2019 State of Green Business

GreenBiz group

Trucost ESG Analysis

S&P Global

table of contents

the trends

the index

and more

introduction

by **Joel Makower**
Chairman & Executive Editor, GreenBiz Group

Welcome to the 12th State of Green Business report, our annual compendium of key data about the world of sustainability, as well as trends to watch in the coming year. The report is produced in partnership with Trucost, part of S&P Global, which provided the key data and metrics for the State of Green Business Index that begins on page 6. Our collective goal is to step back from the daily headlines to take stock of progress, or lack thereof, in corporate sustainability practices.

The world of sustainable business continues to evolve, as more companies take on ever-greater challenges to reduce their negative impacts and, increasingly, increase their positive ones — using their supply chains and operations to do more good, not just less bad, and becoming not just sustainable but regenerative. We're hearing companies talk increasingly about creating value from waste or restoring the ecosystems upon which they depend for their survival and profitability. It's hardly the dominant theme, but it's very much a promising one.

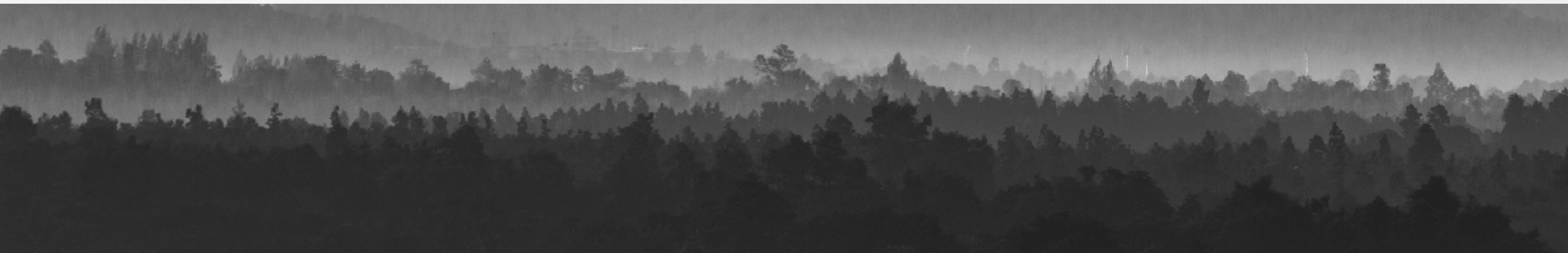
The first half of this report offers the 10 trends sustainability professionals should be tracking in the year ahead. Each year, GreenBiz editors and analysts identify emerging arenas and technologies we believe will be impactful as companies address environmental and social challenges and opportunities. The trends reflect some of the untapped potential of sustainable business strategy: to go beyond cutting costs and reducing risks by fostering product innovation, new revenue streams and leading-edge business models. Some trends will unfold over several years, even decades, while others will become mainstream in a surprisingly short time.

We're proud of the track record we've amassed over the past dozen years in anticipating key sustainable business movements for this report well before they reached tipping points. And while not all of our forecasts have been bullseyes, we've hit the target more often than not — anticipating, for example, the rise of the circular economy, the use of blockchain in supply-chain transparency, the acceleration of corporate clean energy purchases, the heightened concern over food waste, the growth of science-based targets and the emerging market for carbon-removal technologies.

Such positive trends provide a much-needed counterweight to recent headlines — the revelations of growing climate impacts, the accelerating destruction in rainforests, the continued growth of coal usage in some countries and the lack of political will in some of the world's biggest economies to take on climate and other challenges. However sobering, these developments are not necessarily catalysts for faster action. We're still waiting for a collective sense of urgency from the private sector, and to see that urgency transform into action.

Still, there is much hope to be found in these pages, as many of the world's largest companies step up to the challenge of ensuring a sound environment, economy and social fabric around the world. That's the promise of sustainable business that we're proud to track and illuminate through our editorial, events and research offerings at GreenBiz every day, and which is the basis for the pages that follow.

I hope you enjoy this report and look forward to your feedback.



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foreword

by **Dr. Richard Mattison**
Chief Executive Officer, Trucost, part of S&P Global

2019 is set to be a transformational year for the sustainability agenda. The United Nations climate change negotiations in December 2018 resulted in a deal to support the 2015 Paris Agreement and, despite significant challenges, we now have a rulebook that defines how governments must measure, report on and verify their emissions.

Separately, the Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD) conducted its first major review of disclosures in line with its 2017 recommendation report. It found that while the majority of companies disclosed some information, it's still early days for climate-related financial disclosures and further work is needed for disclosures to contain more "decision-useful" climate-related information. In particular, few companies were able to disclose the financial implications of climate risks, something the investor community is keen to understand.

Each year, we assess more than 30 indicators of corporate sustainability performance across the world's top companies. One key indicator is the natural capital cost that a business carries. Natural capital is the limited stock of the Earth's natural resources on which business and society depends for prosperity and well-being, and it is declining at an alarming and unsustainable rate.

Last year's results showed a sharp increase in companies' natural capital costs, which had previously been falling. This year's results show a continued increase in costs — albeit far smaller — and a sharp decline in natural capital costs as a share of net income.

There are positive signs that companies' environmental impacts and resource use are beginning to decouple from growth in some areas, with corporate carbon emissions declining nearly 10 percent globally over the last five years, in absolute terms, and renewables providing a rising share of energy consumption.

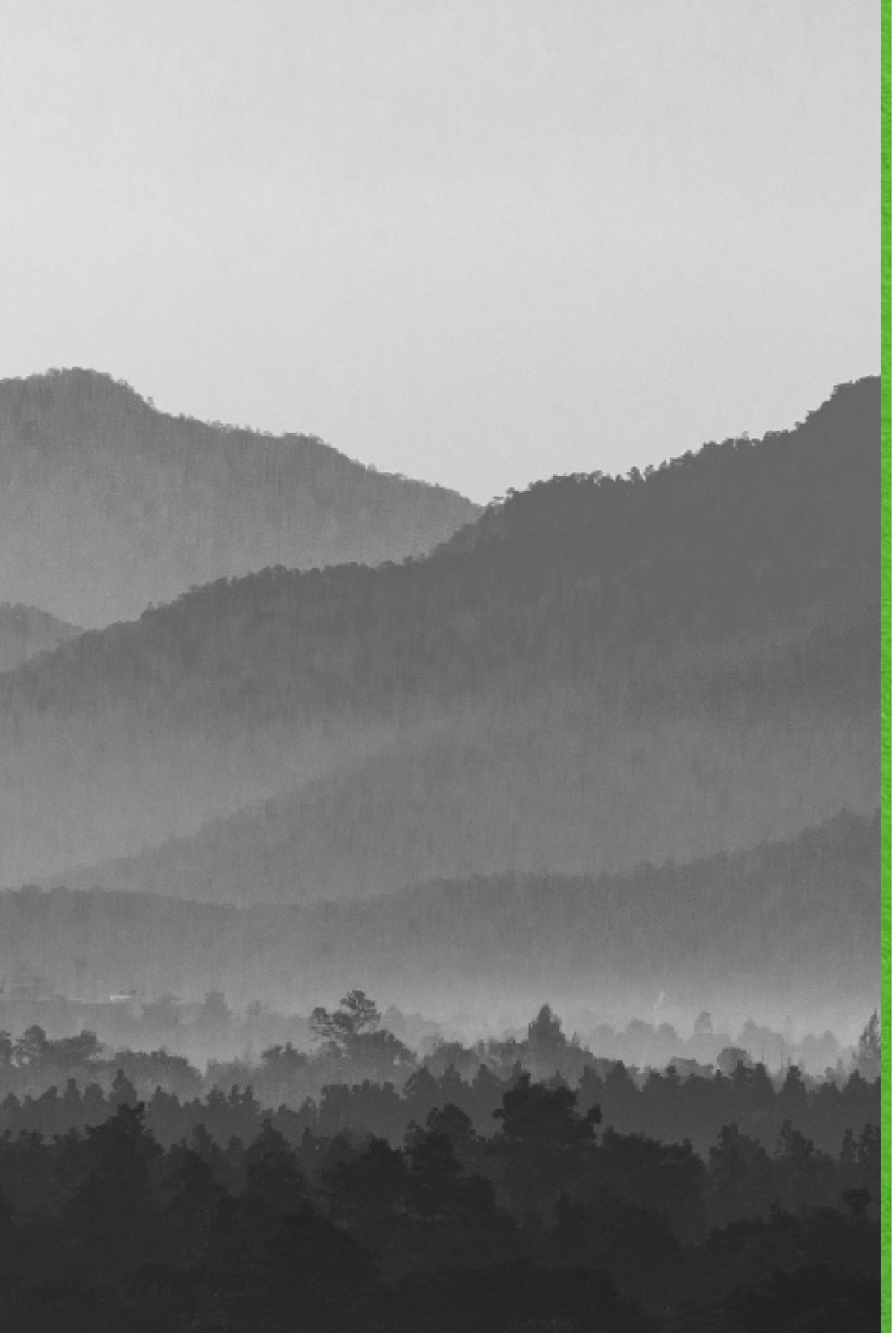
Company awareness and engagement with climate and environmental issues also seem to be increasing rapidly, with 80 percent of companies reporting exposure to physical or market transition risks associated with climate change, and a similar share engaging in reducing corporate emissions. There has been a steady growth in the number of companies applying an internal carbon price, and that price has been rising. Furthermore, an increasing number of companies are disclosing natural capital costs.

Yet again, many of the largest and most persistent impacts occur within company supply chains and products rather than their direct operations. Encouragingly, many more companies quantify and report on these impacts, although progress remains to be made on reporting. Another encouraging sign of real progress: A substantial share of companies report engaging with their customers and supply chains to better understand their behavior and positively influence environmental impacts such as carbon emissions and water consumption.

Supply chain risks from climate change are likely to become more important in the form of exposure to physical risks and disruption, as well as new regulation and capital market shifts supporting the delivery of the U.N. Sustainable Development Goals (SDGs) and the recommendations of the TCFD. Both of these will require companies to have access to more forward-looking data and analytical tools to measure where and when climate risks and natural capital impacts occur within their value chain and to capitalize on the new opportunities this brings.

Better information is the key to managing risk and uncertainty. Governments have stepped up to the climate change challenge by ensuring that there is a rulebook (created last year at COP24, the 2018 U.N. Climate Change Conference) to define how they will measure and report on climate impacts. This will ensure consistent and comparable reporting on carbon reduction plans by nations across the world.

Companies will need to be prepared to analyze the impact of these reduction plans on their operations, supply chains and products. Carbon pricing is among a number of mechanisms available to governments to incentivize the reduction of emissions. Research by Trucost shows the potential impact of increasing carbon prices on companies, which is material in many cases. Carbon prices will need to reach $120 per metric ton by 2030 to achieve the Paris Agreement goal, according to



one scenario compiled using the Trucost Carbon Pricing tool. During this transition period, companies will need to understand how the intricacies of diverse carbon pricing policies could affect their operations, revenues and supply chains. They'll also need to make use of forward-looking data and analytical tools to assess carbon pricing risk under a variety of scenarios, and in different sectors and regions.

The financial community is mobilizing. The TCFD is supported by eight of the 10 largest asset managers, three-quarters of the global systemically important banks, all the major credit rating agencies and many large pension funds. Investors increasingly want to understand how companies are using future carbon pricing scenarios to mitigate risk and direct capital to innovations that will succeed in the transition to a low-carbon economy.

As a result, 2019 is likely to be a year of increased activism by shareholders — an opportunity for leading companies to proactively engage their shareholders and the financial community at large.

top sustainable business trends of 2019

It's déjà vu all over again.

By Joel Makower
Chairman & Executive Editor, GreenBiz Group

"We find ourselves in uncharted waters."

That was part of our assessment 10 years ago, in 2009, when we published our second annual State of Green Business report. It was a time of both bright hope and dark uncertainty: On the one hand, there was regime change in America, a new presidential administration promising green jobs and renewed action on climate and other issues. There was a race by the global automotive industry to transition to electric vehicles — and growing action by companies to reduce the toxic components of their products and manufacturing processes.

On the other hand, there was a global "great" recession, roiling companies in all sectors and pushing environmental issues to the back burner for some, and little progress on addressing climate change and its impacts, as greenhouse emissions continued to ratchet up.

As we wrote back then:

> This year's update is a mixed bag of encouraging and discouraging news. But on balance, despite a growing chorus of corporate commitments and actions, we're less optimistic that these activities, in aggregate, are addressing planetary problems at sufficient scale and speed.

Suffice to say, it's déjà vu all over again. So many concerns of 2009 are concerns again today, albeit with a heightened sense of urgency. So many emerging technologies and business trends of 2009 are still unfolding a decade hence, slowly but surely striving to find mass markets. So much progress we saw back then is still giving us hope.

But the headlines aren't doing much to shore up our optimism.

Let's start with climate change, because pretty much everything else hinges on that. As 2018 wound down, we saw a raft of headlines that were, at best, distressing:

- Rising heat from climate change threatens crop yields
- Climate may force millions to move
- Climate cost: Overheated employees too miserable to work
- Climate change could lead to threefold increase in powerful storms
- Climate change will make roads even worse

- Climate change will shrink economy and kill thousands
- Banks fear climate change will render homes uninsurable
- World hunger rose for three years — climate change is a cause
- Climate change already a health emergency, say experts
- Climate-heating greenhouse gases at record levels

And that was over just two weeks in November.

The year saw wildfires in Greece and the United States, floods in Japan and Nigeria, a heat wave in Pakistan and mudslides in India — and enough human carnage from all these to provide a sobering preview of what might await us in the decades ahead.

The news in 2018 wasn't all bad. Renewable energy procurement continued on the impressive growth curve we've been watching for a decade. Electric vehicle purchases, while still a relatively small slice of the market, continued to grow as automakers around the world promised dozens of new EV models in the next few years, including electric buses and trucks. Eliminating plastic waste became a global cause, with efforts both symbolic (banning plastic straws in restaurants) and significant (corporate commitments to eliminate all single-use plastics). Ideas that not long ago seemed fringe — regenerative agriculture, a circular economy — were becoming commonplace, including within some of the world's largest companies.

In the end, it's another mixed bag, with many of the same challenges we've seen for years. "History doesn't repeat itself, but it often rhymes," Mark Twain is reputed to have said. The history of sustainable business may be a verse-case scenario.

So, which will win out — the good news or the bad? The answer depends in part on the headlines of the day — more cataclysmic signs of a planet under siege or the hopeful signals of a world taking action?

As we concluded back in 2009:

> At the end of the day, the questions remain: Are we moving far enough, fast enough? Does the ever-growing green activity in the business world represent a true transformation, one capable of adequately addressing pressing issues like climate change, air quality, the loss of species and the looming water crisis? Or is it merely nibbling at the edges of the problems? Reasonable minds can justifiably argue both sides.

Plus ça change — the more things change, the more they stay the same.

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01

TOP SUSTAINABLE BUSINESS TRENDS 2019

The Profession of Corporate Sustainability Gets Specific

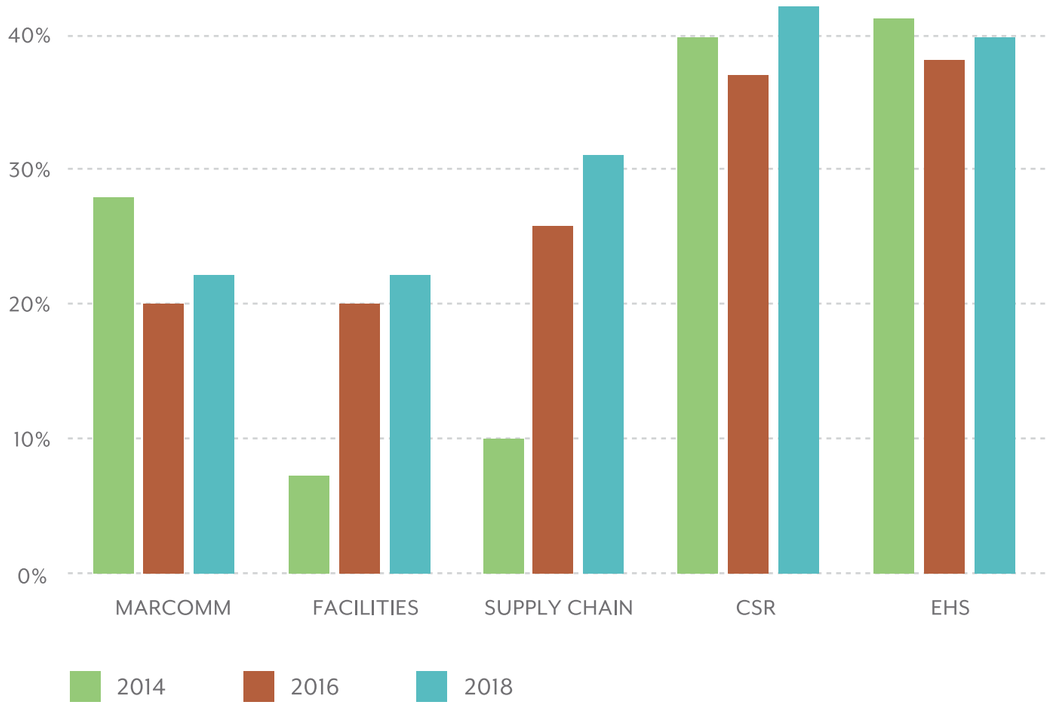
By John Davies
Vice President and Senior Analyst, GreenBiz Group

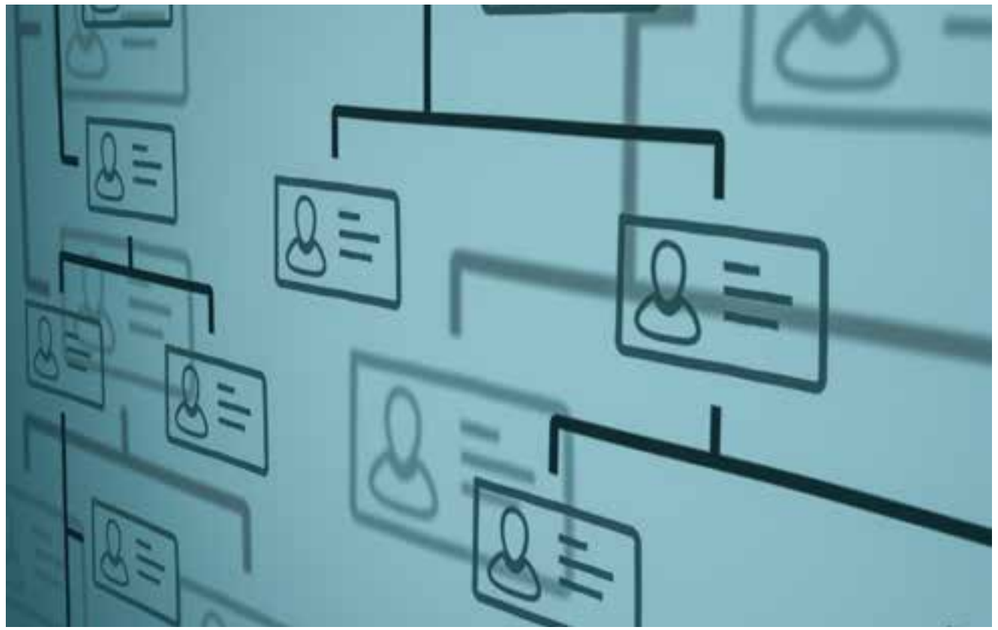
Corporate sustainability programs are turning out to be, well, sustainable. That won't surprise readers of the biennial GreenBiz Group State of the Profession report. This year, we asked nearly 4,000 GreenBiz Intelligence Panel members whether their programs would continue on their current trajectory if the organization's sustainability leader and CEO both left. Only 17 percent said their programs would not continue, while 58 percent said they would carry on and 25 percent didn't know.

This strong belief in the resiliency of sustainability programs is reflected by the biggest change in the profession since we first began conducting this research — namely, the evolution from the early role of sustainability executives as generalists to an increasing demand for those with education and experience in everything from materials science and product design to purchasing and procurement, finance, accounting and more.

There will always be a leadership role for a centralized sustainability executive overseeing an ever-changing landscape of environmental and social challenges and opportunities. There's no working yourself out of a job when it comes to sustainability, even though many sustainability executives state that as their ultimate objective. If anything, the sustainability leader's role

DOES YOUR ORGANIZATION CURRENTLY HAVE ONE OR MORE DEDICATED SUSTAINABILITY RESOURCES EMBEDDED IN ANY OF THE FOLLOWING DEPARTMENTS (EITHER FULL OR PART-TIME)?





expands as the profession evolves from its tactical origins of reporting and stakeholder engagement to that of business strategy, change management and on-the-ground execution. Early on, these roles were established to manage risk; now they are there to harvest opportunity.

This is evident in our most recent survey, of respondents from companies with revenues greater than $1 billion, about whether their organization has one or more dedicated sustainability resources embedded in other parts of the organization.

Historically, departments in corporate social responsibility (CSR) and environmental health and safety (EHS) have been aligned with sustainability efforts. The past few years have shown a marked increase in dedicated sustainability personnel in facilities and supply-chain departments.

To gain greater insight and to learn where companies are increasing sustainability-related resources, we reached out to some leaders in the GreenBiz Executive Network, our member-based, peer-to-peer learning forum for sustainability professionals.

Cargill's Global Sustainability Leader Jill Kolling has seen the specialization of sustainability roles and functions rise in two ways. There's specialization around specific issues such as climate change or water or human rights, and staffing up in areas that can drive corporate policies or strategies. She adds: "Then there is another type of expertise more specific to a particular supply chain or product set. For example, in operations we work to make our plants and manufacturing facilities more efficient and use fewer natural resources."

AT&T's Director of Sustainability Operations John Schulz agrees. "We're covering more bases now in sustainability because we've realized that the scope of sustainability is bigger than just environmental," he says. "It's got social elements, it's got customer and employee engagement elements, and more." As a result, his team has added people.

One development driving greater specialization is an increase in the specificity of goal setting. CDP asks large global corporations to measure and report carbon emissions along with supply chain, water and forest impacts. Measurement has become more target-oriented as companies set goals in alignment with the Science Based Targets initiative and others seek context-based targets for other environmental impacts, such as water. The growing relevance of the SDGs and calls for organizations to conduct scenario planning in accordance with the TCFD all seek to shine a brighter light on corporate commitments and how success will be measured.

According to Steelcase Director of Global Sustainability Angela Nahikian, specialization has increased along with the levels of detail, understanding and transparency and the cross-disciplinary nature of corporate sustainability. Among the 20 people on her team, Nahikian says, "Some started out as generalists and went on to get deeper expertise, and some had technical degrees and sought broader exposure to business strategy and communications."

Jeff Hogue, chief sustainability officer for C&A, the Dutch-based apparel chain, reflects that years ago the sustainability lead typically was drawn from inside the company and put into place to develop the strategy — often a good influencer who knew the business and a broad range of topics well, and led either a small team or none at all.

Hogue notes that today's increase in specialization is a function of the maturity of those strategies. "We've tripled our head count because we need to ensure that we have critical mass to deliver against the very specific goals that we have. My global team is the strategy and policy body, and the retail markets have execution teams."

The shifting of sustainability resources to become more embedded can be seen in the structure at Google. For example, Google has a number of sustainability teams embedded in business units across the company, according to Laura Franceschini, the company's sustainability program manager. Moreover, Google has placed sustainability champions in other teams across the company. For example, there is a sustainable supply-chain team embedded in its supply-chain department, with expertise in life-cycle assessments, factory auditing and human rights issues. There's a renewable energy team embedded in the company's infrastructure group that looks at siting data centers and establishing new utility contracts.

The model allows each of Google's sustainability teams and professionals to be close to the business units they're working with and to develop deep partnerships with the stakeholders that matter most for the type of work that they're doing, along with a central hub of sustainability reporting to Google Sustainability Officer Kate Brandt. The entire team works cross-functionally across the company.

It is a time of great opportunity for those interested in working on corporate sustainability issues, but for most of those jobs the requirements are becoming more specific, a fact acknowledged by higher education institutions that offer MBA programs with a sustainability focus. For example, Arizona State University offers dual degrees combining sustainability with fields such as communications, legal studies and urban planning.

Cisco Director of Supply Chain Sustainability and Circular Economy Lisa Brady is seeing applicants from more dual-degree programs such as product

design and environmental studies, or joint engineering and sustainability degrees: "We think those combinations are powerful as we seek employees who can help us execute on our sustainability and circular economy goals."

Circular economy, renewable energy, supply chain — these are just a few of many areas where sustainability is being embedded and pushing organizations further along toward a more resilient and profitable future. As sustainability is embedded ever deeper inside companies' strategies, operations and product lines, so, too, is the sustainability profession itself.

Key players to watch

Arizona State University — offers one of the most wide-ranging offerings of graduate degrees and programs that incorporate a collaborative and transdisciplinary approach.

BlackRock — CEO Larry Fink's annual letter for 2018 last year rocked the sustainability world in a good way and put CEOs on notice that the investment community is watching.

Global Reporting Initiative (GRI) — its Sustainability Reporting Standards are the most widely adopted global standards for sustainability reporting.

Responsible Business Alliance — one of the first coalitions to create an industry-wide standard on social, environmental and ethical issues in the supply chain.

United Nations — the 17 Sustainable Development Goals and 169 targets are providing a more specific platform for business to engage collaboratively with governments around the world.

02

TOP SUSTAINABLE BUSINESS TRENDS 2019

Reuse Makes a Comeback

By Joel Makower
Chairman and Executive Editor, GreenBiz Group

Reduce, reuse, recycle.

It's an environmental mantra most school kids — and many of their parents — can recite, a pledge of allegiance to an age of limited resources.

Most of the attention goes to the first and last of the Three R's — reduce and recycle — but hardly any to the concept of reuse. To the extent it has, the focus has been on giving a second life to used packaging (such as bags and bottles) and apparel — and maybe to donating or selling unwanted stuff.

That's a start, but just a taste of what's possible.

The rise of the circular economy, where resources flow continuously and safely, has jumpstarted a nearly moribund culture of reuse. A new generation of materials, products and services is coming, reviving business models that would be instantly recognizable to our parents and grandparents, albeit with a distinctly 21st-century overlay.

Consider Loop, a service launched at the 2019 World Economic Forum (WEF) meeting in Davos, Switzerland. It involves a collaboration among more than a dozen global brands, including Clorox, Coca-Cola, Mars, Mondelez, Nestle, PepsiCo, Procter & Gamble, Unilever and UPS.

Loop, managed and owned by TerraCycle — which made its name by finding creative uses for hard-to-recycle materials, from juice boxes to cigarette filters — describes itself as "a global platform that enables consumer product companies and retailers to shift from a disposable to a durable supply chain."

Translation: Welcome back to the "milkman model."

Those of a certain age will recall a time when local dairies would deliver bottles of milk to consumers' doorsteps and, at the same time, pick up empty bottles to be cleaned and refilled.

Loop, rolling out first in Paris and New York, put that model on steroids, offering hundreds of refillable products. That required creating innovative new packaging, designed for 100-use cycles, some digitally enabled, which can be returned and reused. Many offer benefits beyond durability. The Ben & Jerry's ice cream container, for example, will keep your Cherry Garcia colder longer than a typical disposable container. Empties can be left for pickup or returned to retail stores.

Such services are just the beginning of the resurgence of reuse. Another is the renaissance of the fix-it culture, where worn or broken goods, from sweaters to smartphones, are repaired or upgraded rather than disposed of.

Leading the movement is the Repair Café, a concept born a decade ago in Amsterdam, now numbering more than 1,500 outlets worldwide. Each features tools and materials to help individuals repair or refurbish clothes, furniture, appliances, bicycles, crockery, toys and whatever else needs a little TLC. On-site specialists — electricians, seamstresses, carpenters, mechanics and more — are available. The idea is to do it yourself, get help when needed or help others when you can.

The fix-it movement — a subset of the maker movement, which comprises a vast army of individual inventors, designers and tinkerers — is still nascent. But as a new generation of do-it-yourselfers enters the time of life when people traditionally acquire homes, cars, furniture, appliances, baby toys and many other things, fixing what's broken could become second nature. So could an ethic of avoiding nonrepairable goods and shunning companies stuck in the world of cheap, disposable products.

A handful of political leaders is seeing social value in this, particularly in Europe. Sweden offers tax breaks on repairs to clothes, bicycles, refrigerators and washing machines, an effort to counter its throwaway consumer culture. In Ireland, a new focus on reuse has captured the imagination of consumers keen to do their bit to reduce carbon emissions and prevent waste. In Scotland, a furniture reuse firm has drawn praise for bringing the benefits of reuse and repair to housing associations and landlords.

And then there's "recommerce," another emerging concept in the culture of reuse, where consumers can trade in used goods to consumer brands, which then refurbish and resell them. The idea has found a good fit in the apparel sector as a means to combat some of the industry's rampant waste: an estimated 92 million tons of textile waste annually from the global fashion industry, projected to increase by about 60 percent between 2015 and 2030, according to the 2017 Pulse of the Fashion Industry report.

Yerdle Recommerce, which provides a "white label" service for retailers such as Eileen Fisher, Patagonia and REI, aims to stop some of this waste. The service enables companies' customers to return worn goods for store credit. Yerdle then repairs and refurbishes those goods so that the apparel companies can sell them again as refurbished under their own brands, complete with warranties, customer service and return policies.

Yerdle is just one company trafficking in refurbished wear. Others include The RealReal, which sells high-end brands of mostly women's apparel; Rent the Runway, which offers a rental service for clothing; thredUP, "the largest consignment and thrift store"; and Renewal Workshop, which, like Yerdle, handles returns and refurbishing for a select few brands.

According to Yerdle CEO Andy Ruben, a former Walmart executive, the average age of a customer buying refurbished goods is 20 years younger than the conventional customer. Millennials, in particular, prefer experiences over stuff and don't view something being previously owned as a barrier, he says.

Ruben's former employer, Walmart, also sees potential in reuse. "With the materials that we use to protect our product, to deliver it efficiently to the customer, to keep it safe, to keep it fresh, there has to be an end market for those," Zach Freeze, the company's senior director of strategic initiatives in sustainability, told the U.S. Senate Recycling Caucus in November.

As reuse ramps up, a coterie of entrepreneurs and organizations, both for-profit and not, are finding niche opportunities. For example, London-based Restart Project,

with the cheeky motto, "Move slow and fix things," has created a platform for repair-minded consumers who want to dig into closed products. "By bringing people together to share skills and gain the confidence to open up their stuff, we give people a hands-on way of making a difference," the organization boasts on its website. A Los Angeles startup called Replenish has designed "the first fully customizable packaging platform for liquid concentrates" — a refillable container system for cleaning products that cuts plastic waste by 90 percent. SC Johnson is among the large consumer brands that has vowed to introduce more refillable products.

Will consumers buy in to the idea of adding water to a concentrate to make their own Windex or Formula 409? It's been tried a couple times before with only minimal success. But it's a new era with new concerns about waste, particularly single-use plastics, and fewer taboos against reuse — witness the success of the sharing economy and consumers' increased willingness to tote shopping bags and water bottles. So, the third time could be a charm.

Key players to watch

Loop — a consortium of major brands offering products in refillable containers.

Repair Café — a global network of storefront operations offers tools and expertise to repair or refurbish a wide range of products.

Replenish — offers a line of refillable packages designed primarily for cleaning products.

Walmart — is asking suppliers to design products with more recycled content, and with reuse and recyclability in mind.

Yerdle Recommerce — a pioneering platform for apparel companies to offer refurbished clothing to their customers.

03

TOP SUSTAINABLE BUSINESS TRENDS 2019

Soil Becomes Fertile Ground for Climate Action

By Holly Secon
Associate Editor, GreenBiz Group

Soil quality is a growing focus in the sustainability space, and for good reason: Fertile soil naturally stabilizes the climate and ensures resilient supply chains. But a third of the planet's land is severely degraded, and fertile soil is being lost at the rate of 24 billion tons a year, according to a 2017 United Nations-backed study.

So, a small but growing group of companies — some directly in agriculture or ranching, others indirectly via sourcing — are investing in healthy soil initiatives.

Soil, no matter how healthy, may not be the spiciest climate solution. It's not a giant machine that can suck carbon directly from the air — or is it?

In fact, Earth's soils contain more than three times more carbon than is stored in the atmosphere, and four times more than the amount in all living plants and animals. Biologically speaking, the microbes and minerals in soil systems serve critical, beneficial roles in land stewardship: They regulate water, cycle nutrients, filter pollutants, physically support plants and sequester greenhouse gases (GHGs). Soil is, indeed, a buried treasure.

Essentially, what's good for soil is good for the climate — and for business.

Until recently, most of the action was cultivated by smaller, niche players in the organic and natural products space. Soapmaker Dr. Bronner's special operations team, for instance, has long worked with suppliers and farmers to support soil fertility as part of its Fair Trade certification. Bigger companies, too, must clean up their value chains, and one of the most effective ways is starting, literally, from the ground up — the origin of many soil-dependent commodities, from food to fiber to fuels.

That's no easy task. Agricultural value chains are vast and complex, and some commodities' supply chains can obfuscate the provenance of products. Combine that with a half-century of farming management strategies that prioritized higher yields of commodity crops, often with copious amounts of chemical fertilizers and pesticides. The result: depleted topsoil and decreased farm productivity, often leading to a continuous cycle of increased fertilizer inputs to supplement ever-degraded soil.

A number of soil-enhancing land-management strategies have been sprouting among food and ag companies, part of a larger movement of sustainable agriculture and its first cousin, regenerative agriculture.

Companies all along the food chain — from agricultural cooperative Land O'Lakes to retail behemoth Walmart to seed and ag chemical company Monsanto (acquired by German chemical giant Bayer in 2018) — have begun to embrace these strategies to meet sustainability goals, safeguard the resilience of supply chains, meet increasing demand for climate-friendly products and ensure prolonged profitability and reduced risk.

The toolkit of sustainable land-management strategies includes those rooted in pre-industrial era agricultural, forestry and ranching techniques, some employed by indigenous peoples. To name a few: cover cropping, crop rotation, no- or low-till farming, silvopasture, regenerative grazing management, applying compost as fertilizer, integrated pest management, planting perennials and carbon farming. The specific region, type of soil and crop variety are all key in deciding which strategies will provide optimal results.

Making the transition can be tricky. Long-term investments and increased labor costs are associated with some of these practices, which can have estimated annual returns of about $100 per acre. So, the most effective levers to influence sustainable soil health measures in supply chains involve offering economic incentives to producers, entering partnerships with other leaders and grounding these efforts in regional contexts.

For Kellogg's, General Mills and Wrangler, incentives include providing measurement tools to agricultural suppliers to help them assess the current state of their land; paying for conservation consulting and workshops, such as regenerative agriculture expert Gabe Brown's technical advice; and offering preferred access to specific crop markets for farmers that report sustainability progress. More needs to be done, of course, including directing private-capital flows looking to invest in nature-based climate solutions towards these soil initiatives.

There's money to be made. Philanthropists, asset managers and impact investors are looking at an estimated $2.3 trillion opportunity. The Regenerative Agriculture Investor Network (RAIN) convenes these investors annually and develops reports about the state of private capital in regenerative agriculture.

However, this space is notoriously underdeveloped: Less than 5 percent of philanthropic capital in the United States is invested in rural solutions (PDF). Microfinancing has been the traditional method of investing in rural areas of developing countries — but that has been focused primarily on conventional, not sustainable agriculture. Still, with socially and environmentally responsible investing on the rise, and with the expansion of voluntary carbon markets, such as blockchain-based platform Nori, the area is ripe for growth.

Partnerships are one preferred approach by companies, such as pursuing close supply-

chain relationships, public-private-partnerships, landscape alliances and research institutions. Collaborations of this nature are key to implementing more sustainable land-management strategies: They can encourage farmers to use cover crops and other regenerative methods by ensuring that these things will be valued in the marketplace.

Soil-focused organizations such as the Soil Health Institute — which partners with The Nature Conservancy, the USDA Natural Resources Conservation Service and Field to Market, along with General Mills and the Walton Family Foundation (the giving arm of Walmart's founding family) — also offer numerous opportunities to support soil-healthy practices. These include a funding pool, information, research project assessments and collaborations and education.

One major move recently has involved establishing standards for measurements of soil health, so that scientists, farmers, managers and retailers can speak the same language. Another nonprofit, Carbon Underground, partners with companies such as Unilever's subsidiary Ben & Jerry's, General Mills' subsidiary Annie's Homegrown and Danone North America — specifically through its recently launched soil health research initiative — to conduct rigorous soil research for farmer participants, including sampling, analysis reports and training.

For many companies, such research leads to creating sample test bed sites. They allow growers to quantify test soil health measures in local contexts to find the most effective practices, as soil type varies by location.

There are more upcoming opportunities for public-private partnering, especially with local governments, thanks to the signing of the 2018 Farm Bill by President Donald Trump. It extends the funding for programs that incentivize farmers to adopt environmentally beneficial soil health management, nutrient stewardship and carbon sequestering strategies. There's even a pilot program to assess the economic opportunity of carbon sequestering land-management strategies.

It's early days, but these are promising signs. With recent reports warning of the massive impacts of our current farming practices — up to 80 percent of the carbon in the world's soil has been released already, with agriculture as a growing source of GHG emissions — it's time to hit the ground running.

Key players to watch

General Mills — it hired a soil scientist to lead sustainability programs after realizing most of its emissions came from suppliers and farmers. It has invested millions in testing better land management strategies.

Land O'Lakes — the member-owned agricultural cooperative has a sustainability branch, SUSTAIN, that focuses on soil health. With its own technology platform, Truterra, farmers can synthesize soil, weather, economic and farm management data.

Midwest Row Crop Collaborative — this coalition of companies and conservation groups throughout the Upper Mississippi River Basin of the United States is working to ensure that farmers there are trained in conservation methods.

Patagonia — long a leader in regenerative agriculture, it is developing a stricter certification with "regenerative organic" practices. The clothing and gear company, which also has a food subsidiary, focuses on soil health in its agriculture and ranching practices.

Soil Health Institute — it partners with multinational corporations, universities, NGOs and government agencies to conduct and apply research, as well as to ensure the adoption of soil-focused land management practices and technologies.

04

TOP SUSTAINABLE BUSINESS TRENDS 2019

Corporate Action Takes Root on Deforestation

By Ucilia Wang
GreenBiz Contributor

The lungs of the Earth are under assault, and their well-being will worsen without bold recovery plans from businesses and governments. That's the conclusion of the latest report by the Intergovernmental Panel on Climate Change (IPCC), which paints a bleak picture of the health outlook of the world's forests — and the plants and animals that depend on them — if global warming exceeds 1.5-degree Celsius from pre-industrial levels.

"Emissions would need to decline rapidly across all of society's main sectors, including buildings, industry, transport, energy, and agriculture, forestry and other land use," the report stated.

Scientists long have championed forest protection as an important climate strategy because trees act as sponges of carbon emissions. For many industries, conserving forest land also reduces a variety of risks, from ensuring a sustainable supply of raw materials and water to preventing wildfires and air or water pollution that increase business costs.

A good number of companies — including in paper products, fashion, technology and print media — have invested directly in buying forests for preservation or funded other efforts to keep forests' ecology intact, such as restricting logging and researching alternative raw materials.

But our planet continues to see larger and larger bald spots where trees used to stand. In fact, 2017 was the second-worst year on record for tropical forests — 39 million acres of trees disappeared from countries such as Brazil, Democratic Republic of Congo and Indonesia, according to Global Forest Watch.

In an October report, Global Forest Watch calculated that 8 percent of the world's GHG emissions come from tropical forest losses, which release stored gases when trees are cut down or burned. To put this in perspective, the environmental group showed that deforestation would rank third behind the United States and China as a major emitter if it were a country. Yet government spending around the world on forest protection accounted for less than 3 percent (PDF) of the money for climate mitigation.

Human activities — clearing trees for farming, raising livestock and mining — are largely responsible for the disappearance of forests worldwide. These remain major forces of destruction, particularly in countries such

as Colombia, which saw a 46 percent jump in tree losses from 2016 to 2017. That spike coincided with the government's peace treaty with Revolutionary Armed Forces of Colombia rebels, which ceded control of the Amazon forests that used to be off limits to logging and other commercial developments.

Increasingly, wildfires and powerful storms are threatening the health of forests as the warming climate contributes to more droughts and intense hurricanes. The most comprehensive climate assessment by the U.S. government, released in November, pinpointed this trend for the country's 130 million acres of forests, or 33 percent of its land:

> It is very likely that climate change will decrease the ability of many forest ecosystems to provide important ecosystem services to society. Tree growth and carbon storage are expected to decrease in most locations as a result of higher temperatures, more frequent drought and increased disturbances.

Preserving forests isn't a new idea for corporations, to be sure, as many companies have signed up for tree-planting projects as a philanthropic charity, employee-engagement or brand-building effort. Forest protection projects also have offered a source of carbon credits for businesses looking to meet voluntary or mandatory goals for reducing emissions, such as Pacific Gas and Electric's cap-and-trade program in California. But the level of concern and engagement over tree loss is reaching new heights.

One of the biggest challenges for businesses seeking to address deforestation is tracing the journeys of the pulp and paper they use from forest to factory. To solve that, a group of companies including Eileen Fisher, H&M, Kering and Marks & Spencer, and funded a project by a Canadian nonprofit, Canopy worked to create an online map of the locations of ancient and endangered forests from around the world.

Canopy launched that tool, ForestMapper, in November to enable businesses to track their supply chains and avoid buying materials from endangered forests.

Global Forest Watch also offers an online tool to track forest clearance and reforestation occurrences around the world.

The fashion industry is particularly interested in forest management because it relies on wood pulp to make a commonly used fabric, rayon.

Even an electronics giant, heavily reliant on paper packaging, is on board. In September, Apple revealed its plan to plant and preserve 27,000 acres of mangrove forest in Colombia. The tech leader first expressed interest in sustainable forest management in 2015 when it announced projects to buy forests to conserve and implement sustainable logging and management plans in the United States and China.

Sometimes, it takes pressure from environmental activists to force companies to invest in forest protection. Greenpeace's campaign against one of the biggest palm oil traders in the world, IOI Group, caused the

Malaysian company to lose big customers, including Nestlé and General Mills. The latter eventually agreed to stop deforestation on its land and monitor suppliers to ensure they, too, invest in forest preservation.

Increasingly, other large companies with complex supply chains are monitoring and pressuring their suppliers against using materials from endangered forests or otherwise contribution to deforestation. Walmart launched such an initiative last year.

The 2015 Paris Agreement — and the dire IPCC report — has put a sharper focus on the need to work urgently to prevent deforestation and replant in decimated woods. That call to action has prompted some large-scale efforts. Nine foundations, including the Ford Foundation, The Rockefeller Foundation and the ClimateWorks Foundation, recently pledged (PDF) $459 million to restore and expand forests worldwide through 2022.

Organizations such as the United Nations and the World Bank have been drafting policies that the international community labels as Reducing Emissions from Deforestation and Degradation, or REDD+. Those policies provide financial incentives for governments, businesses and communities to preserve forests.

All these public and private efforts certainly will help, considering that just a year ago, a report (PDF) showed that government subsidies and private spending in agriculture and other land-use development totaled $777 billion since 2010, compared with the $20 billion spent during that period for stopping deforestation and reducing forest emissions.

Closing that gap will require significantly more money and commitments. And companies, from product makers to financial institutions, need to play a greater role to protect the forests and let the planet breathe more easily again.

Key players to watch

Apple — while increasing the use of sustainable materials in products and packaging, it has taken an unusual step of buying forests and working with nonprofits to implement sustainable management (PDF). That has led to projects in the United States, China and, most recently, Colombia.

H&M — apparel giant made an early commitment to stop using wood pulp from ancient or endangered forests for making fiber, a pledge emulated by others including VF Corp, Levi Strauss, Stella McCartney, Ralph Lauren and Guess.

Kimberly-Clark — has become a champion against clearcut logging. It adopted materials from certified and sustainably managed forests after Greenpeace pressures more than a decade ago, and continues to invest in forest protection and alternatives to virgin wood fiber.

L'Oreal — the cosmetics giant monitors its suppliers, particularly of palm oil, to help ensure its products aren't linked to deforestation. Like Unilever, it received a high score from the CDP for forest protection.

Unilever — the company has supported the development of forest mapping and monitoring technology and presses its vast network of suppliers to disclose how and where they source raw materials, particularly palm oil.

05

TOP SUSTAINABLE BUSINESS TRENDS 2019

Electric Buses and Trucks Charge Ahead

By Katie Fehrenbacher
Senior Writer and Analyst, GreenBiz Group

In Shenzhen, China, a sprawling metropolis of over 12 million people, more than 16,000 city buses run on batteries, moving commuters to jobs and residents to shops using electricity instead of diesel. The city's 100 percent electric bus fleet, manufactured by Chinese bus maker BYD, is unusual today, but it's an indicator of what's to come.

Transit and school buses are quickly electrifying in cities around the globe, from Krakow, Poland, to Park City, Utah. Other types of commercial, industrial and institutional trucks, such as delivery vans and cargo-handling vehicles, aren't far behind as battery costs continue to drop and adoption begins.

At some point, fleet vehicles will electrify more quickly than passenger vehicles. By 2040, Bloomberg New Energy Finance (BNEF) predicts that fully 80 percent of the world's city bus fleets will be electric. That same year, only a third of the world's passenger vehicles are predicted to be electric.

Today, cities in China, Europe and the United States are plugging into electric transit and school buses as part of efforts to reduce local air pollution, meet carbon emissions reductions targets and potentially save money on fuel costs. There are also the green optics: It's hard to argue with eliminating diesel fumes from a bus packed with school kids.

Yet last year, there were only a few hundred electric transit buses in the United States, out of 70,000 municipal buses. That's primarily because most battery-powered buses are more expensive to buy than their diesel-powered counterparts.

To help with the couple-hundred-thousand-dollar price gap per vehicle, American cities have turned to state and federal incentives. It's not surprising, then, that California — with its ample cap-and-trade and gas tax funds — has the most electric transit buses in the United States. The Golden State also recently added a stick to its carrots: In late 2018, it became the first U.S. state to mandate that transit agencies must stop buying fossil-fuel-powered by buses starting in 2029.

At the same time, China, with its aggressive government and considerable air pollution, is by far the world's e-bus leader. Ninety-nine percent of the electric buses driving on the planet's roads last year were in the world's most populous country, according to BNEF.

However, these are signs of an emerging market. As the cost of lithium-ion batteries continues to drop, and the e-bus and e-truck markets continue to expand, these vehicles eventually will become cost-competitive with diesel-powered vehicles the same way that electric passenger vehicles are rapidly approaching that point.

At that tipping point, battery-powered fleets for certain applications will become the de facto choice. Why? Because they'll be able to save cities, transit agencies and companies considerable money on fuel costs and will be simultaneously cleaner and cheaper to operate. That spark will "annihilate the diesel bus," as Ryan Popple, CEO of electric bus maker Proterra, put it.

In the meantime, how these electric vehicles are used will be an important factor to determine how cost-effective they'll be. Delivery vans — with their predictable routes, central depots and average distance traveled — are a natural fit for battery power. But over-the-road semi trucks that haul goods between cities and across state lines? Not so much.

A lot of challenges remain for electrifying truck and bus fleets. Most major original equipment manufacturers have yet to invest heavily in building out large volumes of electric bus and truck models. For example, Proterra, one of the leading electric transit bus makers, has delivered only several hundred buses to date.

The early stage of the market has led fleet operators to buy electric trucks from small, high-risk startups, and some fleet leaders have even played a major role in designing vehicles. The delivery gorillas, FedEx and UPS, have worked with a wide array of small suppliers such as Chanje, Thor Trucks, Workhorse and Tesla. Tesla's electric truck model, the Semi, likely won't be commercial for a couple years, although the company already has some big-name customers lined up, including PepsiCo, Albertsons, JB Hunt and Walmart.

Today, there are a small number of corporate EV fleet buyers, but the list is slowly growing. The Climate Group's year-old EV100 program, whose members pledge to convert parts of their fleets to electric by 2030, has 31 names, including IKEA Group and Baidu.

The interest from original equipment manufacturers is starting to grow, too. Proterra and German automaker Daimler just started working together on electric school buses. German industrial conglomerate Siemens is beginning to experiment with electric trucks. Meanwhile, diesel engine powerhouse Cummins unveiled an electric powertrain last year.

Yet there are still technical hurdles to overcome. The depots needed to charge a fleet of EV transit buses or delivery vehicles require considerable investment and electricity demand compared to passenger EV chargers. That can add considerable costs to a fleet manager's decision to convert to electric.

That challenge, too, is making some progress. For example, last year, California regulators approved close to $1 billion for electric vehicle charging projects run by the state's utilities. A good portion of these funds will go toward preparing commercial and industrial zones — such as ports and bus depots — for future charging networks.

Companies are also hard at work on innovating new ways to charge buses and trucks, including battery-swap stations and wireless charging technologies. In London, UPS worked with partners last year to develop a system to dynamically charge its delivery fleet using smart software and smart-grid technology.

In the immediate years, when electric buses and trucks remain more expensive than diesel ones, more innovation will be needed around how to finance these vehicles. Leasing, as opposed to buying, bus batteries could become more popular. Down the road, fleet operators could work with utilities to pay for fleet vehicle batteries through monthly energy bills.

Fleet electrification will be a huge market one day, filled with large manufacturers that offer a wide range of models, in addition to companies and cities that commonly operate all-electric fleets. But the environmental effect of electrification will be equally important. The transportation sector stubbornly has seen its GHG emissions rise in many places in recent years. Electrifying commercial and industrial transportation is crucial to helping curb those emissions.

Fleet electrification can help alleviate local air pollution, particularly in economically disadvantaged communities often found near ports, bus depots and industrial warehouses. Drivers and riders of these vehicles likewise will benefit from the elimination of diesel exhaust.

Today, it's clear that city and school buses will be the pioneers of this sector. While Chinese cities are already moving down this road, 2019 will prove a turning point for American and European cities to assess their transit bus fleets and move toward battery power. Fleet managers at companies and other organizations will follow closely behind.

Key players to watch

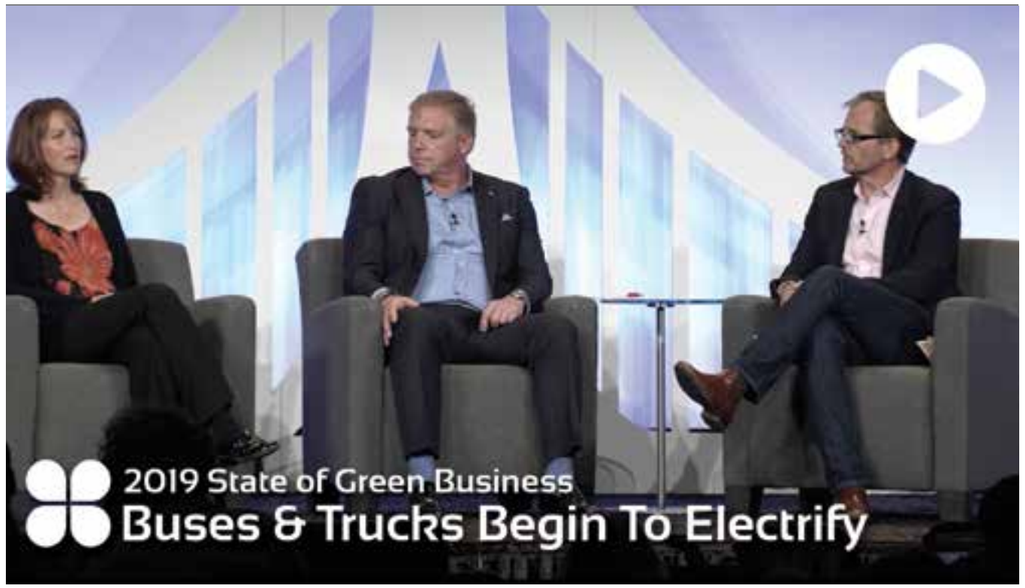
BYD — the world's largest electric vehicle maker in terms of volumes of vehicles sold is based in Shenzhen, China, with offices and a factory in California.

Chanje — the startup, formed out of the ashes of the now-defunct Smith Electric Vehicles, builds electric vans for companies such as FedEx and Ryder.

EVgo — the company is building out a network of fast chargers across the United States for fleets, cities and consumers.

North American Council for Freight Efficiency (NACFE) — the independent research organization focuses on helping the trucking industry navigate energy efficiency and clean energy technology choices.

Proterra — the rare venture-capital-backed startup focused on the electric bus market has unveiled an investment from German automaker Daimler and a deal to partner on making electric school buses.



06

TOP SUSTAINABLE BUSINESS TRENDS 2019

Companies Double Down on Energy Productivity

By Heather Clancy
Editorial Director, GreenBiz Group

It's well established that using less energy doesn't have to come at the expense of economic growth. But why settle for seeking the same results with less power — the hallmark of efficiency programs — when the real jackpot could be increased sales or higher levels of productivity by prioritizing low-carbon energy management?

That question is driving diverse businesses across many industries — ranging from iconic hospitality company Hilton to the massive Indian transportation and industrial conglomerate Mahindra to Japan's largest telecommunications firm Nippon Telegraph and Telephone (NTT) — to bet bigger on energy productivity.

Think of this concept as the science-based evolution of the more familiar energy-efficiency meme that has been part of the sustainable business toolkit for decades.

Yes, reducing power consumption is still the end game, along with the accompanying decrease in GHGs. We need that more than ever, as national governments waffle and flounder in their commitment to limit global temperature increases to the 1.5 degrees Celsius increase recommended by the Paris Agreement.

But growing new products, services and job opportunities also could be part of the payoff. So, energy productivity acolytes are translating power consumption data into a financial metric that's far more familiar to executives than global temperatures or carbon emissions: It's something akin to the number of watts per widget for a manufacturer or megawatt-hours per worker for a services or consulting firm, or whatever measure makes the most sense, given a company's unique business model.

Japanese homebuilder Daiwa House, for example, is using net sales per gigajoule (GJ) of energy as its rubric for managing operations. (For context, 6 GJ is about the amount of power produced by combusting one barrel of crude oil.)

Certainly, incremental efficiency improvements still very much matter at the facility level, but the productivity lens puts a sharper, boardroom-level focus on energy as an input of growth. It helps CEOs and CFOs better understand the business benefits of addressing climate change, and it could help reduce the investments required for decarbonization by helping businesses save on operational costs

while cutting GHG emissions by at least $2.8 trillion, according to one analysis by the We Mean Business Coalition.

Or, as one industry executive put it: "Energy productivity is the macro to energy efficiency's micro."

Hilton has embedded energy productivity into operational decisions for at least 10 years: Its entire portfolio of 5,400 hotels is triple-certified by the International Organization for Standardization for quality, environmental and energy management.

Hilton, Mahindra and NTT are just three of the diverse organizations moving more actively to disprove the conventional wisdom that cutting energy consumption somehow deters economic growth. Each company officially has committed to the EP100 campaign, a high-profile effort to champion energy productivity.

Spearheaded by the Climate Group and the Alliance to Save Energy, the two-year-old EP100 represents companies reducing energy consumption while investing in cleantech innovation. Just three companies were on board at the launch, but participation accelerated last fall alongside the Global Climate Action Summit. By the end of 2018, 35 companies were on board.

For NTT, one of the newest pledgers, the quest for better energy productivity translates into a mission to generate twice the amount of data traffic for every unit of energy consumed by the 2025 timeframe, based on consumption in 2017.

The folks behind EP100 figure that if 100 companies can achieve one of the most ambitious energy productivity commitments a company could make today — doubling economic output per every unit of energy consumed — the emissions reductions would be the equivalent of taking 37 million cars off the road for one year.

About half of the companies in the campaign are aiming that high. That includes German chemicals manufacturer Covestro, the first major European company to join; apparel company H&M, designing and opening stores that use 40 percent

less energy than today; building controls and energy technology makers Johnson Controls and Schneider Electric (both of which also stand to benefit from the commitments of others); and Dalmia Cement and UltraTech, two of India's biggest cement companies.

One of the most straightforward ways a company can improve its energy productivity is by investing in a global energy management system that tracks energy savings globally and reports on them at least annually alongside other operational metrics. That's where South African chemicals maker Sasol and Taiwanese skincare company TRIDL are starting their energy productivity journeys.

The latter already has slashed electricity consumption 60 percent by switching to LED lighting, seen as instrumental for reaching productivity goals, along with occupancy sensors and artificial intelligence software

that helps automate building functions based on workplace and weather conditions. Another company on this path is Hilton, developing mobile apps for guests to control temperature and lighting.

In addition, you'll increasingly hear energy productivity linked with the net-zero-carbon buildings movement — specifically with a pledge, managed by the World Green Building Council (WGBC), for organizations to own, occupy or develop buildings that don't emit carbon by 2030.

Among those working toward that vision are software company Salesforce as well as a slew of real estate and construction concerns such as Integral Group; Australia's AMP Capital, Fraser and GPT Group; Britain's Berkeley Group and Landsec; Ireland's John Sisk & Son; and United States-based Kilroy Realty.

The EP100 list features quite a few corporate partners from India. That's in large part because the effort soft-launched in that fast-developing nation, but also because these companies view energy productivity as one way to leapfrog their domestic and international rivals, says Jenny Chu, head of energy productivity initiatives for the Climate Group. "This concept allows them to decouple business development objectives from environmental ones," Chu says, adding that it makes it simpler for organizations to cast the latter in the language of the C-suite.

A quintessential example is consumer goods and agribusiness Godrej Industries, which has reduced energy consumption by 41 percent since 2001 by investing in heat pumps, deploying microturbines and adopting more-efficient chemical processes. During that time, one of its participating subsidiaries increased sales by 7 percent for its latest fiscal year.

For that reason, you can anticipate more companies — especially fast-growing brands in India and China — to become empowered to embrace energy productivity.

Key players to watch

Alliance to Save Energy — a 41-year-old bipartisan nonprofit dedicated to championing energy productivity as a catalyst for "economic growth, a cleaner environment and greater energy security, affordability and reliability."

EP100 — the Climate Group and the Alliance to Save Energy partnership encourages companies to commit to one of three productivity pathways: doubling the economic output from energy consumed, slashing energy waste in facilities through software, or adopting net-zero carbon buildings.

Hilton — is the first hotel brand to adopt a science-based target for reducing CO2 emissions: 61 percent by 2030 — and has committed to improving energy productivity 40 percent by the same year.

Mahindra Group — the Indian conglomerate across transportation, hospitality and manufacturing has made energy productivity central to its business strategy. It was the first EP100 signatory, and its entire operation has committed to carbon neutrality by 2040.

World Green Building Council (WGBC) — is the principal organization behind the Net-Zero-Carbon Building Commitment, which challenges companies, cities, states and regions to reach net-zero operating emissions in their portfolios by 2030, and to advocate for all buildings to be net zero in operation by 2050.

07

TOP SUSTAINABLE BUSINESS TRENDS 2019

Green Loans Promise a Lower Cost of Capital

By Libby Bernick
Managing Director and Global Head of
S&P Global Trucost Corporate Business

Green bonds have been making headlines in the sustainable finance world the past few years because of their rapid growth. Emerging this year as a rising star in sustainable finance are green and sustainability loans. What has caught the eye of corporate finance and treasury departments is that these loans are often tied to a lower lending rate for companies that can improve their performance on sustainability measures.

Sustainability as a path to lower borrowing costs could be a game-changer.

Green- and sustainability-linked loans reached $36.4 billion while green bond issuance topped $182 billion in 2018 according to BNEF. Since Lloyds Bank's pioneering effort in 2016, with about $1.27 billion earmarked for loans for greener real estate companies in the United Kingdom, other banks have stepped in (including leaders ING Bank and BNP Paribas) and green loans are spreading to many regions and sectors.

Companies in many industry sectors are taking advantage of sustainability-linked lending, including food and beverage giants such as Danone ($2.5 billion loan), Olam ($500 million) and Wilmar ($200 million), and other sectors such as energy (Iberdrola, $6.7 billion), technology and healthcare (Phillips, $1.25 billion) and materials (Royal DSM, $1.25 billion). BBVA ignited the spread of green lending with the first green corporate loan in Latin America, to Iberdrola, and the first in the United States, to Avangrid ($2.5 billion). For some companies, lending rates are tied to an improvement in overall corporate sustainability or environmental, social and governance (ESG) performance, while other loans are linked to specific measures such as reducing GHG emissions.

Why are banks offering lower rates to sustainability leaders? Mounting evidence shows that companies with a focus on financially material sustainability or ESG issues outperform others and should represent a lower credit risk. Lenders also note that a company's focus on sustainability performance can be a measure of innovation as well as an indicator of good management.

For companies, ESG- or sustainability-linked loans, also known as positive-incentive loans, provide a lower lending rate or pricing reward for a company's sustainability leadership. Unlike green bonds, these sustainability-linked loans can be used for corporate general purpose, not just specific green projects or technologies. The borrower must quantify and report its environmental or sustainability benefits each year to the lender, but in general, these loans are often easier to arrange than

bonds and have lower lending thresholds, making them more accessible to smaller companies.

Like many other aspects of green finance, green loans sprouted in Europe. The foundations were laid in March 2018 with the issuance of the Green Loan Principles by the Loan Market Association in conjunction with the International Capital Market Association, which also administers the Green Bond Principles. These organizations collaborated to align the Green Bond and Green Loan Principles, learning from what already had been done on the Green Bond Principles rather than creating a competing framework, as so often has been the case in the sustainability industry. In addition to these standard-setting activities, the EU High-Level Expert Group has included policy recommendations to the European Commission on sustainable finance and green lending.

Credible measures for companies to quantify ESG performance are also fueling growth. To date, most sustainability-linked loans are based on a company's ESG data or third-party ESG ratings. There are no overarching guidelines or standards for sustainability-linked loans, so banks are moving rapidly to develop their own green lending practices aligned with their performance measures in their business strategies. For companies, this means that they should understand and be able to communicate to their lenders how their sustainability or ESG performances are tied to financial performances, such as revenue growth or lower lending risk.

The emergence of companies quantifying their performance on the U.N. SDGs will create another means for banks to align positive impact lending with companies that are able to show improved SDG performance. Last year, for example, 13 companies from the United States, Europe, Asia and Latin America — Aguas Andinas, AMD, Arm, CLP Holdings, HP Inc., Iberdrola, Ingersoll Rand, Ørsted, ROCKWOOL Group, S&P Global, Spectrum Brands Holdings, Tarkett and Walgreens Boots Alliance — quantified their baseline SDG scores and are poised to track improvements over time.

Early adopters such as ING Bank, BNP Paribas and BBVA continue to break new ground. ING has done 15 green loans and holds 15 percent of its portfolio in "responsible finance," with an aim to double that by 2022. BNP Paribas says interest rates tied to sustainability and ESG performance are where banking is headed. "A transaction that demonstrates that delivering on sustainability will ultimately drive economic performance? Yes, this is the future of banking," says Yann Gerardin, head of corporate and institutional banking at BNP Paribas.

Now that the innovators and early adopters are issuing green loans, getting to a wider scale and reaching the middle market of corporate

borrowers will require standardization of terminology and better transparency on ESG. Companies that have invested in sustainability programs, built capacity to manage environmental and social issues across their business functions such as supply chain and risk, and that have taken steps to quantify their performance will be well positioned to take advantage of these loans.

Key players to watch

Barclays — a pioneer in the development of green loans recognizes them as "not only a necessity but a compelling economic opportunity."

BBVA — is the leading provider of green loans, with Iberdrola and Avangrid as initial recipients.

BNP Paribas — one of the leading issuers of green loans sees them as "the future of banking."

ING Bank — a leading issuer of sustainability linked loans aims to double its holdings in responsible finance by 2022.

Loan Market Association — the London-based group is working with the International Capital Market Association to launch the Green Loan Principles.

08

TOP SUSTAINABLE BUSINESS TRENDS 2019

Super Pollutants Become Super Important

By Heather Clancy
Editorial Director, GreenBiz Group

There's something in the air and it isn't just carbon dioxide. As the world bickers over the correct paths for CO2 emissions reductions over the next quarter-century and beyond, a growing number of policymakers and corporate leaders are prioritizing more swift, short-term action to mitigate so-called super pollutants.

What makes a pollutant "super"? GHGs such as methane, black carbon (aka soot), chlorofluorocarbons and hydrofluorocarbons (HFCs) don't have a long lifespan in the atmosphere. They may waft for days or decades rather than the centuries carbon dioxide is expected to hang around. But these GHGs are troublesome because they have an outsize negative impact during their time in the biosphere.

If more isn't done aggressively to reduce or phase out these super pollutants, the global temperature could rise even faster than anticipated, say experts. "Mitigation of super pollutants is the only way to keep it below 2 degrees [Celsius] by 2050," alongside long-term strategies for reducing CO2, Veerabhadran Ramanathan, distinguished professor of atmospheric and climate sciences at the Scripps Institute of Oceanography, said at an event in September.

The good news: Heroic cities, states, industry sectors and companies are flexing their super powers to combat super pollutants.

Part of that is a natural benefit of setting science-based targets. Take Tyson Foods, the world's largest processor of chickens and pigs, which embraced a meaty new science-based sustainability agenda last spring. It is launching a test program within its refrigerated truck fleet in 2019 for a next-generation engine from Achates Power that reduces nitrogen oxide (NOx) emissions up to 90 percent.

Why does that matter? NOx, spewed by agricultural fertilizer production and fuel combustion, accounted for about 6 percent of U.S. GHG emissions in 2016. NOx variants are considered a more potent warmer than CO2, plus they damage the ozone layer.

Astonishingly, while President Trump's appointees have deflated dozens of environmental protections, the U.S. Environmental Protection Agency is pumping up regulations for NOx emissions, suggesting new, more aggressive rules for heavy-duty trucks in 2020. Meanwhile, Japan, New Zealand, Norway, the Philippines and Sweden were among the first to sign onto the Talanoa Statement, which advocates strong mitigation actions to cut methane, HFCs, black carbon (sooty material emitted from gas and diesel engines, coal-fired power plants, and other sources burning fossil fuels) and ground-level ozone — with human health as the most powerful motivator.

Elsewhere, various actors are prioritizing accelerated replacement of HFCs, a refrigerant commonly used in air conditioners and commercial building chillers. The Kigali Amendment to the 1987 Montreal Protocol — the framework credited with reversing depletion of the earth's ozone layer — was adopted in late 2016, and the phaseout began at the beginning of 2019.

The Natural Resources Defense Council is working with some of the biggest makers of air conditioning systems technologies to catalyze safer substances by 2023 (for home AC systems) and 2024 (for commercial chillers). Among its collaborators are HVAC equipment manufacturers Carrier, Chemours, Dalkin Applied Americas, Goodman Manufacturing, Honeywell, Lennox, Nortek Global and Trane.

U.S. states — especially members of the bipartisan U.S. Climate Alliance — are also becoming more proactive. Maryland, Connecticut and NewYork vowed last fall to phase out HFCs, and California previously declared its intention to do so — its rule took effect in January. The alliance's long-term vision is to reduce emissions from what it calls short-lived climate pollutants by up to 50 percent by 2030.

Super pollutants are particularly important to address before they cough up a humanitarian crisis over the next decade. That's because as the earth warms, the need to air condition our living and work spaces will increase. "Cooling is central to everything," Rachel Kyte, CEO and special representative of the U.N. Secretary-General for Sustainability at Energy for All, said at the Global Climate Action Summit in September. That goes for humans, food and life-saving medicines.

Here's a not-so-fun fact: Methane is 84 times more potent than CO2 at trapping GHGs during its first two decades in the atmosphere

— one reason scientists are fuming over global permafrost thaws, which stand to release millions of tons of methane as polar ice caps melt. Another concern bubbling up closer to terra firma is the rapid pace at which U.S. utilities and energy developers are retiring coal-fired power plants and adding natural gas-powered plans to the electricity grid. That's because natural gas production and delivery systems are notoriously leaky. Against that backdrop, the Trump administration has signaled it will step back from enforcing leak detection and elimination rules established under President Barack Obama, potentially adding fuel to the fire.

The federal flip-flop has prompted an outcry about asthma and other health issues linked with methane pollution, and it is fueling renewed corporate- and state-level action. California, New York and Virginia have suggested a slew of regulations. Colorado was the first state to regulate emissions from oil and gas operations in 2014, and Vermont's recycling system prioritizes reducing methane leaking from landfills.

What's more, the Environmental Defense Fund (EDF) has announced plans to launch a satellite to identify and measure methane from "human-made sources." The first focus is on oil and gas operations. MethaneSAT, as it's been dubbed, will be capable of monitoring regions that account for more than 80 percent of global production.

EDF is also working with major oil and gas companies, including BP, ExxonMobil and Shell, that are taking action to address methane through the Oil and Gas Climate Initiative. The group's high-level agenda is to reduce the footprint of the "energy value chain." For forward-thinking manufacturing companies — including food businesses such as Cargill and Mars, automotive giant General Motors and cosmetics and personal care company L'Oreal — advancing the use of energy from biomass, biogas, geothermal, landfill gas and solar thermal sources is becoming a more urgent priority of GHG-reduction efforts. Smithfield Foods has gone one step further: It created a $250 million joint venture with the Virginia utility Dominion Energy to turn the methane captured at its hog farms into electricity.

Addressing thermal energy loads related to manufacturing will be an important component of addressing super pollutants, particularly methane. Up to two-thirds of the energy usage at Mars, for example, is linked to direct operations, where it consumes significant volumes of natural gas. For that reason, the company is stepping up its development of low-carbon and zero-carbon options, including biomass and solar thermal alternatives.

"The list of who needs this is much longer than the list of people that realize they need this," Kevin Rabinovitch, global vice president

of sustainability for Mars, noted in mid-2018. "There are a lot of people who haven't quite appreciated how important this issue is." But heading into 2019, change is in the air.

Key players to watch

Center for Climate and Energy Solutions — is focusing attention on practical, renewable options and technologies for industrial and thermal energy consumption, a major source of methane emissions.

Climate & Clean Air Coalition — a group of more than 100 governments, businesses, scientific organizations and other stakeholders in 2018 became more proactive in suggesting super pollutant policies and solutions.

Environmental Defense Fund (EDF) — the NGO is actively addressing methane pollution by developing a satellite detection system and working with oil and gas companies to help them minimize the impact of production.

Renewable Thermal Collaborative — an initiative of the Renewable Energy Buyers Alliance encourages the use of renewable energy that could displace natural gas and coal consumption such as biomass, biogas, geothermal, landfill gas and solar thermal for heating and cooling applications.

U.S. Climate Alliance — the bipartisan coalition of 17 governors represents 40 percent of the country's population that is dedicated to acting on climate issues, and is prioritizing super pollutants.

09

TOP SUSTAINABLE BUSINESS TRENDS 2019

Climate-Risk Disclosure Takes Investors by Storm

By Libby Bernick
Managing Director and Global Head of S&P Global
Trucost Corporate Business

For more than 20 years, large companies have been ramping up the depth and breadth of their disclosure on GHG emissions. At the same time, the amount of forward-looking financial information on climate risks and the opportunities being provided to investors has been patchy at best.

But in the short time since July 2017, following the release of the TCFD guidelines, more than 500 large businesses, investors and industry groups have signed on to provide this type of forward-looking financial disclosure. Companies in the financial services industry are leading the way in their support of the TCFD recommendations, including BlackRock, State Street and S&P Global, along with the Association of Chartered Certified Accountants.

It's not limited to the financial services industry. Other sectors are signing on, including Statoil and Shell in the energy sector, consumer product companies such as H&M and Nestlé, materials companies such as BASF and DowDuPont, as well as industrial companies such as Saint-Gobain and Ingersoll Rand.

The moment for improved financial disclosure on climate has arrived. This investor- and business-led initiative grew out of a growing belief that a changing climate and energy transition will have profound implications for both individual companies and the global economy. For example, some experts have estimated that the cost of climate-related impacts could reduce the U.S. Gross Domestic Product by 1 to 4 percent.

Companies' and investors' disclosures of the financial implications of climate change can benefit all parties. In the words of the TCFD:

> Better access to data will enhance how climate-related risks are assessed, priced and managed. Companies can more effectively measure and evaluate their own risks and those of their suppliers and competitors. Investors will make better-informed decisions on where and how they want to allocate their capital. Lenders, insurers and underwriters will be better able to evaluate their risks and exposures over the short, medium and long-term.

The TCFD guidelines provide a framework for companies to evaluate climate risks and opportunities on four dimensions: company governance; strategy; risk management; and metrics and targets. What is new to many corporates is the explicit expectation to translate

climate issues into financial implications on their income statements, cash flow statements and balance sheets.

Companies are now expected to address climate-related physical risks such as water scarcity or extreme weather events, as well as transitional risks such as changes in policy, technology, market or reputational issues that could create both risks and opportunities for the organization.

As companies begin to address the TCFD guidelines and make disclosures in line with the recommendations, common challenges and questions are emerging.

One concern is how to incorporate climate change into existing operational decision-making processes and standard business functions. For example, how should climate be included in reports to the board and in company financial reports? Product innovation pipelines need to consider how urgently companies should invest in creating different products and services that capture climate-related opportunities or reduce risks from policies that will cut demand for energy intensive products. Many companies have risk-management processes that address business continuity in the event of a severe storm, but the wider range of longer-term climate risks is not generally part of the analysis.

For example, Rio Tinto's sustainability report describes how it has put in place an internal carbon price to assess the possible cost and impact on product prices, and how the company has conducted a physical risk assessment of its assets to understand the business implications of climate-related risks such as water stress and rising sea levels. General Motors reports how it includes energy reduction targets in its business plans.

There's also growing awareness that the climate conversation isn't just about energy. Consider water. Are company assets sufficiently resilient to rising seas, droughts or flooding? Is enough fresh water available for operations and supply chains? For example, Danone, among other food and agriculture companies whose operations are heavily dependent on water, includes reporting on water scarcity risks as well as the steps it takes to assess these physical risks in developing new manufacturing sites. How will companies attract top talent to work in regions that are becoming more drought-prone?

Adaptation to a changing climate is another emerging issue, as more companies realize that today's business models and commercial strategies may not be the same in a low-carbon economy. For example, Swedish steelmaker SSAB describes its strategic decision stemming from its analysis of climate-related risks to become a fossil fuel-free steelmaker by 2045.

Still another issue is standardizing scenario analyses under the TCFD guideline — that is, the likely impacts to a company and its operation under various climate scenarios. The guidelines do not prescribe specific scenarios, and companies have been using a wide range of approaches, assumptions and frameworks — 1.5 degrees Celsius of warming, 2 degrees Celsius, etc. Without a more standardized approach to scenario analysis, it's unclear if investors will be able to consistently apply the results.

Practical tools, data and analytics to help companies conduct climate-related analysis are rapidly surfacing. The U.N. Environment Program Finance Initiative, together with 16 leading banks as part of a TCFD pilot project, released two reports in 2018 providing best practices on transition risk, Extending Our Horizons and Navigating a New Climate. Climate and energy scenario analyses are available through organizations such as S&P Global Platts and the International Energy Association. Frameworks for translating climate exposure into exposure into financial risk and opportunity have emerged, as well as new Committee of Sponsoring Organizations of the Treadway Commission (COSO) guidelines (PDF) for incorporating ESG risks into company enterprise risk management processes.

The TCFD guidelines notwithstanding, key questions remain. For example, what is decision-useful climate information, and how will it get mainstreamed into the capital markets?

Investors, particularly large institutional investors such as asset managers and pension funds, are just beginning to understand how to incorporate corporate climate disclosure data into their investment strategies, processes and financial valuations.

What's clear is that different types of investors use corporate climate data in different ways depending on their investment strategies and asset classes. As these practices mature, investors are likely to sharpen their focus on

specific aspects of corporate climate disclosure, such as how the company's board is engaging on climate or the need for more robust GHG emissions-reduction targets. While leading investment analysts, banks and organizations are pioneering ways to financially value the implications of climate, these techniques are not yet standard practice. Investors will need to build organizational capacity on these methodologies.

Mainstreaming climate data into capital markets in decision-useful form will require standardization. For now, corporate disclosure on climate impacts is mostly voluntary. But the demand for mandatory climate disclosure is intensifying. In 2019, the European Commission is expected to address the TCFD guidelines as part of existing non-financial corporate reporting requirements.

Key players to watch

Climate Disclosure Standards Board — offers resources including the TCFD Knowledge Hub to help organizations understand and implement guidelines of the Task Force on Climate-related Financial Disclosures.

Committee of Sponsoring Organizations of the Treadway Commission (COSO) — the leading risk management organization has published a framework for integrating ESG considerations (such as climate) in corporate risk management processes.

European Commission — it intends to revise the guidelines of its non-financial reporting directive in 2019 as part of the EU Action Plan for Financing Sustainable Growth, to include guidance on data disclosure in line with the TCFD recommendations.

U.N. Environment Program Finance Initiative (UNEP FI) — convenes pilot projects working with the financial services industry to address TCFD reporting.

World Business Council on Sustainable Development (WBCSD) — is creating sector-specific TCFD workgroups and has published guidance on effective disclosure practices for the oil and gas industry.

10

TOP SUSTAINABLE BUSINESS TRENDS 2019

Science-Based Targets Look Beyond Carbon

By Joel Makower
Chairman and Executive Editor, GreenBiz Group

In 2015, a group of nonprofit organizations came together to help companies create GHG emissions reduction targets that were in line with the 2 degree Celsius goal of the 2015 Paris Agreement. In other words, that companies would reduce their "fair share" of emissions relative to their size, sector and other factors.

In its first 18 months of operation, 200 companies committed to doing so. Nearly four years into the initiative, that number has grown to more than 500 companies. In relatively little time, "science-based targets" became the gold standard for companies, cities and others seeking to establish credible goals for reducing their contributions to climate change.

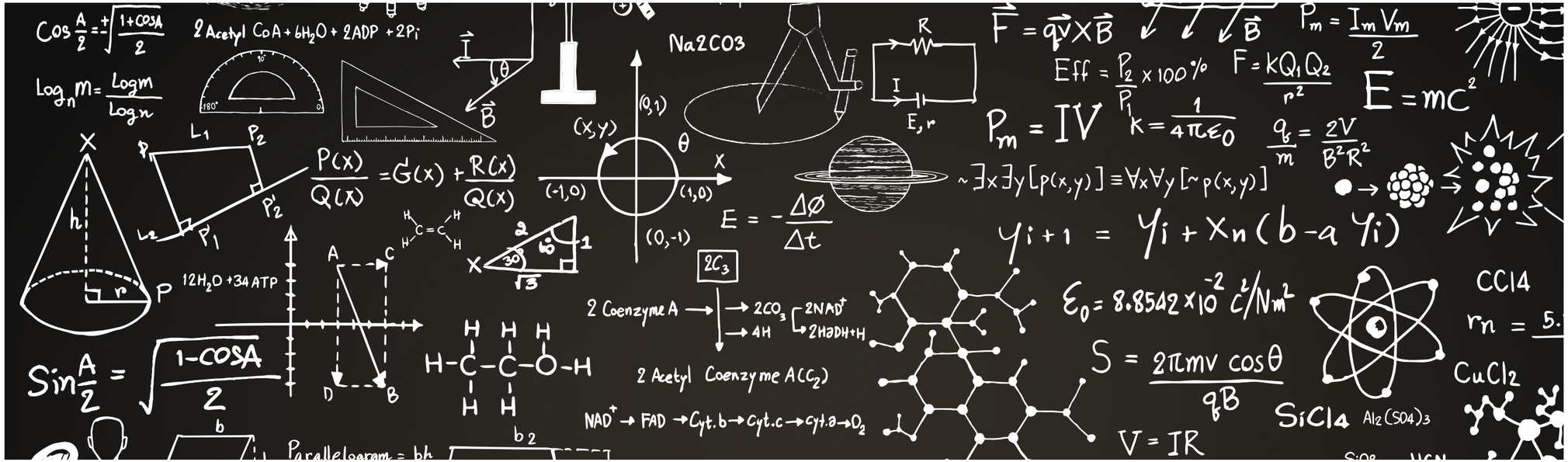
Now, a new initiative, created by many of those same nonprofit organizations, is looking into how to set science-based targets for other environmental impacts, including those for water, land use, biodiversity and oceans. Last fall, a group of about 25 organizations formed the Science-Based Targets Network to consider undertaking this complex task.

Science-based targets make sense, particularly in a world where the global commons — the natural capital humans rely upon to support life, grow food and provide fresh water, among many other things — are governed in widely different ways, from nation to nation and region to region. By creating a set of standard goals and methodologies rooted in science, companies and other interested parties can assess whether they are implementing solutions at the appropriate scope and scale.

Those goals can go a long way to ensuring that humans stay within what scientists call "planetary boundaries," the parameters within which humanity can continue to develop and thrive for generations. Exceeding those boundaries means consuming resources at a rate faster than they can be replenished by natural systems.

The concept has significant implications for companies. "Companies need to link planetary boundaries to their core business model by decoupling economic growth from the impact on planetary limits and linking economic growth with the delivery of social thresholds," according to a 2016 report by British consultancy Article 13.

Now, that concept may be extended beyond GHG emissions to other parts of the global commons.



Over the past year, more than 250 people have pitched in to develop the Science-based Targets Network, with representatives from BSR, CDP, Ceres, the U.N. Global Compact, the WEF, World Resources Institute (WRI), the We Mean Business Coalition, the WBCSD and WWF, among other organizations.

The group has its work cut out for it. Creating science-based targets for things such as land use and biodiversity will push the boundaries of both scientific knowledge and corporate governance. What is an individual organization's "fair share" of preserving biodiversity or stewarding the health of oceans? How do you measure those impacts and allot responsibility across companies, sectors and national borders?

Water may be the easiest of these to tackle, primarily because of the amount of work that's already been done to promote water stewardship around the world.

"Water is something that companies can imagine that they're having an impact on, and that impact should be measured and they should understand what that is in absolute terms, as opposed to 'We're using less water,'" consultant Randall Krantz says. He works with the Science-Based Targets Network through the Swiss-based consulting network Value Web, a network of process facilitators working in sustainability.

Some companies already have started. Mars, the global manufacturer of candy, pet food and other products, in 2016 developed "context-based" water targets in partnership with WRI. The goals recommended basing total water withdrawals within a given watershed at or below 40 percent of the annual average renewable available supplies, as identified by the United Nations.

The company's diverse global supply chain includes many water-dependent commodities: cereals; fats and oils; nuts; meat and fish; dairy products; and commodities such as sugar, cocoa and mint. Among the biggest part

of its water footprint is irrigating the rice products sold under its Uncle Ben's brand, much of it sourced from water-stressed locations in India, Pakistan and Spain.

Mars' Sustainable in a Generation water-withdrawal goal, a science-based target, strives to make significant cuts to its agricultural irrigation in water-stressed areas. The long-term ambition "is to ensure water use in our value chain is within annually renewable levels by watershed," according to Mars Global Site Sustainability Manager Ian Knight.

Meanwhile, International Paper, the packaging, pulp and paper giant, last year partnered with WWF to take on forests, and to encourage what WWF has dubbed "forest positive" actions. The collaboration will help answer the question of the quantity and quality of forestland needed for the planet to thrive, with the goal of creating the world's first science-based targets for forests.

Developing and harnessing such goals will be essential in the coming years, as climate change and population growth conspire to further stress natural resources. For example, it is estimated that global water demand will increase by 55 percent by 2050, and more than 40 percent of the global population will be living in areas of severe water stress. The lessons learned by companies such as Mars and International Paper about setting science-based targets will inform how, and how quickly, other companies can move forward with setting their own goals.

The difficulty of this endeavor cannot be overstated. Each goal presents complex questions for companies and stakeholders in creating meaningful metrics, avoiding double-counting of benefits, engaging suppliers and effectively communicating the goals and outcomes to the full spectrum of stakeholders.

For now, the Science-Based Targets Network is just getting organized. It met in January, at the 2019 WEF annual meeting in Davos, Switzerland, to resolve some governance issues this sizeable and potentially unwieldy group of organizations will need to operate effectively. There are the usual funding challenges of any nascent nonprofit. There is the need for a roadmap for developing guidelines and getting public comments, then piloting frameworks with a handful of leadership companies before rolling them out.

And there's no guarantee that what comes out of the process will be embraced, not just by companies, but also investors, activists, communities and policy makers. More to come on that during 2019.

If it works, the notion of leveraging science to determine how to take on complex environmental challenges could play a key role in accelerating progress on addressing climate change and pressing resource issues.

Key players to watch

Mars — the global purveyor of candy, pet foods and other products is an early leader in science-based targets for climate, land and water impacts.

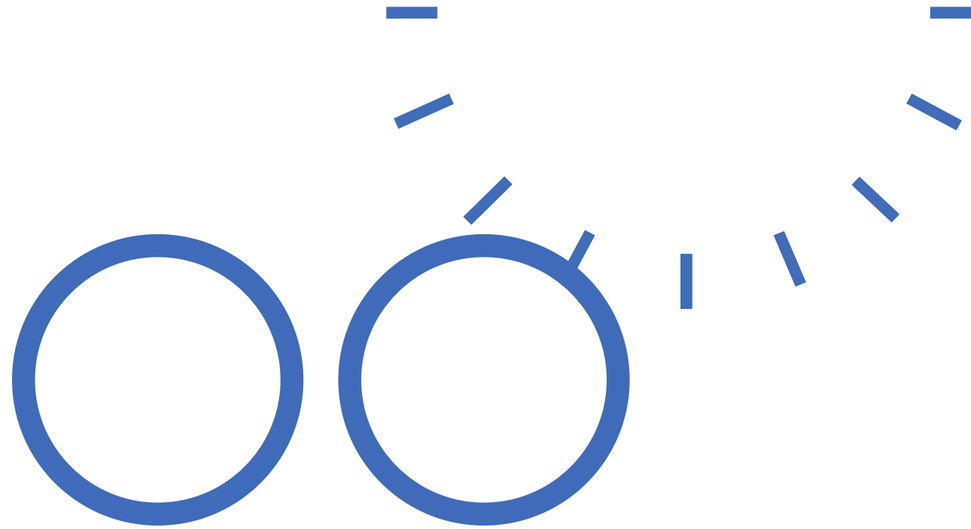
Science-Based Targets Initiative — a coalition of five partner NGOs, it is the principal organization providing guidelines and guidance for creating science-based GHG goals.

Science-Based Targets Network — a consortium of roughly 25 nonprofit organizations and more than 200 individuals working to develop science-based targets for water, land use, biodiversity and oceans. Currently in formation.

We Mean Business Coalition — the coalition of seven leading sustainable business NGOs — The B Team, BSR, CDP, Ceres, Climate Group, the Prince of Wales's Corporate Leaders' Group and the World Business Council for Sustainable Development — is taking a leading role in the Science-Based Targets Network.

World Resources Institute (WRI) — its Science-Based Targets Initiative has led the way in developing emissions-reduction goals for carbon and has worked with companies to develop goals for water and other issues.

50 key players to watch



Alliance to Save Energy — a 41-year-old bipartisan nonprofit dedicated to championing energy productivity as a catalyst for "economic growth, a cleaner environment and greater energy security, affordability and reliability."

Apple — while increasing the use of sustainable materials in products and packaging, it has taken an unusual step of buying forests and working with nonprofits to implement sustainable management (PDF). That has led to projects in the United States, China and, most recently, Colombia.

Arizona State University — offers one of the most wide-ranging offerings of graduate degrees and programs that incorporate a collaborative and transdisciplinary approach.

BNP Paribas — one of the leading issuers of green loans sees them as "the future of banking."

Barclays — a pioneer in the development of green loans recognizes them as "not only a necessity but a compelling economic opportunity."

BBVA — is the leading provider of green loans, with Iberdrola and Avangrid as initial recipients.

BlackRock — CEO Larry Fink's annual letter for 2018 last year rocked the sustainability world in a good way and put CEOs on notice that the investment community is watching.

BYD — the world's largest electric vehicle maker in terms of volumes of vehicles sold is based in Shenzhen, China, with offices and a factory in California.

Center for Climate and Energy Solutions — is focusing attention on practical, renewable options and technologies for industrial and thermal energy consumption, a major source of methane emissions.

Chanje — the startup, formed out of the ashes of the now-defunct Smith Electric Vehicles, builds electric vans for companies such as FedEx and Ryder.

Climate & Clean Air Coalition — a group of more than 100 governments, businesses, scientific organizations and other stakeholders in 2018 became more proactive in suggesting super pollutant policies and solutions.

Climate Disclosure Standards Board — offers resources including the TCFD Knowledge Hub to help organizations understand and implement guidelines of the Task Force on Climate-related Financial Disclosures.

Committee of Sponsoring Organizations of the Treadway Commission (COSO) — the leading risk management organization has published a framework for integrating ESG considerations (such as climate) in corporate risk management processes.

Environmental Defense Fund (EDF) — the NGO is actively addressing methane pollution by developing a satellite detection system and working with oil and gas companies to help them minimize the impact of production.

EP100 — the Climate Group and the Alliance to Save Energy partnership encourages companies to commit to one of three productivity pathways: doubling the economic output from energy consumed, slashing energy waste in facilities through software, or adopting net-zero carbon buildings.

European Commission — it intends to revise the guidelines of its non-financial reporting directive in 2019 as part of the EU Action Plan for Financing Sustainable Growth, to include guidance on data disclosure in line with the TCFD recommendations.

EVgo — the company is building out a network of fast chargers across the United States for fleets, cities and consumers.

General Mills — it hired a soil scientist to lead sustainability programs after realizing most of its emissions came from suppliers and farmers. It has invested millions in testing better land management strategies.

Global Reporting Initiative (GRI) — its Sustainability Reporting Standards are the most widely adopted global standards for sustainability reporting.

H&M — The apparel giant made an early commitment to stop using wood pulp from ancient or endangered forests for making fiber, a pledge emulated by others including VF Corp, Levi Strauss, Stella McCartney, Ralph Lauren and Guess.

Hilton — is the first hotel brand to adopt a science-based target for reducing CO2 emissions: 61 percent by 2030 — and has committed to improving energy productivity 40 percent by the same year.

ING Bank — a leading issuer of sustainability linked loans aims to double its holdings in responsible finance by 2022.

Kimberly-Clark — has become a champion against clearcut logging. It adopted materials from certified and sustainably managed forests after Greenpeace pressures more than a decade ago, and continues to invest in forest protection and alternatives to virgin wood fiber.

Land O'Lakes — the member-owned agricultural cooperative has a sustainability branch, SUSTAIN, that focuses on soil health. With its own technology platform, Truterra, farmers can synthesize soil, weather, economic and farm management data.

Loan Market Association — the London-based group is working with the International Capital Market Association to launch the green loan principles.

Loop — a consortium of major brands offering products in refillable containers.

L'Oreal — the cosmetics giant monitors its suppliers, particularly of palm oil, to help ensure its products aren't linked to deforestation. Like Unilever, it received a high score from the CDP for forest protection.

Mahindra Group — the Indian conglomerate across transportation, hospitality and manufacturing has made energy productivity central to its business strategy. It was the first EP100 signatory and its entire operation has committed to carbon neutrality by 2040.

Mars — the global purveyor of candy, pet foods and other products is an early leader in science-based targets for climate, land and water impacts.

Midwest Row Crop Collaborative — this coalition of companies and conservation groups throughout the Upper Mississippi River Basin of the United States is working to ensure that farmers there are trained in conservation methods.

North American Council for Freight Efficiency (NACFE) — the independent research organization focuses on helping the trucking industry navigate energy efficiency and clean energy technology choices.

Patagonia — long a leader in regenerative agriculture, it is developing a stricter certification with "regenerative organic" practices. The clothing and gear company, which also has a food subsidiary, focuses on soil health in its agriculture and ranching practices.

Proterra — the rare venture-capital-backed startup focused on the electric bus market has unveiled an investment from German automaker Daimler and a deal to partner on making electric school buses.

Renewable Thermal Collaborative — an initiative of the Renewable Energy Buyers Alliance encourages the use of renewable energy that could displace natural gas and coal consumption such as biomass, biogas, geothermal, landfill gas and solar thermal for heating and cooling applications.

Repair Café — a global network of storefront operations offers tools and expertise to repair or refurbish a wide range of products.

Replenish — offers a line of refillable packages designed primarily for cleaning products.

Responsible Business Alliance — one of the first coalitions to create an industry-wide standard on social, environmental and ethical issues in the supply chain.

Science-Based Targets Initiative — a coalition of five partner NGOs, it is the principal organization providing guidelines and guidance for creating science-based greenhouse gas goals.

Science-Based Targets Network — a consortium of roughly 25 nonprofit organizations and more than 200 individuals working to develop science-based targets for water, land use, biodiversity and oceans. Currently in formation.

Soil Health Institute — it partners with multinational corporations, universities, NGOs and government agencies to conduct and apply research, as well as to ensure the adoption of soil-focused land management practices and technologies.

U.S. Climate Alliance — the bipartisan coalition of 17 governors represents 40 percent of the country's population that is dedicated to acting on climate issues, and is prioritizing super pollutants.

Unilever — the company has supported the development of forest mapping and monitoring technology and presses its vast network of suppliers to disclose how and where they source raw materials, particularly palm oil.

U.N. Environment Program Finance Initiative (UNEP FI) — convenes pilot projects working with the financial services industry to address TCFD reporting.

United Nations — the 17 Sustainable Development Goals and 169 targets are providing a more specific platform for business to engage collaboratively with governments around the world.

Walmart — is asking suppliers to design products with more recycled content, and with reuse and recyclability in mind.

We Mean Business Coalition — the coalition of seven leading sustainable business NGOs — The B Team, BSR, CDP, Ceres, Climate Group, the Prince of Wales's Corporate Leaders' Group and the World Business Council for Sustainable Development — is taking a leading role in the Science-Based Targets Network.

World Business Council on Sustainable Development (WBCSD) — is creating sector-specific TCFD workgroups and has published guidance on effective disclosure practices for the Oil and Gas Industry.

World Green Building Council (WGBC) — is the principal organization behind the Net-Zero-Carbon Building Commitment, which challenges companies, cities, states and regions to reach net-zero operating emissions in their portfolios by 2030, and to advocate for all buildings to be net zero in operation by 2050.

World Resources Institute (WRI) — its Science-Based Targets Initiative has led the way in developing emissions-reduction goals for carbon and has worked with companies to develop goals for water and other issues.

Yerdle Recommerce — a pioneering platform for apparel companies to offer refurbished clothing to their customers.

Trucost ESG Analysis

S&P Global

ESG Data and Analytics That Inform the Transition to a More Sustainable Economy

Trucost SDG Evaluation Tool

The UN Sustainable Development Goals (SDGs) aim to resolve the world's social, economic and environmental problems. For companies, they are also a lens to uncover innovation and drive growth.

Trucost's SDG Evaluation Tool allows companies to optimize investments and powerfully communicate on company SDG performance.

Benefits Include:

Use a **holistic, data-led** approach to identify material SDGs and quantify risks and positive benefits

Uncover innovation opportunities across the company value chain and regions of operation.

Prioritize investments and track SDG performance over time and in comparison to peers.

Report on the SDGs with confidence, using robust data to support your communications

Corporate Carbon Pricing Tool

Over 20% of global carbon emissions are now priced by a confusing array of taxes and trading plans. Business as usual is not an option.

Trucost's Corporate Carbon Pricing Tool allows companies to assess climate risk, make the case for low carbon investment, and report in line with TCFD guidelines.

Benefits Include:

Set a range of internal carbon prices across the enterprise or for each business unit.

Understand current and future financial implications of carbon pricing on margins and operating costs.

Benchmark carbon earnings at risk against peers.

Conduct a 2° scenario analysis to stress test against rising carbon costs and report in line with investor expectations.

Contact us at Trucostinfo@spglobal.com to request a demo

the INDEX

Welcome to the annual State of Green Business Index, a review of trends in sustainability performance over the past five years for the largest 500 companies in the United States, as well as the largest 1,200 companies globally. Produced in collaboration with the natural capital research firm Trucost, the 2019 assessment includes more than 40 corporate sustainability performance indicators.

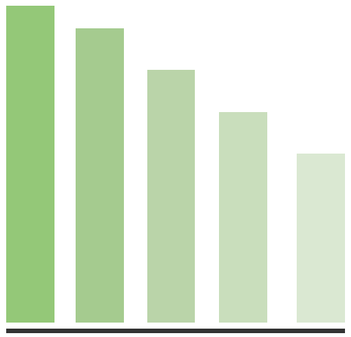
HIGHLIGHTS
OF KEY FINDINGS

The natural capital costs of the top 1,200 global companies exceeds

$4.1 trillion

Costs exceed net income by

2X



Companies' GHG emissions fell by

9%

compared to 2013 levels

85% of S&P 500 companies published a sustainability report in 2017, an increase of nearly 20% from 2013

28% more companies set carbon and water targets over the past five years

Current carbon targets contribute just

16%

of the reductions needed by the top 1,200 global companies to align with the Paris Agreement 2 degrees Celsius goal

28 more stock exchanges than in 2017 set environmental listing requirements

58 total stock exchanges that have environmental listing requirements

52k companies listed in these stock exchanges

THE INDEX

The Big Picture

Each year in the State of Green Business Index, we assess what progress, if any, is being made by publicly traded companies in improving their environmental sustainability.

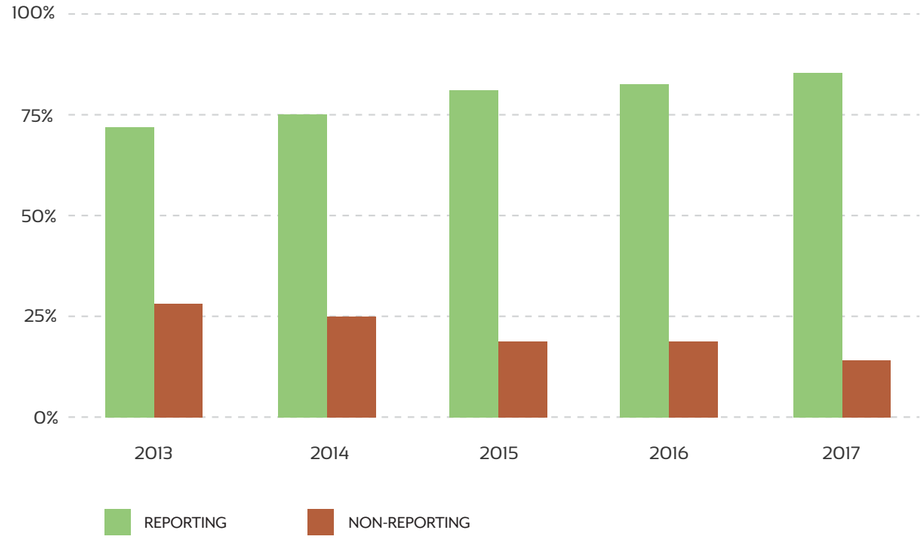
In this section, the assessment provides an overview of key trends in corporate environmental performance, starting with natural capital costs.

Companies use natural resources and generate pollution as a result of their business activities. Every year, Trucost estimates the costs associated with these impacts by the top companies in the United States and the world.

Direct, verified disclosure of impacts by companies is the primary means of measuring these costs, and the trend here is strongly towards greater disclosure of impacts, with 85 percent of the S&P 500 publishing dedicated sustainability reports in 2017.

A GROWING SHARE OF COMPANIES ARE PUBLISHING SUSTAINABILITY REPORTS

# of S&P500 COMPANIES PUBLISHING SUSTAINABILITY REPORTS



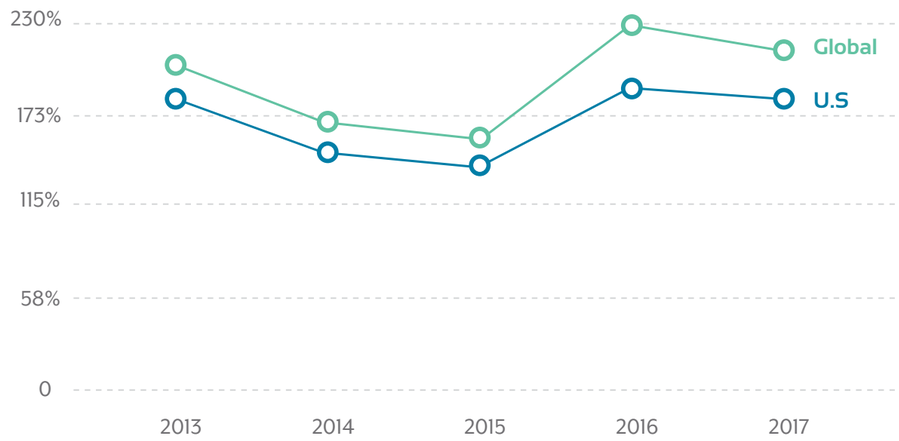
Source: Source: G&A Institute, 2018

In 2016, the cost of natural capital impacts — the dollar value of resources extracted and pollution emitted — by companies increased for the first time since 2013, a trend that continued in 2017. This increase is largely driven by increased production in agricultural supply chains and therefore greater environmental impacts, in particular water consumption and water pollution from fertilizer and pesticide use. If companies had to internalize all of the natural capital costs associated with their business, for example, as a result of increased regulations or new carbon taxes, their profit would be significantly at risk. The natural capital cost generated by the largest 1,200 companies in the world is more than twice their net income.

For most of the sectors considered, much of this cost is embedded in the supply chain. On average, 78 percent of ca company's impact are in its supply chain. For this reason, measuring impacts from goods and services purchased by companies is essential in understanding their natural capital costs and exposure to environmental regulatory and policy risks.

COMPANIES' NATURAL COSTS ARE MUCH HIGHER THAN NET INCOME GLOBALLY

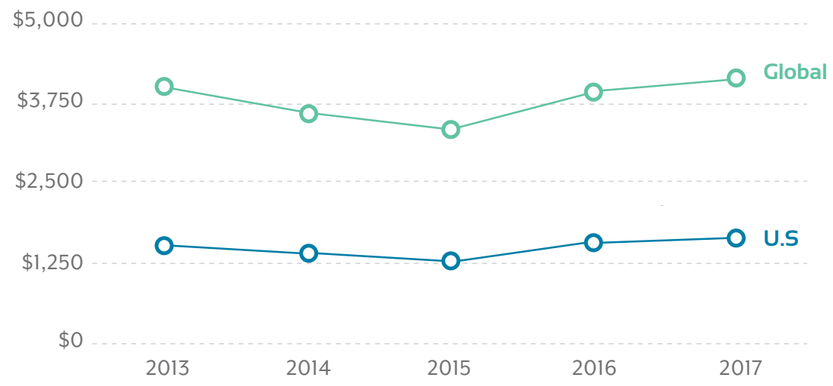
TOTAL NATURAL CAPITAL COST AS PERCENT OF NET INCOME



Source: Trucost, 2018

COMPANIES' NATURAL CAPITAL COST INCREASES GLOBALLY

TOTAL NATURAL CAPITAL COST (BILLION USD)



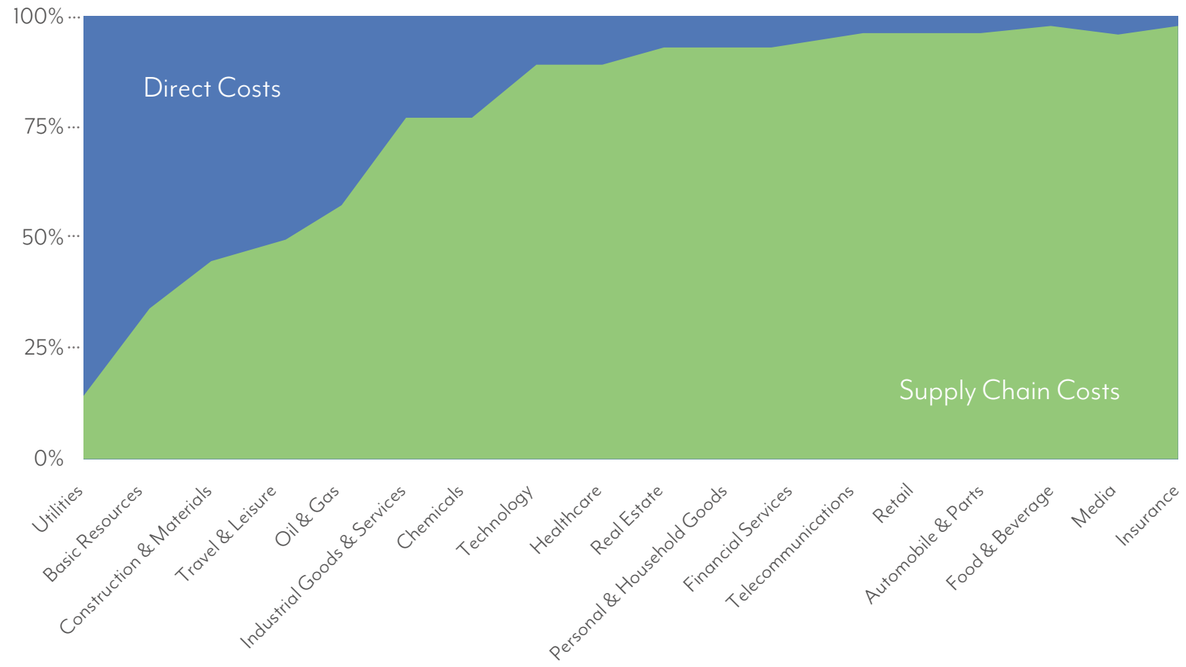
Source: Trucost, 2018

"Natural capital" refers to the limited stock of the Earth's natural resources upon which people and businesses depend for prosperity, security and well-being. It includes things such as clean air and water, land, soil, biodiversity and geological resources. The total value of natural capital to society globally has been estimated to be up to $72 trillion per year according to the U.N. Environment Program.

Natural capital costs and environmental impact data, as measured by Trucost, combine hundreds of environmental indicators related to the resources consumed to create goods or services sold, as well as the pollution and waste impacts related to the production of those goods and services, both within a company's own operations and throughout its value chain. A full description of Trucost's methodology is available later in this report.

MAJORITY OF CORPORATE NATURAL CAPITAL COSTS COME FROM SUPPLY CHAIN FOR MOST SECTORS

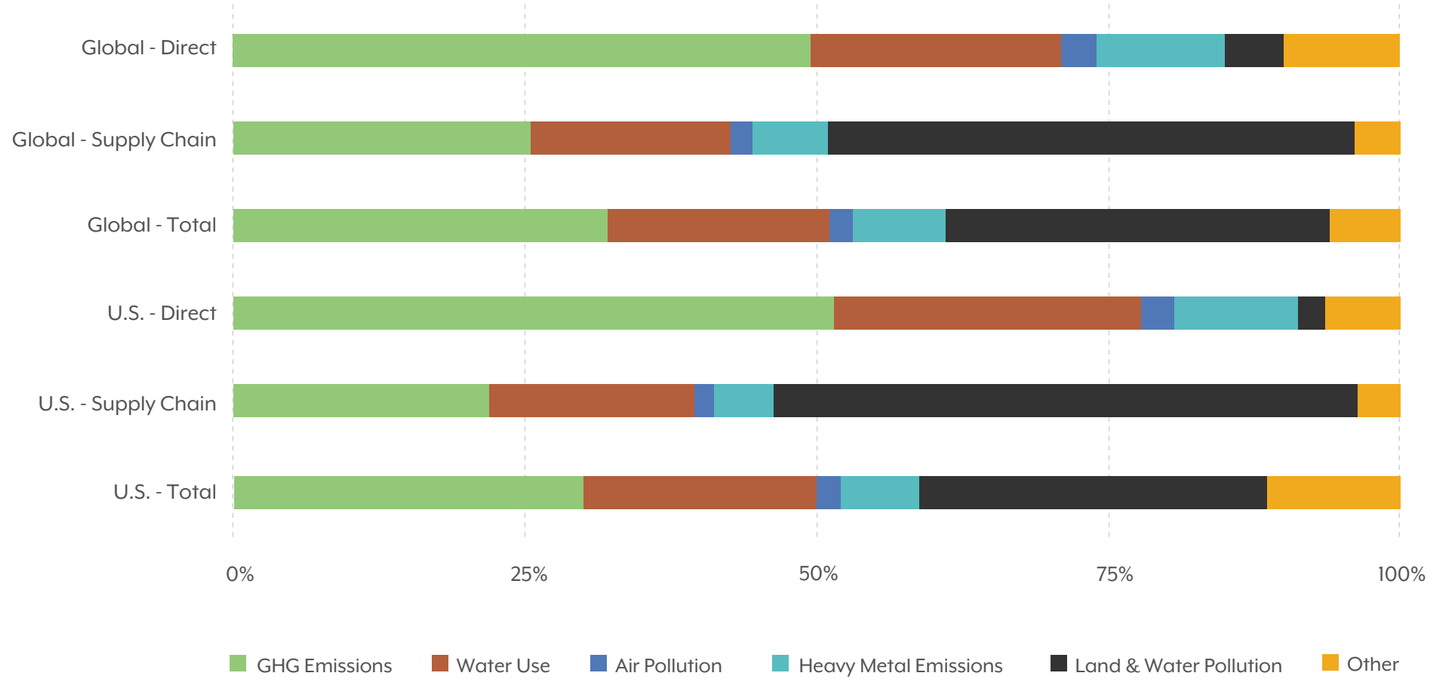
NATURAL CAPITAL COSTS (%)



Among all types of environmental impacts, the largest are GHG emissions (53 percent), water consumption (16 percent), heavy metal pollution (12 percent) and fertilizer-related organic pollutants and nutrients (6 percent). Water consumption and nutrient and organic pollutants are the greatest type of impact in 2017 because of their impacts within agricultural supply chains where production has increased. These four main types of environmental impact jointly account for nearly 90 percent of the total natural capital cost of the 1,200 companies assessed.

While these indicators illustrate that natural capital costs and exposure to business risk continue to be significant for companies, measuring and valuing the key types and sources of impacts could help businesses to prioritize ongoing improvement in their environmental performance.

THE LARGEST NATURAL CAPITAL IMPACTS BY COMPANIES COME FROM LAND & WATER POLLUTION, AND WATER USE



Source: Trucost, 2018

THE INDEX

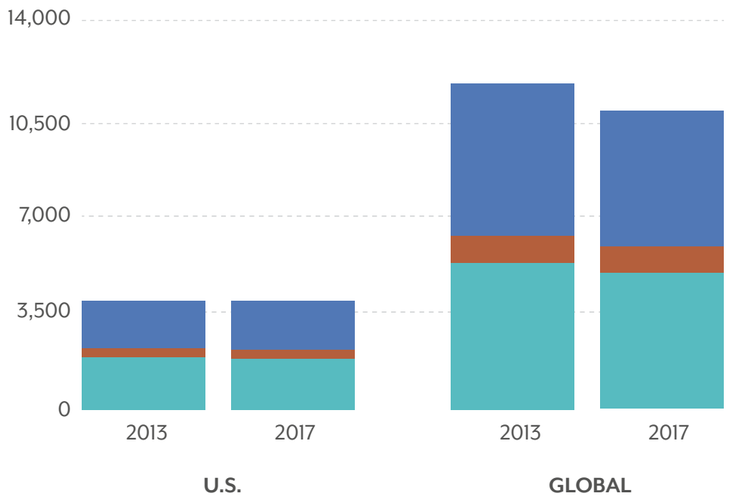
Corporate Performance

In this section, we provide more detail on corporate GHG emissions, water, waste and energy use. Many of the measures show improvement over the past five years because businesses have reduced the amount of resources used per dollar of revenue generated.

Corporate GHG emissions show a small increase year on year of 1 percent, in line with a global increase of 3 percent. However, the 1,200 largest companies in the world emitted 9 percent less GHG emissions in 2017 than they did in 2013.

COMPANIES' GHG EMISSIONS HAVE FALLEN SHARPLY SINCE 2013

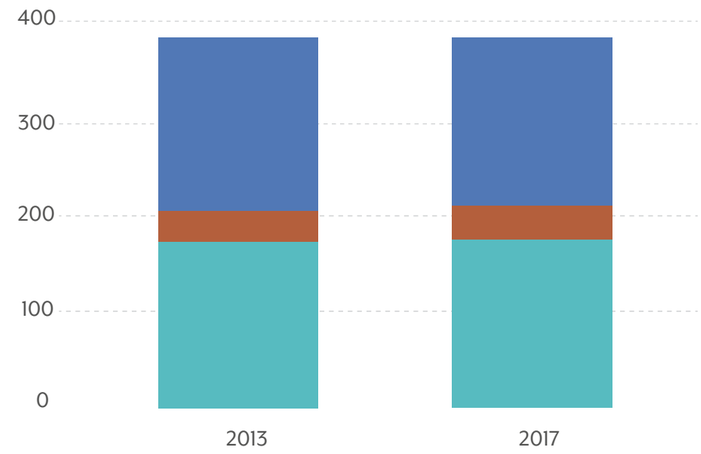
GHG EMISSIONS, MILLION METRIC TONS CO_2 EQUIVALENT (tCO_2e)



Source: Trucost, 2018

COMPANIES' EMISSIONS INTENSITY IS LARGELY UNCHANGED

tCO_2e PER MILLION USD REVENUE



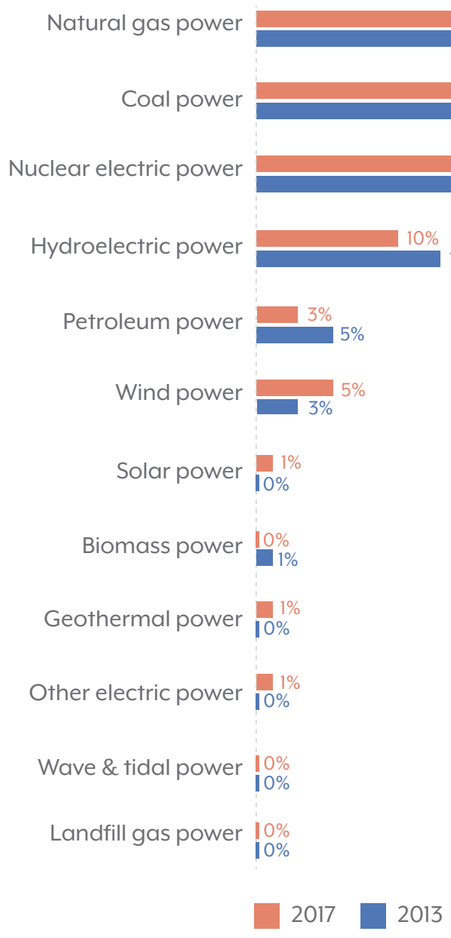
SCOPE 1
Emissions generated during companies' operation such as fuel use for vehicles or on-site power generation

SCOPE 2
Emissions from purchased energy

SCOPE 3
Emissions from supply chain

Source: Trucost, 2018

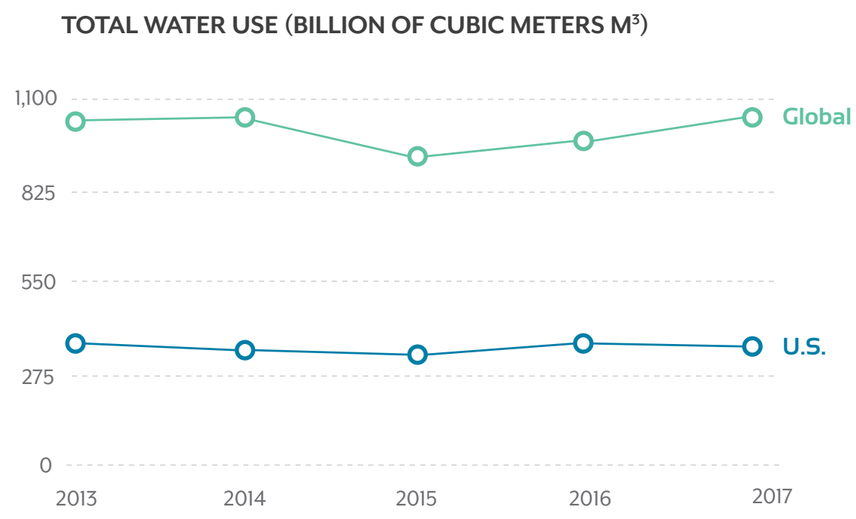
COAL CONTINUES TO BE REPLACED BY NATURAL GAS AND RENEWABLES FOR POWER GENERATION



Source: Trucost, 2018

The energy mix continues to shift towards lower-carbon fuels. Renewable energy by U.S. utilities increased by 5 percent since 2013, while the share of coal power generation decreased by 6 percent. The green transition of the energy mix is not only taking place through a switch to renewables, but also through the use of natural gas for power generation, which accounts for 5 percent more of the U.S. energy mix compared to 2013.

CORPORATE WATER USE HAS GROWN IN RECENT YEARS



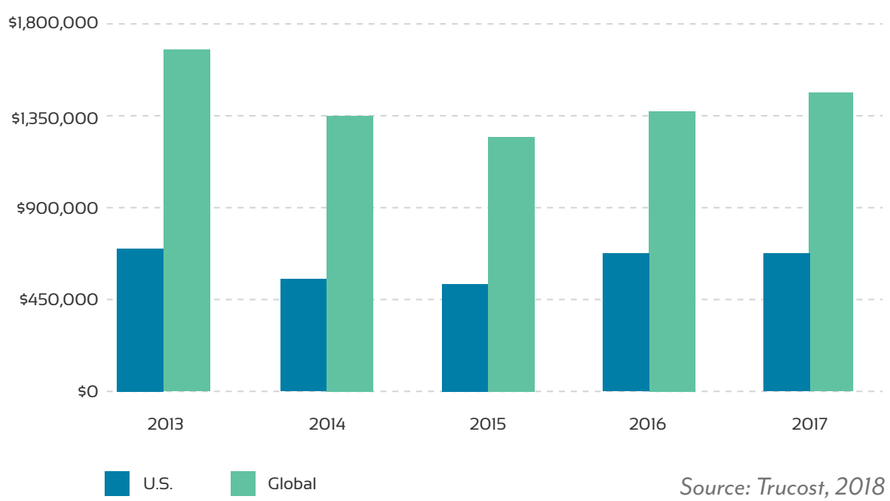
Source: Trucost, 2018

Water use by companies saw an increase of 7 percent year on year. The supply chain accounts for the largest share of companies' water use (65 percent), and it also has the highest water intensity. This indicates that most water risk for companies is likely to be beyond their operations and direct control, which highlights the importance of corporate programs focused on managing supplier-related water risks.

Alongside the small reduction in overall water use, water quality impacts associated with business activities have increased.

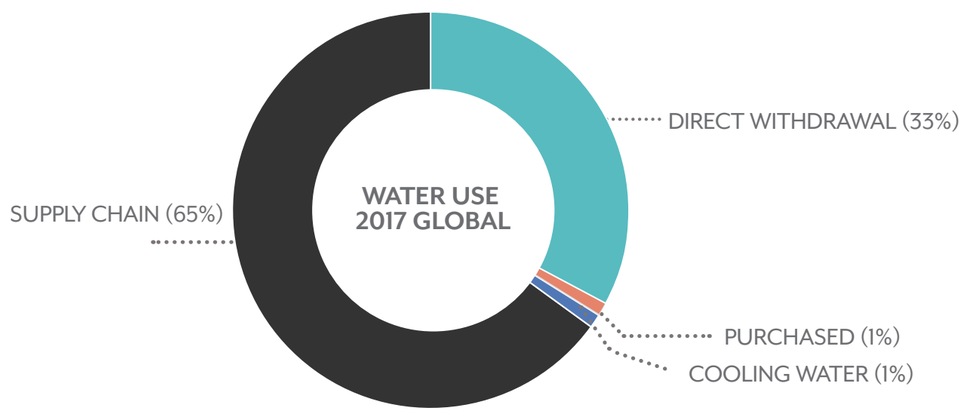
WATER POLLUTION BY GLOBAL COMPANIES INCREASED IN 2017

TOTAL NATURAL CAPITAL COST OF WATER POLLUTION (USD)



Source: Trucost, 2018

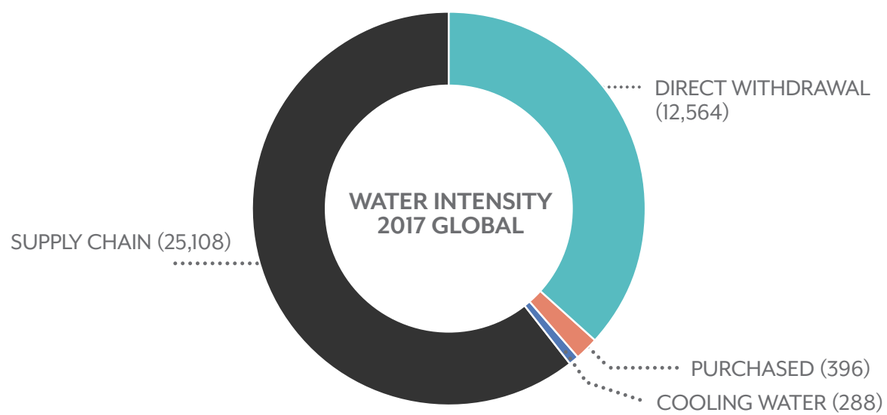
OVER HALF OF COMPANIES' WATER USE COMES FROM SUPPLY CHAINS



Source: Trucost, 2018

COMPANIES' SUPPLY CHAINS USE THE MOST WATER PER UNIT OF REVENUE

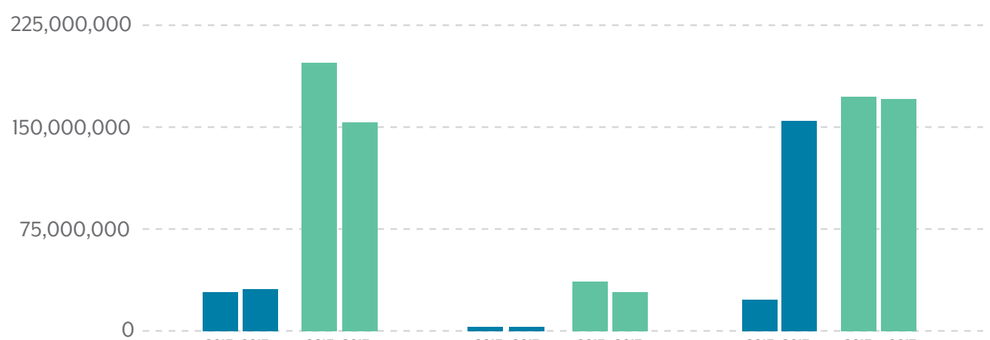
WATER INTENSITY: CUBIC METERS PER MILLION USD REVENUE



Source: Trucost, 2018

WASTE GENERATED BY COMPANIES REDUCES GLOBALLY

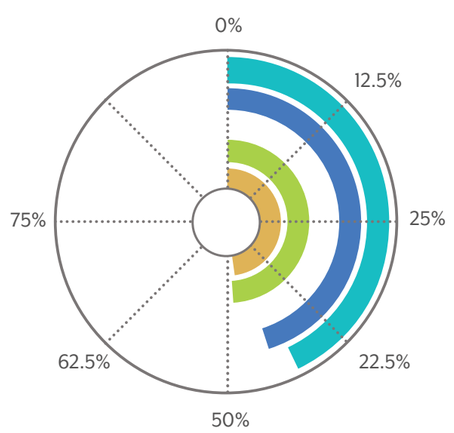
TOTAL WASTE GENERATED (METRIC TONS)



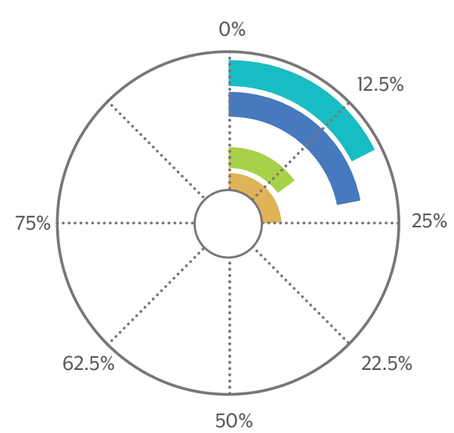
Source: Trucost, 2018

MORE COMPANIES SET CARBON AND WATER REDUCTION TARGETS

% OF COMPANIES WITH CARBON REDUCTION TARGETS



% OF COMPANIES WITH WATER REDUCTION TARGETS



U.S. 2013 U.S. 2017 Global 2013 Global 2017

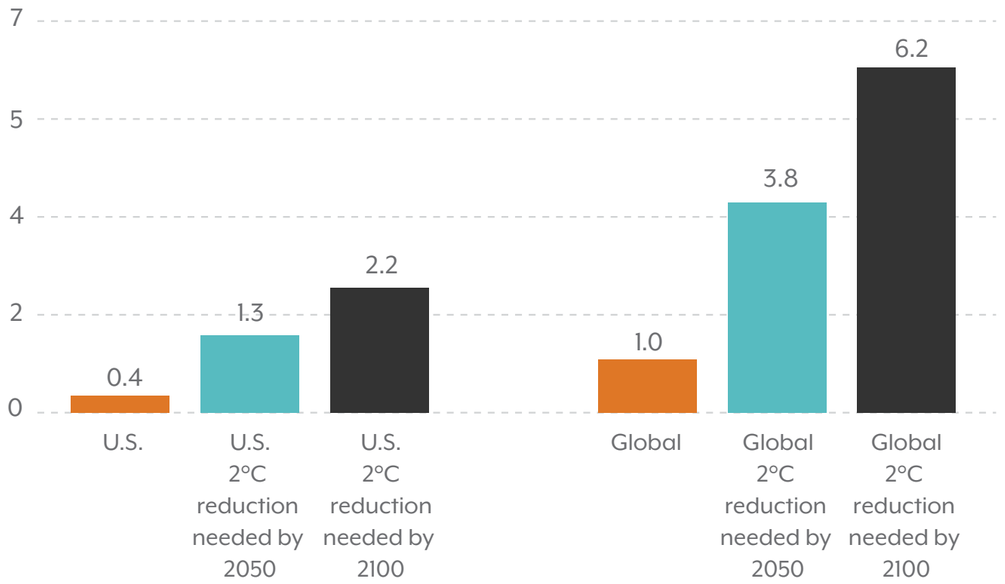
Source: Trucost, 2018

The amount of sent to landfills and incinerators fell year on year and has declined by nearly a quarter since 2013. At the same time, company-reported recycling continued its upward trend, growing 3 percent year on year. These trends suggest that companies are making positive efforts to minimize waste generation ahead of maximizing recycling.

Companies also show growing commitment to further reduce environmental impacts and publicly disclose reduction targets. The share of global and U.S. companies having a GHG and water reduction targets grew by roughly 10 percent over the past five years. In 2017, around half of global companies set a GHG reduction target, while a quarter of global companies set a water reduction target.

While the efforts made by companies to date are growing, the commitments are far short of the GHG reductions required using science-based or context-based target setting approaches. Given that top global and U.S. companies accounted for a substantial share of global emissions in 2017, Trucost estimates the proportional reduction that these companies need to achieve by 2050 and 2100 to achieve the 2 degrees Celsius target specified in the Paris Agreement are 3.8 and 6.2

CARBON REDUCTION TARGETS SET BY COMPANIES FALL SHORT OF THEIR CONTRIBUTION TO 2 DEGREE TARGET



Source: Trucost, 2018; IPCC, 2014

gigatons of carbon dioxide equivalent ($GtCO_2e$) for global companies and 1.3 and 2.2 $GtCO_2e$ for U.S. companies. The GHG reduction targets set by top global and U.S. companies in 2016 (1.0 and 0.4 $GtCO_2e$) account for only 26 percent and 27 percent of their share of reduction needed by 2050. The gap between existing reduction targets and those needed to meet 2 degrees Celsius aligned targets by 2100 is even wider, currently at 16 percent of the necessary reductions by both U.S. and global companies.

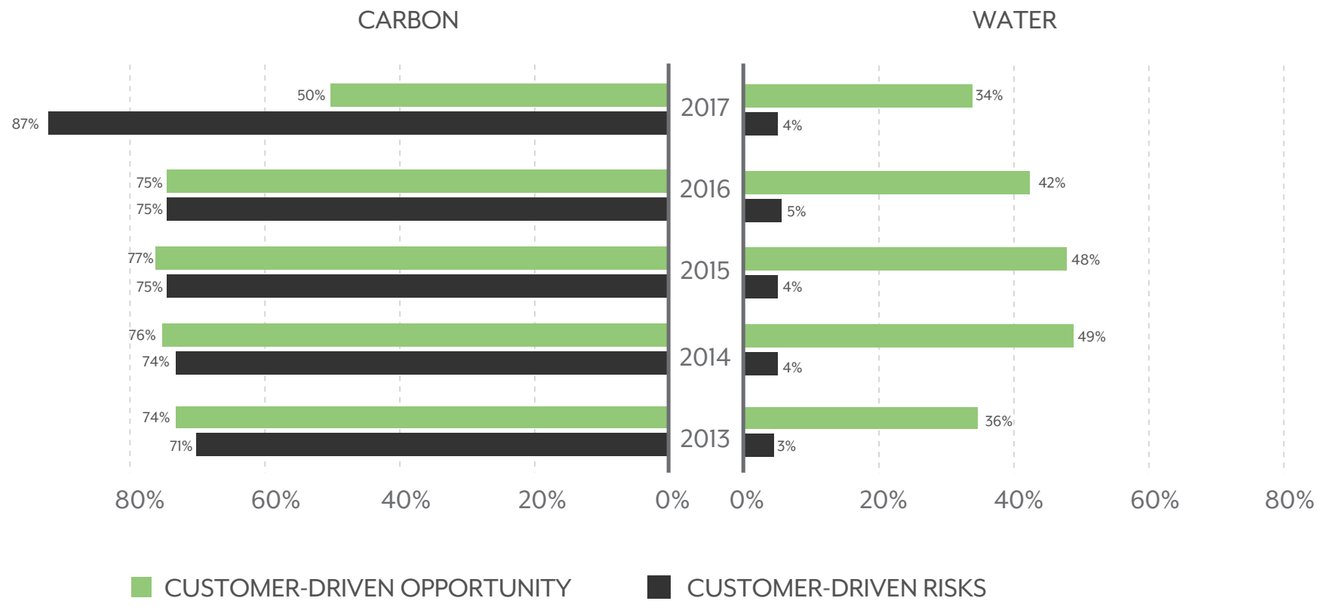
THE INDEX

Customer Preference

Analysis of customer preferences shows a number of positive trends with regards to awareness and engagement with climate and environmental issues. A sharp increase in the number of companies reporting customer-driven risks relating to climate change points to growing awareness of downstream issues and issues relating to product use and end of life impacts. At the same time, a large number of companies perceive opportunities to capitalize on goods and services that minimize negative impacts or have a positive influence on carbon and water.

HOW COMPANIES SEE CUSTOMERS' INTEREST IN CARBON- AND WATER-RELATED ISSUES

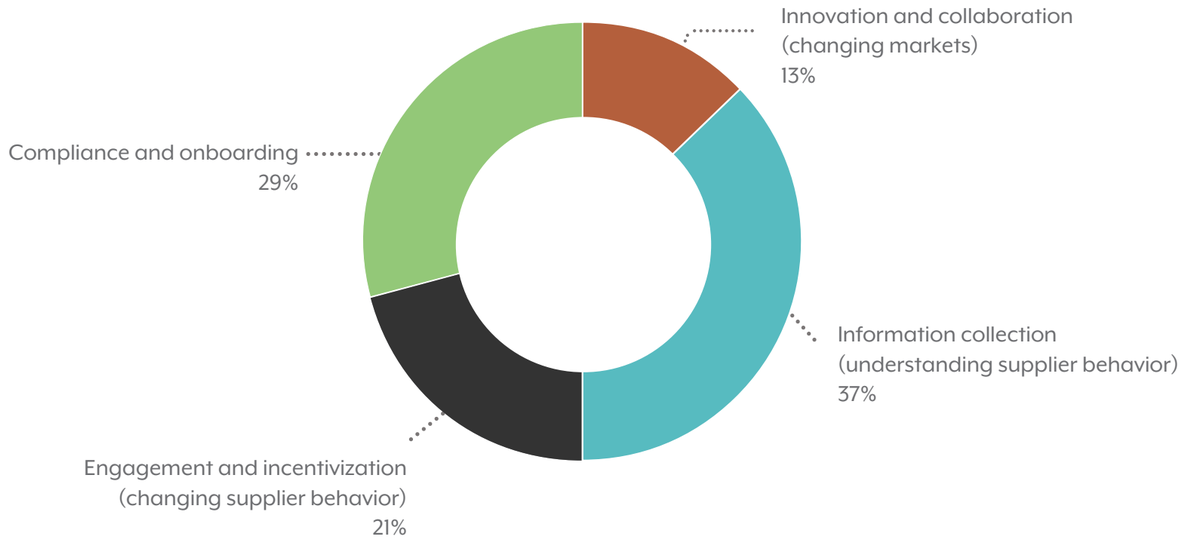
% OF COMPANIES THAT SEE CUSTOMER AS THE KEY DRIVER FOR CARBON/ WATER RISKS & OPPORTUNITIES



For those companies engaging with their suppliers, a large number report doing so as part of compliance and onboarding processes to ensure regulatory alignment. However, the largest share of companies suggest they are doing so to better understand customer behavior, while nearly a fifth suggest they engage so as to positively incentivize and change customer behavior.

MOST COMPANIES ARE ENGAGING SUPPLIERS TO BETTER UNDERSTAND BEHAVIOR

FORMS OF ENGAGEMENT



Source: Trucost, 2018

THE INDEX

Risk Management

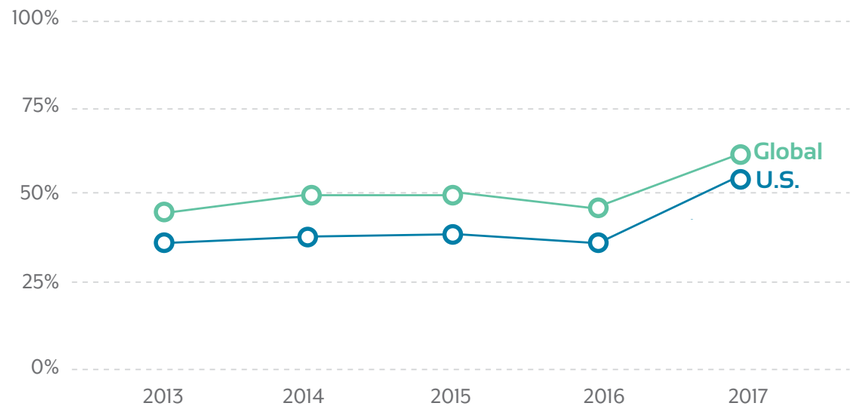
Overall, most indicators show steadily improving trends for corporate environmental risk management through more in-depth understanding of risks throughout the value chain, better disclosure and impact reduction projects.

Companies are becoming increasingly aware of the potential implications that environmental impacts could have for their business. In this section, we review what companies are actively doing to monitor and mitigate environmental risks.

More companies are interested in exploring the value of natural capital through various initiatives, such as participating in natural capital alliances or setting an internal carbon price. Compared to 2013, the number of companies taking part in natural capital initiatives increased over threefold, and disclosure of natural capital costs has increased sharply in recent years.

DISCLOSURE OF NATURAL CAPITAL COSTS HAS INCREASED SHARPLY

% OF DISCLOSED ENVIRONMENTAL COST

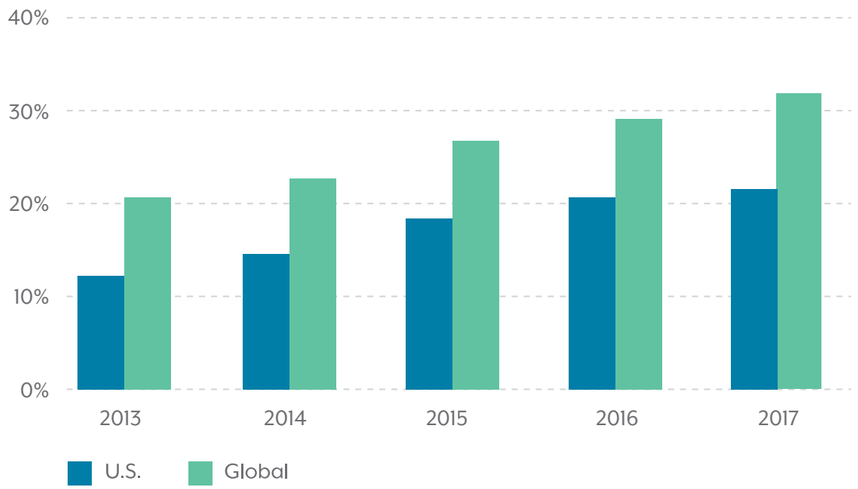


Source: Trucost, 2017

In 2017, the number of companies disclosing on the environmental performance of their supply chains increased. From 2013, the Scope 3 emissions reported increased on an average by 13 to 14 percent for both U.S. and global companies. The top four categories commonly assessed by countries are business travel, employee commuting, fuel-and-energy-related activities (not included in Scope 1 or 2) and purchased goods and services. Reporting of purchased goods and services has nearly doubled since 2013, while reporting of business travel has risen to 81 percent.

MORE COMPANIES REPORT EMISSIONS FROM PRODUCTS

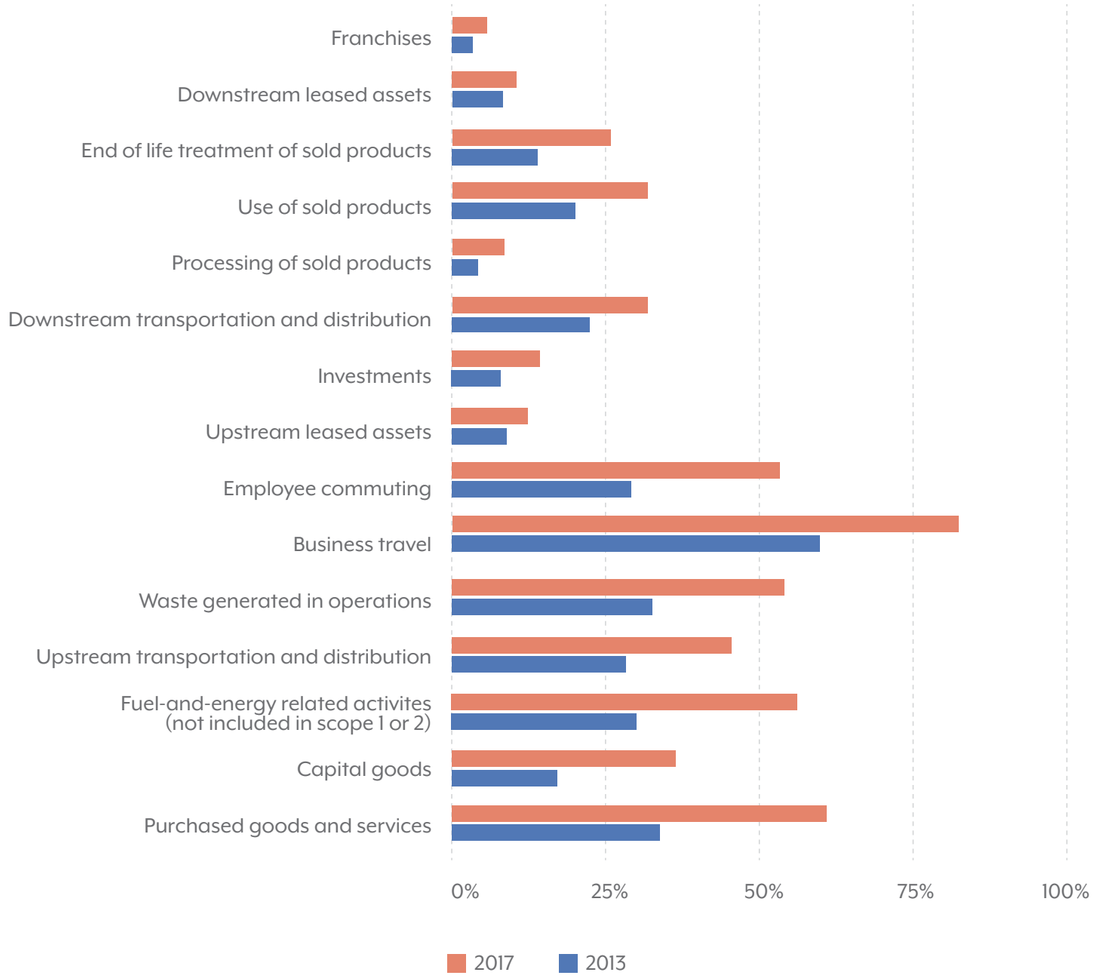
% OF COMPANIES REPORTING SCOPE 3 EMISSIONS FROM SOLD PRODUCTS



Source: Trucost, 2018

COMPANIES SHARPLY INCREASE TRANSPARENCY OF VALUE CHAIN EMISSIONS

% OF GLOBAL COMPANIES DISCLOSING EACH CATEGORY OF SCOPE 3 EMISSIONS



Source: Trucost, 2018

Substantially more companies reported GHG emissions related to their sold products, increasing to a third of global companies in 2017.

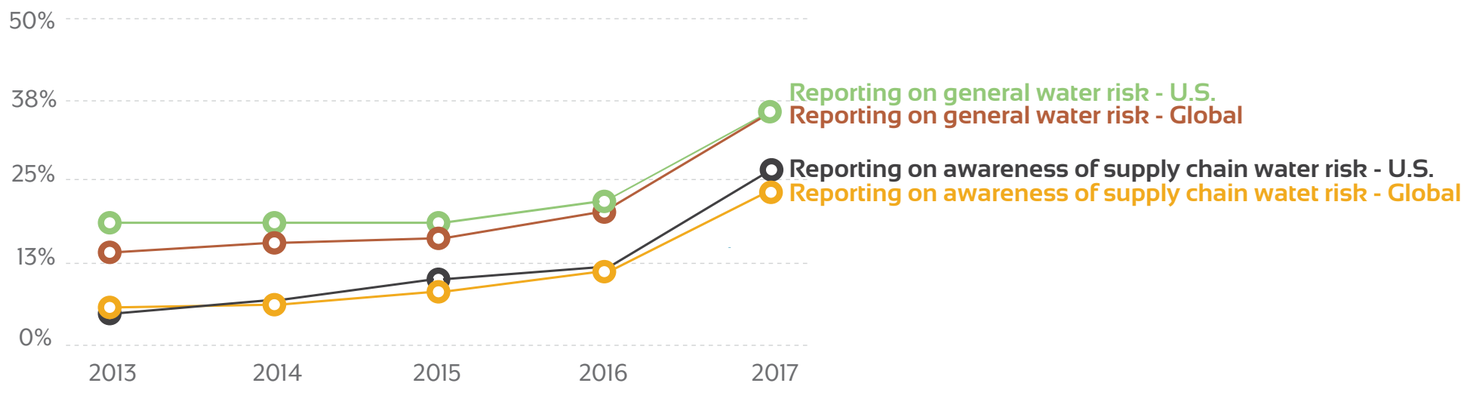
A similar trend also applies to water risks. About 14 percent and 15 percent more U.S. and global companies, respectively, reported their general water risks, while roughly 15 percent more U.S. and 13 percent more global companies disclosed awareness on supply chain risks in 2016.

In addition to broader disclosure, companies remain proactive on investments to reduce their environmental impacts. Around 60 percent of top U.S. and global companies reported research and development investments towards reducing natural capital impacts. Based on their mitigation effort, roughly 60 percent of companies reported natural capital profit or savings in 2017. Nearly 80 percent of companies have at least one GHG reduction project in place, an increase from less than half in 2013.

The cost of curbing GHG emissions has dropped slightly. The low cost of Renewable Energy Certificates (RECs) implies that companies could reduce their emissions by switching to renewable energy — for example, the cost of compliance RECs has fallen by two-thirds between 2013 and 2017. Carbon prices, including mandatory, voluntary and internal carbon prices, nonetheless show an upward trajectory.

REPORTING ON WATER-RELATED RISKS CONTINUES TO GROW

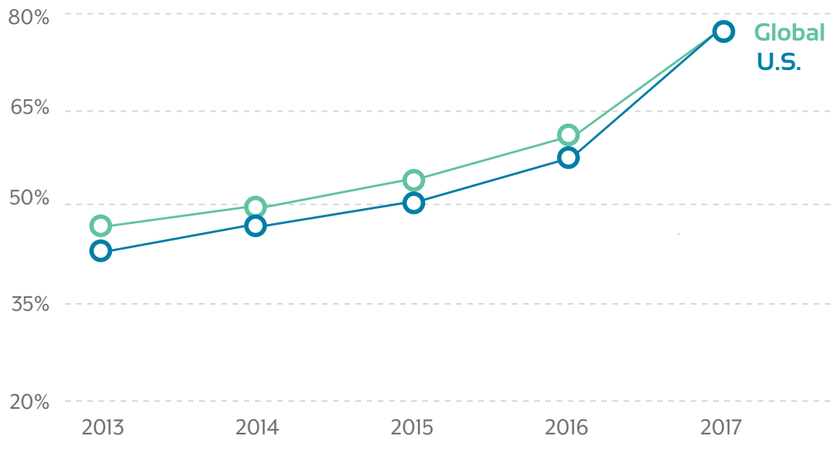
% OF COMPANIES REPORTING ON WATER RISK



Source: Trucost, 2018

MORE COMPANIES ENGAGE IN REDUCING GHG EMISSIONS

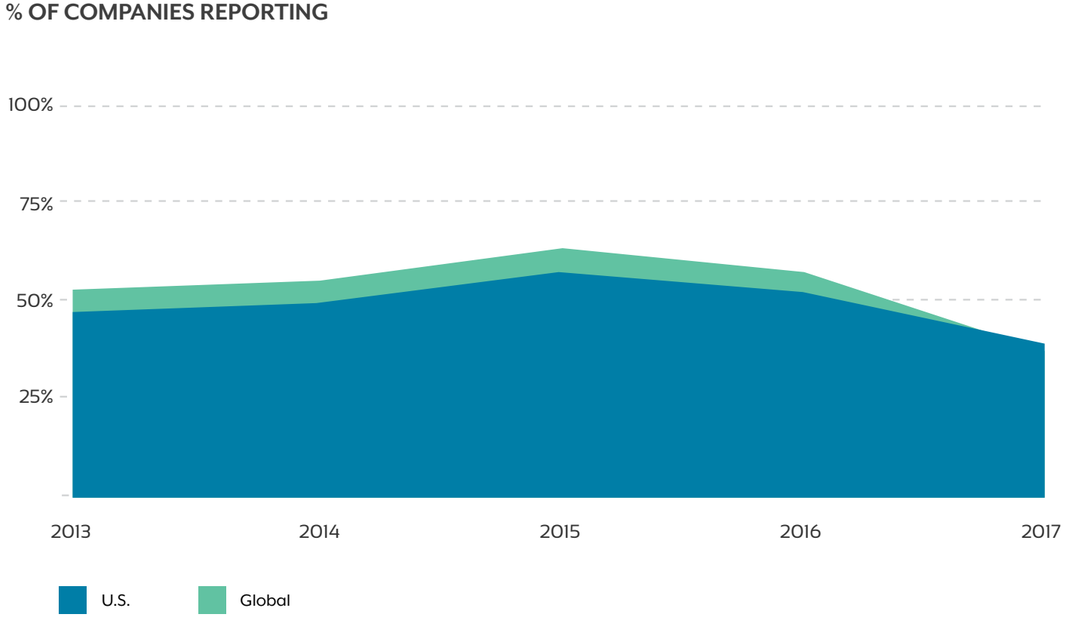
% OF COMPANIES HAVING GHG REDUCTION PROJECTS



Source: Trucost, 2018

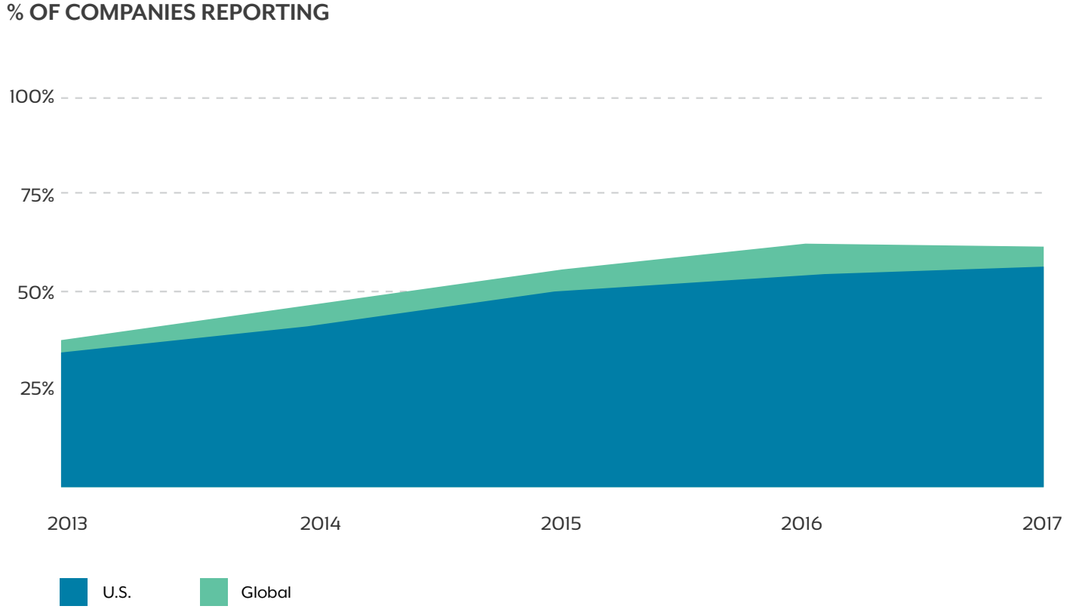
Around 60 percent of top U.S. and global companies reported research and development investments towards reducing natural capital impacts. Based on their mitigation effort, roughly 60 percent of companies reported natural capital profit or savings in 2017. While the percentage of companies disclosing natural capital R&D and investments fell slightly, this still represents a substantial share of global companies making active investments that relate to natural capital. A clear majority of companies reported exposure to transition risks and physical risks associated with climate change.

A SUBSTANTIAL SHARE OF COMPANIES ARE DISCLOSING NATURAL CAPITAL R&D OR INVESTMENTS



Source: Trucost, 2018

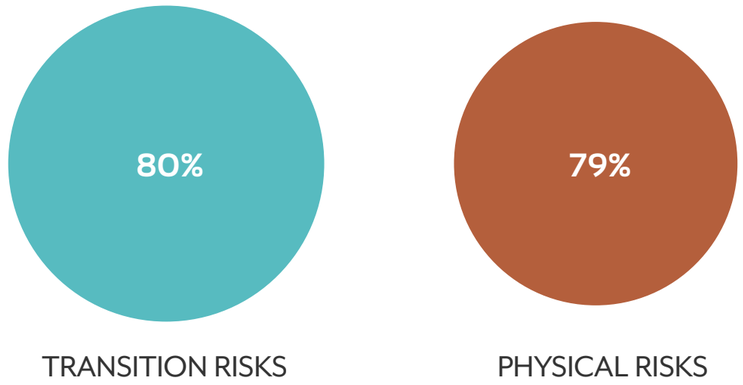
A MAJORITY OF COMPANIES REPORT NATURAL CAPITAL PROFITS OR SAVINGS



Source: Trucost, 2018

TYPES OF CLIMATE RISK REPORTED BY COMPANIES

% OF COMPANIES REPORTING EXPOSURE TO CLIMATE RISKS

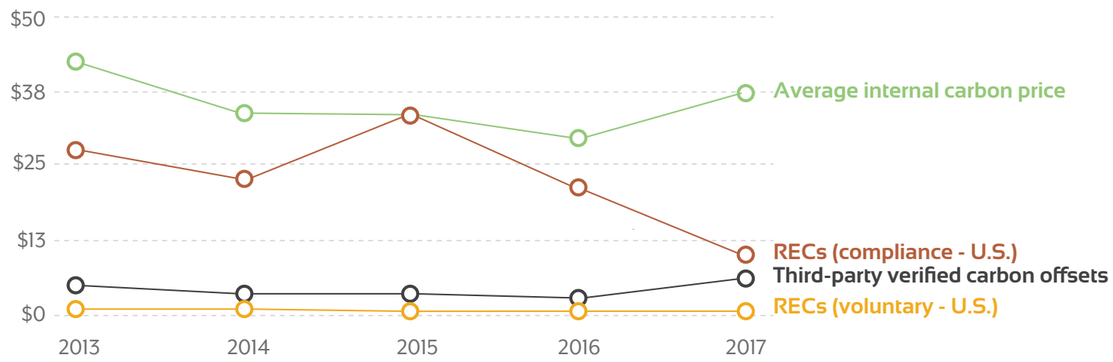


Source: Trucost, 2018

In order to achieve the Paris Agreement goal to limit global warming to 2 degrees Celsius, the carbon price will need to reach $120 per metric ton by 2030, according to Trucost analysis of International Energy Agency and International Renewable Energy Agency data. Along with the growing momentum in climate policy, companies are likely to face significantly higher carbon prices in the future. Recent announcements at COP 24 underlined the importance of internal carbon pricing as a tool to deliver on the commitments of the Paris Agreement, with an alliance of 50 CEOs of global companies representing $1.3 trillion in revenue over 20 sectors urging businesses to implement effective carbon pricing systems.

COST OF CARBON REMAINS LOW COMPARED TO PRICE NEEDED TO ACHIEVE 2 DEGREE TARGET

AVERAGE COST OF CARBON (USD PER tCO_2e)



Source: Trucost, 2018

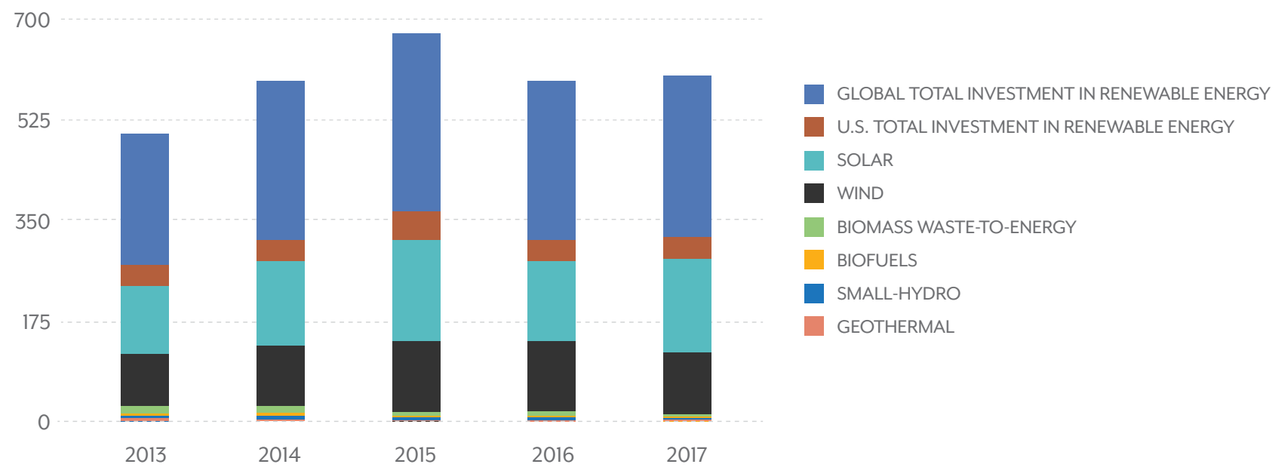
THE INDEX

Investment in Greener Business Models

In 2017, total investment in renewable energy increased by 2 percent (PDF), beginning to reverse the previous years' fall. Solar and wind energy continue to receive the most investment, whereas solar has experienced the largest growth of investment from 2013. As noted last year, the overall drop in renewable investment since the 2015 peak is partly due to the falling capital cost of renewable technologies, and the underlying slowdown in key markets such as China and Japan.

GLOBAL INVESTMENT IN SOLAR ENERGY ROSE YEAR ON YEAR

TOTAL INVESTMENT (BILLIONS USD)



Source: UNEP, 2018

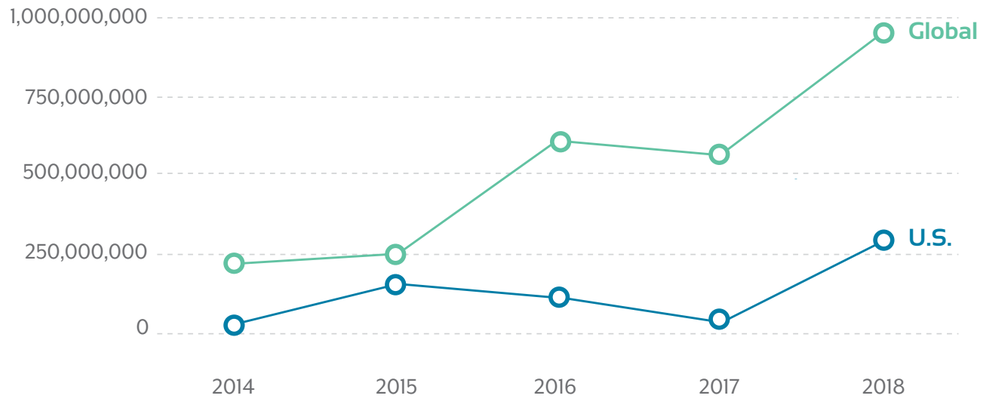
The green bond market reached $250 billion in issuances in 2018, with corporate green bonds reflecting close to a third of this total. Corporate green bonds issued as of Nov. 6, 2018 have the potential to save nearly 950 million metric tons carbon dioxide equivalent ($tC0_2e$) of GHG emissions, according to Trucost analysis of Climate Bonds Initiative data. The majority of GHG savings from corporate green bonds issued in 2017 comes from financing renewable energy projects (84 percent), followed by mixed project types or other projects such as water conservation.

The discussion on assessing climate risks and opportunities using scenario analysis is also rising rapidly among investors, NGOs and regulators. Initiatives, such as the TCFD, which aims to help investors, lenders and insurance underwriters appropriately assess and price climate-related risks and opportunities, reflect the importance of transparent risk assessment to companies' access to capital in the future.

Elsewhere, adoption of environment and climate disclosures by corporations as a listing requirement of the world's major stock exchanges continues to gain

GHG EMISSIONS SAVINGS FROM CORPORATE GREEN BONDS INCREASED SHARPLY IN 2018

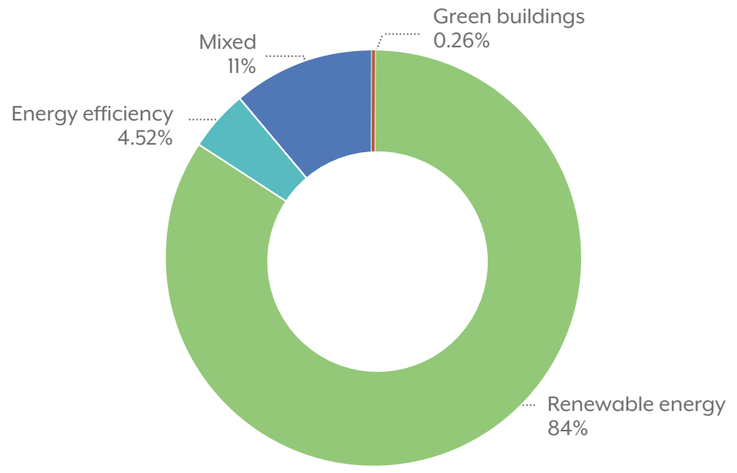
MILLIONS OF tCO_2e AVOIDED BY CORPORATE GREEN BONDS



Source: Trucost, 2018

MOST GHG EMISSION SAVINGS BY CORPORATE GREEN BONDS COME FROM RENEWABLES*

***AS OF NOVEMBER 2018**



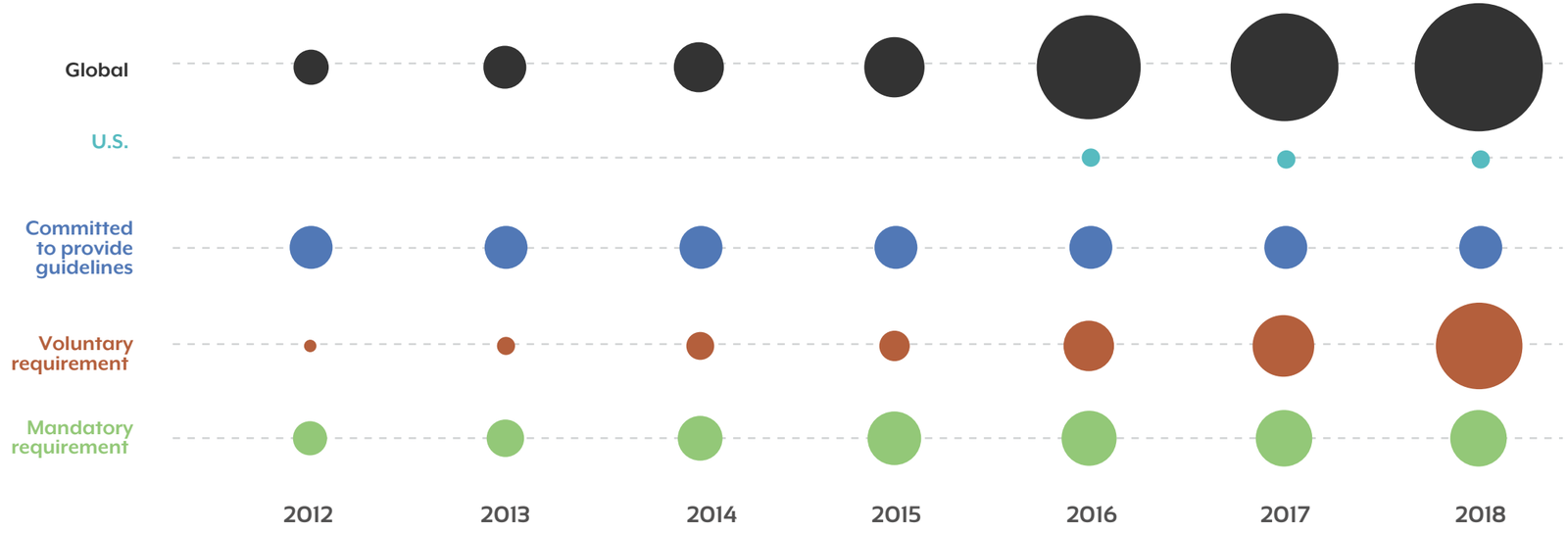
Source: Climate Bonds Initiative, 2018

momentum, with 94 exchanges now signatory to the U.N. Sustainable Stock Exchanges initiative.

There is growing evidence of climate and environmental risks and opportunities impacting on access to capital. Recent analysis by S&P Global Ratings explored the citation of climate and environmental factors in credit rating movements between 2015 and 2017. The three key risk drivers that led to a rating change over this period included physical risk, policy and legal risk and technology risk, while the sectors most heavily affected include oil refining and marketing, regulated utilities and unregulated power and gas industries. More recent analysis of water risks shows a similar pattern, where utilities and consumer manufacturing companies are particularly exposed to prevailing water quality from a credit health perspective.

MORE STOCK EXCHANGES PUT IN ENVIRONMENTAL LISTING REQUIREMENTS

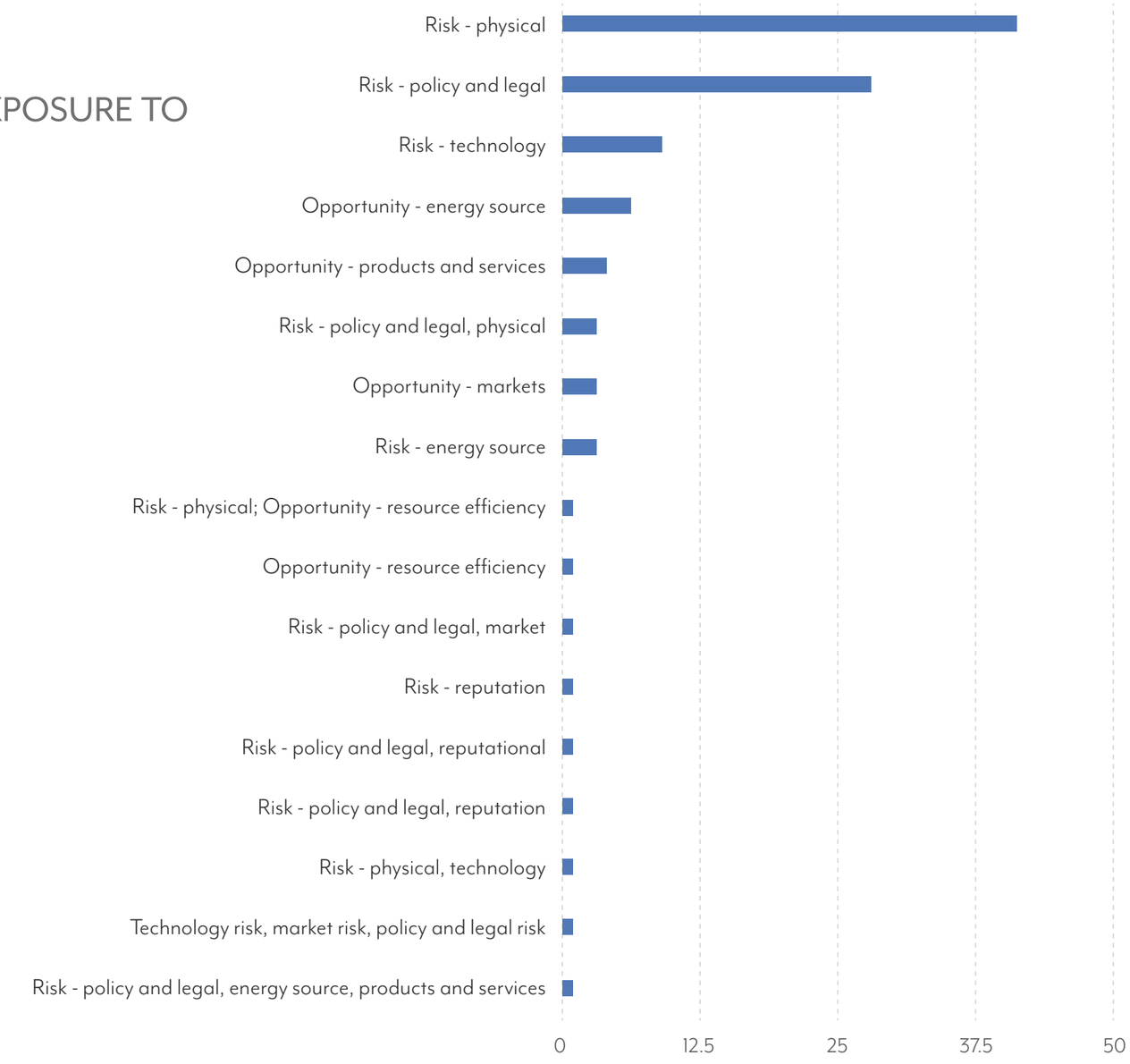
NUMBER OF STOCK EXCHANGES WITH ENVIRONMENTAL LISTING REQUIREMENTS



Sustainable Stock Exchanges Initiative, 2018

OIL & GAS AND UTILITIES HAVE THE HIGHEST EXPOSURE TO ENVIRONMENT, CLIMATE AND WATER FACTORS

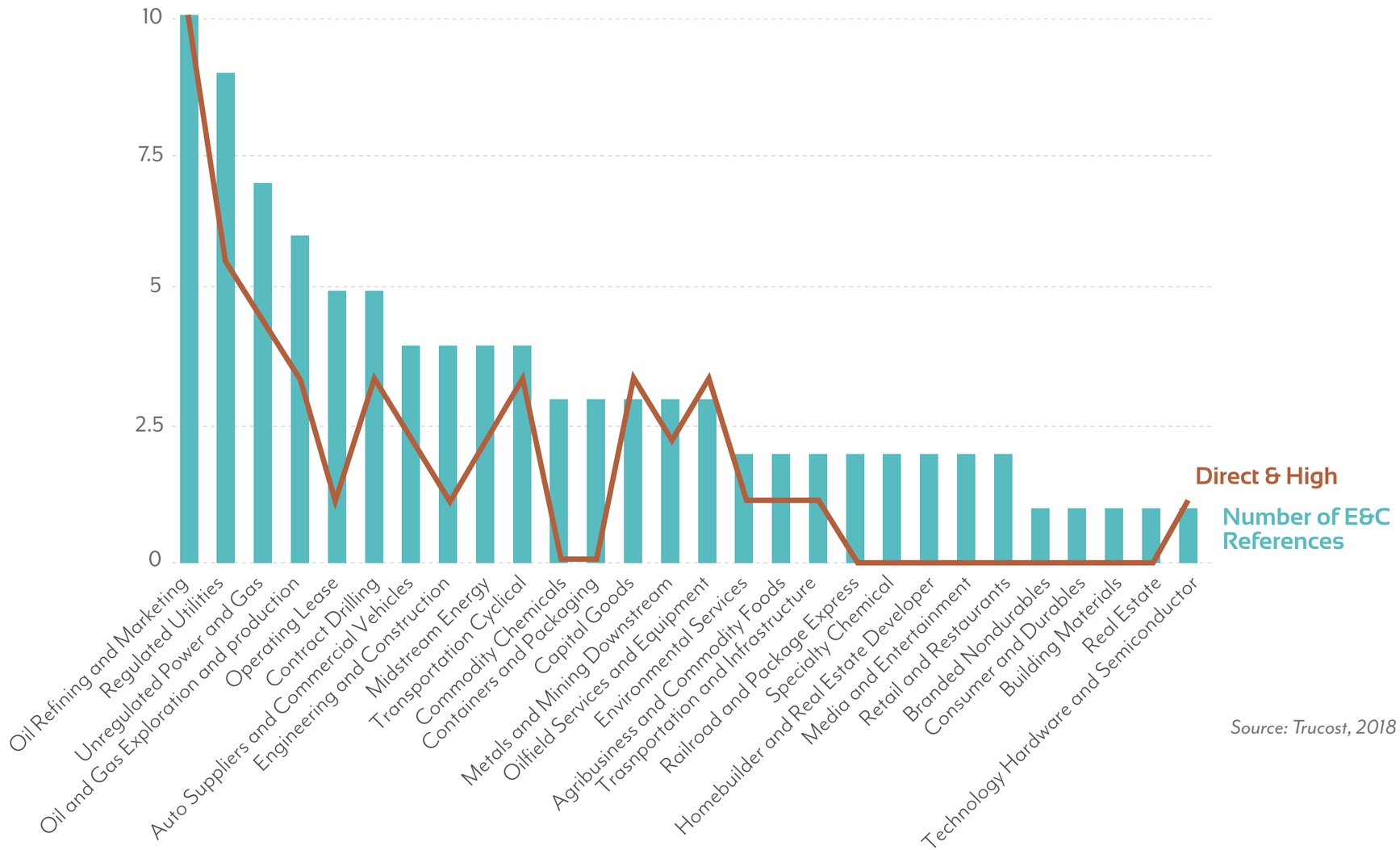
PHYSICAL CLIMATE AND ENVIRONMENT RISKS ARE THE MOST PROMINENT IN RATING MOVEMENTS



Source: S&P Global Ratings, 2018

OIL & GAS AND UTILITIES HAVE THE HIGHEST EXPOSURE TO ENVIRONMENT, CLIMATE AND WATER FACTORS

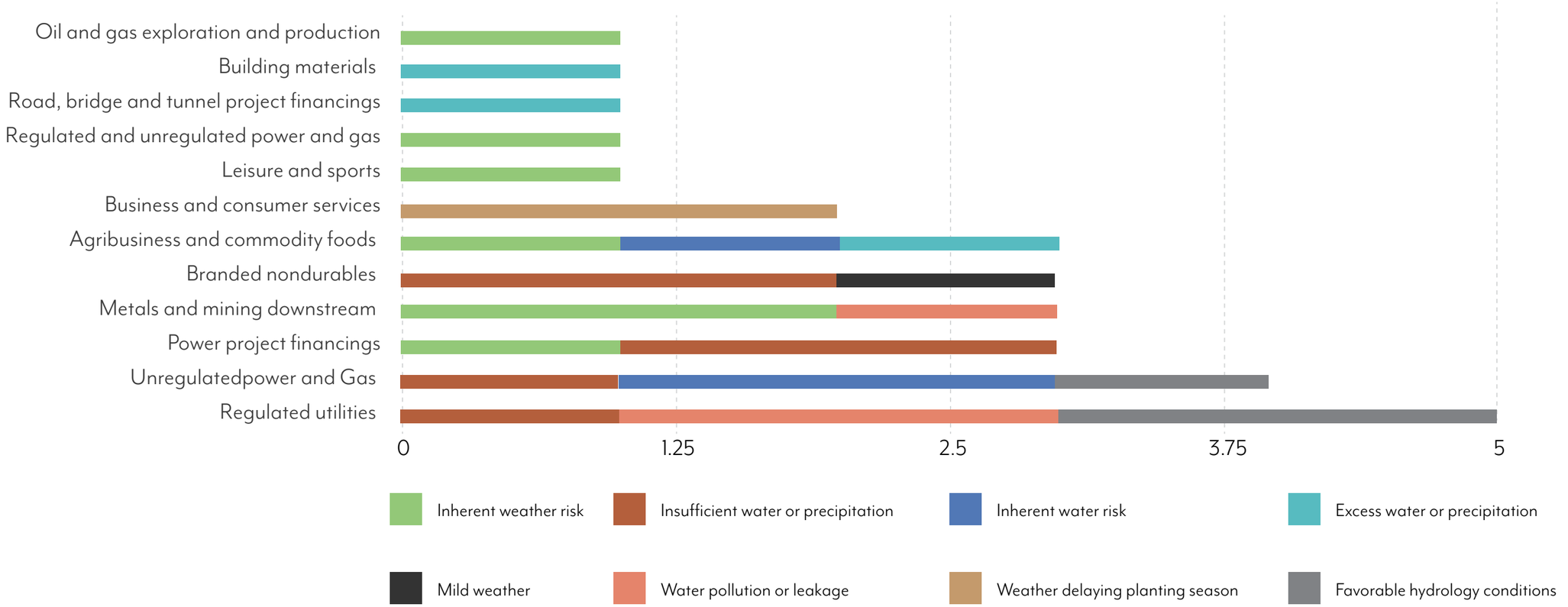
NUMBER OF E&C REFERENCES IN KEY CREDIT FACTOR ARTICLES, AND THEIR IMPACT AND RELEVANCE PER INDUSTRY



Source: Trucost, 2018

OIL & GAS AND UTILITIES HAVE THE HIGHEST EXPOSURE TO ENVIRONMENT, CLIMATE AND WATER FACTORS

REFERENCES TO WATER-RELATED RISKS BY SECTOR



Source: S&P Global Ratings, 2018

Circularity 19

JUNE 18 - 20, 2019
MINNEAPOLIS, MN

Circularity 19 will bring together more than 500 thought leaders and practitioners to accelerate the circular economy. Through inspirational plenaries, interactive breakouts, hands-on design charrettes, networking opportunities and a solutions-focused expo, Circularity 19 will inspire, inform and empower participants to make the shift to a circular economy.

LEARN MORE

Methodology

The State of Green Business (SOGB) analysis, the Index derives from Trucost databases and models that use quantitative, scientific frameworks to assess the environmental and financial performance of the global economy. Trucost's approach accounts for environmental impacts in company's operations as well as supply chains, looking holistically at a wide range of environmental measures including GHG emissions, air pollution, water use and pollution, waste and land use.

For the 2019 report, Trucost aggregated corporate environmental performance data for both the S&P 500 index of U.S. companies and the S&P Global 1200, covering approximately 70 percent of global market capitalization. In addition to analyzing corporate environmental performance trends, Trucost also calculated the cost of companies' environmental impacts to provide insight into the economic consequences of those impacts.

Data sources

Corporate environmental performance data is sourced from the Trucost Environmental Register, a database that covers approximately 14,000 companies, representing 99 percent of available global market capitalization. The Trucost Environmental Register is built on information from companies' annual reports, websites and other publicly disclosed data. Trucost's annual engagement program provides an opportunity for companies to review, improve and verify the research.

Modeling environmental impacts

Where company disclosure data is not available, Trucost applies a wide range of estimation techniques and environmental modeling tools, including standard and hybridized life-cycle assessment (LCA) models to compare environmental impacts across companies, supply chains, regions, sectors and investment benchmarks. For the 2019 SOGB analysis, Trucost filled gaps in company disclosure with its environmentally extended input-output LCA model, which estimates the amount of resources a company uses (the inputs) to produce goods or services (outputs), as well as the pollution that results.

Trucost's analysis accounts for impacts from a company's own operations and its supply chain. This provides a means to understand business risk, and differentiate between low-impact supplied goods, such as renewable energy and high-impact supplied goods, such as fossil fuel energy. The methodology models the purchases a company makes and the resultant environmental impacts. This analysis is extended to include first-tier suppliers that the company buys from, through subsequent tiers of suppliers until the supplier of the raw material is reached. In this way, Trucost can calculate the cost of supply chain impacts back to raw materials extraction.

Trucost's model calculates the environmental impacts of 464 standard business activities, and has been further enhanced to provide additional detail

for environmentally intense sectors. The environmental impacts for each sector are allocated to a company according to its proportion of total revenue, using data from FactSet, Bloomberg and company reports to segment revenues and map each company to a set of sectors. The model also incorporates sector-level inflation data to adjust calculations in line with annual inflation and movements in commodity prices.

Trucost's model draws on robust data from a wide range of government and academic data sources, such as the U.S. EPA covering more than 700 environmental indicators including GHG emissions, toxic pollutants, water consumption and waste. The system is consistent with the U.N. Millennium Ecosystem Assessment. Data on emissions is combined with economic data from sources such as the U.S. Bureau of Economic Analysis to analyze interactions between economic productivity and the environment.

Valuing natural capital and environmental impacts

The production, use and disposal of most materials have environmental and social costs that are not reflected in the market prices of goods and services. Applying environmental or "natural capital" valuation techniques allows businesses to understand and communicate environmental impacts in monetary terms alongside traditional financial performance measures. These costs also can be factored into business and investment decision making, by considering tradeoffs between the implied costs and benefits of financial and economic activity. Natural capital accounting helps companies understand their environmental impacts and potential exposure to increased costs or increased competitiveness due to tightening environmental regulation (such as carbon taxes, reduced water allocations, or greater restrictions on use of toxic materials) or consumer pressure to improve environmental performance.

For the SOGB 2019 analysis, in addition to measuring environmental performance in physical units (such as metric tons of greenhouse gases or cubic meters of water), Trucost also valued in monetary terms the costs of these impacts. An environmental damage cost (natural-capital cost) was applied to each unit of resource and emission. The costs represent the quantities of natural resources used or pollutants emitted multiplied by the environmental damage costs to the economy and society. Trucost's natural capital valuations draw on extensive international academic research into environmental economics and are informed by an independent international advisory panel of leading academics.

For more information, visit www.trucost.com

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GreenBiz Group is the leading media and events company at the intersection of business, sustainability and innovation. Through our media, events, research and membership network, GreenBiz Group drives transformation and accelerates progress — within companies, industries and in the very nature of business.

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ABOUT Trucost

Trucost ESG Analysis

S&P Global

Trucost is part of S&P Global. A leader in carbon and environmental data and risk analysis, Trucost assesses risks relating to climate change, natural resource constraints and broader environmental, social and governance factors. Companies and financial institutions use Trucost intelligence to understand their ESG exposure to these factors, inform resilience and identify transformative solutions for a more sustainable global economy. S&P Global's commitment to environmental analysis and product innovation allows us to deliver essential ESG investment-related information to the global marketplace. For more information, visit www.trucost.com.

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