounds annually. “Nearly 45 percent of these HPV chemicals [lack] adequate toxicological studies conducted to evaluate their health effects on humans and wildlife,” says DTSC. Further, about 2,000 new chemicals are introduced into commerce annually in the United States — nearly six new chemicals every day.

Recent studies have shown that some of these chemicals can act as endocrine disruptors, affecting normal hormone function, and can do so at the parts-per-billion or parts-per-trillion level. And their effects can be transgenerational, persisting for decades.

As more such information comes to light, concern is growing among consumers, advocacy groups, government regulators, health professionals and others. For years, product manufacturers and retailers hid behind the veil of proprietary nondisclosure — the companies professed



JASON MCLENNAN,  
INTERNATIONAL LIVING FUTURE INSTITUTE  
**ON CHEMICAL TRANSPARENCY**



**More than 85,000 chemicals are in commerce in the U.S. alone, with 2,000 more introduced annually.**

ignorance of such chemicals' existence because they were used by upstream suppliers, who didn't disclose ingredients because of competitive pressures — at least, that was their excuse.

But that's changing. As concern grows, activists are stepping up pressure on those closest to end users — branded manufacturers and retailers. One goal is to expand ingredient disclosure in the hopes of unearthing chemicals of concern in everyday products, with an emphasis on personal care products, cosmetics and toys. The efforts were led in recent years by concerns over bisphenol A, an industrial chemical that has been present in many hard plastic bottles and metal-based food

and beverage cans since the 1960s. As a growing number of studies linked the chemical with cancer, developmental problems and reproductive issues in laboratory tests — and as news reports about those studies stoked public concern and activist pressure — companies like Campbell Soup and General Mills began moving away from using it.

In 2013, triclosan, a common ingredient used in consumer and houseware products boasting antibacterial properties became the latest target. The chemical reportedly has the potential to degrade in water treatment systems, rivers, lakes and streams, producing dioxins in the process. In December, the U.S. Food and Drug Administration proposed to put

the burden on manufacturers of products containing triclosan to prove that their products are safe and more effective than regular soap in preventing illness and the spread of infections.

California, as it often is, will be the vanguard for chemical disclosure in the coming years, at least in the United States. Last October, the state adopted new regulations to implement its Green Chemistry Initiative, a bold new environmental law to identify and restrict toxic chemicals in consumer products sold in the state. The law requires a new life-cycle “alternatives analysis” to evaluate suitable substitutes for hazardous substances in consumer products, based not only upon their risk during product use but also during their manufacture and after disposal. The state may then condition, restrict or ban the use of those chemicals.

The Department of Toxic Substances Control has prepared a target list of about 1,200 toxic chemicals and plans to develop a list of about 200 products that contain chemicals that pose the greatest danger to health or the environment. By April, it will select up to five “priority products” for manufacturers to reformulate into safer products using green chemistry.

The success of such efforts will depend in part on how customers respond — both B-to-B customers as well as individual consumers. Should there be an outpouring of concern and market demand, we will no doubt see such efforts accelerate far faster than regulators could command and control, even in progressive state like California.

The right formula of supply (green chemicals) and demand (concerned citizens) could be a potent mix.

**As concern grows, activists are stepping up pressure on branded manufacturers and retailers.**



# 3 | WATER RISES AS A RISK FACTOR

For much of the past decade, stories about water as “the new oil” or “the new carbon” have come out at a steady trickle. These days, it’s more of a stream. Companies, communities and countries are coming to recognize that “water” is increasingly being paired with the words “crisis” or “risk.”

It’s not just climate change, though climatic shifts are altering weather patterns and contributing to, if not causing, droughts and floods. It’s also the growth of consumption. As hundreds of millions of people climb up the economic ladder, their water use grows. Cooking and personal hygiene may be the least of it. The bigger piece is likely the water it takes to produce the chemicals, materials, food, fuels, energy and other “stuff” associated with middle-class living and overall economic growth.

For some companies, water is becoming a chokepoint — a commodity without which operations are curtailed, even

stopped altogether. These need not be water-intensive companies, like farming or energy production. In many cases, water shortages upstream in a supply chain can wreak havoc — for example, when a power plant lacks cooling water and must shut down electricity production to its customers, or restrictions on mining lead to shortages and higher prices for key metals.

Water is now one of the highest global risks, alongside the economy, unemployment, food shortages and extreme weather patterns, according to the [ninth edition of the Global Risk Report](#), released in early 2014 by the World Economic Forum.

Increasingly, companies are finding themselves competing for water resources with local farmers and households, or may be blamed for water shortages or contamination that they didn’t cause, but for which they serve as a handy target. Dealing with these things strategically and

proactively may determine whether a company will sink or swim.

These are among the factors leading companies to view water more as a risk factor that needs to be managed and mitigated.

For perhaps obvious reasons, water experts like to organize things in “buckets.” For example, there are three main buckets of water risk, according to Deloitte Consulting’s Will Sarni, a leading expert on corporate water strategy:

- **Physical** – having the right quantity and quality of water where and when its needed
- **Regulatory** – being able to adjust to changes in water pricing and allocation schemes
- **Reputational** – being able to address how stakeholders view a company’s management/ stewardship of water

For consumer-facing companies, that last bucket can be the most tricky. Reputational risk is the most challenging to quantify, but the most impactful because stakeholders can withdraw a company's social license to operate — literally boot them out of town — as some beverage companies experienced in India a few years ago.

Company awareness about water risk also falls into buckets — four, in this case:

- Companies that don't even know about or acknowledge the problem
- Companies that acknowledge the problem but plan to deal with it when it becomes sufficiently acute
- Companies that are taking steps to mitigate water risks to their operations
- Companies that are actively engaged in shaping water policy, investing in water technologies and working with stakeholders

When you put all these buckets together — the various risks and approaches — you find a reservoir of options companies can take: quantifying their direct and indirect water footprint across their value chain, mapping the risks to their operations, identifying high-priority and high-return opportunities for efficiency investments, collaborating with local communities to stabilize and replenish water resources, educating internal and external stakeholders on water issues, and more.

Not long ago, addressing water issues upstream in a supply chain seemed out of companies' influence and control. Today, it's becoming the norm.

Consider Hennes & Mauritz AB, better known as H&M, the Swedish-based retail-clothing company. Recognizing the water-intensity in nearly everything it sells — growing cotton and dyeing textiles, for example — the company designed and implemented a water strategy to change how it manages water, all the way up its supply chain.

The company's program, in partnership with WWF, has four pillars: developing training materials for its design and sourcing teams

about water-related impacts of producing various raw materials and fashion styles; identifying opportunities to save water at company-owned facilities; working with local and regional governments, NGOs and other companies to generally improve water management of river basins in China and Bangladesh; and educating customers about the importance of water management.

Some companies are warming to “water offsets,” investments to watersheds to offset water consumption that can't be reduced through efficiency improvements or water reuse or recycling. Offsets are a tool developed in the world of carbon, where companies (or individuals) might plant trees or invest in efficiency measures, sometimes in far off lands, as a means of “neutralizing” the carbon emissions associated with their own activities. Similarly, water offsets aim to create a positive impact to offset a negative one.

Water offsets (like carbon offsets) have a place, but they are a limited strategy — a solution intended for when efficiency and reuse/recycling measures have already been exhausted. As Sarni notes, it should be part of an overall approach to measuring one's footprint, understanding risk, governance, reporting, disclosure and working with a broad range of stakeholders — what water experts refer to as “collective action.”

Of course, scarcity and risk drive innovation, and there's a mini-boom taking place in water tech — everything from filtration and desalination to sanitation and efficiency. Some of this is coming from startups — especially in Israel, which has become a kind of Silicon Valley for water — but also from big beverage companies. One growing focus is on data centers, those giant facilities that power websites and telecommunications, which have an unending thirst for water to cool heat-generating servers.

As is often the case, some water-intensive companies view risks as opportunities to show leadership and, if possible, gain competitive advantage. That's the case with many of the world's largest beverage companies, whose lifeblood depends on copious amounts of clean water. Coca-Cola, PepsiCo, Nestle, SABMiller, AB InBev, MillerCoors and others are often at the leading edge of activity.

**Not long ago, addressing water issues upstream in a supply chain seemed out of companies' influence and control. Today, it's becoming the norm.**

But not exclusively. Water is the lifeblood of other industries, too. Take mining, another industry whose consumption — and contamination — of water puts it at high risk, especially in the developing countries where mining operations are frequently found. As a 2012 CDP report found:

*Water is a critical input in all mining developments and operations, making this sector one of the most water-intensive. This high dependency presents the sector with a variety of challenges. Future business growth depends increasingly on having access to adequate quality and volumes of water; action therefore must be taken to secure these resources. ... For these companies, no water means no business.*

The report describes how some mining companies are dealing with such risks as water shortages, water contamination, flooding, efficiency mandates, high water prices, even “loss of license to operate.” It also reveals how some companies already have calculated the cost of such risks to their net profits. While those losses may seem minimal — a fraction of 1 percent — they’re still meaningful when you’re talking about billion-dollar enterprises.

Some companies are looking to be “water-neutral,” or even “water-positive.” For example, Coca-Cola’s Replenish initiative aims, by 2020, to “safely return to communities and nature an amount of water equal to what we use in our finished beverages and their production.” To meet that goal, the company has engaged in nearly 500 projects and partnerships to protect or improve watersheds, increase access to clean water and raise awareness about water issues. The company estimates that its efforts have improved water access and sanitation for more than 1.8 million people.

It’s an exemplar program, though still a drop in the bucket when you consider that more than 1 billion people don’t have access to safe drinking water and roughly 2.6 billion don’t have adequate sanitation. One company, even a global beverage giant, can’t do it alone.



**Some companies are looking to be “water neutral,” or even “water positive.” It’s an exemplar goal, though still a drop in the bucket when you consider that 1 billion people lack safe drinking water and 2.6 billion lack adequate sanitation.**



## 4

## SHADOW PRICING STEPS INTO THE LIMELIGHT

In a world where “money talks” and where “you can’t manage what you can’t measure, it would follow that putting a monetary value on environmental impacts would rule the day. A small but growing number of companies are valuing natural capital by putting a “shadow” price tag on carbon emissions, water use, even land conservation in order to more effectively manage these things.

A shadow price, is simply put, the estimated price of a good or service for which no market price exists, or where the market price doesn’t reflect the full replacement cost. In an environmental context, it’s the estimated price of the goods and services that nature provides to business.

Greenhouse gas emissions fit into the first category — an activity with no tangible value. But that isn’t stopping companies from placing a price on carbon for internal accounting purposes. A 2013 report by CDP (formerly the Carbon Disclosure Project) found at least 30 companies —

including utilities (American Electric Power, Xcel Energy), energy companies (Exxon, Shell), technology companies (Google, Microsoft), airlines (Delta), financial services firms (Wells Fargo), retailers (Walmart) and consumer brands (Disney) — setting an internal price ranging from \$6 to \$60 per metric ton on their carbon pollution.

Why bother? For many, it’s part of a long-term risk-management strategy, a means of talking about carbon in the language of business, then rewarding parts of the company that can demonstrate cost savings to the company from lowering emissions.

Most companies use internal carbon pricing to fund energy efficiency, water conservation and other investments in sustainable resource management. That’s the strategy at Microsoft, which launched a carbon-pricing scheme in 2012 as part of a pledge to become “carbon neutral.” “The carbon fee policy provides an incentive for our

business groups to reach the company’s objective of carbon neutrality,” explains TJ DeCaprio, senior director of environmental sustainability at Microsoft. “Working with our finance team, our model is to charge a fee for the carbon associated with the use of electricity and business air travel. The funds collected are invested in additional efficiency, clean energy and carbon offset projects.” Some of the fees are used to fund carbon offset projects, such as forest conservation or reforestation.

In its report, CDP called the use of internal carbon price by companies an “incentive and strategy planning tool.” Carbon pricing “has become standard operating practice in business planning, in that the companies acknowledge the process of ongoing climate change — including extreme and unpredictable weather events — as a key relevant business factor for which they wish to be prepared,” it said.





TAMARA DICAPRIO, MICROSOFT  
**ON CARBON PRICING**



**General Motors calculated that a one-month disruption at one of its production facilities in Mexico, hard hit by drought, could result in a loss of \$27 million in net income.**

Water is an example of a resource where the market price doesn't reflect the full replacement cost. As we described earlier, the price of water often doesn't reflect its value — that is, the cost of replacing it if it's not available. If lack of access to water renders a company or facility inoperable, the value of water can be sky-high — or maybe even “priceless.”

Some companies that are factoring the value of water into risk analysis. For example, General Motors calculated that a one-month disruption at one of its production facilities in Mexico, an area hard hit by drought, could result in a loss

of US\$27 million in net income.

Companies that acknowledge water scarcity are building that risk into investment decisions through shadow pricing — an internal price that's set above the actual price of water, which is done if a company believes a water shortage is a risk to a line of business or project. A 2012 report by the World Business Council on Sustainable Development identified 21 business case studies that illustrate why and how different companies have carried out water valuation initiatives.

It's not just water and carbon. Shadow

pricing is being applied to land conservation, air quality, fisheries and more — everything from trees to bees. In other words: to natural capital.

It makes sense. Economists like to tout the “efficient markets theory,” which states that the price of an asset reflects all relevant information that is available about the intrinsic value of the asset. That theory works well with traditional commodities, like cotton, coffee or crude oil, but it falls short when looking at the market basket of “commodities” commonly thought of as natural capital: clean air, pest control, climate regulation and other “nature's

services” for which there is no price tag. Yet, most companies can't operate without these things.

This is admittedly hard stuff. The complexities of shadow pricing are so great that corporate finance teams — by nature, a conservative bunch — have shied away. They don't do anything unless fairly certain they can accurately measure potential scenarios and outcomes. But more enlightened financial executives are coming to realize that just because it is difficult doesn't mean you shouldn't do it.



And more companies are coming to the table. Witness the creation in late 2013 of The Prince of Wales's Accounting for Sustainability Project, which involves the chief financial officers of some of Europe's biggest corporations. They've come together to focus on the role CFOs play in integrating environmental and social issues into financial decision making. The group's activities "will include improved modeling of future risk and uncertainty as well as engagement with investors and other stakeholders to increase their understanding of the commercial benefits of sustainable business models."

Good information can lead to good decisions. Consider a 2010 study by two professors from Oregon State University, who used a "multi-output economic production frontier model" to estimate shadow prices for a set of wetland ecological functions for a watershed in the mid-Atlantic region of the United States. It found

that for some sites in this watershed, the land yielded more economic value performing its ecological magic than being turned into farmland. Having that information could be a boon to companies and communities alike. At minimum, it offers a valuable opportunity for a community dialogue about how to value its assets for the short and long term.

As the OSU professors demonstrated, a lot of this stuff is still academic, not yet a part of conventional accounting procedures. But a review of the accounting trade journals — not to mention a scan of GreenBiz.com — suggest that shadow environmental pricing of environmental and social impacts is slowly moving from the margins to the mainstream.

It's a fitting response to our data-intensive world of rabid consumerism, where we tend to know the price of everything, but not necessarily its value.

**Shadow pricing as a way to value natural capital is complex, but more enlightened financial executives are realizing that just because something is difficult doesn't mean you shouldn't do it.**



# 5

## THE PEOPLE SIDE OF SUSTAINABILITY GETS LEGS

“Sustainability,” as everyone knows, is about the three-legged stool: the integration of environmental, economic and social issues. Except, more often than not, it isn’t: “Sustainability” is used synonymously with “environmental,” at least inside many companies.

Protecting the purity of that word has become a largely losing battle in the communications marketplace, as companies, activist groups, cities and others invoke the S-word when they refer only to environmental issues. Even many of us who know better find ourselves doing that (including in this report) — though sometimes that is mitigated through inelegant references to “environmental sustainability.”

There are encouraging signs that the world, in particular the corporate world, is catching up to the language: More companies are integrating social issues into their “sustainability” (read: environmental) programs as they come to recognize the interconnectedness between the two.

This is more than a mere linguistic shift — it’s an emerging recognition about the role of business in society, and the futility of solving only a portion of the problems in an interconnected world.

“The environment exists not as an end unto itself, but the very thing that enables life to be worth living on this planet, to live lives in dignity and having one’s basic needs met,” says Aron Cramer, President and CEO of BSR, a global nonprofit business network dedicating to creating “a just and sustainable world.”

Cramer is among those who recognize how the pieces fit together. “One of the reasons it’s so difficult to manage environmental issues is poor governance,” he says, “which leads to environmental degradation, which leads governments to bring in the military in to control the population. You can’t say the story starts with one issue, then leads to another. It’s the entirety of it.”

Seeing “the entirety of it” is what sustainability executives should be about. And slowly, it is, as companies knit together their environmental and corporate responsibility programs to address more holistically the role of business in the world, and what’s needed to ensure long-term success. In some cases that means mitigating environmental risks, such as water shortages or polluted air. In others, it’s about ensuring the well-being and raising the standard of living of the communities in which they operate in order to ensure future customers.

Whatever the motivation, it’s a breath of fresh air. For most of the past quarter century — since the advent of corporate responsibility in mainstream business — companies didn’t need to think much about ensuring future markets. Economies were growing, markets were emerging, globalization was creating seemingly limitless opportunity.

Even before the global economic crisis in 2008, things began to hit a wall. Water, energy, climate and natural



STEPHEN RITZ, BRONX GREEN MACHINE  
**ON TRANSFORMING COMMUNITIES**

resource shortages started to show up around the globe. Access to cotton, wheat, minerals and other commodities — not to mention clean air and water — hindered business growth. Human rights violations, poorly educated workers, political corruption and other issues challenged companies entering emerging markets.

The business world has had to rethink what it means to be a “responsible” company. It’s not just about “doing the right thing” or “doing well by doing good.” It’s about creating value — for shareholders, of course, but also employees, customers and communities. Failing that, the future didn’t seem so, well, sustainable.

Think of it as CSR 2.0 — corporate responsibility meets business longevity.

A growing number of companies are seeing how

improving lives makes good business sense. Procter & Gamble’s 2010 “sustainability vision,” for example, included a variety of environmental commitments: replacing petroleum-based materials with “sustainably sourced” alternatives, reducing packaging and manufacturing waste, and growing its use of renewable power.

At the same time, it launched an initiative aimed at providing “enough clean water to save a life every hour” by delivering more than 2 billion liters of clean drinking water a year by 2020. The company says this would help save an estimated 10,000 lives and preventing 80 million days of diarrheal illness annually.

What’s the business opportunity? Unilever’s Sustainable Living Plan includes commitments to improve hygiene and bring clean drinking water to the poorest citizens.

Other companies have made similar moves: Starbucks has leveraged strategic CSR initiatives to gain competitive advantage to secure premium coffee from Ethiopia and gain successful market access into India. Levi Strauss’ Wellthread line of clothing connects the dots between smart design, environmental practices and the well-being of the apparel workers who make the garments. Pharmaceutical giant GSK created a Developing Countries Unit to expand access to medicines for around 800 million people in developing countries, including the world’s 49 poorest nations, as defined by the United Nations.

These are examples of companies seeking to align their brands with sustainability while creating business opportunity. Behind these, however, are other companies, including some faceless B-to-B firms, that are doing similar things, albeit more quietly. For them, it’s less about brand than ensuring their social license to operate: that they are welcome participants in local economies. The horrific working conditions of electronics workers in China or textile workers in Bangladesh only begin to unmask the plight of wage-earners at the bottom of the global economic ladder. The increased scrutiny paid to companies tolerating such practices will be at least as great as that of companies spewing noxious chemicals into the air and water.

The good news is that addressing such challenges plays to businesses’ strength: to prosper by improving lives. As companies continue to integrate social dimensions with environmental ones, they are more likely to see the big picture — that they can make more money and gain competitive advantage by creating “a just and sustainable world.”

**It’s not just about “doing the right thing” or “doing well by doing good.” It’s about creating value. Think of it as CSR 2.0 — corporate responsibility meets business longevity.**

## 6

## FOOD SUSTAINABILITY GETS A SEAT AT THE TABLE

There is nothing more central to sustainability than food. We put it in our bodies. We deploy around 40 percent of our planet's land mass to grow it. What we eat and how it is produced has implications for just about every environmental and social issue there is, from climate change and water use to public health and social equity.

Food issues have long been part of the sustainability dialogue — ever since Rachel Carson wrote about how the chemicals that were killing bugs and birds were accumulating in the food chain. But the dialogue is accelerating now for a number of reasons. Resource issues — what we take from and put into the air, water and soil, for example — are intensifying, the result of both further environmental degradation in some areas as the need to feed a growing global population.

Along with population growth has come income growth, and the transition from subsistence-level diets to ones that

include more meat and processed foods, which translate to greater energy and natural resource use, and more waste. Moreover, the majority of these emerging consumers are living in, or moving into, cities, which are expanding their boundaries, often by paving over farmland to build roads and neighborhoods. Soil erosion and loss of irrigation water in many regions are further limiting arable land. Alternatively, farmers are cutting down rainforest to plant crops, despite governmental and activist pressures to stop the practice.

**The net result:** More resources are needed to grow food on less land, leading to greater environmental stresses.

The situation is nontrivial, bordering on dire. According to a 2009 report by the United Nations Environment Programme,

*The surge in food prices in the last years, following a*

*century of decline, has been the most marked of the past century in its magnitude, duration and the number of commodity groups whose prices have increased. The ensuing crisis has resulted in a 50–200 percent increase in selected commodity prices, driven 110 million people into poverty and added 44 million more to the undernourished. Elevated food prices have had dramatic impacts on the lives and livelihoods, including increased infant and child mortality, of those already undernourished or living in poverty and spending 70–80 percent of their daily income on food. Key causes of the current food crisis are the combined effects of speculation in food stocks, extreme weather events, low cereal stocks, growth in biofuels competing for cropland and high oil prices.*

The report concluded that unless action is taken, up to a fourth of the world's food production may become lost due to environmental breakdown by 2050.



SARAH ALEXANDER, FIELD TO MARKET  
**ON FOOD SYSTEMS**



**It will take a great deal of innovation in the coming years to ease the stress at the intersection of food, energy and water.**

The debate over how to feed a growing population, and whether it is even possible, has raged for more than a generation — the Malthusians versus the Cornucopians. The former generally argue that growing population and consumption will lead to “ecological overshoot,” where the population exceeds the long-term carrying capacity of the environment. The latter argue that human ingenuity has disproven that theory time and again — that there is enough matter and energy available to provide for an ever-rising global population.

The debate is far from settled, though Cornucopians seem to be on the winning

side — at least for now. And food will remain at the thick of it.

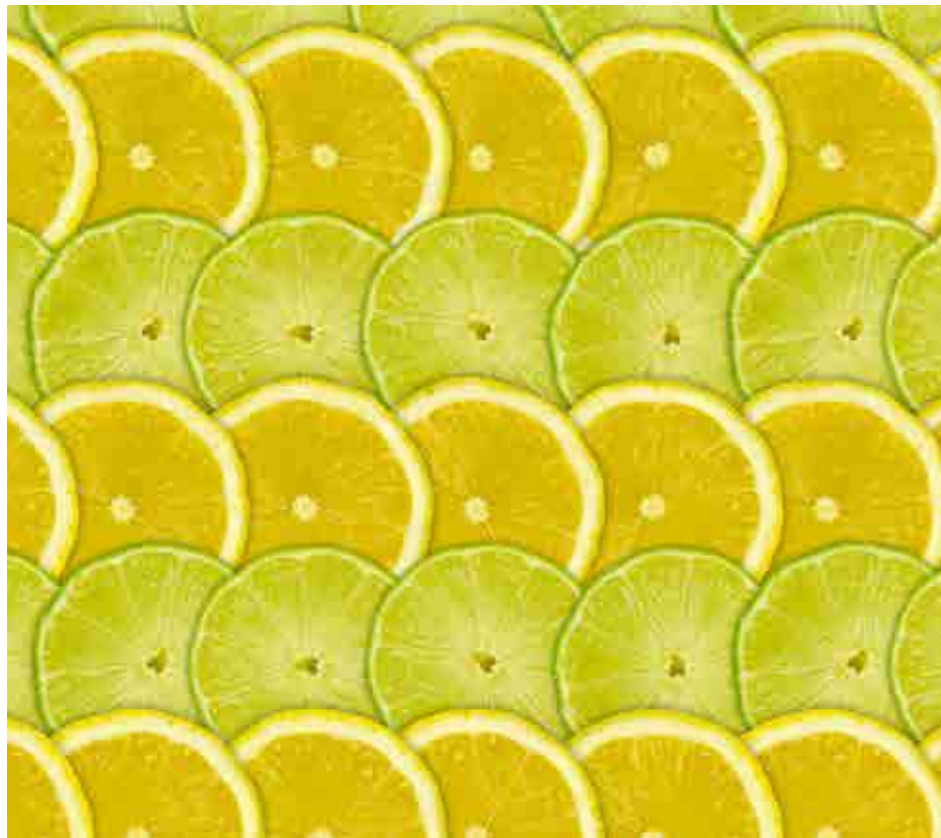
Indeed, it will take a great deal of innovation in the coming years to ease the stress at the intersection of food, energy and water. Consider that, according to the United Nations, humankind will need 50 percent more food, 40 percent more energy and 30 percent more water between now and 2030 — a mere decade and a half from now. That’s daunting. But when one considers how they interrelate, the complexity grows:

- It takes about 1,300 liters of water to create 1 kilogram of wheat, or about 156 gallons per pound

- It takes about 7 calories of fossil fuel to produce 1 calorie of food in the U.S.
- Moving, heating and treating water consumes 13 percent of all energy use
- Power plant cooling uses between 3 and 4 percent of all U.S. water consumption

In other words, it takes water and energy to provide food, water to provide energy and energy to provide water. Given the limits of all three, how do we manage? The food-energy-water nexus will be one of the more interesting stories — and one of the biggest innovation opportunities — for the next decade or more.

Fortunately, efficiency opportunities are ripe for both agriculture and food production, such as minimizing the food waste from harvest through processing and consumption. Around 30 percent of food grown today is never eaten, although this figure varies considerably across geographies and the different points in the value chain, according to Kai Robertson, a consultant who’s been studying the issue for years. She says the two largest sources of waste are from what eaters in industrialized countries do with leftover or spoiled food at home and away, and poor farming and post-harvest practices, especially in emerging economies.



That's not small potatoes. Wasting all that food costs about \$750 billion a year, about the GDP of Switzerland, says the UN Food and Agriculture Organization. No small part of this loss is to food and ag companies themselves — growers, processors, distributors, supermarkets, foodservice companies and others. Therein lie significant opportunities to reduce waste and save money.

Beyond addressing waste is a vast menu of new tools and technologies that can transform food production. The quest for alternative proteins is one meaty area. Plant-based eggs, algae-based cooking oils, aquaculture, even protein-rich insects are being viewed as potential means for meeting the world's food needs. Suffice to say, the world of food alternatives has no shortage of raw material.

And then there's the need to improve the environmental profile of traditional meat, such as from cows, chickens, lambs and pigs. Efforts are underway in each of those industries, notably beef, which is seen by many environmentalists as

evil incarnate. The announcement early this year by McDonald's of its aspiration to buy only "sustainable beef" is a stake in the ground that could transform the industry.

Improving the environmental profile of the existing food base will be key to addressing both people and planetary needs. It's not that the modern food movement — nonprocessed, gluten-free, non-G.M.O., heirloom, grass-fed, free-range, organic, artisanal and all the rest — isn't worthy of advancing. It's just that there's so much low-hanging fruit (and meat and vegetables and grain) available in making conventional agriculture far, far more efficient.

One of the tools and technologies, of course, are genetically modified organisms, another raging controversy in the food and ag worlds. Proponents of GMOs believe that they offer the potential to feed the world, that they reduce energy, water and chemical inputs in agriculture, are safe for people and the environment and raise farmer's incomes.

Those arguments haven't always held up to scrutiny. There are signs, for example, that crops

**Plant-based eggs, algae-based cooking oils, even protein-rich insects are viewed as potential means for meeting the world's food needs.**

are requiring ever-increasing amounts of pesticides due to the rise of "superweeds" and hard-to-kill insects. And farmers in some regions have protested — or worse, committed suicide — after being promised rich harvests and income for switching from farming with traditional seeds to genetically modified ones, whose benefits failed to materialize. And anti-GMO advocates argue that the technology isn't even necessary to fulfill the world's growing caloric needs.

But not all science is anti-GMO — far from it. A 2010 report by the U.S. National Academies of Science found that, "Generally, GE [genetically engineered] crops have had fewer adverse effects on the environment than non-GE crops produced conventionally."

Partly as a result of such debates — and the emotional consumer and investor backlash that can accompany such controversies — some companies have backed off of GMOs. Notable among them is General Mills, which in early 2014 announced that it had started producing its iconic breakfast cereal Cheerios — at least in its "original" version — without GMOs, the first major brand of packaged food in the U.S. to make the switch from containing GMOs to marketing itself as non-GMO. True, Cheerios are made of oats, and GMO oats don't exist — some called out General Mills' move as a marketing stunt — but it was still a very public statement by one of the world's largest food companies.

General Mills may turn out to be a lone voice on the supermarket shelves or the beginning of a wave that will roil the aisles. Either way, it's clear that the world of food and ag will continue to be a hot topic.

## 7

EMPLOYEE ENGAGEMENT  
BECOMES STRATEGIC

Engaging employees on environmental and social issues has long been a favorite topic of corporate sustainability executives. In some respects, it's the gold standard: Their success of these execs is gauged in large part on how effectively they enlist a large swath of the company to help to root out waste, save energy and water, reduce the operational footprint, evangelize achievements and — here's where the real gold comes in — suggest innovations where sustainability can become a driver of customer loyalty or increased revenue.

It's a tall order, to be sure, but it's sufficiently tantalizing to any self-respecting sustainability professional that employee engagement can become a mission, if not an obsession.

Recently, that mission has shifted, from a nice-to-do activity to a strategic one, the result of a confluence of factors. One is that the ROI for employee engagement is

becoming better defined, with research studies from the likes of Harvard Business School and MIT Sloan School of Management.

Both schools, for example, have written about Caesars Entertainment's CodeGreen employee program, which began as a way to save energy and water but subsequently grew into one of the poster children for the field. CodeGreen includes volunteering, workplace sustainability actions and home activities, and features a digital platform produced by PracticallyGreen to encourage connection, competition and action among employees. The Harvard study, commissioned by Caesars, found that customer loyalty and satisfaction — that is, their overall experience and willingness to return to one of Caesars' properties — is directly linked to employees' level of participation in sustainable activities at work.

The management consulting firm Bain & Company has taken an interest, too — in how the business case for sustainability extends to the ongoing challenge of acquiring, retaining and engaging talent. "With top talent in short supply throughout much of the world and in most industries, employee attitudes about sustainable business practices are compelling more companies to take this issue seriously, and yielding significant benefits to those firms that take action," it reported.

In 2013, Bain surveyed about 750 employees across industries in Brazil, China, India, Germany, the UK and the US. The survey

showed a significant shift in attitudes and career decisions relating to sustainability. For example, roughly two-thirds of respondents said they care more about the topic now than three years ago, with almost that many saying sustainable business is extremely important to them.





JIM HARTZFELD, CORPORATE  
SUSTAINABILITY STRATEGIST  
**ON HUMAN TECH**

Interest peaks among employees in their mid 30s to early 40s. When asked which group should take the lead on sustainability, more respondents cited employers than they did consumers, employees, governments or all equally, up from three years ago.

Employee engagement in sustainability also can produce other HR benefits, such as increased productivity. Andrew Savitz, in his 2013 book *Talent, Transformation and the Triple Bottom Line*, found that companies with sustainability engagement initiatives saw increases in overall employee engagement rate, even for employees who didn't participate. Just the presence of a robust program was salutary, creating a kind of engagement halo effect for all employees.

The ultimate benefit is when employee engagement leads to innovation. Susan Hunt Stevens, CEO of PracticallyGreen, which produces digital employee engagement applications for more than two dozen large

companies like Caesars, points to a global program it ran for one IT client. One participating employee was inspired to devise a paperless system for document distribution and retention. It spread to other facilities and eventually became a service offering to the client's customers.

One of the other factors leading to the elevation of employee engagement has to do with the maturing of sustainability inside many companies. Once a company has picked the low-hanging fruit — the blatantly wasteful energy, water and materials use, for example — it's time to tackle some of the harder stuff. Changing entrenched employee behavior certainly qualifies, and doing so can lead to new levels of environmental impact reductions and cost savings. But it's hard work.

Consider business travel. For some employees, especially those in sales, getting on a plane for some customer face time is practically a human right.

Getting them to change those habits takes more than new rules and regulations — it takes a change in culture. That's especially true in large companies that may not be as agile as younger ones in using Skype or other tech tools, or whose telepresence technologies may be incompatible with those of their clients. Addressing employees' daily commute is another thing that's hard to change, but doing so can have a significant positive impact on a company's environmental footprint, and also engender higher employee satisfaction and productivity.

The field is still so new — and so promising — that companies seem to be trying a little bit of everything. Several of the leaders in the field have long lists of employee engagement tools and activities: green teams, volunteer programs, competitions, cash incentives, dashboards, award and recognition programs, games, leaderboards, newsletters, eco-fairs, crowdsourcing, green home programs, hackathons, light bulb giveaways and 101 other things.

With so many options, it's hard to keep it fresh and new — an important ingredient in any successful employee engagement effort. But some companies manage. Consider Unilever, which, back in 2011 launched a Sustainable Living Plan, an effort to align ambitious social and environmental goals with business success. Its Australia/New Zealand division, in an effort to involve the entire company in the effort, bestowed all of its 1,500 employees with the title "Head of Sustainability," including giving each employee five business cards to that effect. "It's the only way to achieve the growth that we have planned over the next 10 to 30 years," said a company executive. "Frankly, we can't do it unless everyone is involved."

That pretty much sums up the strategic nature of employee engagement these days. Companies that want to accelerate improvements in their environmental impacts, and leverage sustainability for shared value, will need to engage the entire organization. They just can't do it unless everyone is involved.

## 8

ENERGY STORAGE BECOMES  
A GAME-CHANGER

One of the big technology stories of 2013 had to do with batteries. Not your garden-variety AA or D type, or even the rechargeables found in phones, laptops and cordless appliances. We're talking about large-scale batteries that provide energy storage for the grid. That story is going to become even bigger in 2014, as technology and economic forces begin to solve one of the big hurdles to a low-carbon energy future. And it will increasingly effect how many companies and commercial and industrial building owners manage energy.

The ability to cost-effectively store energy to power buildings is nothing less than a game-changer. For starters, it enables renewable energy to more easily become cost-effective. No longer do solar- and wind-energy customers need be subject to the vagaries of the sun and wind. Energy can be produced when it's shining (or blowing) and saved for a rainy day, literally.

Battery technology is nothing new, but for years companies have been trying to create a new generation able to store megawatts of energy — enough to power homes and businesses. Doing so not only will benefit renewables, but will make homes and businesses better able to withstand outages or disruptions. After years of hard work, the technologies are finally achieving the price and performance targets needed to make the competitive.

The growing commercial uptake is due in large part to technological advances, but also in response to Superstorm Sandy and other extreme weather events that knocked out power to large areas, and knocked some companies for million- or billion-dollar losses. Suddenly back-up power is looking more and more like a necessity.

Fortunately, the technology is marching forward. There are now 29 different energy storage technologies in use worldwide, according to Navigant Research. They range

from the conventional — refrigerator-sized bundles of lithium-ion batteries (the kind used in laptops, among other places) — to, well, the less conventional, such as capacitor batteries, lithium titanate oxide, nickel-iron and solar thermal. That's a lot of technologies, and there will no doubt be a shake-out, as we've seen with solar and many other technologies.

The sheer number is a factor of the global interest in harnessing energy storage to store both renewable and nonrenewable energy, to be used at times it is needed most, whether on a daily basis or for "just in case." Asia seems to be taking the lead on energy storage, in particular China and Japan, for somewhat different reasons: China to make maximize use of renewables instead of polluting coal plants, and because its grid remains shaky and in need of reliable power; Japan in response to the Fukushima nuclear power plant disaster, which has resulted in dramatic increases in demand for renewable and backup power.

But the situation isn't that different in North America, Europe, Russia and the Middle East. As energy grids become more diversified and bigger, there are emerging opportunities for large-scale energy storage systems.

Companies are seeing opportunities, too, and many of the technologies are being marketed directly to commercial customers. Consider a Silicon Valley company called Stem — which makes sophisticated storage systems that bundle lithium-ion batteries with sophisticated analytics that optimize decisions about when to pull power from the grid and when to draw on the battery. Stem also took a page from the solar industry and created a no-money-down finance option to make their behind-the-meter storage solution cost effective for their commercial customers. It counts among its customers InterContinental Hotels, which installed the technology at its Mark Hopkins hotel in

San Francisco before installing the batteries at 16 other California hotels.

Intercontinental no doubt sees the business value in energy storage. So do a growing number of other property owners. “Just like real estate values are higher for green buildings with LEED recognition, in the future, grid-hardened buildings may command premium prices because they preserve delivery of services regardless of grid status,” says smart-grid analyst Christine Hertzog.

California is one hot spot for energy storage. In 2013, it passed an energy storage mandate that instructs California's investor-owned utilities to expand their electricity storage capacity and procure 1,325 MW of electricity and thermal storage by 2020. As other states follow California's lead, as they inevitably do, that will further accelerate market demand and technology innovation for energy storage.

Another recent development further promises to rev up the energy storage market. SolarCity announced a service to install lithium-ion batteries made by Tesla Motors alongside photovoltaic panels. Business customers sign a 10-year contract with monthly fees, rather than purchase the batteries and solar panels. The batteries are the same used in Tesla's electric cars, but are packaged with power electronics to store solar energy, provide power to a building and connect to the grid. The entire system is remotely monitored by SolarCity.

One big uncertainty is how all this will affect electric utilities. After all, if buildings generate their own power (via solar panels or wind turbines), and can save it for use at any time (via batteries), and can contract with companies like SolarCity to install and manage the whole thing with no upfront investment, the role of utilities shapeshifts somewhat. That's another trend in the making.

Danny Kennedy, founder of the solar company Sungevity, has observed that the future of energy utilities might be a hybrid of eBay and UPS — that is, a company that arbitrages power generated by independent sources and delivers it in a timely fashion where and when it's needed. However fanciful the description, it may not be far from the mark.



**If buildings can generate and store their own power and contract with third parties to install and manage everything with no upfront investment, the role of utilities shapeshifts somewhat.**

## 9

CITIES BECOME  
HOTBEDS OF PROMISE

There's a revolution taking place in cities — or maybe it's an evolution. Whatever it's called, it represents a significant shift in how cities are designed and managed, and the experience of those who live, work and play there. And it is creating a wealth of new opportunities for companies.

The r/evolution we're seeing is the result of a convergence of several factors, including the nature of cities themselves. Unlike states or provinces, let alone nations, cities are run by public officials who typically live close to the citizenry whose lives they impact and who experience daily life much the same way as taxpayers and voters. There can be more collaboration among city councils and mayors, unlike the polarized world of national politics. Cities also operate at a manageable scale — large enough to enjoy economies of scale for new technologies or ideas, but small enough to be innovative and adaptive.

It's also cities' sheer scope. As SustainAbility's Mohammed

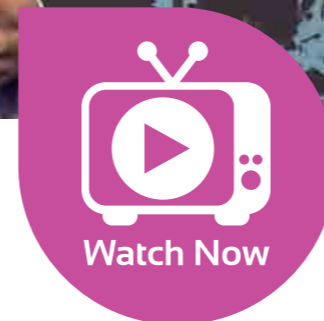
Al-Shawaf notes, cities account for 70 percent of global GDP consume 75 percent of the world's resources and 70 percent of its energy. And that share will grow: By mid century, 70 percent of the world's population will live in cities, up from just over 50 percent today.

We see hopeful innovations springing up in cities around the world. Many of these innovations result in sustainability improvements that reduce environmental impacts while improving lives. Together, these represent an exciting time for the urban landscape.

As Al-Shawaf writes: "Many large metropolitan areas, in the United States and elsewhere, are attempting to rise to the occasion. They're acting as first responders to system-level challenges colliding on their doorsteps. These include escalating consumer waste, water scarcity, 'food deserts,' de-carbonization of the electricity grid, as well as to how to re-envision and repurpose land."

Some of these innovations are tied to the explosion of data — Big Data, in many cases, but not always. Cities have long held large quantities of digital information — about buildings, people, operations, traffic, transit, utilities and more. Now, that data is being turned into solutions, some via consumer apps that improve the lives and experiences of people and businesses.

For example, in the aftermath of Hurricane Sandy, New York City officials used an app called Gasbuddy, which locates cheap gas station prices based in part on crowdsourced data to locate functioning gas stations. That, along with interviews with gas station owners, provided city officials with a more accurate assessment than the one provided by federal agencies. Similarly, the city gathered data from utilities and residents on which neighborhoods were affected by lost power and gas service after Sandy.



**Parking, lighting — and their first cousins, electric vehicle charging stations — are attracting scores of companies, from global superpowers to disruptive start-ups.**

A growing number of cities are collecting energy data on commercial buildings, particularly in the United States. Austin, Minneapolis, New York City, Philadelphia, San Francisco, Seattle and Washington, D.C. are among cities that have adopted energy benchmarking and disclosure rules for commercial buildings as an incentive for landlords to compete for lower operational costs.

Each city has its own set of drivers for pursuing sustainability innovations, but two seemingly prosaic city services seem to be the “gateway drug” for smarter city services: parking and lighting.

Consider parking, the bane of many citizens’ urban experience. The ability to transform data into

smart parking programs benefits citizens and the environment, often while increasing city parking revenue. Pilot programs are now being deployed in San Francisco, Los Angeles, Stockholm, Beijing, Shanghai, São Paulo and the Netherlands. In Los Angeles, low-power sensors and smart meters track the occupancy of parking spaces throughout the Hollywood district, one of its most congested areas. Users can access that occupancy data to determine the availability of spots and then pay for them with their mobile phones. In addition to lending convenience and environmental benefits, smart parking improves the utilization of existing parking, leading to greater revenue for parking owners. Los Angeles saw a return on its investment in smart parking within three months.

Lighting is another bright spot. LED lighting is increasingly the technology of choice in big cities. New York City is converting 250,000 streetlights to LEDs, a move that will save the city \$14 million a year and literally change how residents see their city. In Paris, the City of Light, wireless mesh networks are helping to retrofit street lights in that iconic city, the first part of a multistep process to manage a complex array of thousands of streetlights, streetlight control boxes, traffic signal control boxes, and other elements of Paris’ public lighting and traffic control infrastructure.

Parking, lighting — and their first cousins, such as electric vehicle charging stations — are attracting scores of companies, from global superpowers like IBM, Cisco and Schneider Electric, to disruptive start-ups seeking to become an indispensable part of the smart urban infrastructure. It’s still early days, but we see a growing number of companies across a wide range of sectors entering the “smart city” space.

They’re not the only businesses that benefit: If all these innovations succeed in cleaning up congested roads and polluted city air, and expanding city services to the masses, the millions of companies doing business in urban cores will find themselves operating in healthier communities, in every sense of the word.



# 10 | BUILDINGS AND COMPANIES GO POSITIVE

It's become axiomatic in sustainability circles that "sustainability" as a goal is not terribly inspiring. It implies stasis, staying where you are, not necessarily moving forward.

Perhaps, though we could do worse than stopping environmental degradation and resource depletion in its tracks and keeping things where they are.

Still, the point is well taken. There's a need for a positive vision, goals that aim not just to stop the bad stuff, but restore what we've lost.

Enter "net positive." That's a moniker being given to buildings, products, even companies. And while it heralds a promising change in corporate visions about environmental and social issues, it could create more problems than it solves.

Let's start with buildings. Having a "green building" used to be a big deal, something worthy of a press release or mayoral ribbon cutting. Today, it's become table stakes — a requirement for commercial property owners in some cities or real estate markets. Indeed, in some markets, it's noteworthy if a new commercial building isn't pursuing green building certification.

But green building standards don't typically represent the highest bar — they set a hurdle that almost any reasonable developer can clear. And if all buildings were certified to the highest standard — well, it probably wouldn't get us where we need to go.

A new generation of high-performance buildings are demonstrating they can do a lot better by attaining "net zero" use of energy, water and waste.

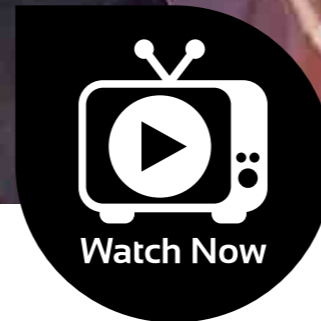
That's the goal of the Living Building Challenge, formed in 2006 with the aim of being a more stringent approach to green buildings than the U.S. Green Building Council's LEED certification program. "All of the green building programs that exist in the world are built around a notion of doing less harm, so we turned that on its head and we're trying to define what 'good' looks like, which is a very different thing," says Jason McLennan, CEO of the International Living Future Institute, which administers the Net Zero Energy Building Certification.

Net-zero is just the beginning. A new generation of net-positive energy buildings are cropping up around the world — in Chicago and Seattle, but also Canada, Norway and India.

It's not just buildings. In India, both Coca-Cola and Pepsi committed to being water positive, meaning that "We were able to give back to society much more water than we



JASON MCLENNAN,  
INTERNATIONAL LIVING FUTURE INSTITUTE  
**ON NET POSITIVE BUILDINGS**



used to manufacture our products by recharging and replenishing water through various initiatives in agriculture and replenishing water in communities around our manufacturing plants,” as a Pepsico Indian executive put it.

Products are claiming positivity, too. Consider Polyair, a “carbon-positive” packaging material that “actively removes CO2 from the atmosphere.” Or ITC, an Indian conglomerate in consumer goods, paper, packaging, agriculture, and information technology. It claims to be “the only company in the world of comparable dimensions to be Carbon Positive (for 8 successive years), Water Positive (for 11 consecutive years) and Solid Waste Recycling Positive (for 6 years now),” according to its chairman. You’ll have to weigh into the company’s latest sustainability report to decide for yourself if those claims hold up to scrutiny.

It could be that the whole “positive” thing could become a negative, if it is viewed as just the latest buzzword.

Still, something is going on here. Consider Kingfisher, the parent brand of B&Q and the largest European home improvement retail group in Europe. In 2012 it launched a Net Positive strategy. It’s a declaration of the company’s intention “to contribute positively to some of the big challenges facing the world while creating a more valuable and sustainable business for our stakeholders.” Specifically, the company intends “to make a positive contribution in four areas: timber, energy, innovation and communities.” The company states:

*Our expectation is that we will put more resources back into the earth than we take out, not just do “less bad.” The reason it’s core to what we do at*

## **If ‘net positive’ proves to be more than a trendy buzzword it could be the beginning of an important trend: companies aligning their sustainability and business goals**

*Kingfisher is because our corporate purpose and aspiration is to give people better homes and better lives. We’re convinced that, going forward, a better home and a better life must be one that is sustainable in the long term. So it’s about tying sustainability to our core business purpose. That’s what makes us think it’s a new way of doing business and not just a typical corporate social responsibility strategy.*

We’ll let the marketplace determine whether this is “a new way of doing business,” or “CSR As Usual.” But Kingfisher seems to be leading a parade. In December, it joined forces with BT (formerly British Telecom), Coca-Cola Enterprises, SKF, Capgemini and The Crown Estate, along with several NGOs, “to encourage businesses to become ‘Net Positive’ by adopting sustainable business practices that have positive impacts on value chains, systems and society.” The group plans to showcase “the many commercial, social and environmental benefits of turning Net Positive” in a communications campaign throughout 2014.

It’s too early to know where this is going — and whether and when the “net positive” concept will spread beyond the U.K. and Europe to cross other continents. If it proves to be more than a trendy buzzword it could be the beginning of an important trend: companies elevating sustainability to the highest levels of the company, aligning their sustainability and business goals to where they become one and the same — improving lives and the world through everyday business activity.

If that’s the case, it would be a development that is — well, truly positive.

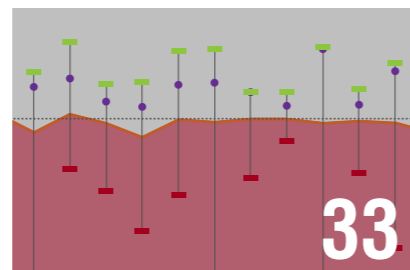
# The Index

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

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

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

## Sections



Natural Capital Leaders Index



Where Impacts Happen



Natural Capital



Company Performance



Disclosure & Transparency



Corporate Leadership



# NATURAL CAPITAL LEADERS INDEX

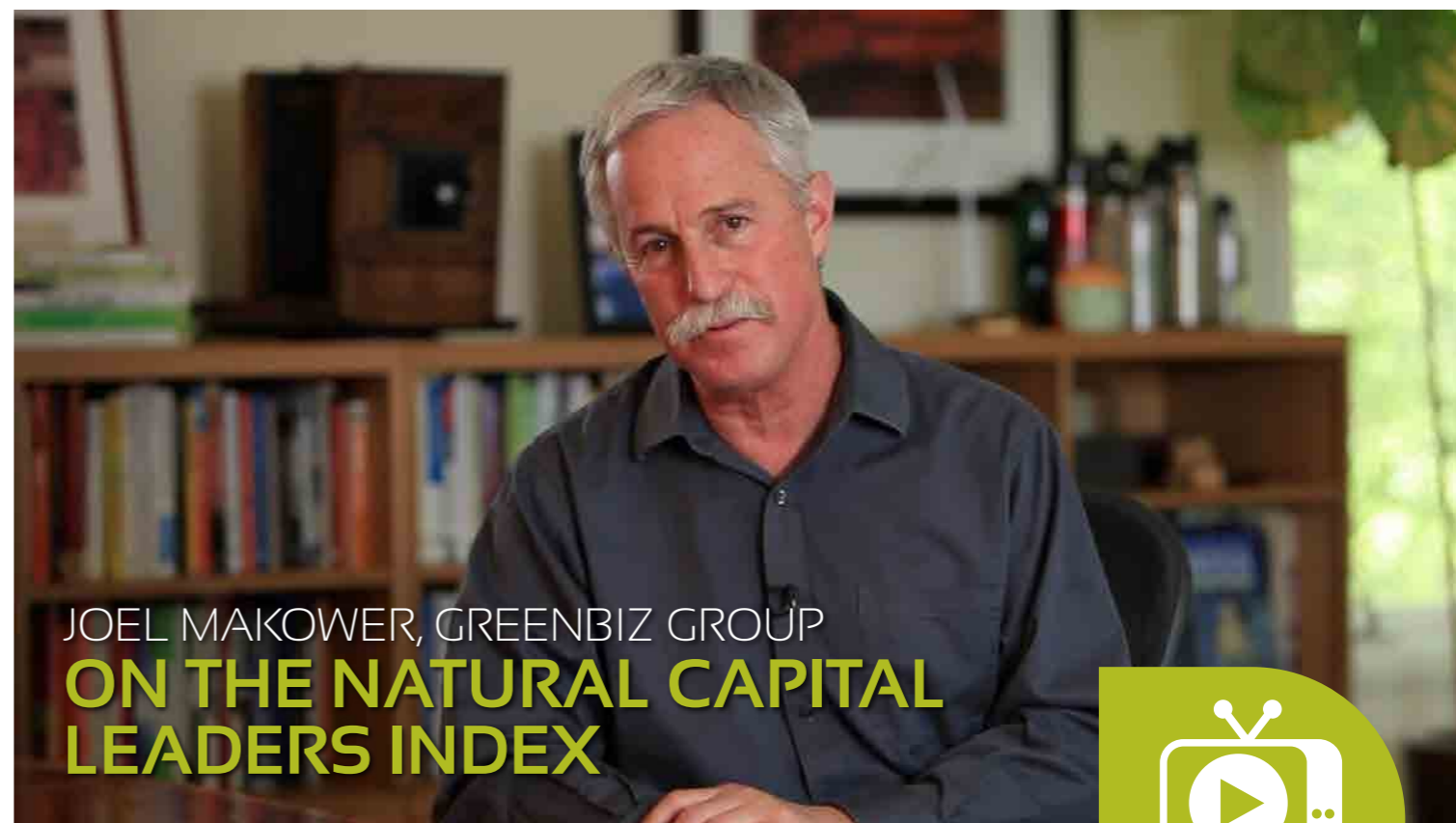
This year, we are introducing a new metric of company performance: The Natural Capital Leaders Index, developed by Trucost. It assesses companies in an innovative way — one that we believe shines a light on those that are making the most progress in addressing planetary limits on natural capital.

Companies have long been measured on their environmental performance against a wide range of standards and metrics. Some of these measurements are created by companies themselves, others by outsiders: advocacy groups, government agencies, media companies and others. Most focus on identifying the leaders — the “greenest” or “most sustainable” companies.

There are challenges with many of these ratings, rankings and indices. One challenge has to do with the difference between “absolute” and “relative” performance, also referred to as “intensity.”

Most assessments of companies look at intensity — the company’s resource use or emissions normalized to revenue. So, for example, if Company A uses 50,000 gallons of water to generate \$1 million in revenue, and Company B uses only 35,000 gallons to do the same, Company B is seen as the more efficient company.

So far, so good. Companies should be lauded for efficiency. But



JOEL MAKOWER, GREENBIZ GROUP  
**ON THE NATURAL CAPITAL LEADERS INDEX**



“efficiency” doesn’t always equal “progress,” at least from the planet’s perspective. As an efficient company inevitably grows, its resource use and emissions typically grow, too. And the burden on natural capital — the use of the earth’s resources and the dumping of waste into the air, water and soil — continues to grow.

The planet doesn’t care about relative performance or intensity. It cares about absolute performance — the total amount of resources extracted or emissions created.

So, if companies achieve high levels of efficiency and their revenue grows at the same historical rates as over the past 30 years, they will not effectively address the challenges of climate change, resource depletion, air and water pollution, land use and other issues.

Please understand: There is absolutely nothing wrong with economic growth. The economy and jobs rely on companies to grow year over year. Growth is expected and inevitable. The challenge is how to accommodate economic growth within the planet’s finite limits, so as to ensure future economic, environmental and social sustainability.

Trucost’s Natural Capital Leaders Index aims to show not just which companies are the most efficient, but which ones have separated growth from impact — that is, which companies have reduced their absolute impacts at the same time that they have increased their revenue.

We believe that measuring whether and how a company is “decoupling” revenue growth from environmental impact will become an increasingly important tool for assessing a company’s sustainability goals and achievements.

In October 2013, GreenBiz.com published the draft methodology for the Natural Capital Leaders Index. Following consultation with the thousands of companies within Trucost’s research universe as well as with the GreenBiz community, Trucost compiled the Natural Capital Leaders Index. It features two categories of leaders:

- **Efficiency Leaders** use natural capital most efficiently to generate revenue over the past year.
- **Decoupling Leaders** have increased revenue while decreasing natural capital impacts over the most recent five-year period.

Both lists were culled from the same universe of more than 4,600 publicly traded companies used to compile the other metrics in the State of Green Business report. (Learn more about Trucost’s methodology in the Appendix at the end of this report.) An outline of

the Natural Capital Leaders Index methodology is also in the Appendix as well as here.

Trucost intended to include up to six companies from each of 19 sectors (three each from the S&P 500 and MSCI World Index), for a total of up to 114 Decoupling Leaders. However, out of the roughly 4,600 companies screened, only 34 met the standard of rising revenue and declining impact over a five-year period. Those companies are listed alphabetically by sector.

To provide additional context, Trucost has published a series of sector-based Natural Capital Benchmarks. Working with the Center for Sustainable Organizations, Trucost provided environmental context alongside financial context through Context-Based Sustainability analysis. Initially, that analysis is limited to carbon, but as consensus is reached on planetary limits for other environmental impacts such as water and land use, Trucost will incorporate them into future editions of the index.

The Natural Capital Leaders Index represents the beginning of a journey to create a new era of sustainability metrics that effectively align business strategies with sustainable development imperatives.

More information on the NCLI methodology can be found in the back of the report, or at [www.trucost.com/naturalcapitalleadersindex](http://www.trucost.com/naturalcapitalleadersindex).

**We believe that measuring whether and how a company is “decoupling” revenue growth from environmental impact will become an increasingly important tool for assessing a company’s sustainability goals and achievements.**

# 2014 NATURAL CAPITAL LEADERS

## DECOUPLING LEADERS & EFFICIENCY LEADERS

**Decoupling Leaders** have most successfully decoupled revenue growth from natural capital impacts in their operations and supply chain over the last five years.

**Efficiency Leaders** have the lowest natural capital impacts in their operations and supply chain per million dollars of revenue. Trucost identified the top global company and the top US company in each industry sector. (Note that for some industry sectors the top global company is the same as the top US company.)

DECOUPLING LEADERS		
SECTOR	COMPANY	COUNTRY
Automobiles & Parts	PT Astra International Tbk	Indonesia
Banks	National Australia Bank Ltd.	Australia
	Nedbank Group Ltd.	South Africa
Basic Resources	Harmony Gold Mining Co. Ltd.	South Africa
	Iluka Resources Ltd.	Australia
Chemicals	Croda International Plc	United Kingdom
	Elementis Plc	United Kingdom
	Orica Ltd.	Australia
	The Mosaic Co.	United States
Construction & Materials	Adelaide Brighton Ltd.	Australia
Financial Services	Aberdeen Asset Management Plc	United Kingdom
Food & Beverage	Coca-Cola Icecek AS	Turkey
Healthcare	Becton, Dickinson & Co.	United States
	Lupin Ltd.	India
	Shionogi & Co., Ltd.	Japan
Industrial Goods & Services	CITIC Pacific Ltd.	Hong Kong
	CSX Corp.	United States
	Cummins, Inc.	United States
Insurance	Liberty Holdings Ltd.	South Africa
Media	Pearson Plc	United Kingdom
	Reed Elsevier Plc	United Kingdom
Oil & Gas	Fortune Oil Plc	Hong Kong
	Lundin Petroleum AB	Sweden
Personal & Household Goods	Kimberly-Clark Corp.	United States
Real Estate	Commonwealth Property Office Fund	Australia
	NTT Urban Development Corp.	Japan
Retail	Dignity Plc	United Kingdom
Technology	Intel Corp.	United States
	Xerox Corp.	United States
Telecommunications	Verizon Communications, Inc.	United States
Travel & Leisure	Carnival Corp.	United States
Utilities	PG&E Corp.	United States
	Reliance Infrastructure Ltd.	India
	Tata Power Co., Ltd.	India

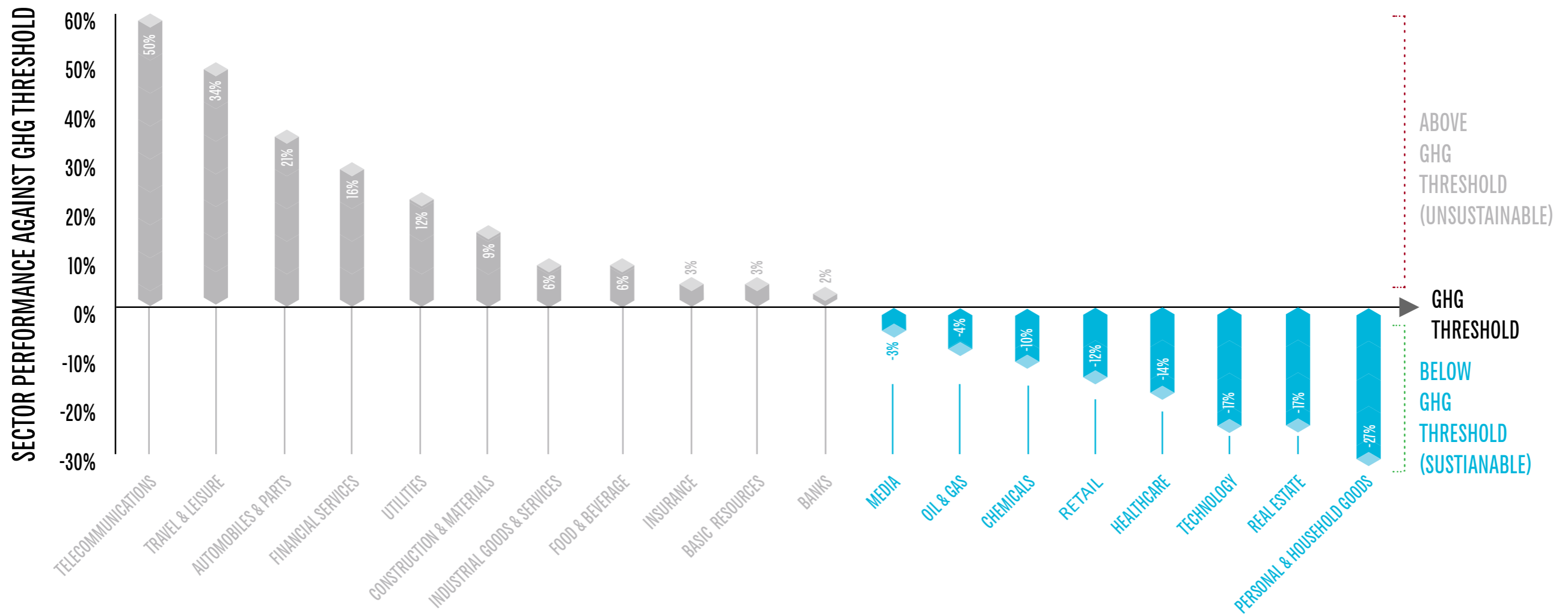
EFFICIENCY LEADERS		
SECTOR	COMPANY	COUNTRY
Automobiles & Parts	Bayerische Motoren Werke AG	Germany
	Ford Motor Company	United States
Banks	Comerica Incorporated	United States
	Resona Holdings, Inc.	Japan
Basic Resources	Freeport-McMoRan Copper & Gold Inc.	United States
	Yamana Gold, Inc.	Canada
Chemicals	Sigma-Aldrich Corp.	United States
Construction & Materials	Fluor Corp.	United States
Financial Services	Invesco Ltd.	United States
	Julius Bär Gruppe AG	Switzerland
Food & Beverage	Green Mountain Coffee Roasters, Inc.	United States
Healthcare	WellPoint, Inc.	United States
Industrial Goods & Services	ManpowerGroup	United States
	Randstad Holding NV	Netherlands
Insurance	Aflac, Inc.	United States
Media	McGraw Hill Financial, Inc.	United States
Oil & Gas	AMEC Plc	United Kingdom
	FMC Technologies, Inc.	United States
Personal & Household Goods	Li & Fung Ltd.	Turkey
	PVH Corp.	United States
Real Estate	Prologis, Inc.	United States
Retail	eBay, Inc.	United States
Technology	Adobe Systems, Inc.	United States
Telecommunications	Sprint Corp.	United States
	Swisscom AG	Switzerland
Travel & Leisure	Hertz Global Holdings, Inc.	United States
Utilities	Pepco Holdings, Inc.	United States
	Red Eléctrica Corp. SA	Spain

Trucost's Natural Capital Leaders methodology is available at [www.trucost.com/naturalcapitalleadersindex](http://www.trucost.com/naturalcapitalleadersindex)

# 2014 PLANETARY LIMITS

## FOR GREENHOUSE GAS EMISSIONS

Planetary Limits for Greenhouse Gas Emissions assesses the performance of industry sectors in context of GHG thresholds, defined by contribution to global GDP and based on limiting atmospheric greenhouse gas levels to 350 parts per million of carbon dioxide equivalents. Companies can use these benchmarks to understand and manage their performance.



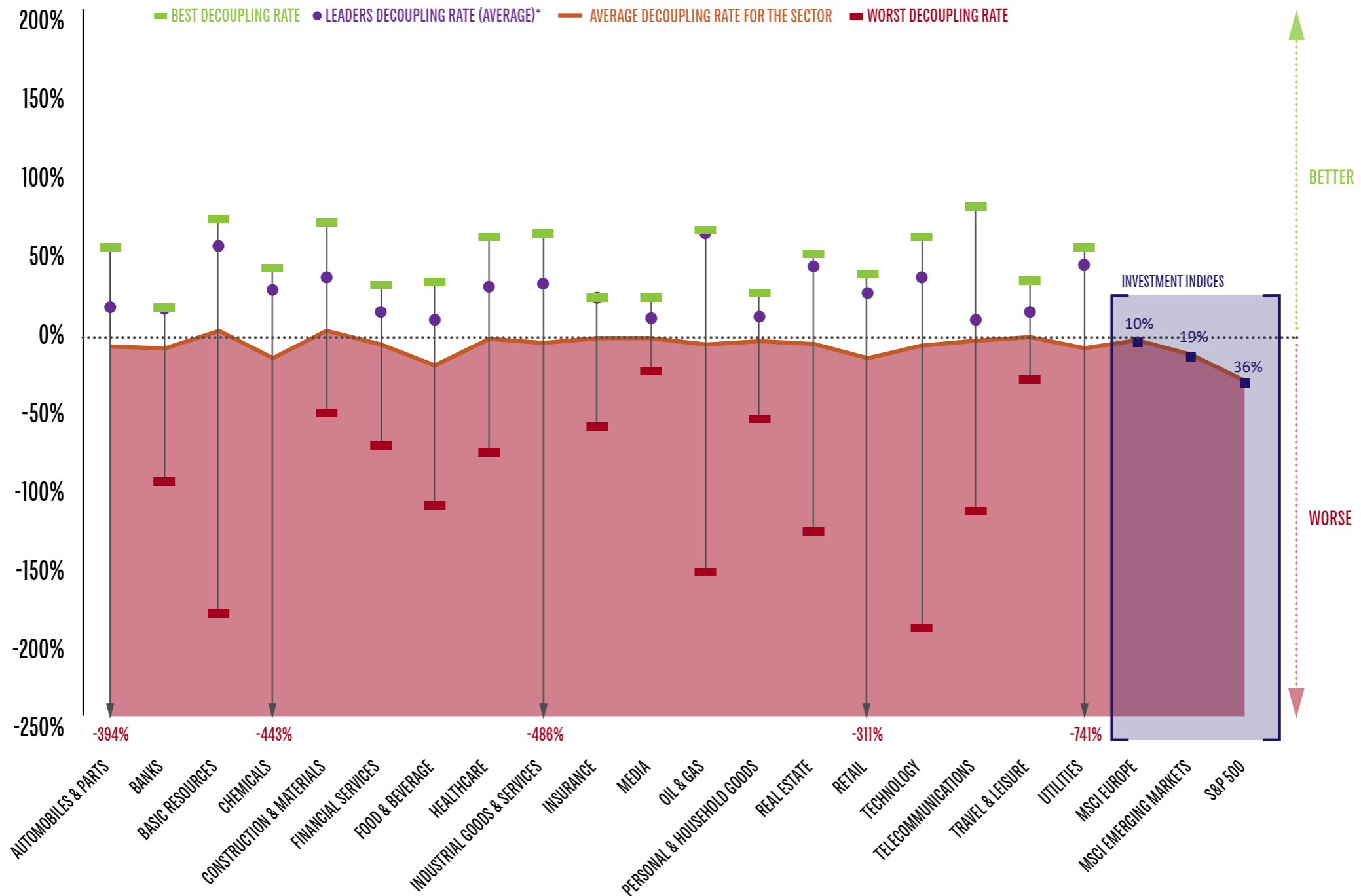
Produced in Partnership with the Center for Sustainable Organizations

Planetary Limits for Greenhouse Gas Emissions results do not include emissions from company supply chains or product use and disposal.

# 2014 NATURAL CAPITAL

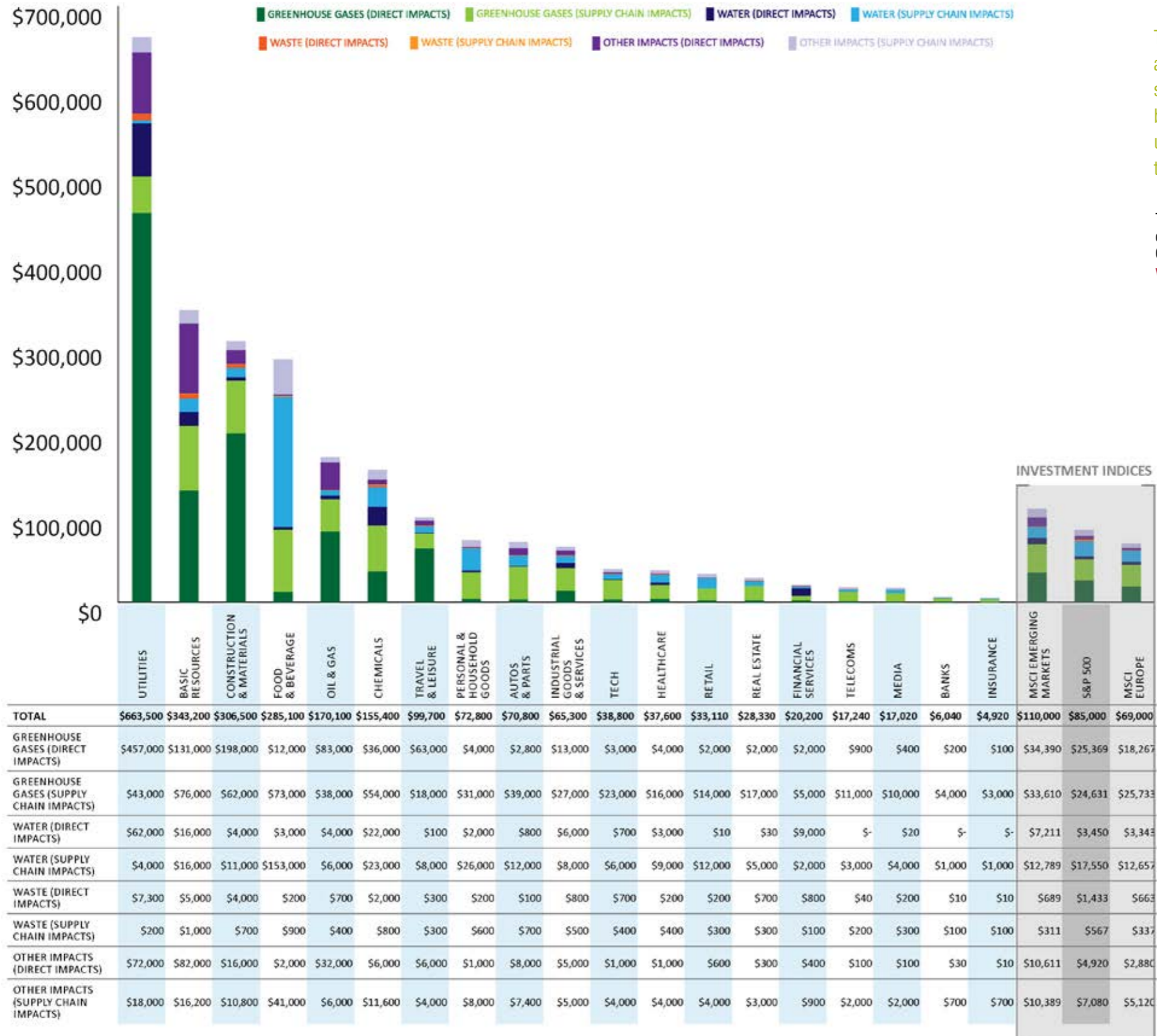
## DECOUPLING BENCHMARKS

Trucost's Natural Capital Decoupling Benchmarks identify the extent to which industry sectors and investment indices have grown revenue while reducing natural capital impact over the past five years. Companies and investors can use these benchmarks to understand and manage their performance.



\*THE LEADERS DECOUPLING RATE METRIC REFERS ONLY TO THE NATURAL CAPITAL DECOUPLING LEADERS AND NOT TO THE NATURAL CAPITAL EFFICIENCY LEADERS

# 2014 NATURAL CAPITAL BENCHMARKS



Trucost's Natural Capital Benchmarks present average natural capital impact intensities for industry sectors and investment indices to enable impacts to be tracked over time. Companies and investors can use these benchmarks to understand and manage their performance.

The Natural Capital Valuation coefficients used by Trucost to calculate environmental impacts costs for the 2014 Natural Capital Benchmarks are available at: [www.trucost.com/naturalcapitalleadersindex](http://www.trucost.com/naturalcapitalleadersindex)

Investments and downstream emissions are not included in the industry sector benchmarks

# WHERE IMPACTS HAPPEN



Supply chains continue to be a rich vein for companies to tap in search of opportunities to address environmental impacts. As we noted last year, this field has advanced to the front lines of sustainability inside many companies, as supply-chain professionals look beyond their traditional concerns — price, quality and timely delivery — to embrace such concerns as travel distances, packaging, security of natural capital inputs such as water, land and other issues. In some sectors, notably consumer products, there is a growing focus on chemical transparency, as we noted earlier in this report.

All of this is leading companies to push impacts upstream, from distributors to factories to raw material suppliers. And at each step of the way, there are new pressures to find solutions that reduce the customer's environmental impacts.

In this section, we show where the biggest environmental impacts lie — in the sector's direct

impacts or within its supply chains. As you'll see, each sector has its own profile.

Such knowledge is a key first step in understanding a company or sector's biggest opportunities for environmental improvements, risk reductions and innovation. For example, the opportunities are different for companies and sectors where most impacts are in supply chains, compared to those where impacts lie in direct impacts.

Understanding the full environmental footprint behind products continues to be a critical challenge for many companies. The challenges come from collecting reliable and comparable data from a company's suppliers, which can number in the thousands, or even tens of thousands, and are typically spread across multiple continents. Some large brands may not even know who all of their suppliers are, due to multiple levels of contractors and subcontractors.

Aggregating, massaging and reporting such data for both internal and external use remains another key challenge. Despite the continual advances in corporate reporting standards and methodologies, the field continues to be a Tower of Babel, with inconsistent systems for collecting and reporting data. Overcoming that hurdle — if it can even be done — will be a major boon to companies, suppliers and stakeholders. Environmentally Extended Input Output modelling, a technique recommended by the GHG Protocol, provides a valuable head start by calculating baseline data from which high-impact supply-chain links can be identified for primary data collection.

**Supply chains are a rich vein for companies to tap in search of opportunities to reduce environmental impacts and risks.**

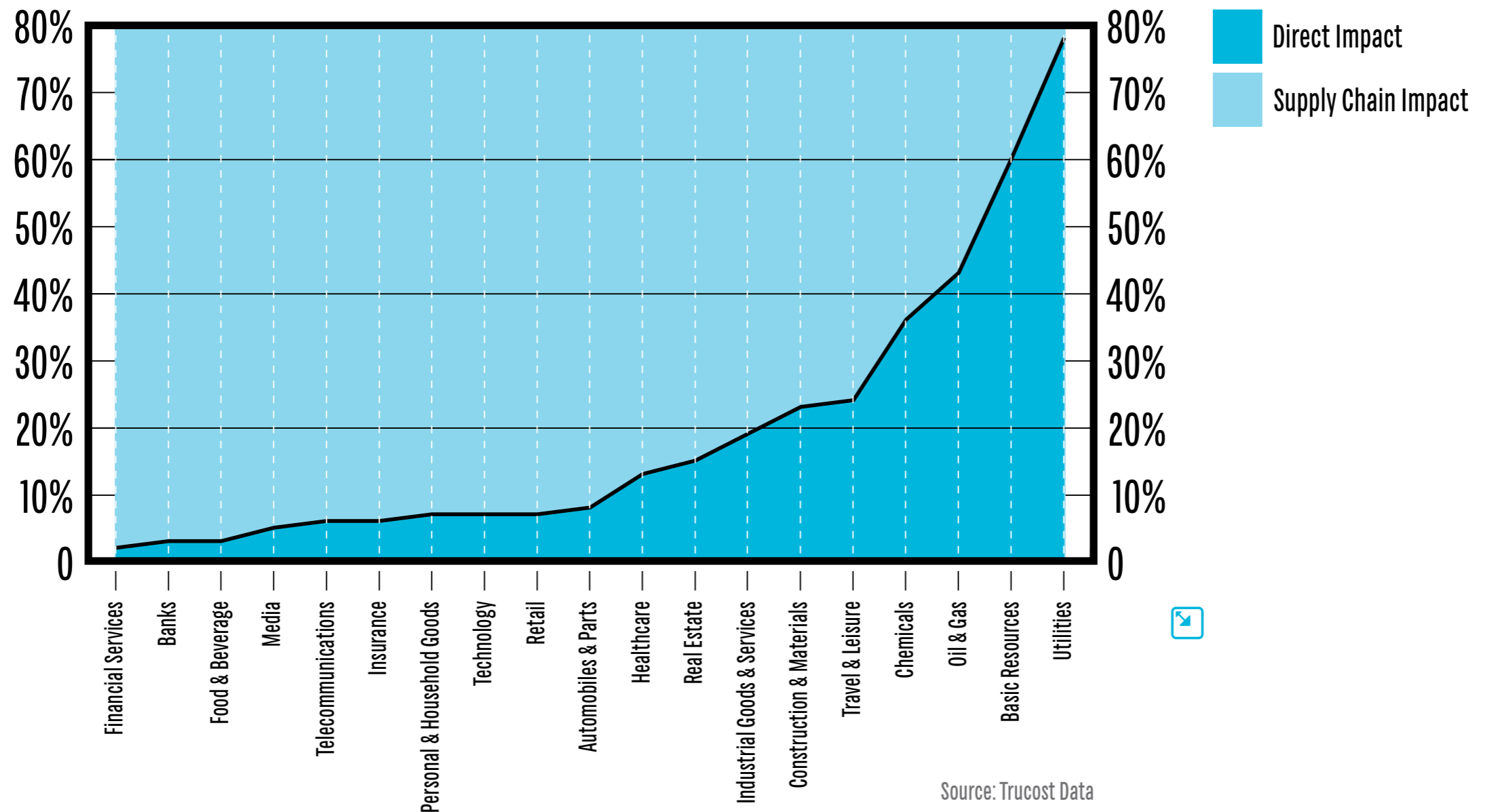
## Direct vs. Supply-Chain Impacts

This graph shows where the environmental impacts exist for 19 different industrial sectors, in terms of whether they are direct (happening within their facilities or operations) or indirect (happening within their supply chains). As you'll see, there is quite a range.

What's most interesting about this graph are the four sectors on the far right: Utilities; Basic Resources (primarily forestry and mining), Oil and Gas; and Chemicals. Together,

these four sectors, which represent about 16 percent of global market capitalization, comprise 50 percent of all environmental costs. All four are at the top of most companies' supply chains, providing the raw materials for products and packaging, as well as the energy to run factories, buildings and transportation systems. That suggests that companies need to focus their environmental improvements upstream. Having a green building is a terrific achievement, but it is only a symbolic gesture if most of a company's impacts lie outside the company walls.

### Direct vs. Supply Chain Impacts by Super Sector





## Top Key Performance Indicators

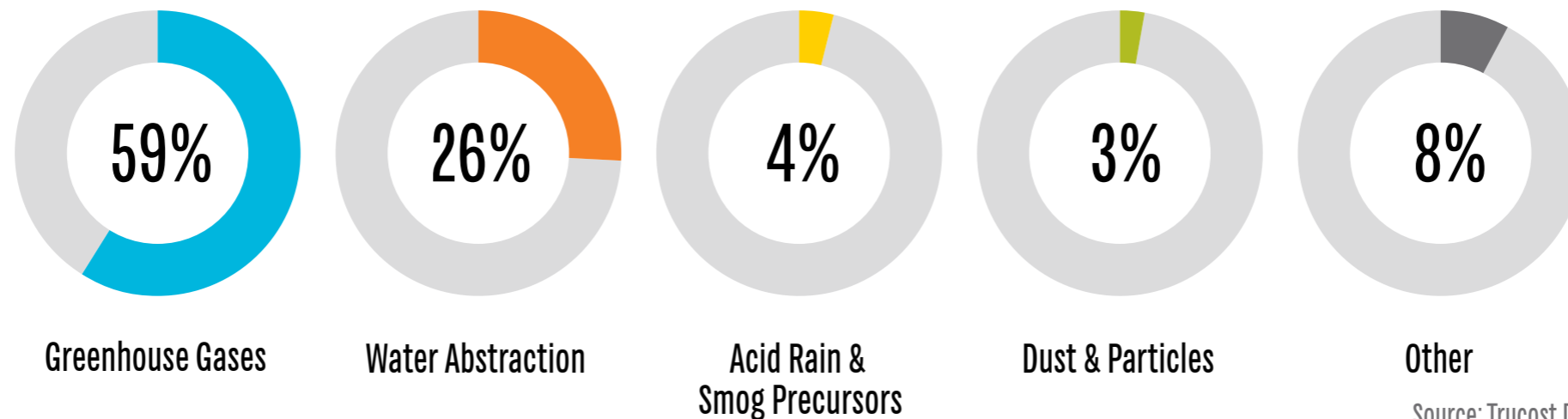
One thing is fairly consistent among companies around the world: their top four environmental impacts represent about 80 percent of their overall footprint. That confirms the Pareto Principle — also known as the 80-20 rule — that for many events, roughly 80 percent of the effects come from 20 percent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

In the global view of business, that 80 percent (actually, 79 percent) comes from:

- greenhouse gas emissions of all types (59 percent);
- water abstraction — the process of taking water from any source, for irrigation, energy production, manufacturing, drinking water, or other uses (26 percent); and
- acid rain and smog precursors, which include sulfur dioxide (SO<sub>x</sub>), nitrous oxides (NO<sub>x</sub>) and ammonia for acid rain, and NO<sub>x</sub> and carbon monoxide for smog (4 percent). **E**



### Top Environmental KPIs



Source: Trucost Data

# NATURAL CAPITAL

Companies are beginning to understand that the full environmental costs of doing business are not accounted for in financial disclosures and filings. Those statements fail to calculate externalities — the cost to people and the planet that companies unwittingly inflict.

Just because companies don't report these costs doesn't mean that they can't be measured or tracked.

“Natural capital” refers to the limited stock of Earth's natural resources that humans depend on for our prosperity, security and well-being, including things such as clean air and water. As we wrote in last year's report:

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



The economic toll of business activity to natural capital is significant. Research conducted by Trucost found that the natural capital impacts of business cost the global economy around \$7.3 trillion per year in terms of the environmental and social impacts associated with pollution, ecosystem depletion and related health costs.

Putting a dollar amount on an individual company's natural capital impacts, and doing so in a way that is consistent across companies, is ambitious but not impossible. A number of global business groups — including the World Bank, the TEEB for Business Coalition, the Cambridge Programme for Sustainability Leadership, the World Business Council for Sustainable Development and the WAVES Partnership — have been developing methodologies for natural capital accounting at the company level.

The indicators in this section place aggregate costs on natural capital impacts as measured by Trucost, which applies an environmental economics methodology to place a financial value on the environmental impacts

of companies and their suppliers. Its annual research methodology standardizes disclosed environmental impact data from the world's largest 4,600 companies (representing 93 percent of global markets by market capitalization) and supplements this data with environmental modeling to complete data gaps in traditional sustainability metrics. Trucost's environmental modeling quantifies 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 the supply chain. At the end, each firm's environmental impact and materiality is measured relative to its financial performance. (See a full description of Trucost's methodology in the back of this report.)

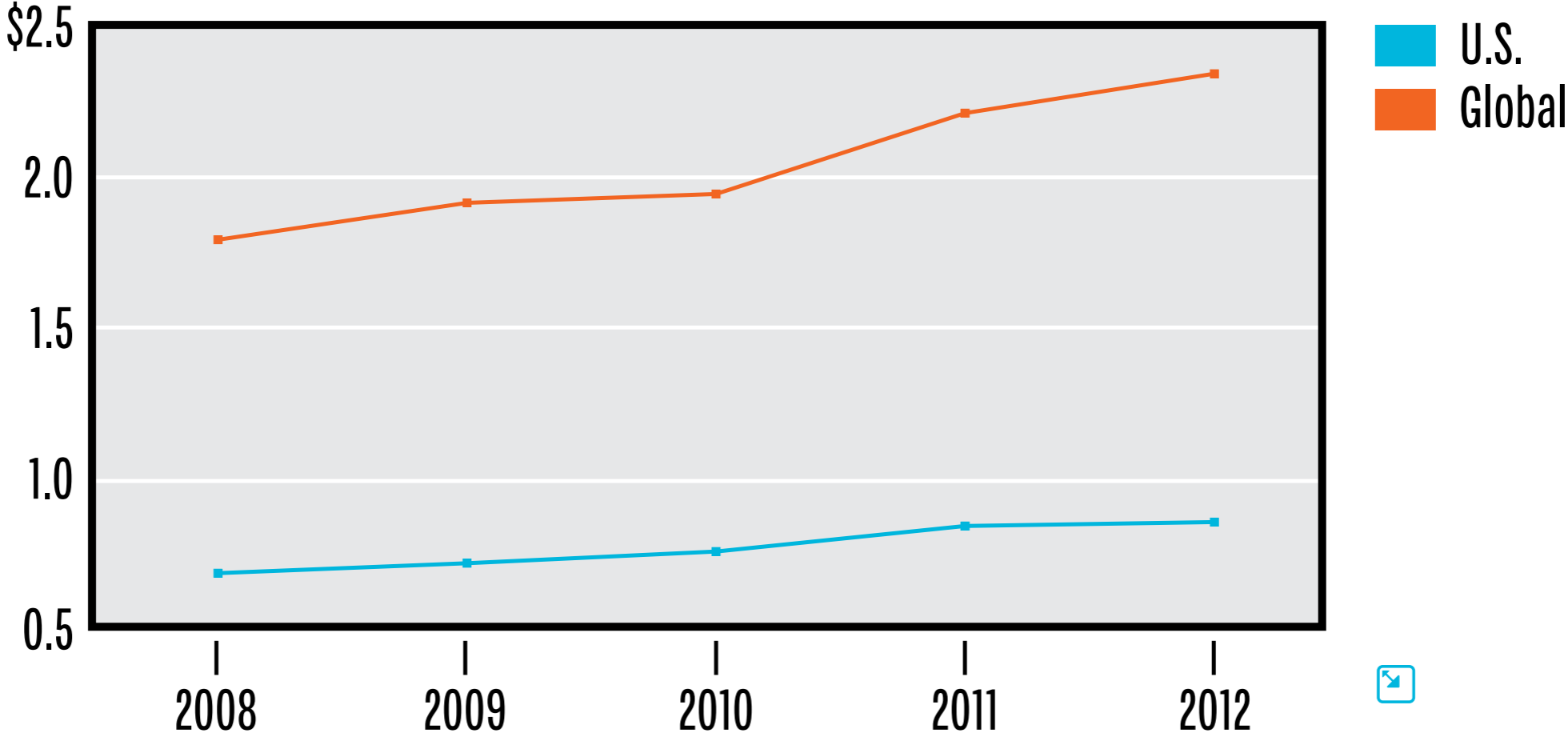
In essence, Trucost's calculations answer the question, “If a company actually had to pay for its impacts on natural capital, what would it cost, and how would that affect the company's profitability?” As you'll see, the impact on companies' bottom lines would be significant.

# Total Environmental Costs

Absolute environmental costs are tallied by compiling companies' individual impacts, such as carbon emissions, water consumption, waste and other pollution impacts, and assigning a monetary cost to each. 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

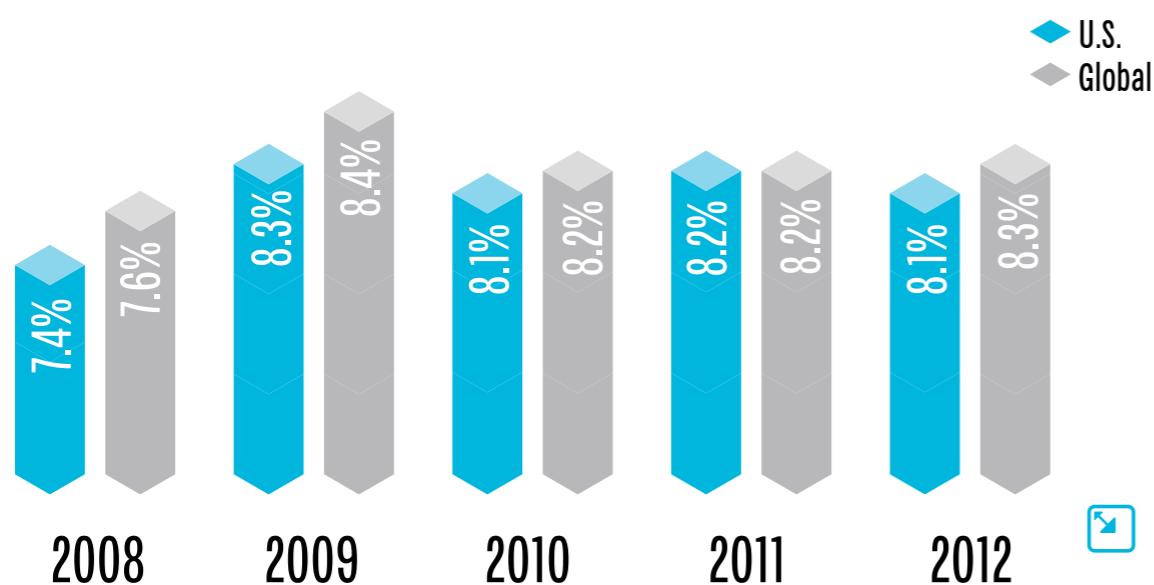
The absolute environmental costs, assessed for U.S. firms as well as globally, fell in 2007 and 2008, a period of low economic activity due to the global recession. By 2011, as the engines of commerce kicked back in, absolute costs regained their 2007 levels and then some, climbing further still in 2012. In the most recent year, natural capital costs for U.S. firms reached \$797 billion, and \$2.3 trillion for firms globally.

### Absolute Environmental Costs (Trillions of U.S. dollars)



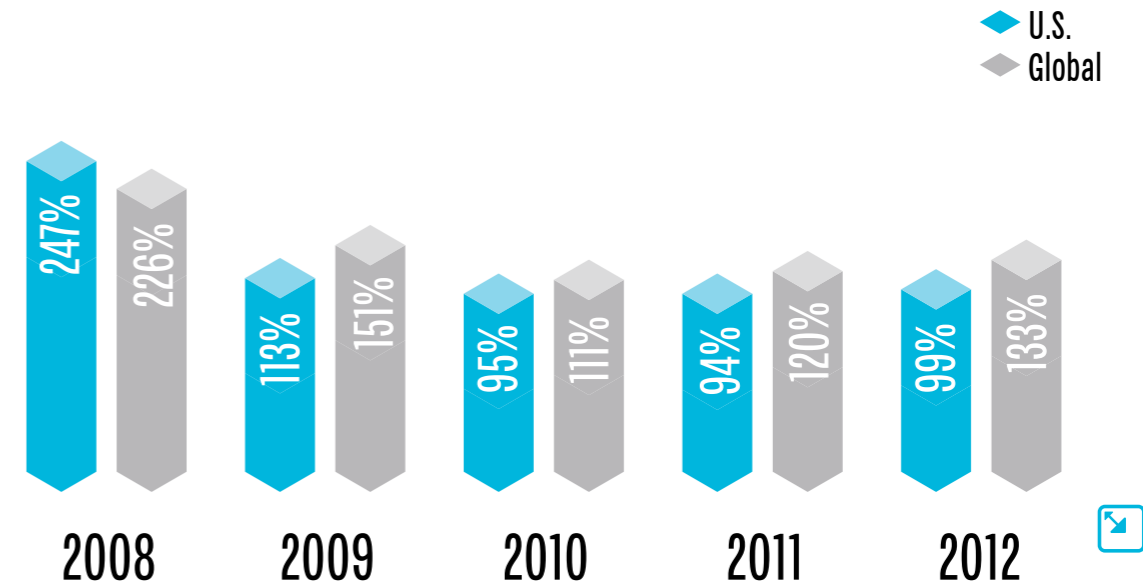
Source: Trucost Data

## Total Environmental Costs as Percentage of Revenue



Source: Trucost Data

## Total Environmental Costs as Percentage of Net Income



Source: Trucost Data

## Environmental Efficiency and Return on Natural Assets

These indicators, which look at natural capital costs as a percentage of total revenue, show how efficiently companies are using their natural capital over time — specifically, how their natural costs compare to their revenue and net income.

During the most recent three years, as the global economy has regained its footing, natural capital costs as a percentage of revenue have remained steady — around 8 percent for both U.S. and global companies. Prior to that, in the recessionary year 2009 when revenue was down, natural capital costs were a higher slice of income.

But the story takes on a more dramatic hue when looking at natural capital costs relative to profitability. On average, natural capital costs in 2012 were 99 percent of net income for U.S. companies and 133 percent for global companies.

That is to say, natural capital costs incurred by companies equalled or exceeded their profits. (During 2008, when profits were way down, environmental costs were more than double net income.)

Put another way: If companies had to pay their fair share for their environmental impacts, their entire profits would have been wiped out.

Or worse. In some sectors, the natural capital costs far exceed their net profits. For example, the environmental costs for the Basic Resources sector in the S&P 500 — primarily mining and forestry companies — were more than 10 times the sector's net income in 2012. Utilities' environmental costs were more than eight times profits. Food & Beverage companies' costs were more than five times profits.

As we said, these are only theoretical costs — for now. At what point will companies be held accountable by customers and stakeholders for some or all of these costs?

Logic would dictate that companies could reduce their natural capital costs by boosting efficiencies and reducing waste and emissions, though there is not yet an ironclad business case showing that as efficiencies improve, the percent of profits at risk due to natural capital costs decreases. ■

**If companies paid for their environmental impacts, their profits would be wiped out.**

# COMPANY PERFORMANCE



**Why is all this activity essentially getting us nowhere? Are we finding ourselves in a corporate sustainability trough?**

In this section, we look at specific attributes of companies' environmental performance, such as their use of energy and water as well as their emissions and waste.

At best, it's a mixed bag of accomplishments and achievements. Many of the metrics show little or no progress in recent years, even slight downturns in some cases. That's discouraging, when one considers the growth of company programs related to such things as increasing energy and water efficiency, reducing greenhouse gas emissions, zero-waste initiatives and other environmental commitments and achievements.

Why is all this activity essentially getting us nowhere? Are we finding ourselves in a corporate sustainability trough?

There's no definitive answer. It may reflect the return of economic growth without a concomitant growth in programs designed to mitigate the impacts of increased business activity. It may reflect the fact that the easy solutions — the “low-hanging fruit” — have already been harvested and that most companies haven't yet tackled the harder stuff, such as the environmental impacts found in their supply chains.

Whatever the reason, it's a disconcerting state of affairs. On the one hand, a baseline level of environmental action has become “business as usual” over the past few years. But companies could find that achieving only those baseline levels of performance is insufficient in a world of increased climate, water, energy and resource risks — and where growing extreme weather events, resource scarcity and commodity price fluctuations can lead to more frequent business disruptions.

## Energy Efficiency

The amount of energy needed to produce a dollar of gross domestic product continues to be one bright spot on the corporate environmental front. That has been the story for more than three decades. In 1980, it took an average of 9,333 British Thermal Units (BTUs, a standard unit of energy) to generate \$1 of gross domestic product (in 2005 U.S. dollars) worldwide — what is referred to as “energy intensity.” By 2013, that number dropped to 7,425 BTUs, a 20 percent improvement reflecting more efficient use of energy.

The energy story in the United States is even more impressive, though the country started from a less-efficient place. In 1980, it took an average of 13,381 BTUs to generate \$1 of GDP. By 2013, that number had dropped by nearly half, to 6,916 BTUs. Both the U.S. and global economies have effectively decoupled energy consumption from economic growth. It’s an outright success story.

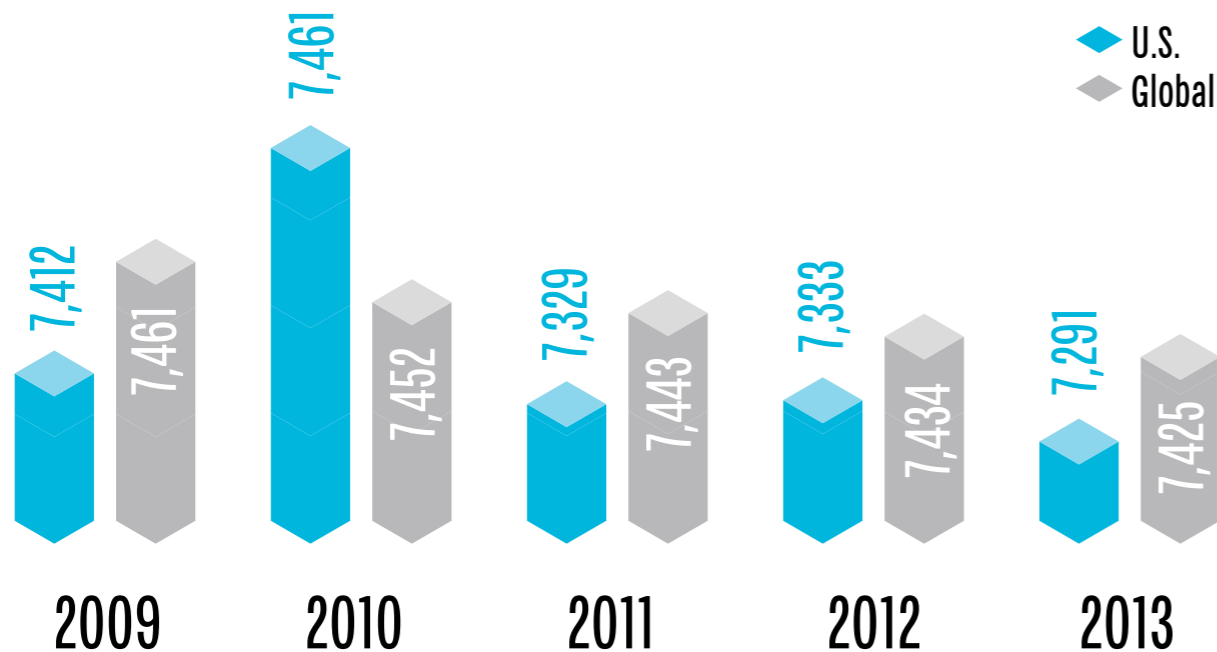
Still, there is much more to be done. Company revenues will continue to grow (we assume 3.0 percent economic growth from the U.S. to 2015 and 3.3 percent globally). It is not enough to reduce the amount of energy needed to produce each unit of revenue. We need to take the further step of decoupling energy use and revenue generation.

Consider the potential of the “Industrial Internet,” a coinage of General Electric to describe the integration of industrial equipment with sensor technology and analytics software. Together, they can optimize a vast number of industrial devices by reducing energy use, improving productivity and keeping capital equipment in service longer. For example, says GE, achieving a 1 percent fuel savings across the entire global airline fleet would save \$30 billion over the next 15 years. A similar 1 percent improvement in the efficiency of gas-fired power generation would save \$66 billion over that same period. A 1 percent improvement in railroad efficiency adds \$27 billion to the total.

Globally, there is still much work to be done. According to the McKinsey Global Institute, developing countries could slow the growth of their energy demand by more than half over the next 12 years — to 1.4 percent a year, from 3.4 percent — which would lower demand by 25 percent in 2020 from it would otherwise have been. That is a reduction larger than total energy consumption in China today.

### Primary Energy Consumption

(BTUs per millions U.S. dollars of GDP)



Source: Trucost Data

### Average Annual Efficiency Growth



Source: Trucost Data

# Greenhouse Gas Emissions

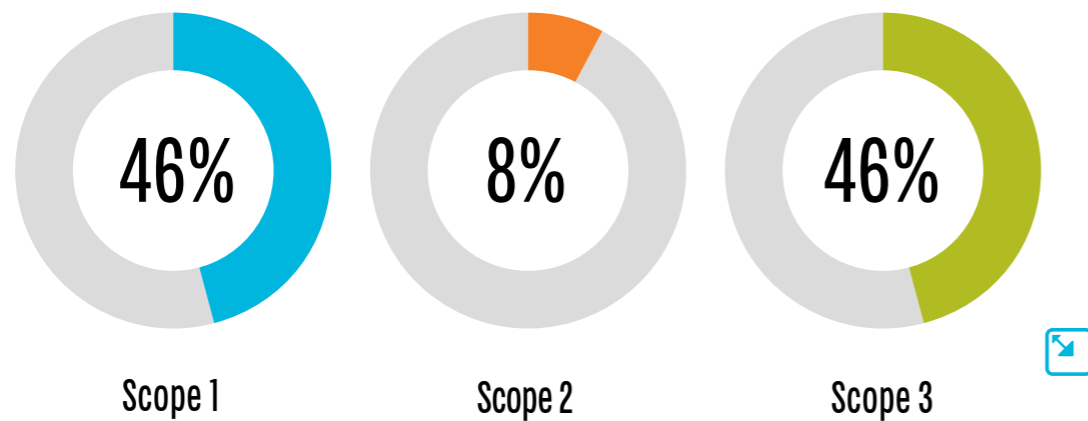
Total greenhouse gas (GHG) emissions among both U.S. and global market indices remain flat. For the five-year period between 2008 and 2012, U.S. emissions were essentially unchanged while global emissions ticked up slightly. All told, it's a wash.

It is important to keep in mind that this data does not reflect all greenhouse gas emissions — only that reported by large, publicly traded companies. As such, it does not necessarily take into account such things as carbon releases through deforestation — that is, unless reported as part of a company's direct operations or supply chain. However, the emissions created by small farmers cutting down trees to create agricultural land are not likely accounted for here.

The data is vexing whether one views it in terms of absolute emissions or intensity, which are emissions normalized to economic activity. Intensity, too, is largely unchanged — from 450 tons per million dollars for both U.S. and global companies in 2008, to 440 tons for U.S. companies and 460 tons for global companies in 2012. Again, it's largely a wash, meaning that for all of the efforts companies are making, it's not leading to progress.

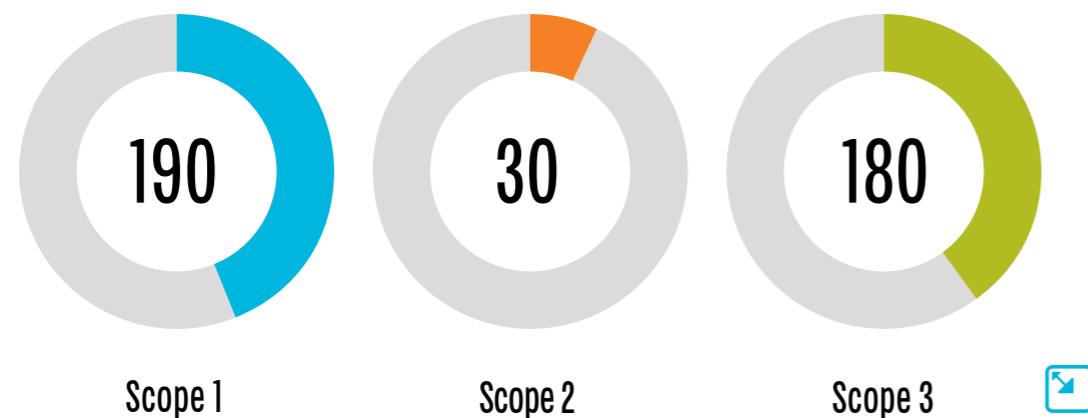
And the prognosis isn't much better. According to the U.S. Energy Information Administration, energy-related carbon dioxide emissions in 2013 are expected to be roughly 2 percent above the 2012 level. That is, despite the best efforts of hundreds of U.S. companies, greenhouse gas emissions are going in the wrong direction.

## GHG Percentages by Scope, 2012



## Global GHG Intensity by Scope, 2012

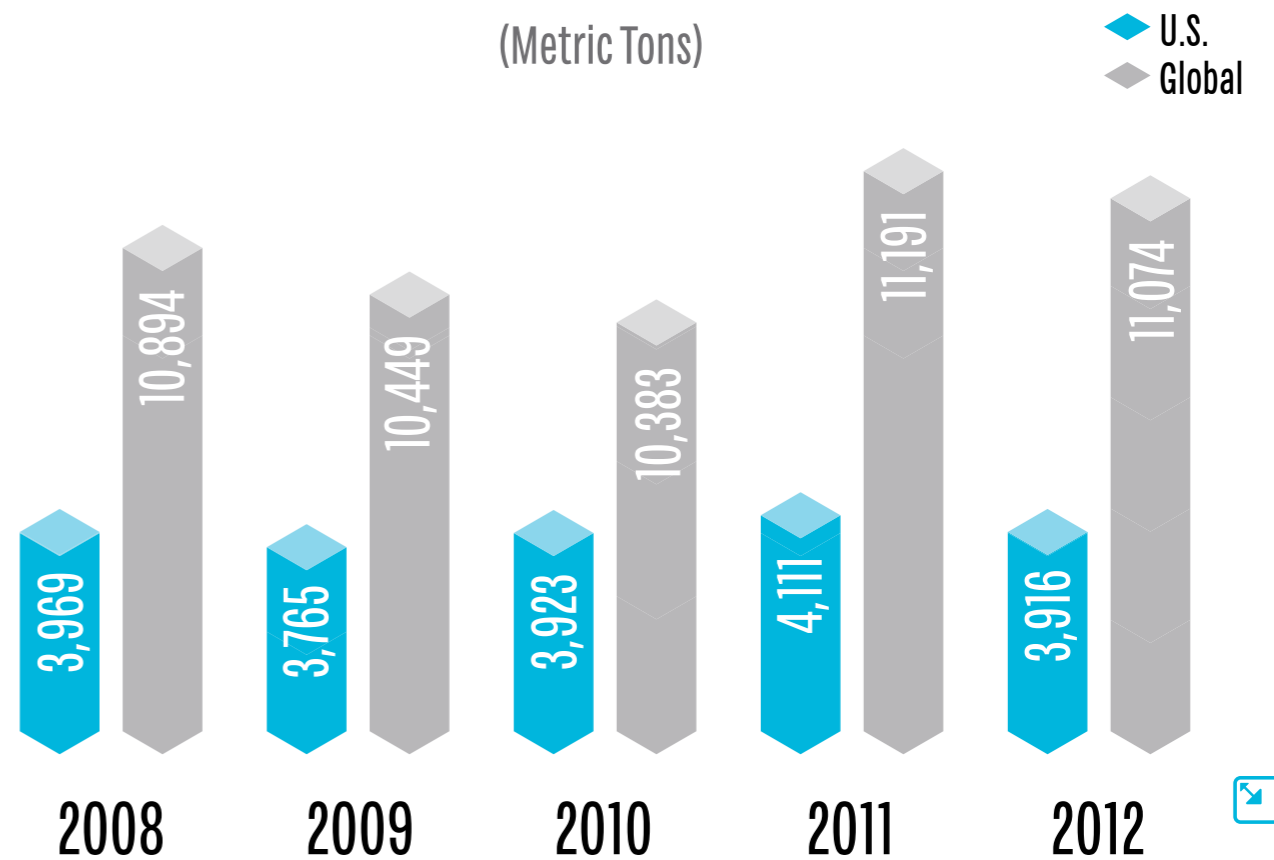
(Metric tons per million U.S. dollars)



Source: Trucost Data

## Total GHG Emissions

(Metric Tons)



Source: Trucost Data

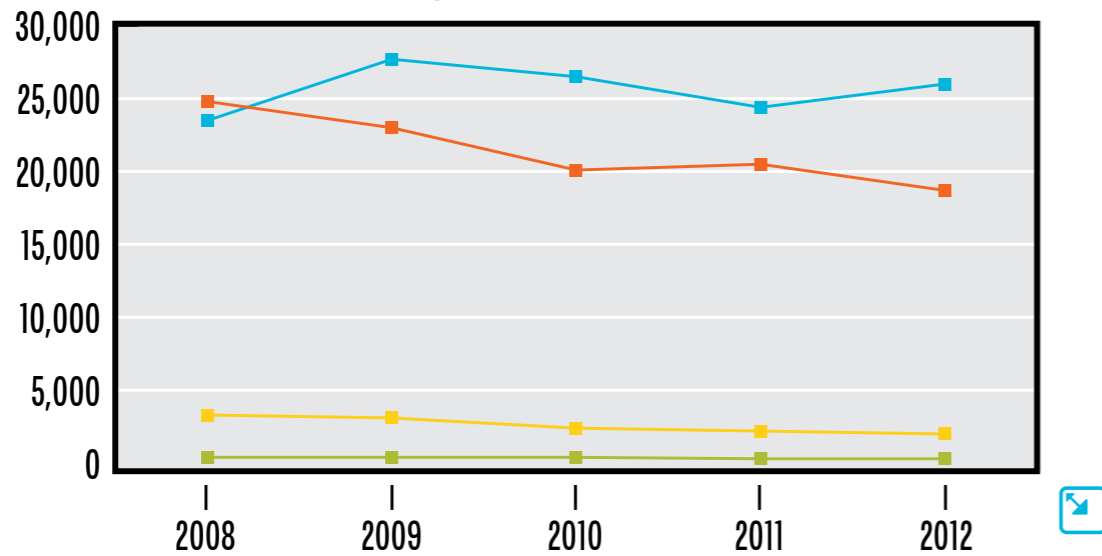
# Water Use and Intensity

Water use and intensity both continue to grow slightly year over year for both U.S. and global company indices. Absolute U.S. water use grew by 1.5 percent between 2008 and 2012, while global use grew by 5 percent. Even on an intensity basis, measured in cubic feet of water per million dollars of revenue, U.S. and global companies were largely unchanged.

Even where there are signs of progress on water, it is tempered by the reality of world economic growth. Between 2010 and 2011, for example, there were improvements in water intensity, indicating more efficient use of water in business. However, the absolute amount of water consumed by businesses continues to rise each year, indicating that overall economic growth is continuing to increase overall water use — a not-very-encouraging sign in an increasingly parched world.

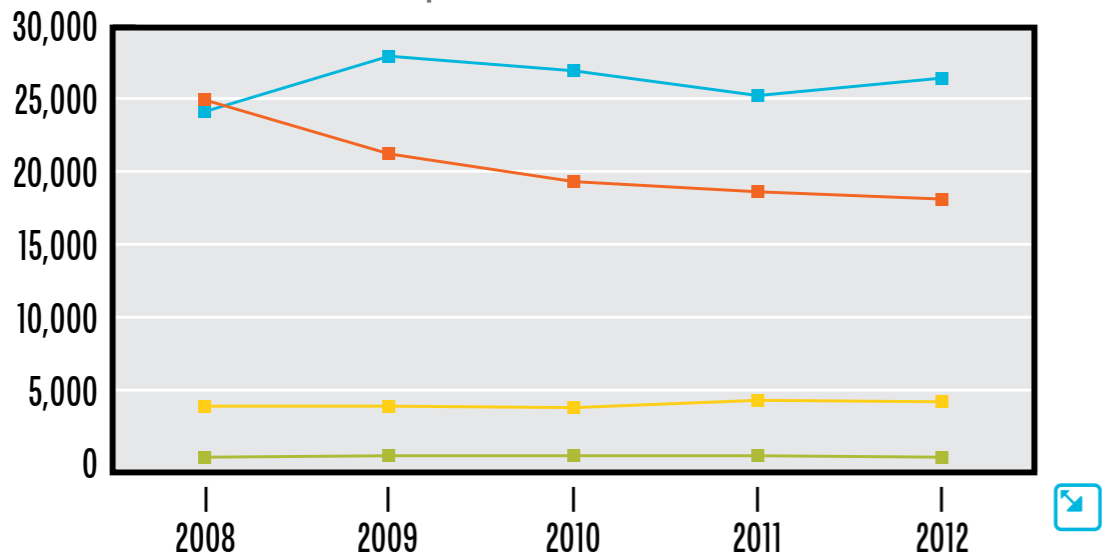
## U.S. Water Intensity

(Cubic feet per million dollars of revenue)



## Global Water Intensity

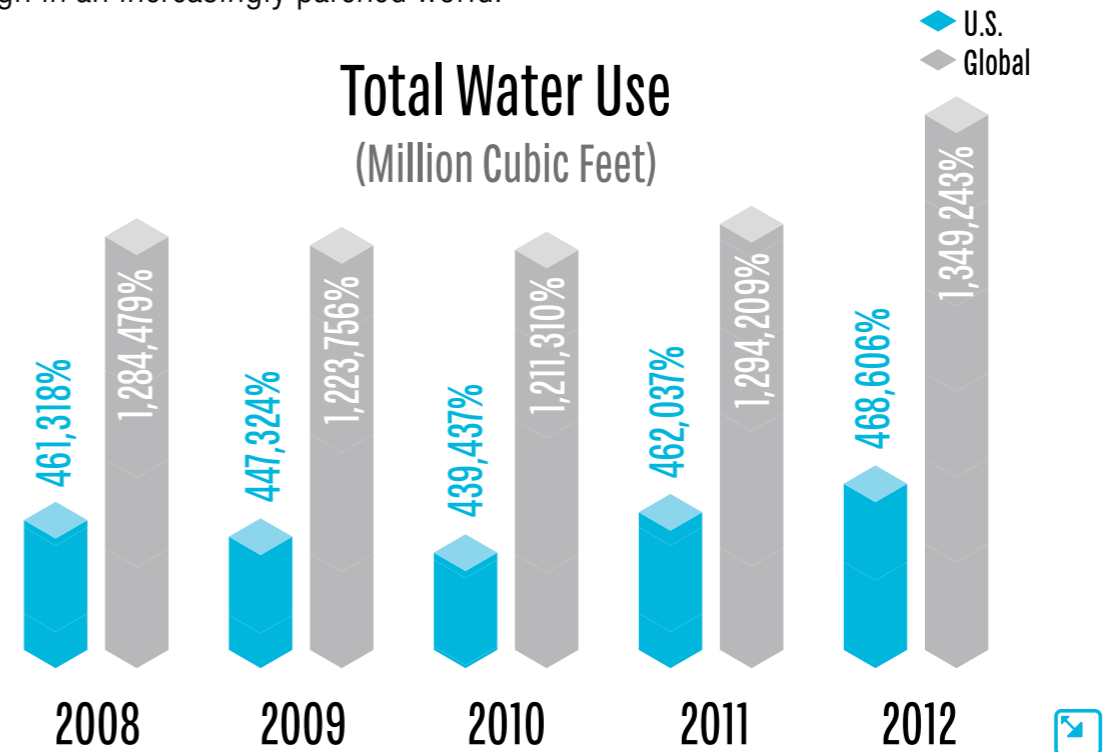
(Cubic feet per million dollars of revenue)



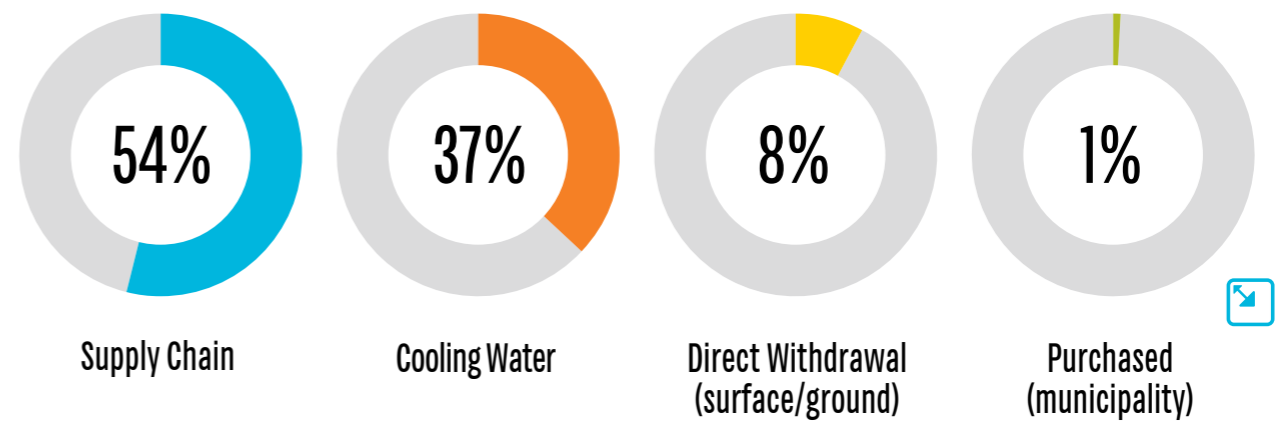
Source: Trucost Data

## Total Water Use

(Million Cubic Feet)



## Water Use by Scope, 2012



Source: Trucost Data

Supply Chain Cooling Water Direct Withdrawal (Surface/Ground) Purchased (Municipality)



# Air Emissions

The past year offered a vivid and painful illustration of what happens when air pollution gets out of control. In early 2013, the level of fine particulate matter in Beijing reached record levels. In October, those records were broken.

The images seen around the world were harrowing: air so thick with irritating and toxic matter that life was severely disrupted. So was the economy: schools, highways and airports were closed; construction was halted on building sites; factories were shuttered. And then there are the costs to human health: According to the World Bank, dirty air and water in China resulted in a 4.3 percent hit to its GDP.

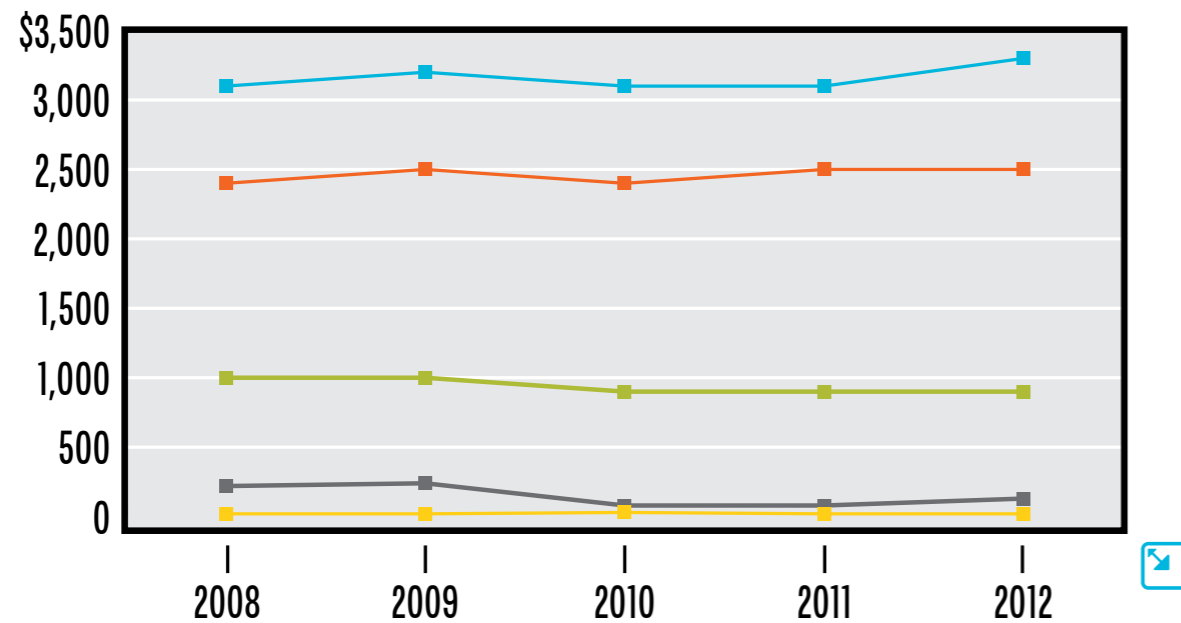
It's not just China, of course. Dozens of big cities are facing their own "air-pocalypse" scenarios. When the online magazine [Quartz named the cities](#) with the world's worst air pollution, four of the top 10 were in Iran; another four were in India or Pakistan. Just

behind those were troubling cases in the emerging economies of Eastern Europe. Notably missing from the list were African cities such as Addis Ababa, Ethiopia; Luanda, Angola; or Brazzaville, Congo, all of which [ranked](#) high on [another most-polluted-cities list](#).

Our data indicate that the corporate contribution to this problem isn't improving very quickly — the total natural capital cost of air pollution has edged up over the past five years, from \$6,800 per million dollars of revenue to \$6,880. Most costs of air emissions by large publicly traded companies are level or slightly growing, with the biggest jump seen in acid rain and smog precursors, largely from coal-fired power plants. Dust and particulates — the primary cause of China's air problems — also notched up in both absolute and relative levels. None of our five measures of air emissions showed any meaningful progress.

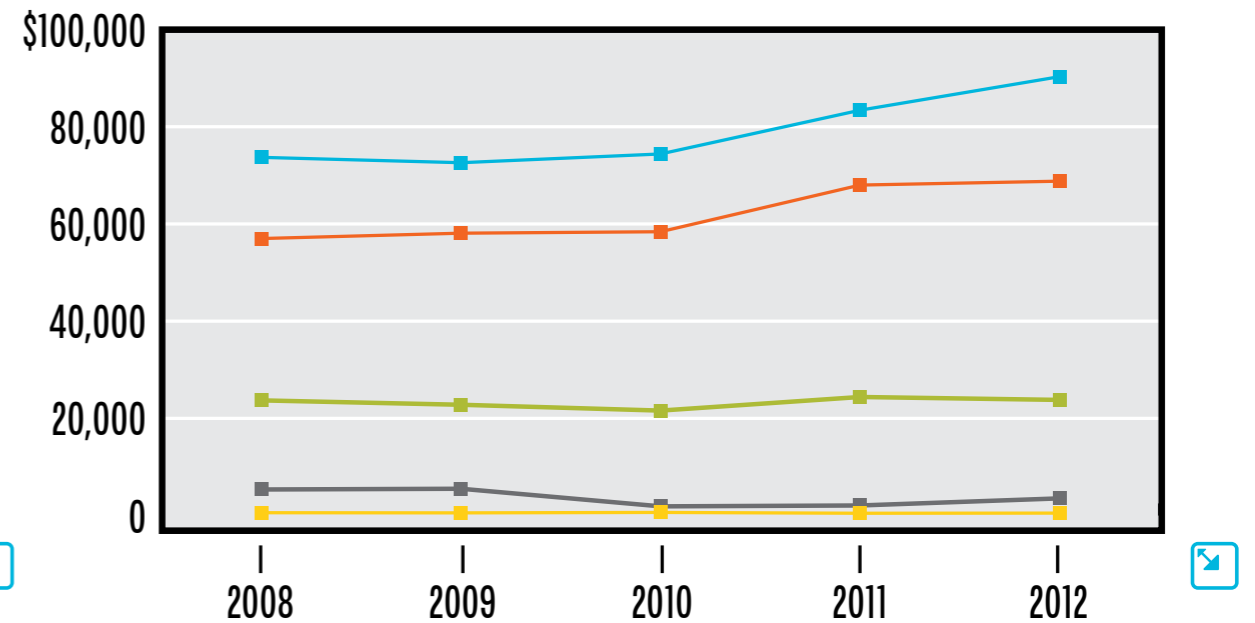
## Global Air Emissions Intensity

(Environmental cost per million dollars revenue)



## Global Air Pollution Total Values

(Environmental cost per million dollars revenue)



Source: Trucost Data

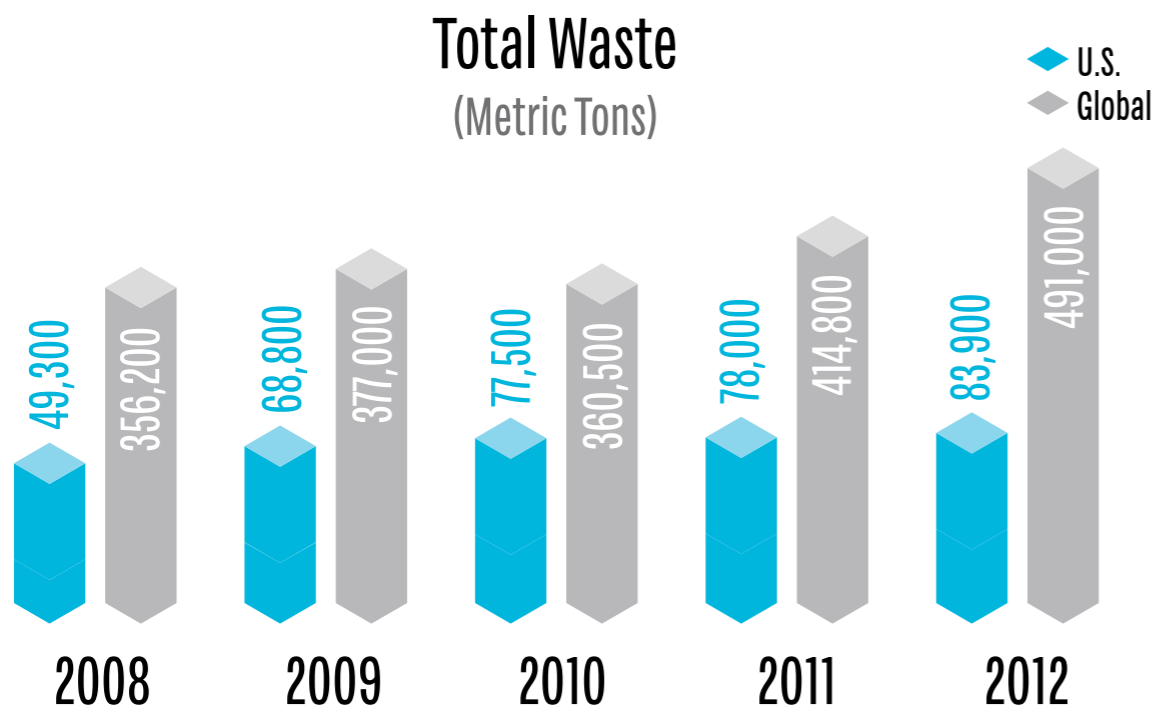
■ Acid Rain & Smog Precursors  
 ■ Dust & Particles  
 ■ Ozone Depleting Substances  
 ■ Volatile Organic Compounds  
 ■ Metal Emissions to Air

## Solid Waste

There are encouraging trends in the world of corporate management of solid waste: Recycling is growing while incineration is dropping. Landfilling is, well, flat, on an absolute basis; on an intensity basis, things are improving measurably in the United States (5.2 metric tons of landfill waste per million dollars of revenue, compared to 6.2 tons in 2009), while companies globally are doing worse (8.6 tons of landfill waste per million dollars of revenue in 2012, compared to 6.7 in 2009).

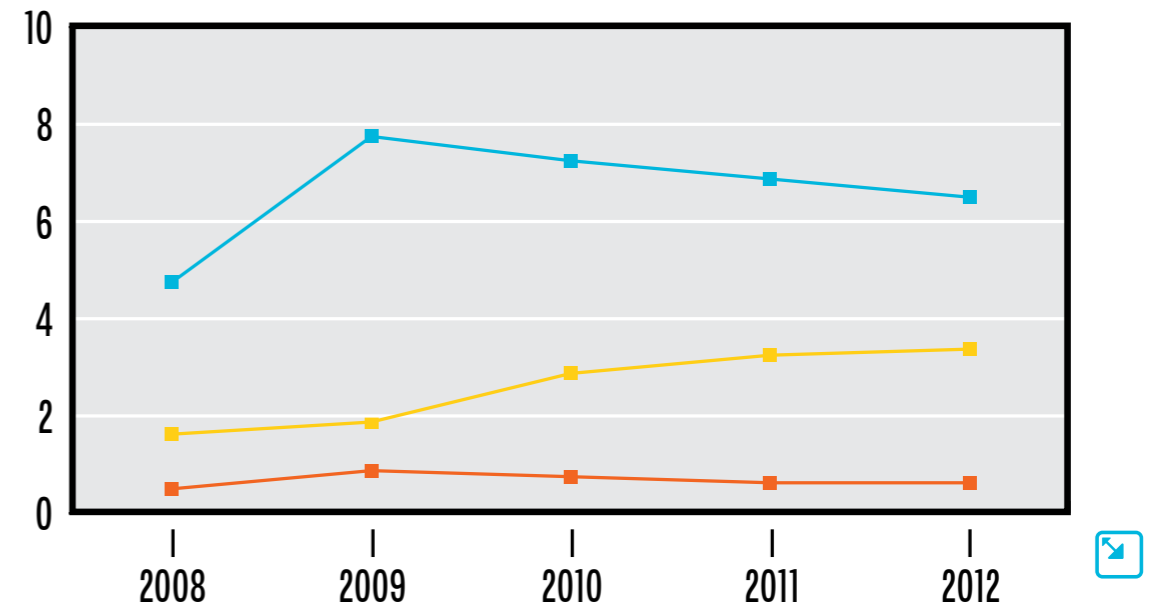
One encouraging driver is the growing number of companies and institutions with “zero waste” or “landfill free” commitments. The number of companies making such pledges seems to be growing. During 2013, for example, MillerCoors said its Golden, Colo., facility had accomplished something no other brewer can claim: landfill-free status. They join other companies with zero-waste or landfill-free achievements: Bridgestone, General Motors, Walmart, DuPont, PepsiCo and others — not to mention other “firsts” that seem to be popping up weekly: the first [zero-waste stadium](#), [supermarket](#), [sports team](#), [city](#) and on and on.

Electronic waste, or e-waste, continues to be a growth area in many countries — both generating it and recycling it. More than 50 million tons of e-waste are produced globally every year, according to the United Nations Environment Program, and is seeing a 40 percent annual growth rate.

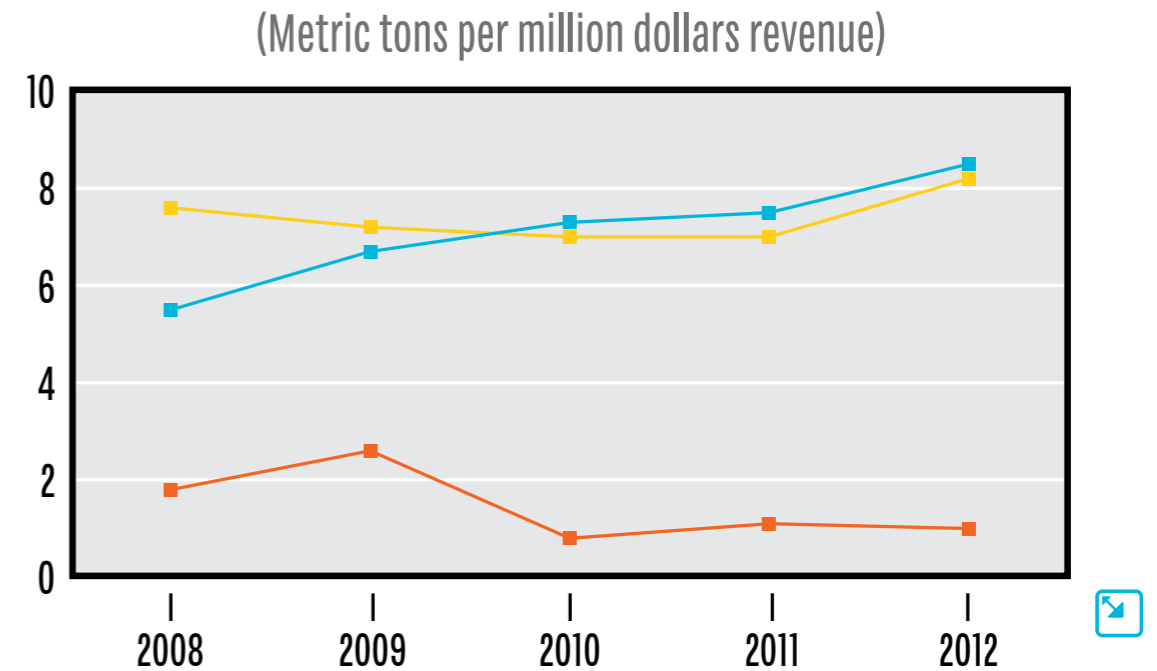


Source: Trucost Data

### U.S. Waste Intensity (Metric tons per million dollars revenue)



### Global Waste Intensity (Metric tons per million dollars revenue)



Source: Trucost Data

Legend: Landfill (Blue), Incineration (Orange), Company Reported Recycling (Yellow)

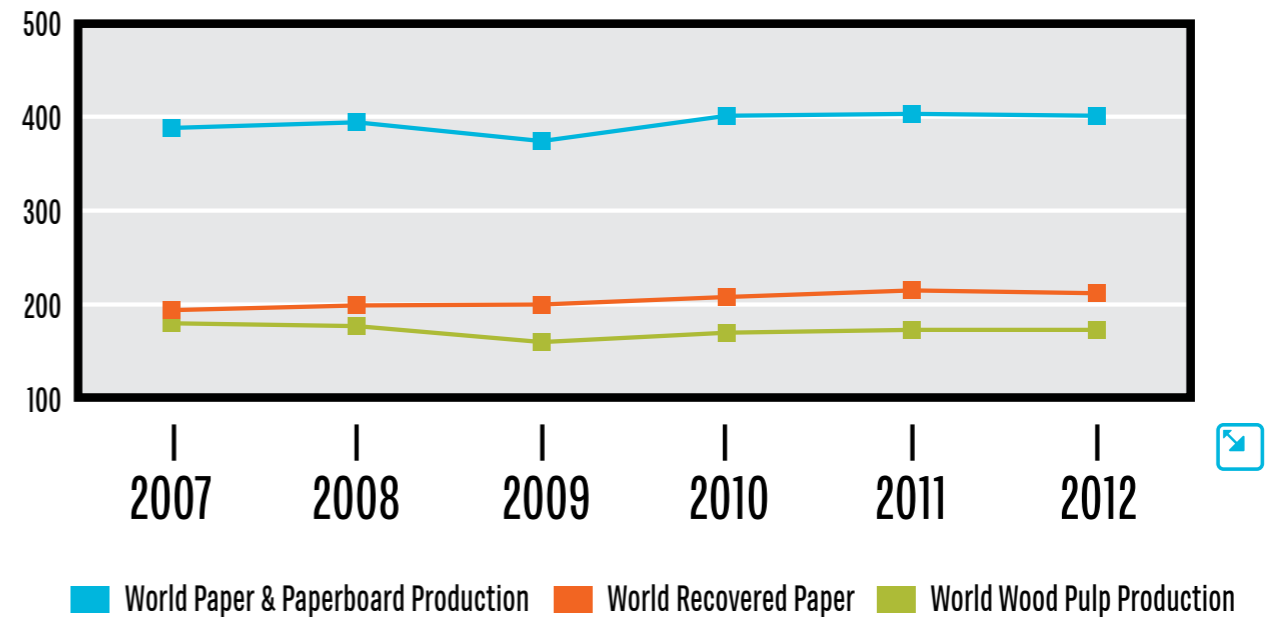
## Paper Recycling

Paper recycling by businesses and consumers around the world, which for years showed gradual increases, seems to have leveled off for the past five years. The percentage of world paper production recovered for recycling remains steady at 53 percent. The rate is lower outside the United States, where the rate for 2012 was 65.1 percent, according to the American Forest & Paper Association, which has a goal of exceeding 70 percent by 2020.

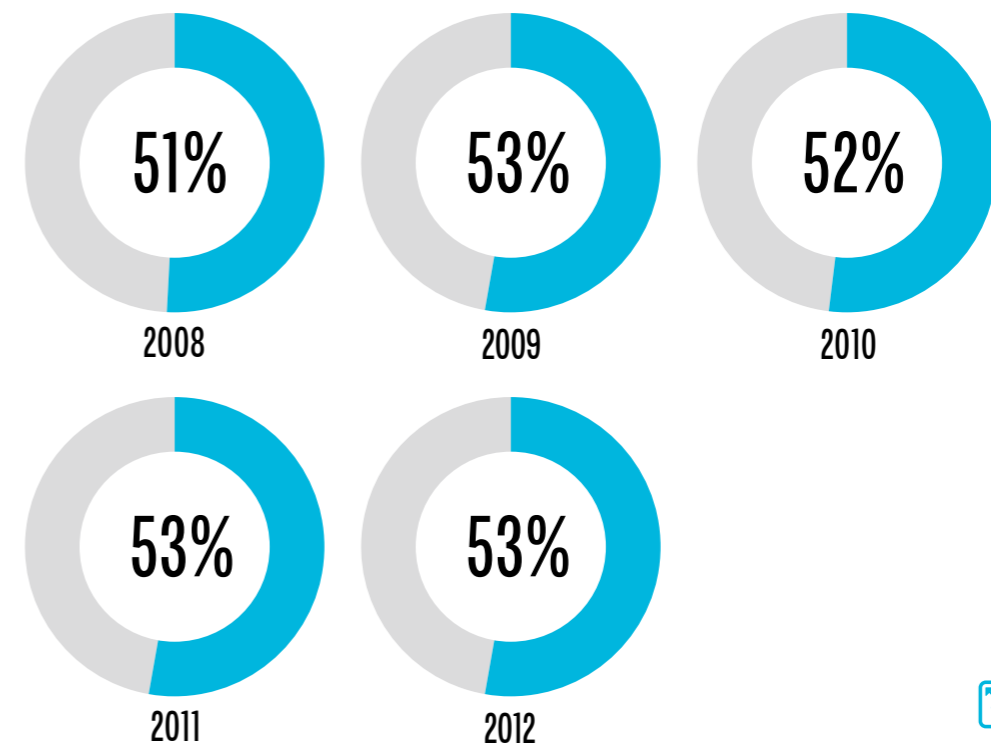


## Global Paper Production and Recycling

(Millions of metric tons)



## Percentage of Paper from Recycled Stock



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



## DISCLOSURE and TRANSPARENCY

The number of companies issuing sustainability reports continues to grow, as it has over the past half-decade, although the amount of data being reported is leveling off. We may soon reach the point where companies have picked the low-hanging fruit on disclosure and transparency. That is, companies are saying most of what they plan to say about their environmental performance and impacts. Have we hit “peak transparency”?

That would be one reasonable interpretation of the data, which shows most of our measurements of disclosure leveling off. When it comes to corporate disclosure of water use and risks, greenhouse gas emissions and other factors, the participation of new companies has slowed. The exception is the disclosure of relatively positive information about investments in environmental or cleantech research and development, or the reporting of profits from environmental products or services — a growing number of companies are telling those stories in their reports.

**We may soon reach the point where companies have picked the low-hanging fruit on disclosure and transparency. That is, they are saying most of what they plan to say about their performance and impacts.**

## Disclosure Trends

Companies are being compelled to disclose their environmental impacts, achievements and commitments, and companies are responding. Reporting on environmental impacts continues to tick upward — a positive trend.

But reporting alone does not equal progress. It simply means that a company is more forthcoming about what it is doing — the good, the bad and the ugly.

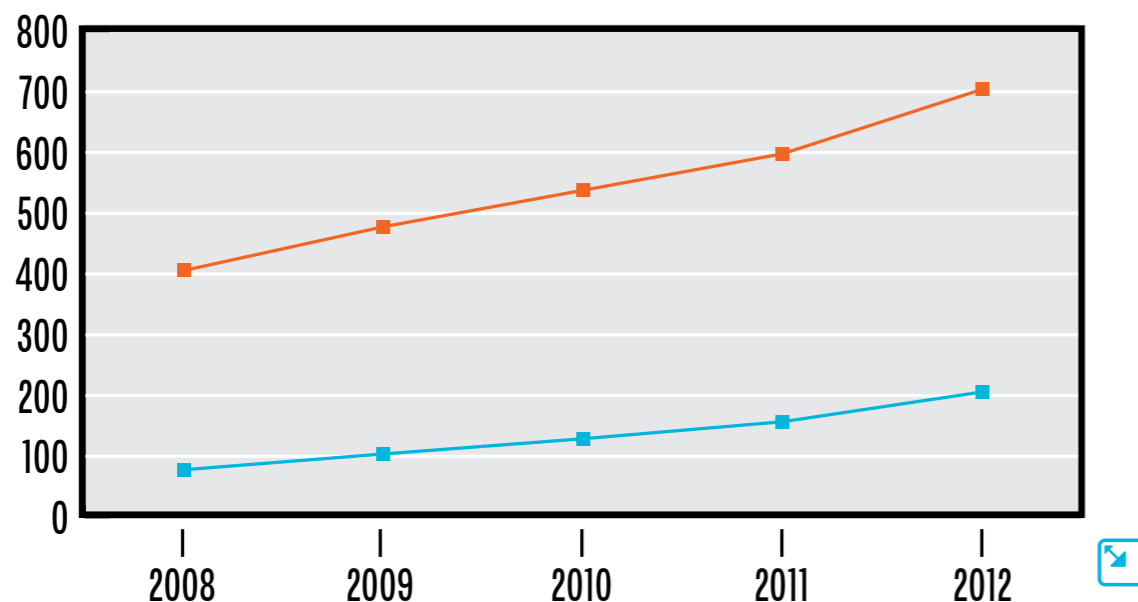
Despite the popular conception of corporate reporting — that it is done primarily to address the needs of customers, pressure groups and other stakeholders — much of the impetus is coming from inside: the need for companies to better understand the risks and opportunities resulting from their use of resources and their waste and emissions. It also provides a means for engaging employees on sustainability and corporate responsibility issues, a key goal for many companies. And, of course, reporting provides a means of communicating with customers and other stakeholders.

As we noted last year, “sustainability reporting” is not necessarily the same thing as “publishing a sustainability report.” Companies disclose information in other ways, such as filings with regulatory agencies as well as to nongovernmental bodies such as the CDP or DJSI.

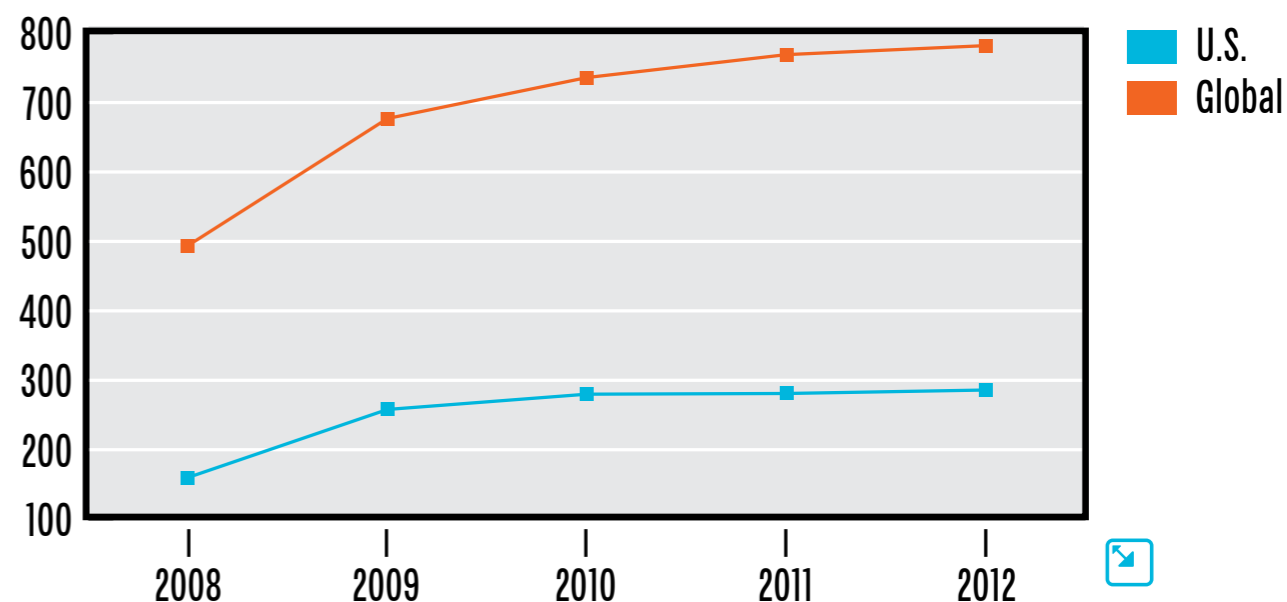
Reporting on both the U.S. and global indices is growing, albeit incrementally, with global companies rising during 2012, widening the gap with U.S. firms. But over a five-year period, the rate of growth for U.S. companies was larger than for global companies.

One encouraging sign is that the biggest growth in sustainability reporting has taken place among sectors that have the biggest natural capital impacts: Food and Agriculture, Basic Resources, Utilities and Chemical. As companies continue to measure and value natural capital, and factor it into their business decisions and metrics, we expect this trend to continue.

### Company Sustainability Reporting (Standalone reports)



### Company Sustainability Reporting (Other disclosures)



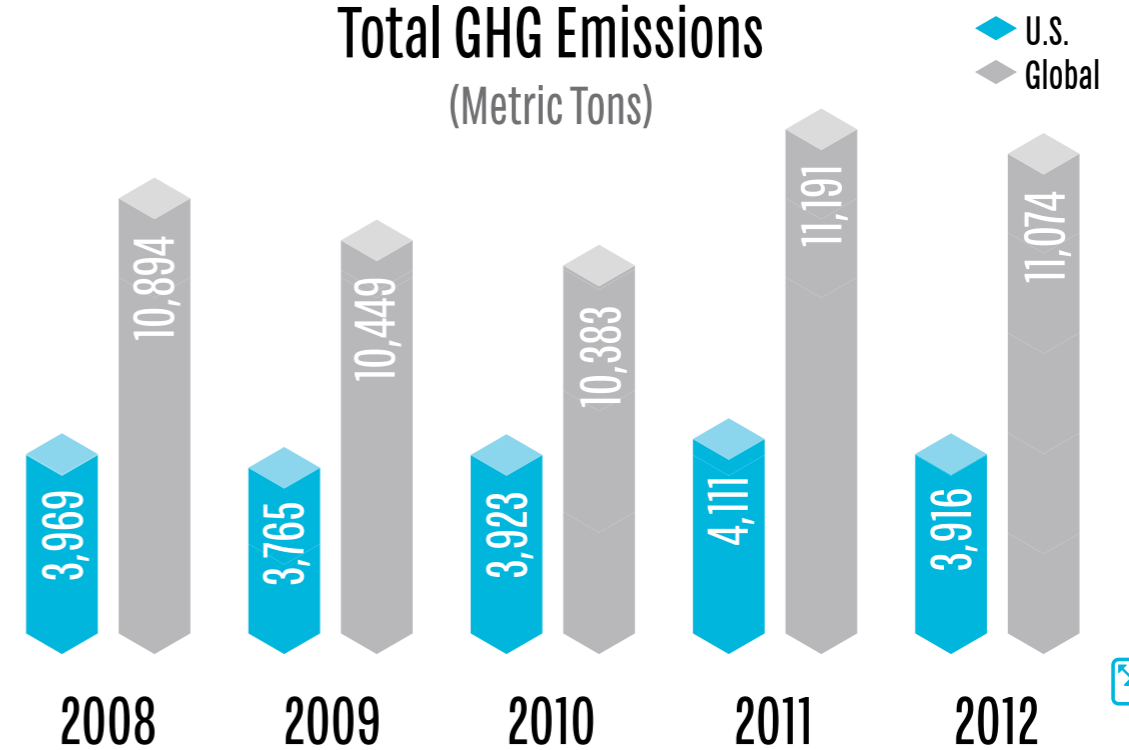
Source: Trucost Data

# Greenhouse Gas Emissions Reporting

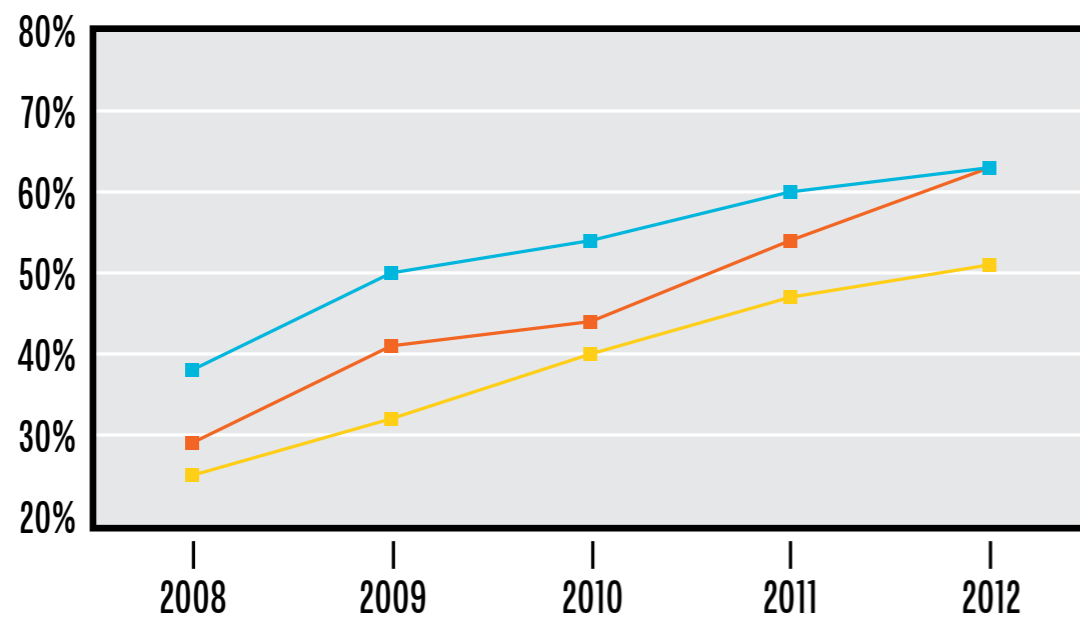
Companies around the world continue to increase their reporting of greenhouse gas emissions, as our indicators show growth on all dimensions for both U.S. and global companies. Reporting has now broken the 50 percent barrier for all three scopes, meaning that the majority of companies in both indices are now reporting their Scope 1, 2 and 3 emissions. However, the rate of growth has decreased in most instances.

This year, for the first time, we are also tracking the growth of greenhouse gas reporting at the product level. A small number of companies — 7 percent of our U.S. sample and 11 percent of the global companies — are now providing product-level GHG reporting. Just two years prior, only 4 percent of both groups were doing this.

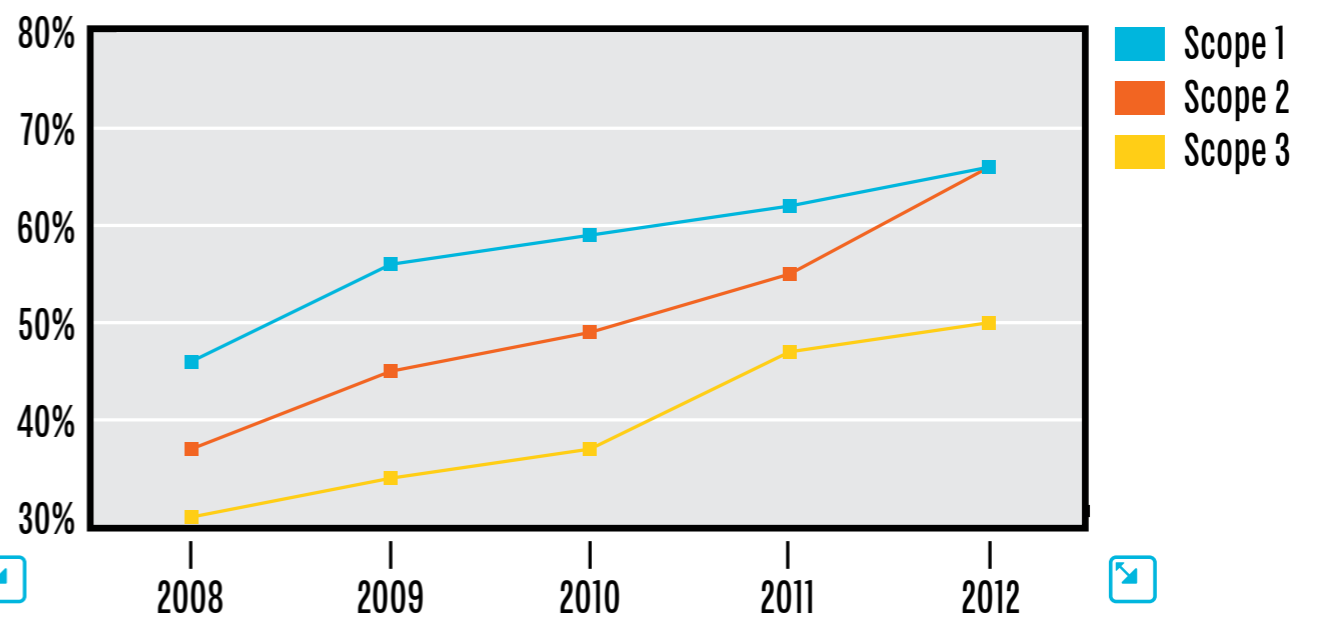
## Total GHG Emissions (Metric Tons)



## U.S. Greenhouse Gas Reporting by Scope (Percentage of companies reporting)



## Global Greenhouse Gas Reporting by Scope (Percentage of companies reporting)



Source: Trucost Data

## Water Risk Reporting

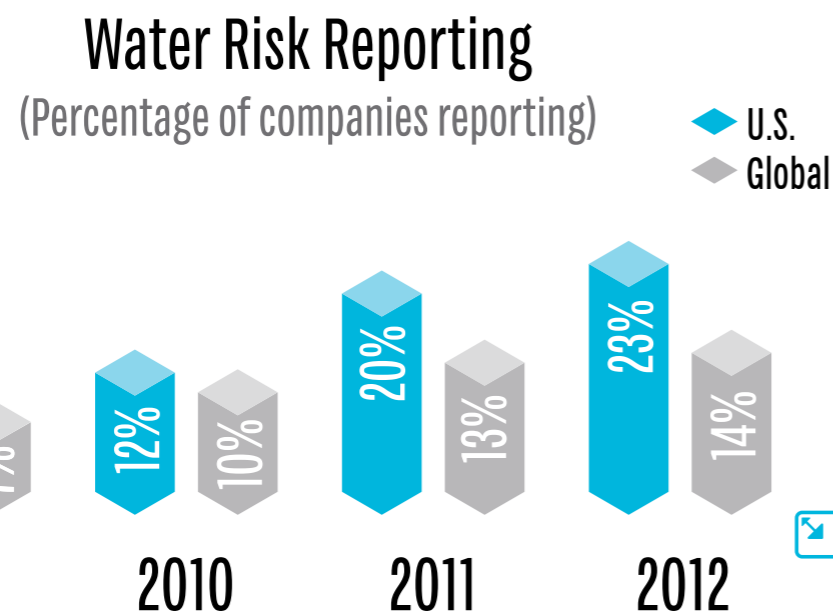
Corporate reporting on water risks — business operations in water-stressed areas, for example — leveled off in 2012, after growing the previous few years. In 2012, reporting by global companies inched up from 13 to 14 percent while U.S. firms grew slightly faster: 23 percent reported in 2012, up from 20 percent a year earlier.

These numbers should be growing faster. As noted earlier in this report, water risks have risen to a higher level of focus inside many companies, including those that aren't themselves significant users of water but whose supply chains may be dependent on water-intensive processes. The fact that risk disclosure is not growing in lockstep with the level of concern seems to be a disconnect that we'll continue to watch.

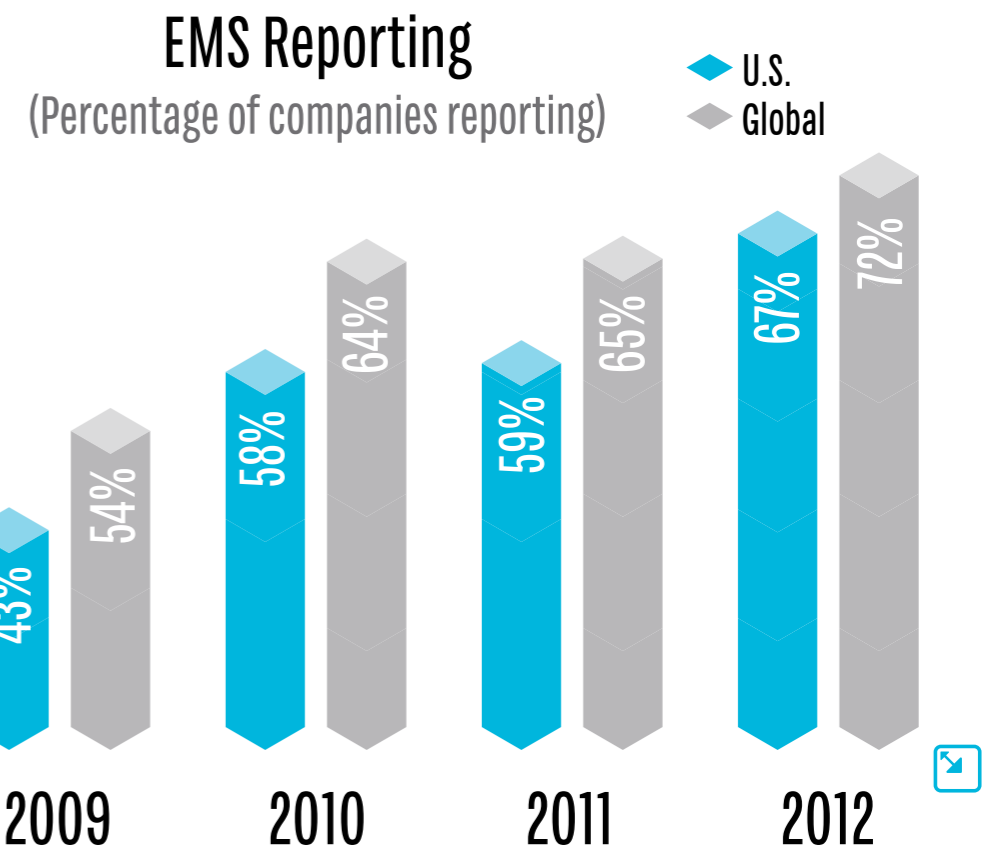
## Environmental Management Systems Reporting

An environmental management system, or EMS, is a framework to measure and manage environmental goals. They are becoming increasingly commonplace, as has corporate disclosure of EMS practices. Both U.S. and global firms showed a significant jump in disclosure of these systems and practices.

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



Source: Trucost Data



Source: Trucost Data

## Overall Transparency

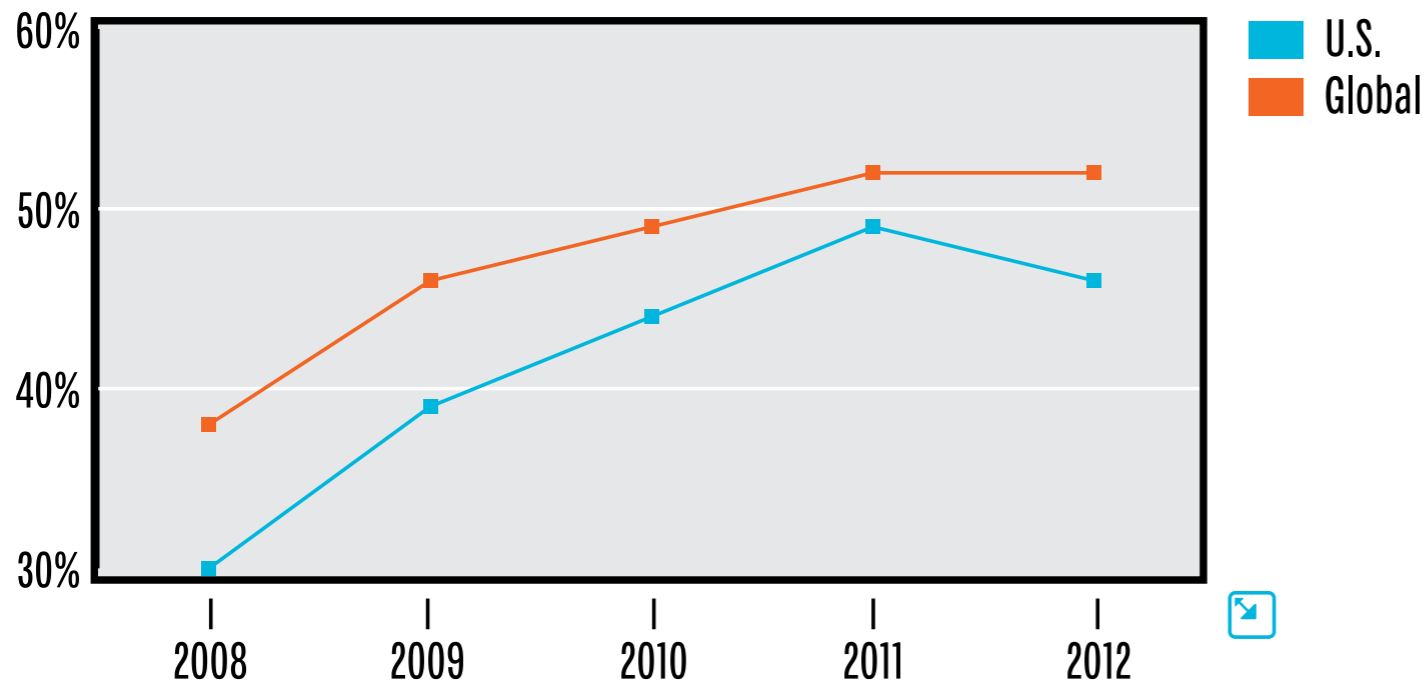
This indicator shows the percentage of companies' total environmental impacts that they disclose, as measured and assessed by Trucost. Each year, Trucost tracks more than 700 environmental impacts of more than 4,000 companies — such things as greenhouse gases, emissions contributing to smog or acid rain,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

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

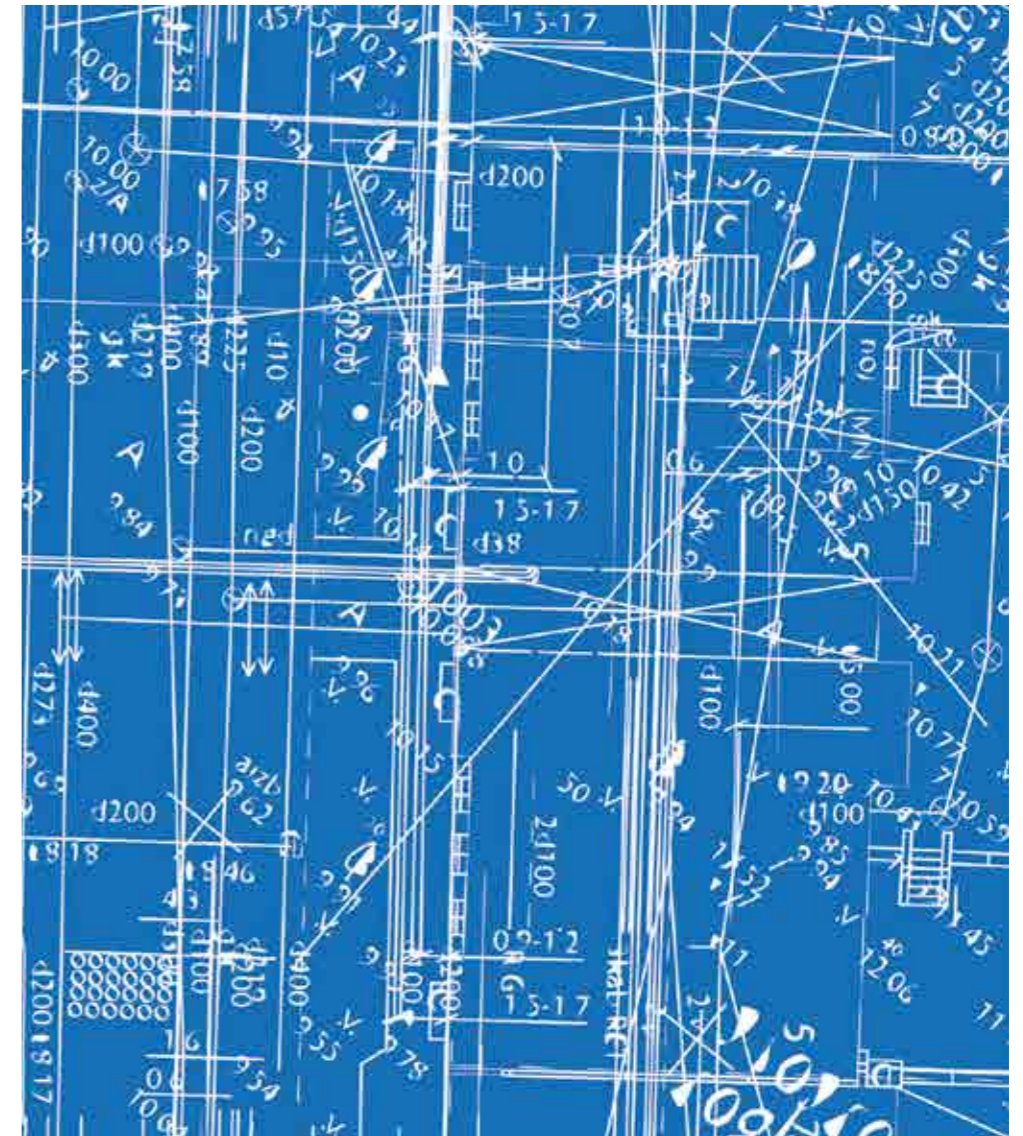
In 2012, disclosure scores dropped slightly for both U.S. and global firms. Moreover, the percentage of companies providing no disclosure held steady for both U.S. and global firms, suggesting that companies have hit “peak transparency.”

### Disclosure Score

(Percentage of total environmental costs disclosed)



Source: Trucost Data



**Half of all direct impacts are not being recognized by companies.**





## Third-Party Assurance

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

The UK government notes that third-party data assurance is key to obtaining reliable and accurate data, important to allow investors to use the data to make investment decisions and protects companies from the risk of reporting inaccurate figures. Most assurance services also provide valuable guidance on opportunities to improve reporting procedures to achieve best practice standards.

This indicator, like the overall disclosure score, remains steady, with no growth in the number of companies using third-party assurance for their sustainability reports. This is yet another indication that overall sustainability reporting may have peaked. **E**

### Companies Using Third-Party Assurance for Sustainability Reporting



Source: Trucost Data



# CORPORATE LEADERSHIP

In this final section, we assess leadership initiatives — company investments in cleantech and environmental research and development, purchases of renewable energy and development of green office space. These, we believe, are indicators of near-term progress.

This is a decidedly more upbeat set of indicators, showing sustained progress over the five-year periods we examine. It suggests that there exists a set of market drivers — increased demand for green office space and renewable energy, for example — with more innovations coming. Combined, this will continue to drive reductions in resource consumption and emissions.

These don't always go hand in hand, of course, and as we noted earlier about natural capital, efficiency measures don't necessarily translate to environmental improvements in an ever-growing economy.

But the innovations we measure are ones largely focused on low-carbon solutions, suggesting that future economic growth will at least slow, if not reverse, environmental decline.

That's an encouraging sign and a positive omen for the future.

**The innovations we measure are ones largely focused on low-carbon solutions, suggesting that future economic growth will at least slow, if not reverse, environmental decline.**

## Cleantech Patents

To gauge the state of cleantech innovation, we looked at the growth of cleantech patent filings and grants issued in the United States, as well as those in other patent offices and through the World Intellectual Property Office. Known as WIPO, that organization allows parties to put placeholders for their inventions in multiple national patent offices, since true international patents do not exist.

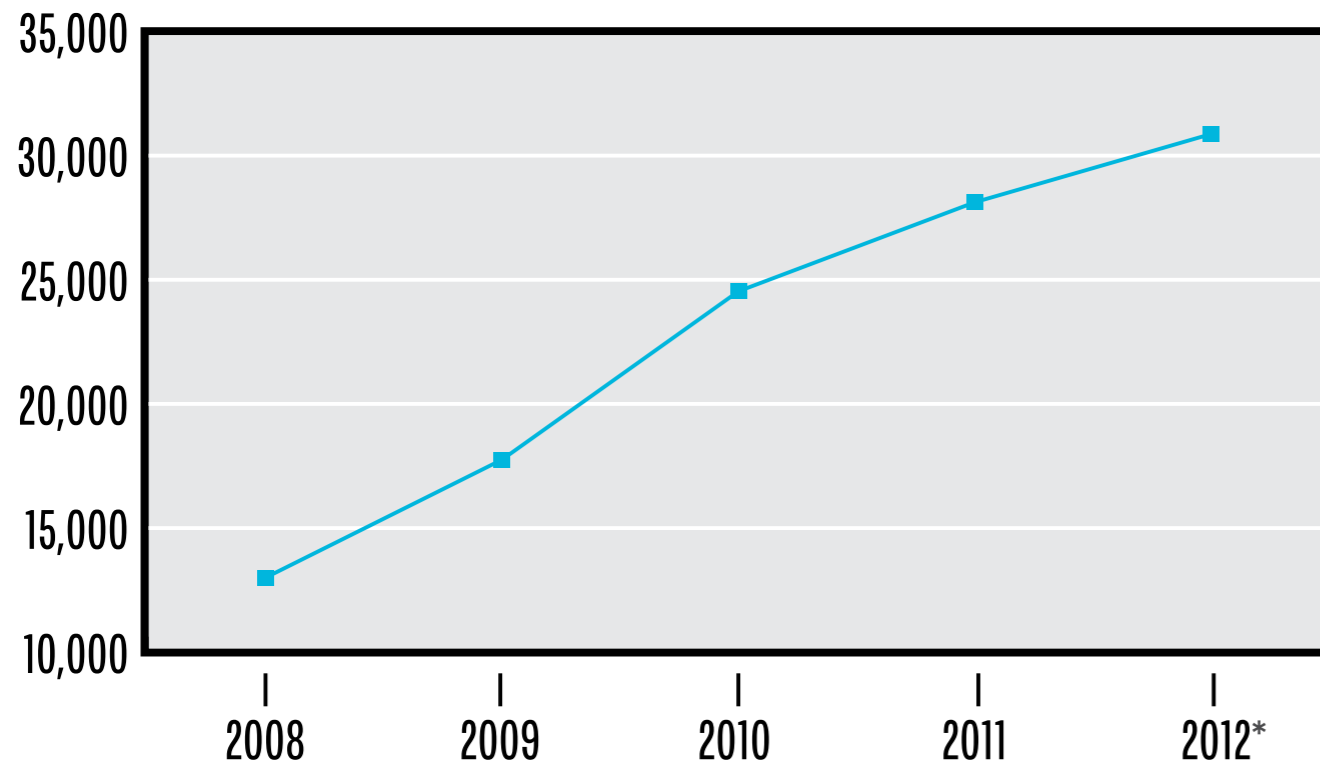
This year's story is part of what has become a steady drumbeat of innovation, year after year. The number of cleantech patent publications has more than doubled in five years, an astonishing rate of innovation — and a leading indicator of greener products and services still to come. So, too, with wind energy. What innovations will those patents bring? How will that affect the price and performance of solar and wind technology? Clearly, the final

chapters for those technologies are far from over, making hash of some critics' claims of a "cleantech crash."

It's not just solar and wind. Patent publications grew for all of the clean technologies during 2012 save two, geothermal and hydropower (though both were still up in 2012 compared with 2008).

As seen in the table below, Japanese companies are leading the pack, although American, Korean and German companies are among the top patent recipients. China, which is the most aggressive country when it comes to the growth of renewable power, is notably absent.

### Cleantech Patent Filings



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

### Top Cleantech Patent Companies, 1981-2012

Toyota	13,586
General Electric	9,294
Honda Motor Co	8,034
3M	6,706
Siemens	6,563
Panasonic	6,515
Samsung	6,506
Robert Bosch	5,856
Dupont	5,779
Hitachi	5,724

Source: World Intellectual Property Organization

## Green Research & Development

There is a bright spot in the growing amount of money companies report they are investing in environmental research and development. These investments in innovative technologies, new materials, and more efficient processes stand to accelerate change over the long term. They grew for both U.S. and global companies during 2012, as they had for the past few years, even throughout the recession.

Still, there is much that this data does not tell us. For one thing, while we know how many firms are publicly disclosing green investments, these disclosures do not always come with dollar (or euro or yen) figures. Some of these investments may be normal efficiency improvements that companies regularly make, but singled out as “green” because they will have positive environmental impacts in addition to saving money or improving operations. On the other hand, companies are always working to improve the efficiency of their products and processes, so some of what we would consider green investments might not be called out as such — they may just be more efficient or higher-performing versions of previous products.

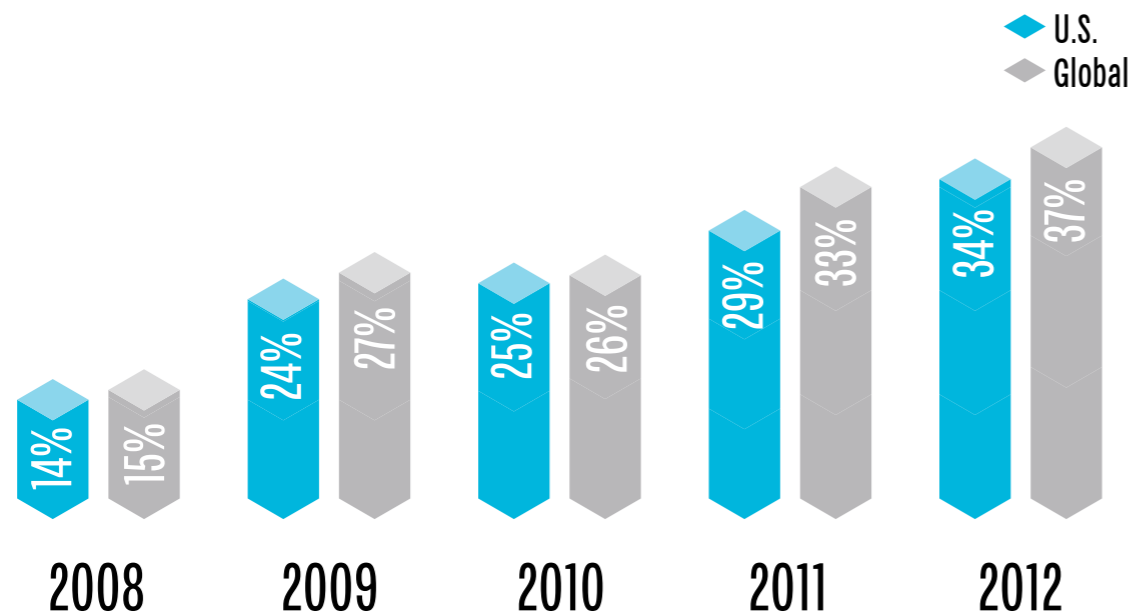
So essentially, how companies disclosed these investments depends largely on their own subjective interpretation of what “green investments” means.

The view from the cleantech investment community is clearer: global investments and deals were down in 2013, as they were in 2012, according to the Cleantech Group’s analysis. Cleantech venture investment in 2013 reached \$6.3 billion during 2013, down about 15 percent from 2012.

It is important to point out that venture capital cleantech investments don’t necessarily reflect those of the corporate sector. Indeed, there may be an inverse relationship: As technologies mature, corporate investments take over from venture capitalists to help bring products to market.

Either way, the corporate uptake in green R&D is an encouraging sign, and a leading indicator of technology breakthroughs — and the efficiencies and carbon reductions they can bring — in the years ahead.

## Companies Reporting on Environmental R&D or Investments



Source: Trucost Data

**How companies disclosed these investments depends largely on their own subjective interpretation of what “green investments” means.**

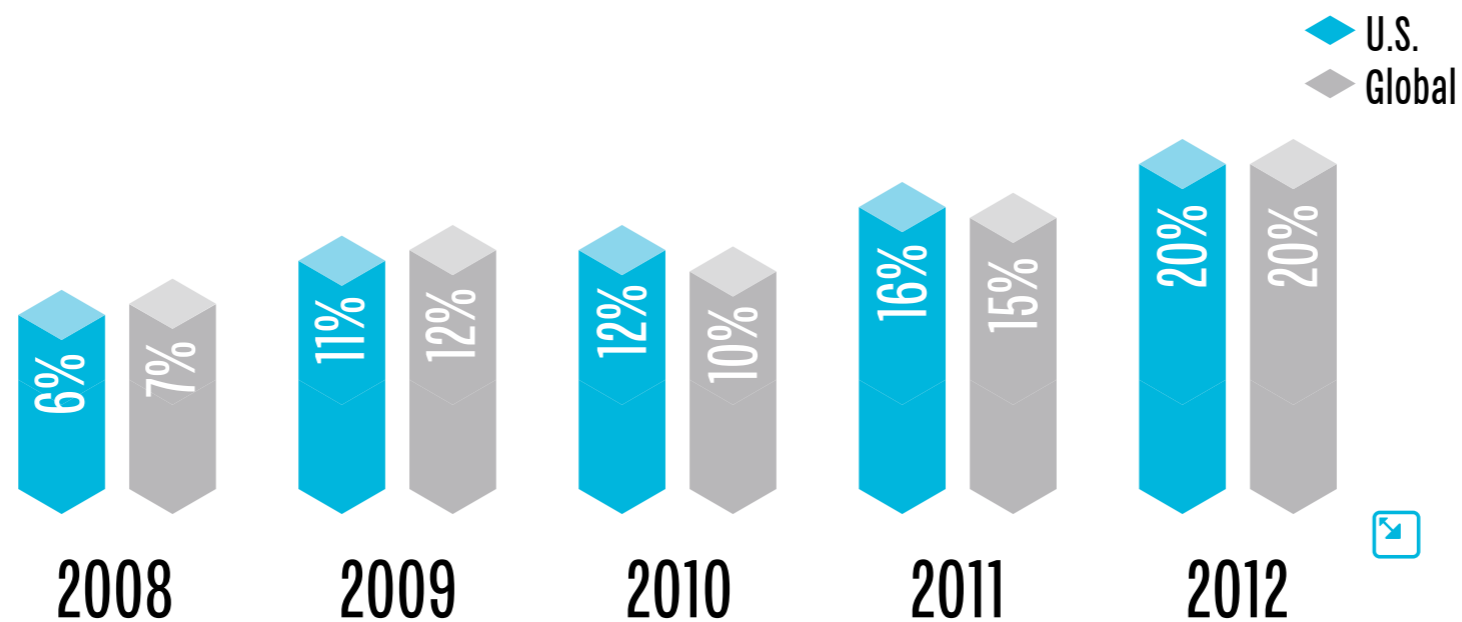
## Environmental Profits or Savings

This indicator tracks the number of companies talking publicly about specific outcomes — such as profits within a certain line of business, or returns on improved operational efficiency — resulting from their environmental innovations and lines of business. Between 2008 and 2012, the percentage of U.S. firms disclosing such profits nearly tripled, from 7 percent to 20 percent. Globally, the trend upward was roughly the same, from 6 percent to 20 percent.

Information about financial outcomes of environmental initiatives needs to be viewed in context. Most of this information does not reveal costs or investments, let alone returns on investments — it shows only that profitability was disclosed.

Nor do we know from this whether and how such profitability is driving each firm's larger business goals; it might take some extra digging for readers of these reports to understand whether the profits are material relative to the company's overall revenue. Since these are voluntary disclosures, they are used largely for marketing purposes. This indicator, therefore, is likely showing a positive bias.

### Companies Reporting on Environmental Profits or Savings



Source: Trucost Data

## Green Power

The amount of electricity derived from renewable or low-carbon sources continues to increase every year — though only slightly. Despite the robust growth of solar and wind installations around the world, renewables only ticked up about 4 percent during 2012, as measured in total gigawatt-hours of electricity delivered. As a slice of overall global electricity use, renewables barely budged — they increased from 20.07 percent in 2011 to 20.34 percent in 2012. More significantly, when removing hydropower from the mix, renewables accounted for just under 4 percent of global electricity generation in 2012.

That seems wholly inadequate in a world racing to decarbonize its fuels and energy sources.

It is, suffice to say, a challenging environment for renewables. According to the International Energy Agency:

*“The story of renewable energy development is becoming more complex. Short-term indicators in some regions of the globe have pointed to increased challenges. Despite remaining high, global new investment in renewable energy fell in 2012. Policy uncertainties, economic challenges, incentive reductions and competition from other energy sources clouded the investment outlook for some markets. Some countries and regions have faced difficulties in integrating variable renewables in their power grids.*”

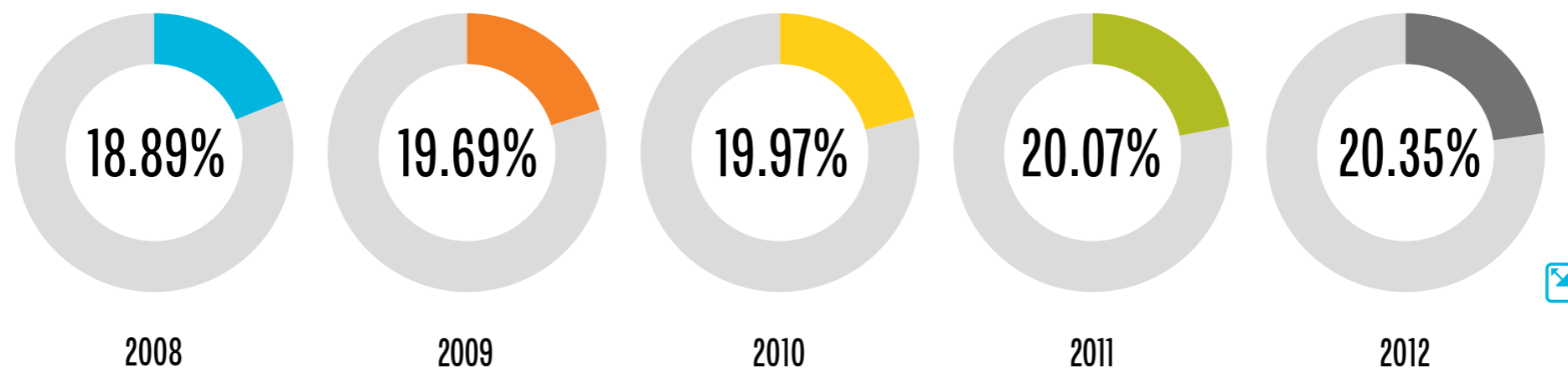
*“The renewable manufacturing industry, particularly solar and wind, entered a deeper period of restructuring and consolidation.”*

Still, the IEA is moderately bullish on renewables. According to its 2013 [Medium-Term Renewable Energy Market Report](#), renewable power is expected to increase by 40 percent in the next five years. Renewables are now the fastest-growing power generation sector and will make up almost a quarter of the global power mix by 2018, up from the current 20 percent. The share of non-hydro sources such as wind, solar, bioenergy and geothermal in total power generation will double, reaching 8 percent by 2018.

That’s encouraging, but only somewhat. The International Energy Agency says the world will need about 48 percent of total electricity generation sourced from renewable energy by 2035, if it is to meet the stated climate change goals of international governments — 450 parts per million of carbon dioxide concentration, never mind the lower levels some scientists are advocating to ward off the worst impacts of global climate change. The IEA said four years ago it would take \$1 trillion a year in new infrastructure projects by 2030 to make the shift from a coal- and oil-based economy to the cleaner fuels and technologies that would help keep global warming below a 2° C threshold.

At the current rate of growth, we are far off from that trajectory.

### Global Green Power Production as Percentage of Total\*



\*Includes Hydroelectricity

Source: International Energy Agency

## Green Office Space

The amount of green office space, measured in gross square feet as certified under the LEED Green Building Standard, continues to grow. But that's only part of the story. What's noteworthy about the latest generation of office space isn't just its quantity, but also its quality: Technology and new approaches to green building are ramping up new levels of energy efficiency, while a push to make buildings healthier for occupants is also gaining steam.

The tech piece is part of the inexorable march of progress for technology in general, but it seems to be reaching a tipping point. "Smart building technology is sweeping the commercial building industry," says Dan Probst, Chairman of Energy and Sustainability Services, Jones Lang LaSalle. "These new systems, based on sophisticated monitoring and analysis of building equipment, are revolutionizing the way buildings operate. They optimize performance through review and control by continually looking inside equipment and systems. The smart technology then determines what needs to be adjusted or fixed — before equipment failures occur and before costs for inefficient operations are incurred."

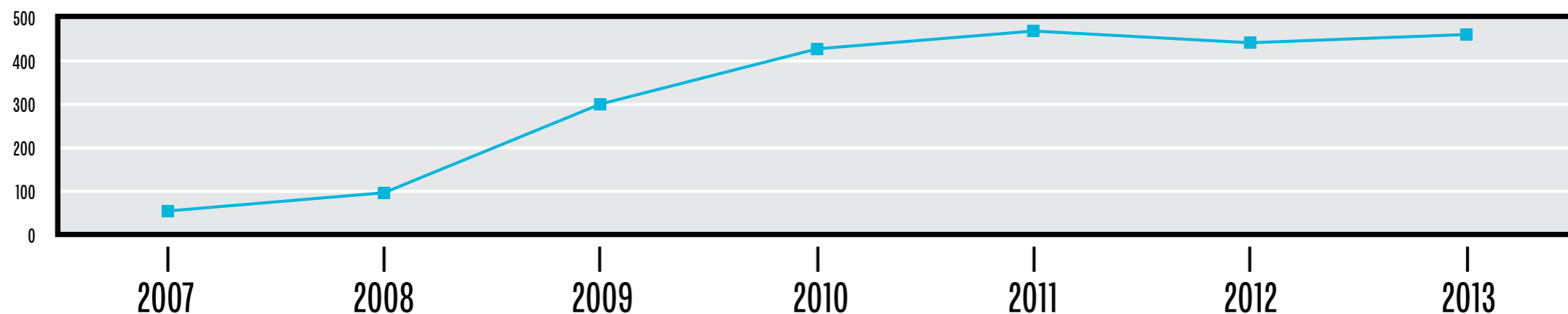
In addition to energy efficiency benefits, these systems require little to no capital investment. They leverage the cloud and sophisticated algorithms unavailable in standard building control systems to provide continuous oversight and remote control, boosting efficiency in real time.

Another positive trend is the increase of Health Product Declarations, or HPDs, a standardized format for manufacturers to disclose product contents, emissions, and health information to help designers, specifiers, and building owners and occupants make informed purchasing decisions. Think of it as a "nutrition label" for building materials. Over the past two years, HPDs have become a fast-growing part of the green building marketplace, taking the industry past energy efficiency and other aspects of building operations to consider the well-being of occupants. That's a positive development.

**New building systems leverage the cloud and sophisticated algorithms to provide continuous oversight and remote control to make buildings run more efficiently in real time.**

### Global LEED-Certified Commercial Projects

(Millions of gross square feet)



Source: U.S. Green Building Council

# VERGE

## Trends to Watch IN 2014

**Elaine Hsieh** VERGE Program Director &  
Senior Analyst, GreenBiz Group



It's become clear that traditional business models and markets are ripe for disruption. Technology is accelerating many of these disruptions, enabling sustainable solutions that are efficient, distributed, open and collaborative.

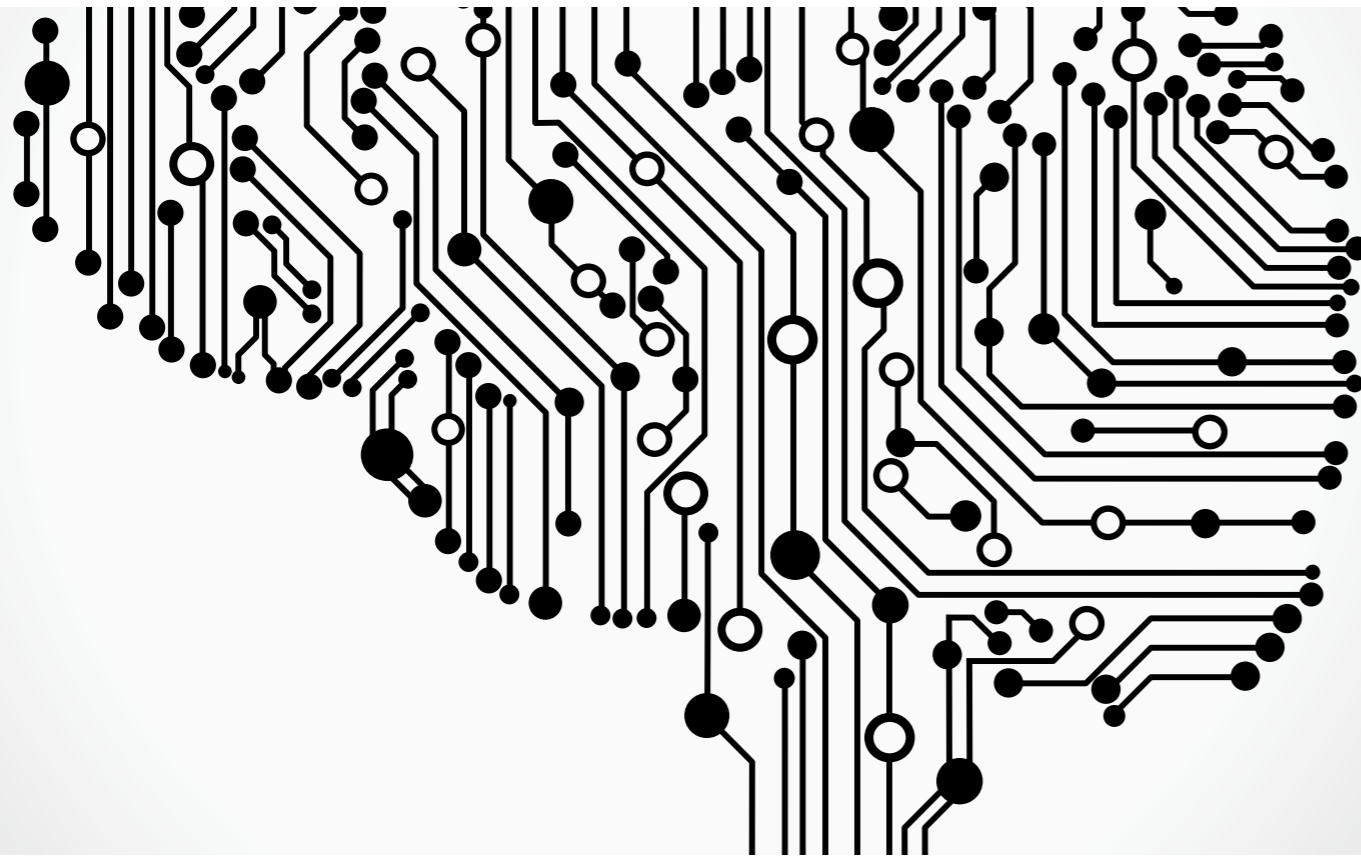
"Technology meets sustainability" is the theme at our annual VERGE conferences, which bring together leaders from both tech and sustainability to look at opportunities for large companies, startups and cities.

Here, in no particular order, are some of the tech trends we anticipate seeing more of this year.

### **1. INFLECTION POINT FOR THE 'INTERNET OF THINGS'.**

Machine-to-machine technologies and the automated management and optimization of energy, manufacturing and transportation have become mainstream, and the demand for more intelligent, connected technologies for businesses and cities is growing. Cisco recently estimated this market as a \$4.6 trillion public-sector opportunity alone.





These devices are catalyzing new levels of resource efficiency and carbon reductions, and the business case for connected, data-centric solutions is already here.

## 2. SURGE OF CLEAN ENERGY.

While renewable portfolio standards have forced utilities to bring more clean energy sources online over several years, tech companies like Google, Facebook and eBay are pushing utilities further by proving that there is a business case to demand solar, wind and other clean energy sources for their energy-intensive data centers around the world. For businesses and homeowners, financial innovations are rapidly increasing the use of rooftop solar, and energy storage innovations are enabling this growth. Distributed generation and microgrids will only gain momentum as communities seek to be more resilient.

## 3. UTILITIES' EVOLVING BUSINESS MODELS.

As demand for clean, reliable energy grows, utilities are starting to lose value and their traditional model is being disrupted. Germany's electricity market evolution is a clear example of what happens when utilities face this existential threat. Case in point: RWE, Europe's second largest utility, decided to shed its traditional business model to become a renewable energy provider when faced with market pressures. Companies like Walmart are increasingly turning to clean, distributed energy sources as part of their sustainability goals. But there are ways where utilities can embrace distributed systems like microgrids toward a mutually beneficial future and even lead the way.

**Tech companies like Google, Facebook and eBay are demanding solar, wind and other clean energy sources for their energy-intensive data centers.**

## 4. BIG DATA SIMPLIFIED.

When data is cheap and plentiful, it takes a lot of work to make it useful. The emergence of smart sensors with brain-like algorithms in devices that are designed with users in mind provides companies with a massive opportunity to use relevant data to increase transparency and traceability, and create radical efficiencies at all levels.

## 5. TRANSPORTATION TRANSFORMING.

Autonomous technologies, electric vehicles and cleaner fuels are just some of the catalysts changing the transportation industry. The success of Tesla has driven other companies like General Motors to up their EV game, and our aging infrastructure to support these technologies must transform as a result. Google's self-driving car is no longer an anomaly. Volvo is releasing 100 driverless cars onto public roads in Sweden to test their safety and efficiency at a large-scale. On the heavy-trucking side, Walmart is looking into fuel-neutral engines and hybrid systems leading to more efficiency and advancement of alternative fuels.

## 6. SYSTEMS-THINKING FOR COMPANIES.

There is growing recognition of the need to create interoperability in order to accelerate and scale cleantech solutions. The ability to build microgrids, for example, is hampered by a lack of solutions that enable various technologies and components to work together. The EV charging infrastructure is one example of an industry where technologies and companies are beginning to create interoperability standards and solutions.

In last year's *State of Green Business* report identified a phenomenon we called "peak sustainability." We noted that the wave of major companies hiring their first full-time sustainability executive crested in 2008 and by 2012 had fallen back to the relatively low level seen in 2003. It made us wonder if everyone who's coming to this party has already arrived.

Our latest survey of the 3,400-plus members of the [GreenBiz Intelligence Panel](#) hasn't made it any easier to read the green tea leaves. While environmental health and safety (EHS), corporate social responsibility (CSR), and green product development budgeting remain relatively flat, panel members identified a marked increase of investment in environmental and sustainability activities. While that may make your head hurt, it just might point to a significant change in how companies are pursuing the sustainability agenda. Let's do the numbers.

#### **COMPANY BUDGETS ARE FLAT.**

Traditional metrics aren't telling much of the story. Eighty-one percent of our panel members said EHS spending in 2014 will be equal to or greater than

last year's 79 percent. CSR spending held constant, with 82 percent spending as much or more than last year, an increase of 2 percentage points. Even green product development remained flat. The number of companies either not investing or decreasing their investment remained steady at 16 percent.

Where the surprise comes is in our panelists' response to whether the economic recovery resulted in their company cutting back or increasing sustainability-related investments. Thirty-two percent said they were investing more, a 10-point increase from 2013. Conversely, only 14 percent responded that they were cutting back on their environmental and sustainability activities, a significant drop from the 30 percent cutting back last year.

The obvious answer would be, "It's the economy, stupid," but that might not be true this time around. We asked our panelists to tell us what is most impacting their company's work on environmental issues. Only 17 percent cited the economy, down from 28 percent last year. And the impact of customer requirements hasn't shown much change over the past six years.

# The State of the **PROFESSION:** **Are Companies Playing Follow the Leader?**

**John Davies** VP & Sr. Analyst, GreenBiz Group



## LEADERSHIP IS ON THE RISE.

The big change is the ascendancy of company leadership, steadily rising from 12 percent in 2009 to 33 percent this year. We've seen this anecdotally, as CEO's like Unilever's Paul Polman, Sprint's Dan Hesse, and McDonald's Don Thompson establish their company's strategy by working to embed a foundation of corporate responsibility and sustainability. It now appears that there are even more leaders out there driving the corporate sustainability agenda.

## ARE COMPANIES LOSING FOCUS?

Lest we get too comfortable with the rise of sustainability showing up in our corporate leaders, there's still more work for sustainability teams to do. For the past six years we've asked panelists about their number-one environmental initiative. For the first five years it has been reducing energy use through efficiency. For 2014, that was overtaken by "making sure green stays on the agenda," at 19 percent. This is a big change from two years ago when reducing energy use was cited by 36 percent of panelists and keeping green on the agenda by 11 percent.

## ARE WE LOSING FOCUS?

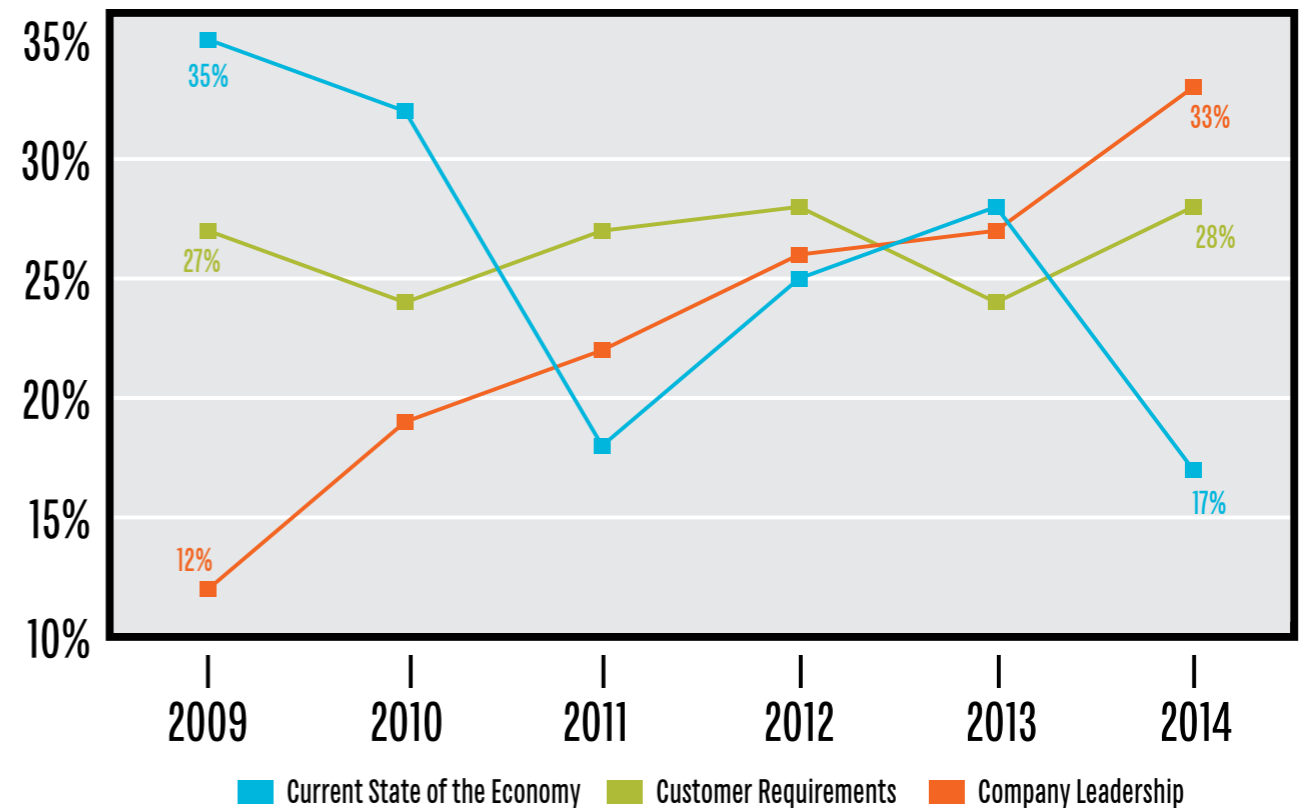
Probably not. The more likely explanation is that once the low-hanging fruit of energy efficiency efforts has been harvested, it's important to find the next economically impactful initiatives to keep a company's sustainability work moving forward. That's more challenging work.

## WHERE THE JOBS ARE(N'T).

Finally, there's both good news and bad news when it comes to those looking to join a corporate sustainability team. The number of companies with open requisitions has declined from a high in 2011 of 49 percent to just 32 percent for the upcoming year. A little more than a third of those openings (12 percent) are replacement hires while 20 percent are companies increasing the sustainability team's headcount.

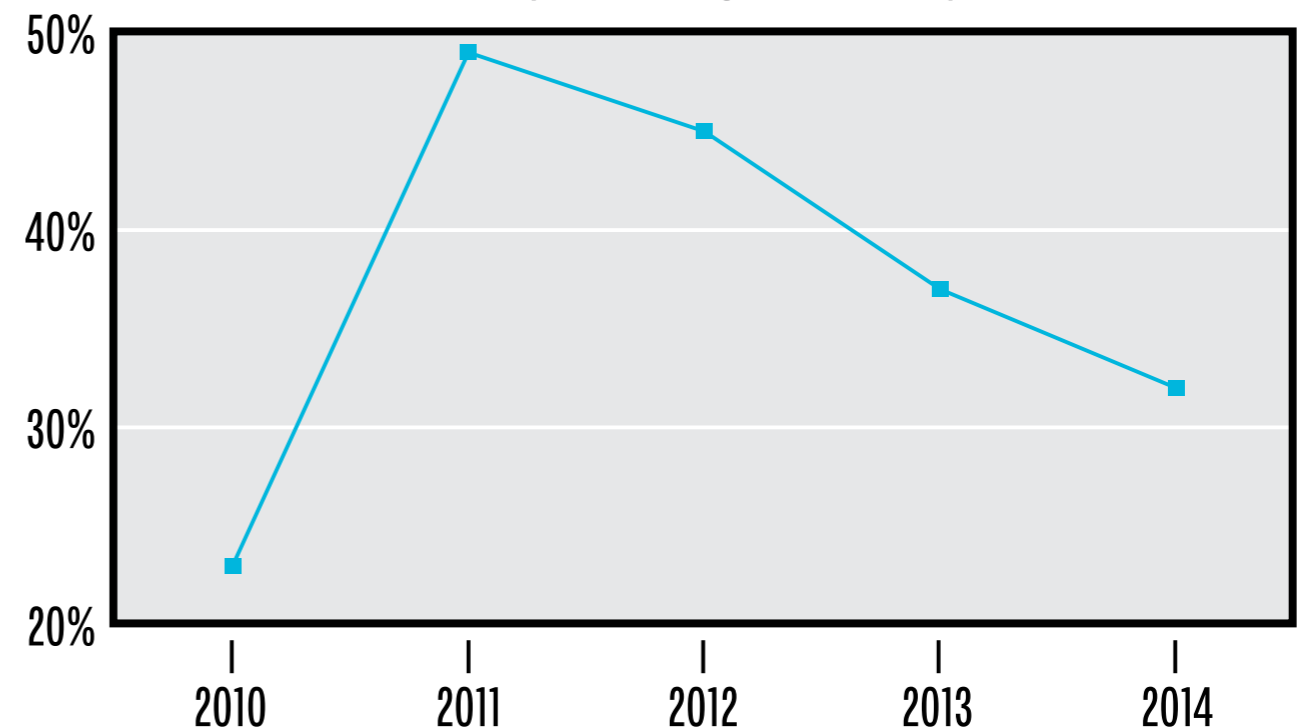
But there is a bright spot we'll be exploring in greater depth when we conduct our annual "State of the Profession" research this summer: We continue to see an increase of companies hiring dedicated sustainability resources and, instead of adding them to the sustainability team, embedding them in supply chain, product development, and other areas of the company. That's where those increased sustainability investments are taking place. And those will likely be the companies demonstrating leadership in the coming years.

## State of the Profession



## We're Hiring?

(Percent of Companies Hiring Sustainability Positions)



# METHODOLOGY

Trucost researches and standardizes the environmental performance disclosures of more than 4,600 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. Trucost applies 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.

In this report, those benchmarks have been aggregated for both the S&P 500 index of U.S. companies; and the MSCI World Index, covering more than 1,600 companies in 24 developed markets. Trucost also applies natural capital valuations to traditional environmental performance metrics to provide insight into the economic consequences of environmental impacts.

## Modeling Environmental Impact

Trucost draws on extensive government and academic data sources to quantify more than 700 environmental indicators per unit of output. These indicators cover the

use of resources such as water, as well as waste production and pollutants such as mercury and greenhouse gas emissions. The system is consistent with the United Nations Millennium Ecosystem Assessment.

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

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



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

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

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

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

## Company Disclosures

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

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

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

For example, the European Commission estimates that dust and particles from 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 €189-609 billion in health costs by 2020. Measures to reduce pollutants could cost the market economy around €7.1 billion annually, saving at least €42 billion in health costs.

**Trucost conducts an annual engagement program to provide companies with the opportunity to review and verify its research.**

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 and human capital by pollutants 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 these resources and pollutants in financial terms provides the most suitable weighting factor to differentiate the relative damage of a range of impacts. The same approach was applied by the Stern Review on the Economics of Climate Change, a study commissioned by the UK government in 2006. By applying a price to each environmental resource, based on the environmental impact of that resource, the model is able to analyze in financial terms the productivity and environmental performance of each sector.

Trucost's external costs-based system addresses a significant gap in rigorous, comparable and quantified environmental research. Trucost has compiled a library of prices for over 700 different natural inputs and outputs. For example, Trucost applies the social damage cost of US\$120 for each ton of greenhouse gases in its analysis.

The prices in Trucost's model are based on external cost principles derived from a wealth of peer-reviewed environmental economics literature. Valuations draw on extensive international academic research into the

pricing of environmental externalities and are overseen by an independent International Advisory Panel of leading academics.

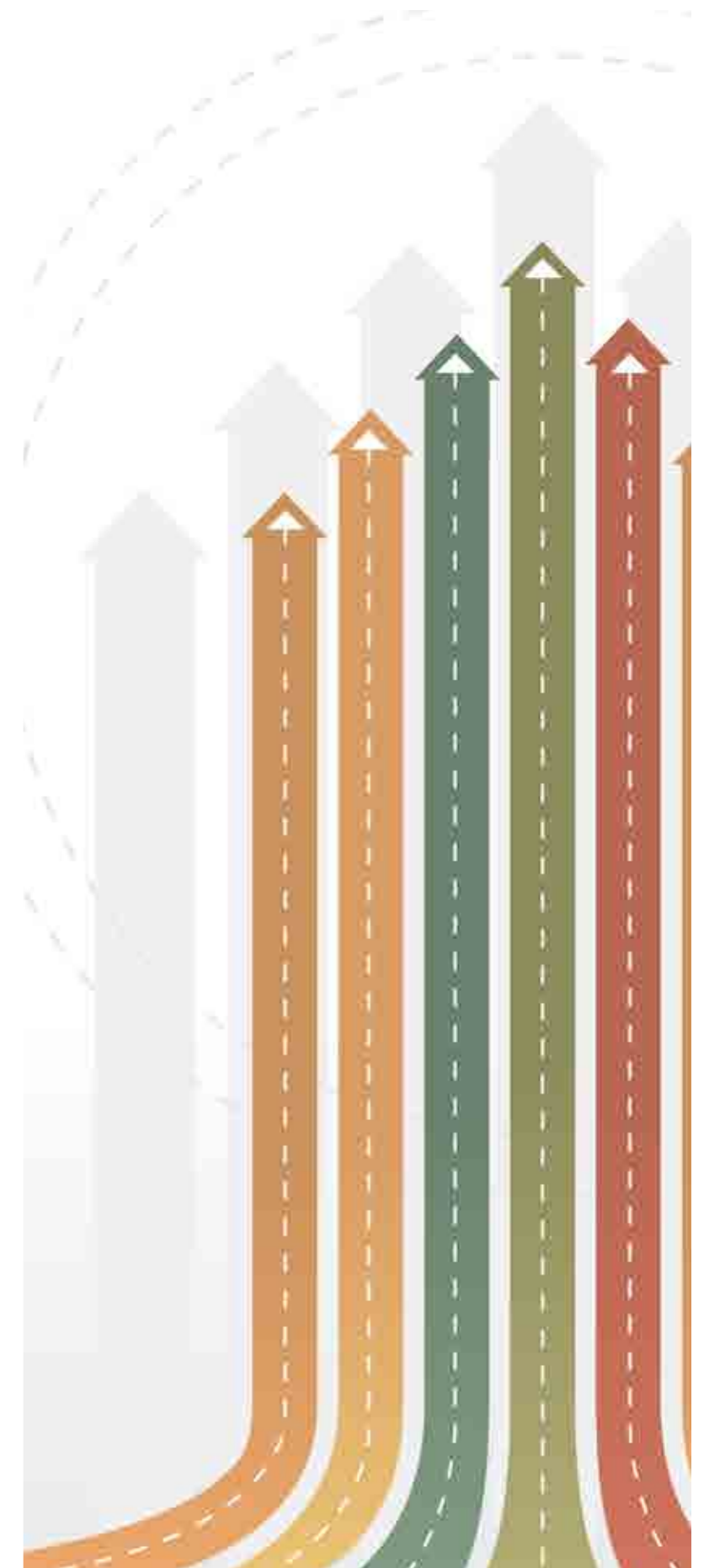
Trucost's damage costs differentiate between methods used to manage resources or emissions to reflect relative damage. For example, process water has a higher damage cost than cooling water used by power utilities. Similarly, damage costs for waste sent to landfill are higher than for waste incineration.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

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

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

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

**Trucost's external costs-based system addresses a significant gap in rigorous, comparable and quantified environmental research.**





## Natural Capital Leaders Index 2014 Methodology

The Natural Capital Leaders Index is designed to recognize companies demonstrating natural capital leadership. It also aims to break new ground by identifying companies that are truly “moving the needle” by decoupling growth from natural capital impact.

Natural capital impacts, such as pollution and unsustainable demand for natural resources, are compromising nature’s ability to deliver economic growth. The problem is expected to intensify with our rapidly expanding population. Natural capital, an extension of the economic notion of capital to goods and services provided by the natural environment, provides much-needed business context to help companies understand and optimize their performance.

The Natural Capital Leader’s Index has identified Natural Capital Leaders across 19 industry sectors as part of the 2014 *State of Green Business* report, in two performance categories:

- **Natural Capital Efficiency Leaders** have the lowest natural-capital impacts in their operations and supply chain per million dollars of revenue. Trucost identified the top global company and the top U.S. company in each industry sector.
- **Natural Capital Decoupling Leaders** have most successfully decoupled revenue growth from natural capital impacts in their operations and supply chain over the last five years. Trucost identified the three top global companies and top three U.S. companies in each industry sector, where decoupling companies are available.

We have also provided industry sector average benchmarks to help companies understand their performance and enable the progress of industries to be tracked over time. The *State of Green Business* report was established in 2007 to provide a measure of the environmental impacts of the emerging green economy. It has been widely recognized for its leading commentary and trend metrics, developed to support companies in addressing complex sustainability challenges. The new metrics build on this heritage by providing valuable insights for companies wanting to best position themselves for the transition to a low-carbon, resource-efficient economy.

## HOW NATURAL CAPITAL LEADERS ARE IDENTIFIED

There are four key steps:

1. Take the traditional environmental impact data disclosed by companies and supplement it to produce a complete environmental footprint covering companies’ own operations and supply chain.
2. Apply natural-capital valuations reflecting the economic and social costs of companies’ environmental impacts to identify the scale of each environmental impact and allow direct comparison with financial metrics.
3. Identify companies that are most efficiently using natural capital to generate revenue.
4. Identify the extent to which companies are decoupling environmental impact from growth by comparing changes in company revenues to changes in natural capital costs. To get a clear picture, we chose to do this over a five-year period.

See the next page for a hypothetical case study.

Step	Impact	Quantity	Natural Capital Valuation Coefficient	Natural Capital Cost (\$millions)	
1 and 2	GHG emissions (metric tons)	1,086,015	\$120	\$130	
	Water use (cubic meters)	97,715,010	\$1	\$98	
	Sulfur oxide (metric tons)	1,120	\$1,300	\$1	
	Particulate emissions (metric tons)	120	\$16,700	\$2	
	Other environmental impacts				\$113
	Natural Capital Costs (\$millions)				\$344
3	Company Revenue (\$millions)			\$12,050	
	Natural Capital Efficiency Rate (Natural Capital Costs / Company Revenue)			2.85%	
4	5-Year Natural Capital Efficiency Rate ( $\Delta$ 5 years Natural Capital Cost / Revenue)			3.55%	
	Natural Capital Decoupling Rate (Natural Capital Efficiency Rate – 5-Year Natural Capital Efficiency Rate) / 5-Year Natural Capital Efficiency Rate * 100			-19.58%	

## ELIGIBILITY

Natural Capital Efficiency Leaders must:

- be included in Trucost's Environmental Register covering 4,600 companies representing 93 percent of global markets by market capitalization
- have disclosed greenhouse gas emissions from their direct operations for the last financial year

Natural Capital Decoupling Leaders must:

- be included in Trucost's Environmental Register covering 4,600 companies representing 93 percent of global markets by market capitalization
- have disclosed greenhouse gas emissions from their direct operations for the last five years
- have shown that disclosed impacts have decreased over the last five years
- have increased revenue over the last five years

## GUIDING PRINCIPLES

Several core principles guided the development of the Natural Capital Leaders Index. In particular, it is our intent that the index will:

- promote the adoption of scalable business models that drive economic growth decoupled from natural-capital dependencies;
- put performance in context, in particular business context, by reporting environmental performance in financial terms; and environmental context by addressing impacts in relation to planetary limits;
- recognize that businesses in different industry sectors have inherently different natural-capital dependencies that cannot always be easily compared;
- be grounded in science-based environmental performance measurements and informed by peer-reviewed natural capital accounting methodologies;
- incorporate objective, data-driven metrics and transparent methodologies;
- utilize high-quality company disclosures on their natural capital use and environmental impacts, and;
- take into account momentum and performance changes over time.

**Companies tend to publicly disclose environmental performance data at a global rather than regional level making it necessary for Trucost to apply global average natural capital valuation.**



## Limitations and Assumptions

By necessity there are some limitations to our methodology — and also some assumptions.

**Data Availability:** Companies tend to publicly disclose environmental performance data at a global rather than regional level making it necessary for Trucost to apply global average natural capital valuation coefficients in its Natural Capital Leaders analysis. This is a critical limitation of the Natural Capital Leaders methodology since the power of natural-capital valuation lies in its ability to factor regional natural resource constraints and impacts.

For example, applying regional water valuations to traditional water metrics provides insight into the sustainability and future cost of a company's global water dependency at a site level by factoring, among other criteria, local water availability. Such shadow water pricing enables companies to optimize their water use — and manage risk from increasing water costs — by identifying opportunities to minimize increasingly expensive unsustainable water dependency.

Again, due to challenges with data availability, Trucost has applied Environmentally Extended Input-Output Lifecycle Analysis (EEIO-LCA) modeling to complete data gaps. EEIO-LCA modeling is particularly helpful when looking across company supply chains where data is less likely to be available. Modeled data has the advantage of providing companies with a data map to identify high-impact areas across their supply-chain tiers around which to prioritize primary data collection and manage business-critical environmental challenges.

Given the complexity of today's global supply chains, this map can be extremely valuable. Since the majority of environmental impacts are embedded in the supply chain — for food and beverage companies this is the

case for around 90 percent of impacts — we need to use this data in the absence of primary disclosed data to understand the magnitude of the challenge.

**Scope:** Our current focus recognizes companies that are improving their operational and supply-chain environmental performance. We would like to recognize companies that are contributing to the transition to a low-carbon, resource-efficient economy by bringing to market greener products, technologies and services, as well as companies that create natural-capital benefits. But there's a lack of consistent data to incorporate into a broad analysis. We do, however, aim to include this insight in future editions of the Natural Capital Leaders Index since financially orientated environmental metrics are particularly well suited to measuring net environmental benefits and product-level analysis.

**Planetary Limits:** Working with Mark McElroy at the [Center for Sustainable Organizations](#), we are providing environmental context alongside business context by introducing insight into the challenges of planetary limits through Context-Based Sustainability analysis, in the form of Natural Capital Leaders Index benchmarks. Initially, our analysis is limited to carbon, but as consensus is reached on planetary limits for other environmental impacts such as water and land use, we will incorporate them.

## COLLABORATION

We note our thanks to the many companies that responded to our call for collaboration in developing these metrics when we published our initial methodology in October 2013. We've responded to this feedback along the way — most significantly by developing an additional performance metric to help companies understand how efficiently they are using natural capital to generate revenue. This is the start of a journey towards exploring the right indicators to effectively align business strategies with sustainable development imperatives. Our objective has been to demonstrate the power of financially orientated sustainability metrics. We trust in

the innovation of the companies we work with to adapt these metrics to address more specific sustainability goals and objectives.

More detailed information about the Natural Capital Leaders Index Methodology is available at [www.trucost.com/naturalcapitalleadersindex](http://www.trucost.com/naturalcapitalleadersindex). We welcome your continued feedback and collaboration on the development of the natural capital [Leaders](#) index methodology. Please contact us at [naturalcapitalleaders@trucost.com](mailto:naturalcapitalleaders@trucost.com). **E**

**This is the start of a journey towards exploring the right indicators to effectively align business strategies with sustainable development imperatives.**

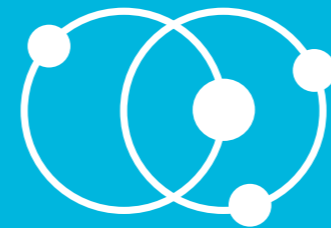
# About GreenBiz Group



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

VERGE is a series of events focused on the convergence of energy, data, buildings, and transportation. VERGE events are creating a new dialogue focused on harnessing radical efficiencies within companies, campuses and cities across their operations and supply chains. VERGE brings together a new ecosystem incorporating executives from such diverse domains as utilities, facilities, fleets, and the public sector. VERGE has travelled the world, with events in Shanghai, London, Washington DC, São Paulo, Boston, Paris — with the flagship event, VERGE San Francisco, to be held October 27-30, 2014.

[www.greenbiz.com](http://www.greenbiz.com)



# GreenBiz group

# About Trucost

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

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

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

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

See next page for a brief video as well as information about three information tools designed especially for readers of this report.

[www.trucost.com](http://www.trucost.com)



# TRUCOST<sup>PLC</sup>

## THE MATERIALITY REPORT:

*The Materiality Report* has been designed to help companies take the first step on the “new era of sustainability metrics” journey. You need only provide your existing environmental performance data and annual financial spend. Our goal is to take the data you already have and transform it from information into actionable business insights by analyzing it, supplementing it, applying natural capital valuations and delivering business intelligence. For more information about the report, visit [www.trucost.com/thematerialityreport](http://www.trucost.com/thematerialityreport).

## STATE OF GREEN BUSINESS DATA SUPPLEMENT:

Natural Capital Benchmarks is a data supplement to the 2014 *State of Green Business* report providing a “new era of sustainability metrics” environmental performance insights for companies and sectors. For more information, visit [www.trucost.com/naturalcapitalleadersindex](http://www.trucost.com/naturalcapitalleadersindex).

## EBOARD:

A source of “new era sustainability metrics” for financial institutions. For more information, visit [www.trucost.com/EBoard](http://www.trucost.com/EBoard).

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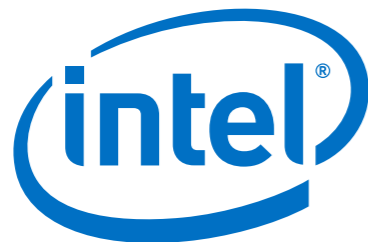
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<b>Direct versus supply-chain impacts by super sector</b>		
	<b>Direct</b>	<b>Supply Chain</b>
<b>Food &amp; Beverage</b>	3%	97%
<b>Financial Services</b>	2%	98%
<b>Banks</b>	3%	97%
<b>Telecommunications</b>	6%	94%
<b>Media</b>	5%	95%
<b>Real Estate</b>	15%	85%
<b>Technology</b>	7%	93%
<b>Retail</b>	7%	93%
<b>Insurance</b>	6%	94%
<b>Personal/Household Goods</b>	7%	93%
<b>Automobiles &amp; Parts</b>	8%	92%
<b>Industrial Goods &amp; Services</b>	19%	81%
<b>Travel &amp; Leisure</b>	24%	76%
<b>Healthcare</b>	13%	87%
<b>Construction &amp; Materials</b>	23%	77%
<b>Chemicals</b>	36%	64%
<b>Oil &amp; Gas</b>	43%	57%
<b>Basic Resources</b>	60%	40%

Source: Trucost data

[Return To Document](#) 

## Top four environmental impacts direct and supply chain – 2012

	Impact 1		Impact 2		Impact 3		Impact 4	
<b>U.S.</b>								
<b>Direct</b>	Greenhouse Gases	70%	Water Abstraction	11%	Dust & Particles	4%	Acid Rain & Smog Precursors	4%
<b>Supply Chain</b>	Greenhouse Gases	52%	Water Abstraction	34%	Nutrients and Organic Pollutants	4%	Acid Rain and Smog Precursors	4%
<b>Total</b>	Greenhouse Gases	59%	Water Abstraction	24%	Acid Rain & Smog Precursors	4%	Dust & Particles	3%
<b>Global</b>								
<b>Direct</b>	Greenhouse Gases	69%	Water Abstraction	14%	Acid Rain & Smog Precursors	4%	Dust & Particles	4%
<b>Supply Chain</b>	Water Abstraction	52%	Water Abstraction	33%	Nutrients and Organic Pollutants	4%	Acid Rain and Smog Precursors	4%
<b>Total</b>	Greenhouse Gases	59%	Water Abstraction	26%	Acid Rain and Smog Precursors	4%	Dust and Particles	3%



<b>Absolute environmental costs</b> (Million U.S. dollars)					
	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>U.S.</b>	\$653,000	\$681,000	\$714,000	\$786,000	\$797,000
<b>Global</b>	\$1,819,000	\$1,923,000	\$1,948,000	\$2,176,000	\$2,287,000

Source: Trucost data

<b>Total environmental costs as percentage of revenue</b>					
	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>U.S.</b>	7.4%	8.3%	8.1%	8.2%	8.1%
<b>Global</b>	7.6%	8.4%	8.2%	8.2%	8.3%

<b>Total environmental costs as percent of net income</b>					
	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>U.S.</b>	247%	113%	95%	94%	99%
<b>Global</b>	226%	151%	111%	120%	133%
<b>Net income</b>					
<b>U.S.</b>	\$264,237	\$604,315	\$753,484	\$833,073	\$802,652
<b>Global</b>	\$805,084	\$1,269,581	\$1,754,567	\$1,819,463	\$1,722,612
<b>Total Environmental costs</b>					
<b>U.S.</b>	\$653,000	\$681,000	\$714,000	\$786,000	\$797,000
<b>Global</b>	\$1,819,000	\$1,923,000	\$1,948,000	\$2,176,000	\$2,287,000

Source: Trucost data

## **Total primary energy consumption per dollar of GDP**

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

	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>U.S.</b>	7,412	7,505	7,329	7,333	7,291
<b>Global</b>	7,461	7,452	7,443	7,434	7,425

## **Average annual efficiency growth rate**

	<b>1991-2009</b>	<b>1999-2009</b>	<b>2002-2013</b>
<b>U.S.</b>	-1.94%	-1.89%	-1.81%
<b>Global</b>	-1.30%	-1.16%	-1.16%

Source: Trucost data

# GHGs emissions and percentages by scope

## Total emissions (million metric tons)

	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>U.S.</b>	3,969	3,765	3,923	4,111	3,916
<b>Global</b>	10,894	10,449	10,383	11,191	11,074

## Percent of emissions

<b>U.S.</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>Scope 1</b>	51%	47%	49%	50%	47%
<b>Scope 2</b>	9%	8%	9%	9%	9%
<b>Scope 3</b>	40%	39%	41%	44%	43%
<b>Global</b>					
<b>Scope 1</b>	50%	46%	46%	47%	46%
<b>Scope 2</b>	8%	8%	8%	8%	8%
<b>Scope 3</b>	42%	42%	42%	47%	46%

Source: Trucost data

## GHGs intensity by scope

Metric tons per million dollars of revenue

<b>S&amp;P 500</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>Scope 1</b>	230	230	220	200	190
<b>Scope 2</b>	40	40	40	40	30
<b>Scope 3</b>	180	190	180	180	170
<b>Total</b>	450	420	440	460	440
<b>MSCI World Dev</b>					
<b>Scope 1</b>	220	220	210	190	190
<b>Scope 2</b>	40	40	30	30	30
<b>Scope 3</b>	190	200	190	190	180
<b>Total</b>	450	430	430	460	460

Source: Trucost data

## Water intensity

Cubic feet per million dollars of revenue

<b>U.S.</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>Direct withdrawal</b> (surface/ground)	3,300	3,100	2,400	2,200	2,000
<b>Purchased</b> (municipality)	400	400	400	300	300
<b>Cooling water</b>	24,800	23,000	20,100	20,500	18,700
<b>Supply chain</b>	23,500	27,700	26,500	24,400	26,000
<b>Global</b>					
<b>Direct withdrawal</b> (surface/ground)	3,900	3,900	3,800	4,300	4,200
<b>Purchased</b> (municipality)	400	500	500	500	400
<b>Cooling water</b>	24,900	21,200	19,300	18,600	18,100
<b>Supply chain</b>	24,100	27,900	26,900	25,200	26,400

Source: Trucost data

## Air emissions intensity

Environmental cost per million dollars revenue

<b>U.S.</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>Acid rain and smog precursors</b>	\$3,100	\$3,100	\$3,100	\$3,100	\$3,200
<b>Dust and particles</b>	\$2,400	\$2,600	\$2,400	\$2,600	\$2,600
<b>Ozone-depleting substances</b>	\$10	\$10	\$10	\$10	\$10
<b>Volatile organic compounds</b>	\$1,200	\$1,200	\$1,000	\$1,000	\$1,000
<b>Metal emissions to air</b>	\$90	\$90	\$80	\$80	\$70
<b>Global</b>					
<b>Acid rain and smog precursors</b>	\$3,100	\$3,200	\$3,100	\$3,100	\$3,300
<b>Dust and particles</b>	\$2,400	\$2,500	\$2,400	\$2,500	\$2,500
<b>Ozone-depleting substances</b>	\$20	\$20	\$30	\$20	\$20
<b>Volatile organic compounds</b>	\$1,000	\$1,000	\$900	\$900	\$900
<b>Metal emissions to air</b>	\$220	\$240	\$80	\$80	\$130

Source: Trucost data

<b>Total air emissions</b>					
Environmental cost in millions of dollars					
<b>U.S.</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>Acid rain and smog precursors</b>	\$27,800	\$25,900	\$27,900	\$30,000	\$31,900
<b>Dust and particles</b>	\$21,200	\$21,400	\$21,300	\$25,500	\$25,900
<b>Ozone-depleting substances</b>	\$130	\$120	\$130	\$130	\$130
<b>Volatile organic compounds</b>	\$10,200	\$9,600	\$9,200	\$9,500	\$9,900
<b>Metal emissions to air</b>	\$790	\$730	\$690	\$780	\$710
<b>Global</b>					
<b>Acid rain and smog precursors</b>	\$73,700	\$72,600	\$74,400	\$83,400	\$90,300
<b>Dust and particles</b>	\$57,000	\$58,100	\$58,400	\$68,000	\$68,800
<b>Ozone-depleting substances</b>	\$590	\$560	\$650	\$480	\$510
<b>Volatile organic compounds</b>	\$23,700	\$22,800	\$21,600	\$24,400	\$23,800
<b>Metal emissions to air</b>	\$5,370	\$5,520	\$1,900	\$2,080	\$3,540

Source: Trucost data



<b>Waste intensity</b>					
Metric tons per million dollars revenue					
<b>U.S.</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>Landfill</b>	3.8	6.2	5.8	5.5	5.2
<b>Incineration</b>	0.4	0.7	0.6	0.5	0.5
<b>Company-reported recycling</b>	1.3	1.5	2.3	2.0	2.7
<b>Global</b>					
<b>Landfill</b>	5.5	6.7	7.3	7.5	8.6
<b>Incineration</b>	1.8	2.6	.8	1.1	1.0
<b>Company-reported recycling</b>	7.6	7.2	7.0	7.0	8.2

Source: Trucost data

<b>Paper recycling</b>					
Metric tons					
	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012*</b>
<b>Global recovered paper</b>	199,517,246	200,280,772	208,004,105	215,003,029	212,751,404
<b>Percent of paper production</b>	51%	53%	52%	53%	53%

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

<b>Company reporting on sustainability</b>					
<b>Number of Companies Reporting</b>					
<b>Standalone reports</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>U.S.</b>	78	104	129	157	206
<b>Global</b>	406	478	538	598	704
<b>Other sustainability disclosures</b>					
<b>U.S.</b>	160	258	280	281	286
<b>Global</b>	494	677	736	769	782
<b>Percent of Companies</b>					
<b>Standalone reports</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>U.S.</b>	16%	22%	27%	33%	43%
<b>Global</b>	28%	33%	37%	41%	49%
<b>Other sustainability disclosures</b>					
<b>U.S.</b>	33%	54%	58%	58%	59%
<b>Global</b>	34%	47%	51%	53%	54%

Source: Trucost data

<b>Greenhouse gas reporting by scope</b>					
<b>Number of Companies Reporting</b>					
<b>U.S.</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>Scope 1</b>	185	239	259	255	272
<b>Scope 2</b>	140	195	213	200	240
<b>Scope 3</b>	121	156	192	154	196
<b>Global</b>					
<b>Scope 1</b>	666	804	852	898	946
<b>Scope 2</b>	531	655	706	789	947
<b>Scope 3</b>	431	498	534	682	724
<b>Percent of Companies</b>					
<b>U.S.</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>Scope 1</b>	38%	50%	54%	60%	63%
<b>Scope 2</b>	29%	41%	44%	54%	63%
<b>Scope 3</b>	25%	32%	40%	47%	51%
<b>Global</b>					
<b>Scope 1</b>	46%	56%	59%	62%	66%
<b>Scope 2</b>	37%	45%	49%	55%	66%
<b>Scope 3</b>	30%	34%	37%	47%	50%

Source: Trucost data

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<b>Water reporting</b>								
<b>Reporting on general water risk</b>								
	<b>2009</b>		<b>2010</b>		<b>2011</b>		<b>2012</b>	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<b>U.S.</b>	38	8%	59	12%	95	20%	109	23%
<b>Global</b>	95	7%	150	10%	199	13%	199	14%
<b>Reporting on operations in regional water-stressed areas</b>								
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<b>U.S.</b>	38	8%	59	12%	90	19%	103	21%
<b>Global</b>	95	7%	148	10%	174	12%	186	13%
<b>Reporting on key inputs from water-stressed regions</b>								
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<b>U.S.</b>	9	2%	12	2%	38	8%	45	9%
<b>Global</b>	32	2%	45	3%	82	6%	102	7%
<b>Reporting on awareness of supply-chain water risk</b>								
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<b>U.S.</b>	12	2%	12	2%	24	5%	26	5%
<b>Global</b>	31	2%	44	3%	65	5%	76	5%

Source: Trucost data

## Number of companies reporting on environmental management systems

	2008		2009		2010		2011		2012	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<b>U.S.</b>	157	33%	208	43%	278	58%	286	59%	321	67%
<b>Global</b>	718	50%	778	54%	927	64%	945	65%	1,036	72%

Source: Trucost data

<b>Disclosure Score</b>					
Percentage of total environmental costs disclosed					
	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>U.S.</b>	30%	39%	44%	49%	46%
<b>Global</b>	38%	46%	49%	52%	51%

Source: Trucost data

## Companies using third-party assurance for sustainability reporting

	2008		2009		2010		2011		2012	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<b>U.S.</b>	19	4%	23	5%	32	7%	45	9%	40	8%
<b>Global</b>	166	11%	190	13%	252	17%	296	20%	285	20%

## Companies using third-party assurance for greenhouse gas reporting

### Scope 1

	2008	2009	2010	2011	2012
<b>U.S.</b>	10%	22%	28%	36%	38%
<b>Global</b>	12%	24%	29%	36%	37%

### Scope 2

<b>U.S.</b>	10%	18%	24%	32%	36%
<b>Global</b>	12%	20%	27%	33%	35%

### Scope 3

<b>U.S.</b>	5%	7%	13%	16%	22%
<b>Global</b>	6%	11%	16%	20%	23%



## Companies reporting on environmental R&D or investments

Number					
	2008	2009	2010	2011	2012
<b>U.S.</b>	200	349	358	425	485
<b>Global</b>	71	129	127	158	176
Percent					
<b>U.S.</b>	14%	24%	25%	29%	34%
<b>Global</b>	15%	27%	26%	33%	37%

Source: Trucost data

## Companies reporting on environmental profits or savings

Number					
	2008	2009	2010	2011	2012
<b>U.S.</b>	90	161	170	233	283
<b>Global</b>	32	57	47	74	96
Percent					
<b>U.S.</b>	6%	11%	12%	16%	20%
<b>Global</b>	7%	12%	10%	15%	20%

Source: Trucost data

<b>Global green power production as percent of total</b>					
	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>Hydropower</b>	19.19%	16.51%	16.46%	16.39%	16.41%
<b>Solar PV</b>	0.06%	0.11%	0.16%	0.16%	0.18%
<b>Solar CSP</b>	0.00%	0.00%	0.01%	0.01%	0.01%
<b>Wind onshore</b>	1.06%	1.32%	1.58%	1.69%	1.85%
<b>Wind offshore</b>	0.02%	0.03%	0.04%	0.04%	0.05%
<b>Bioenergy</b>	1.24%	1.37%	1.38%	1.44%	1.50%
<b>Geothermal</b>	0.32%	0.35%	0.33%	0.34%	0.35%
<b>Ocean</b>	0.00%	0.00%	0.00%	0.00%	0.00%
<b>TOTAL</b>	<b>18.89%</b>	<b>19.69%</b>	<b>19.97%</b>	<b>20.07%</b>	<b>20.34%</b>

Source: International Energy Agency

## Global commercial LEED space

Gross square feet

	2008	2009	2010	2011	2012	2013*
<b>Registered</b>						
<b>New Construction</b>	859,489,543	1,051,178,165	281,485,512	502,872,205	487,399,547	469,569,692
<b>Commercial Interiors</b>	54,703,103	161,496,755	53,643,586	55,556,567	53,965,022	59,758,474
<b>EB:O&amp;M**</b>	455,844,838	625,661,725	290,776,098	356,025,431	500,676,797	302,805,181
<b>Certified</b>						
<b>New Construction</b>	63,736,511	139,109,240	163,098,829	185,991,453	217,360,953	204,349,395
<b>Commercial Interiors</b>	8,594,159	21,709,280	32,757,264	36,074,982	37,406,377	43,629,039
<b>EB:O&amp;M**</b>	25,431,292	140,467,756	232,265,053	247,198,359	188,106,098	213,457,966

\*Through November 2013    \*\* Existing Buildings: Operations & Maintenance | Source: U.S. Green Building Council

## **Environmental Efficiency**

Total environmental costs as percentage of revenue in millions of U.S. dollars

	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>U.S.</b>	7.4%	8.3%	8.1%	8.2%	8.1%
<b>Global</b>	7.6%	8.4%	8.2%	8.2%	8.3%

Source: Trucost data

<b>Total global green power production</b>					
	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>Hydropower</b>	3,280,470	3,328,670	3,536,023	3,573,960	3,669,097
<b>Solar PV</b>	12,016	21,841	34,528	34,919	40,858
<b>Solar CSP</b>	909	853	2,264	1,920	2,189
<b>Wind onshore</b>	213,931	266,624	339,583	367,754	414,812
<b>Wind offshore</b>	4,283	5,619	8,802	9,163	10,558
<b>Bioenergy</b>	250,713	276,724	295,834	314,661	334,464
<b>Geothermal</b>	64,608	70,069	71,525	74,495	77,426
<b>Ocean</b>	546	530	558	540	537
<b>TOTAL</b>	<b>3,827,476</b>	<b>3,970,931</b>	<b>4,289,117</b>	<b>4,377,412</b>	<b>4,549,941</b>

Source: International Energy Agency

<b>U.S. &amp; European cleantech patent filings</b>					
	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>Biofuels</b>	1,940	2,394	3,632	4,317	4,624
<b>Solar Energy</b>	1,938	3,522	5,466	6,943	7,879
<b>Wind Energy</b>	994	1,649	2,672	3,713	4,359
<b>Hydropower</b>	348	518	777	940	886
<b>Geothermal</b>	125	167	267	292	272
<b>Water Desalination</b>	317	359	582	649	720
<b>Water Filtration</b>	501	566	602	625	651
<b>Advanced Batteries</b>	2,517	3,276	4,377	5,091	5,999
<b>Fuel Cells</b>	4,321	5,302	6,160	5,554	5,483
<b>TOTAL</b>	<b>13,001</b>	<b>17,753</b>	<b>24,535</b>	<b>28,124</b>	<b>30,873</b>

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

## Product-Level Greenhouse Gas Reporting

Number					
	2008	2009	2010	2011	2012
<b>U.S.</b>	21	19	17	20	35
<b>Global</b>	64	62	55	83	152
Percent					
<b>U.S.</b>	4%	4%	4%	4%	7%
<b>Global</b>	4%	4%	4%	6%	11%

Source: Trucost data



<b>Waste</b>					
<b>Total Waste (Metric Tons)</b>					
	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>U.S.</b>	49,300	68,800	77,500	78,000	83,900
<b>Global</b>	356,200	377,000	360,500	414,800	491,600
<b>Waste Intensity (Metric Tons per Million Dollars of Revenue)t</b>					
<b>U.S.</b>	5.5	8.4	8.7	8.0	8.4
<b>Global</b>	14.9	16.5	15.1	15.6	17.8

Source: Trucost data

<b>Water</b>					
<b>Total Water Use (Million Cubic Feet)</b>					
	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>U.S.</b>	461,318	447,324	439,437	462,037	468,606
<b>Global</b>	1,284,479	1,223,756	1,211,310	1,294,209	1,349,243
<b>Water Intensity (Cubic Feet per Million Dollars of Revenue)</b>					
<b>U.S.</b>	52,000	54,200	49,400	47,400	47,000
<b>Global</b>	53,300	53,500	50,500	48,600	49,100

Source: Trucost data

<b>Air Pollution</b>					
<b>Total Environmental Cost (Millions of Dollars)</b>					
	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>U.S.</b>	\$60,120	\$57,750	\$59,220	\$65,910	\$68,540
<b>Global</b>	\$160,360	\$159,580	\$156,950	\$178,360	\$186,950
<b>Intensity (Environmental Cost per Million Dollars of Revenue)</b>					
<b>U.S.</b>	\$6,800	\$7,000	\$6,590	\$6,790	\$6,880
<b>Global</b>	\$6,740	\$6,960	\$6,510	\$6,600	\$6,850

Source: Trucost data

## Greenhouse Gases

Total Emissions (Millions of Pounds)					
	2008	2009	2010	2011	2012
<b>U.S.</b>	3,969	3,765	3,923	4,111	3,916
<b>Global</b>	10,894	10,449	10,383	11,191	11,074
Intensity (Metric Tons per Million Dollars of Revenue)					
<b>U.S.</b>	450	420	440	460	440
<b>Global</b>	450	430	430	460	460

Source: Trucost data