Putting a price on carbon

Integrating climate risk into business planning

October 2017

Today,

1,389+ companies

are disclosing to CDP their plans or current practice of putting a price on carbon emissions because they understand that carbon risk management is a business imperative. This represents an 11% increase from 2016.

Contents

This report's findings are based on disclosures of 6,086 companies who responded to CDP's 2017 climate change and supply chain information requests, made on behalf of investors with $100 trillion in assets, and purchasing organizations with over $2 trillion in spending power (only responses submitted prior to September 1, 2017). In this report, all price values are in USD unless otherwise stated (see currency conversion rates on page xx); and all emissions are reported in metric tons.

Foreword
Alzbeta Klein, Director, IFC Climate Business

> As a financial institution, IFC felt it was important to begin to assess the impact of carbon prices and other climate risks on our investments.

A dangerously warming planet is not just an environmental challenge—it is a fundamental threat to our way of life and threatens to put prosperity out of the reach of millions of people. What do we do about it?

There is general agreement among economists, businesses and a growing number of governments that carbon pricing is one of the most effective strategies to help mitigate the impacts of climate change. A strong price signal directs finance away from high-emitting activities toward a suite of cleaner, more efficient alternatives.

To be effective, the price must be meaningful—i.e., provide a signal for investment in low-carbon and resilient growth—and it must be paired with other policies. Many governments, investors and major businesses, including those in high-emitting sectors, are now supporting carbon pricing after years of doubt and resistance. The World Bank Group's State and Trends of Carbon Pricing report tells us that over 40 national and 25 subnational governments are pricing carbon, covering about 15% of global emissions. This number will grow as countries move to implement the commitments they made as part of the Paris Agreement.

Progressive companies are acting to price carbon internally, while also supporting government pricing policies through initiatives like the Carbon Pricing Leadership Coalition. CDP's data collection and analysis around corporate use of carbon pricing have been key drivers of increased corporate action and change over the past several years. IFC clients in places like Turkey, Brazil, Mexico, Chile, and India are increasingly using carbon pricing to 'future proof' their business models against climate risk, and to uncover new opportunities.

Clearly there is momentum, and this is good news. But more needs to be done to set us on a pathway to stabilize the climate. This is why the IFC—as a part of the World Bank Group and together with other development finance institutions—is implementing a pilot internal carbon pricing program. As a financial institution, IFC felt it was important to begin to assess the impact of carbon prices and other climate risks on our investments. The recently released Task Force on Climate-Related Disclosures is driving more interest in carbon pricing as a climate risk management tool. We look forward to sharing our early results with other financial institutions and multilaterals soon, and hope that this will stimulate further action by our clients and competitors.

Leadership in the 21st century will be defined by forward-looking businesses that re-define economic growth to focus on people, planet, and profits. These companies are showing that we can have it both ways; that we can address climate change while keeping our economies growing. IFC is pleased to work alongside CDP and its network to continue to advocate for greater corporate and government use of carbon pricing to drive climate investment.

1 The Carbon Pricing Leadership Coalition brings together leaders across national and sub-national governments, the private sector, and civil society with the goal of putting in place effective carbon pricing policies. www.carbonpricingleadership.org

Executive summary

1. Carbon pricing is on the rise again.
The report notes a steady increase from 2014 to 2017 in companies participating in or expecting participation in an Emission Trading System (ETS). This year brings notable developments in carbon markets in China, South Korea, Canada, and a handful of US states, as well as exciting announcements in Latin America and South Asia, all of which are being tracked by companies.

2. Four years of steady growth of internal carbon pricing, a global phenomenon.
Internal carbon pricing has emerged as an important mechanism to help companies manage risks and capitalize on emerging opportunities in the transition to a low-carbon economy. From 150 global companies in 2014, the number has steadily grown to over 1,300 companies in 2017—including more than 100 Fortune Global 500 companies with collective annual revenues of about US$7 trillion—disclosing that they are using an internal carbon price or plan to do so within the next two years. This year's reported increase is prevalent in most regions and greatest in China, Japan, Mexico, and the U.S.

3. Companies use an internal carbon price to achieve different objectives.
Companies disclose a variety of reasons for using an internal carbon price: to reveal hidden carbon risks and opportunities, or even as a deliberate tool to transition to a low-carbon business model. The most effective way to embed this into business practice depends on the objective a company is seeking to achieve.

4. Large number of companies may be at risk.
Nearly 500 companies disclosed to CDP that they are affected or expect to be affected by carbon pricing regulation and are potentially vulnerable to the effects of regulation through their failure to internalize the cost into their business. The report notes an even larger group potentially vulnerable due to the increasing addition of carbon taxes to global policy frameworks. Investors may question the risk-preparedness of these companies for climate regulations.

5. It is not clear whether companies are prepared for the medium- to long-term.
Only 15% of companies that use an internal carbon price to stress test their investments and operations disclose assumptions that the price level will increase over time, while the remaining 85% assumes a static price, or do not disclose their practice. Further, very few companies disclose price assumptions past 2025, although the ROI period for the assets of certain energy-intensive sectors extends far beyond this range. Investors should take note of this, and call for more disclosure and better practice in the future.

6. North American companies are a big part of the growth.
Despite political uncertainty in the United States concerning climate-related regulation, the number of U.S. companies reporting the use of an internal carbon price continues to increase year-on-year (96 already pricing and 142 with plans to implement by 2019). This is clearly linked to the multinational nature of several companies that trade in the European Union Emissions Trading System (EU-ETS), and significant policy activities occurring at the state level. Meanwhile, the stability and coordination of provincial and federal Canadian climate policy has provided Canadian companies with clarity regarding future increases in the price of carbon in the economy, allowing them to peg internal carbon prices directly to forward-looking policy prices.

7. All eyes are on Asia.
Over the past year, the number of companies using an internal carbon price in China, Japan, and South Korea has increased from 170 to 281. One hundred and two Chinese companies disclosed using or planning to implement an internal carbon price in 2017—nearly doubling from 54 companies in 2015. China's plan to roll out the largest ETS in the world towards the end of 2017 is likely to send a ripple across markets regionally, and in time, globally.

8. There is increasing investor focus on how carbon pricing is being integrated into business planning.
The report unpacks the relationship between internal carbon pricing and the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD), highlighting what investors should look out for in corporate disclosure on carbon pricing, and trying to help answer the question: "Is this company ready for a low-carbon transition and the accompanying risks and opportunities?"

9. It's not just the price, it's how you use it.
While it is important to understand the assumptions of an internal carbon price, it is equally important to understand if and how it is impacting business decisions. Key indicators of whether an internal carbon price is meaningful include the scope of greenhouse gas emissions it applies to, whether it is embedded into operational as well as capital spend decisions, and the degree of overall influence that it has on decision-making.

10. The market response to carbon pricing and the integration of climate risk are about to undergo another step change.
To meet the growing interest in climate-related financial disclosure, CDP is committed to implementing the TCFD's recommendations by facilitating the enhanced disclosure of carbon pricing. The report outlines the evolution of CDP's carbon pricing questions (regulation and internal carbon pricing) from 2018, providing companies with emerging insights regarding disclosure and best practice.

Latest trends and four years of progress

> **The number of jurisdictions with carbon pricing policies have doubled over the past decade.**

Introduction

Over the past few years, CDP has been tracking a steady increase in the number of companies embedding an internal carbon price into their business strategies. The first publication of this information was in 2014,[1] showing 150 global companies using internal carbon pricing to assess and manage carbon-related risks. Today, that number has grown to over 1,300 companies—including more than 100 Fortune Global 500 companies with collective annual revenues of about US$7 trillion—disclosing in 2017 that they are currently using an internal carbon price or are planning to do so within the next two years.

A response to explicit and implicit market signals of an increasing cost of carbon

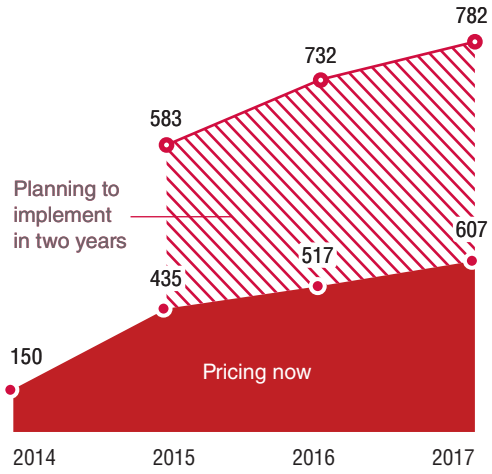
Carbon pricing has emerged as a key policy mechanism to drive greenhouse gas emissions reductions and mitigate the dangerous impacts of climate change. The number of jurisdictions with carbon pricing policies has doubled over the past decade. Today, over 40 national and 25 regional governments already put a price on carbon through emissions trading systems (ETS) and taxation, covering 15% of global GHG emissions[2]. This momentum is expected to continue as the international community acts to implement the Paris Agreement.

In many geographies, there are also implicit carbon pricing signals arising from changing technological, regulatory and market dynamics: for example, energy efficiency standards and support for renewable energy, as well as shifts in supply and demand for low-carbon commodities, products and services. The sum of these factors combined with explicit carbon pricing policies creates a signal indicating the present and future cost of carbon.

Additionally, companies are facing increasing pressure from shareholders and customers to adequately manage their climate-related risks. This includes assurance that companies are lowering their risk exposure to policies that increase the cost of carbon and are actively investing in areas of their business that will see a higher return in a carbon-constrained future. This has recently manifested in a shareholder lawsuit against Australia's Commonwealth Bank claiming a failure to properly disclose the financial risks related to climate change.[3]

Internal carbon pricing has emerged as a powerful approach to assessing and managing carbon-related risks and opportunities that may arise from the transition to a low-carbon economy. For many companies, the most significant consequences of these risks will emerge over time, and their magnitude is uncertain. Assigning a monetary value to the cost of carbon emissions helps companies monitor and adapt their strategies and financial planning to real-time and potential future shifts in the external market.

Growth of internal carbon pricing



Why companies use internal carbon pricing

Across all industries and geographies, companies have identified a variety of reasons for utilizing an internal carbon price as a tool within their business—from simply translating carbon-related risks and opportunities into financial terms to deliberately driving low-carbon initiatives. The three main reasons for internal carbon pricing are outlined below:

1) Manage risks: Companies internalize the existing, expected or potential price of carbon—from an ETS, carbon tax, or implicit carbon pricing policy—to assess its risk exposure to regulations that affect the cost of emitting CO_2e. Example companies include: Air Canada, LG Electronics, PG&E Corporation, Tata Steel, Volkswagen AG.

2) Reveal opportunities: Companies also use an internal carbon price as a tool to reveal potential opportunities that may emerge with the transition to the low-carbon economy. As policy and legal, market, technological and reputational factors shift, they also present opportunities for companies to seize. When used as a generic proxy in this way, an internal carbon price can help guide strategic decisions, such as low-carbon R&D to create the products and services of the future. Example companies include: AGL Energy, Hitachi Chemical Company, Ltd., Owens Corning, Royal DSM, Solvay S.A.

1 The original publication of this data occurred in 2013, showing 29 U.S. companies using an internal carbon price.

2 World Bank and Ecofys, Carbon Pricing Watch 2017, May 2017.

3 "Commonwealth Bank shareholders sue over 'inadequate' disclosure of climate change risks," The Guardian, August, 2017.

3) Transition tool: A smaller number of organizations deliberately use an internal carbon price to drive emissions reductions and incentivize low-carbon activities—such as investments in energy efficiencies, clean energy, development of green products/services—in order to facilitate a company-wide low-carbon transition. This includes companies who utilize the voluntary carbon markets to offset their emissions, although increasingly the focus has been on driving down emissions within the company. Example companies include: LafargeHolcim Ltd, Natura Cosmeticos SA, Saint-Gobain, Shree Cement, T.GARANTI BANKASI A.S., Unilever.

This year's report offers the latest insights on internal carbon pricing and on corporate expectations regarding the development of regulations that put a price on carbon, and it reflects on four years of progress to date. To meet the growing interest in climate-related disclosure, CDP will be requesting enhanced disclosure around carbon pricing. This includes further information regarding carbon pricing regulation that companies are expecting, as well as the corporate response to internalizing this policy signal. The latter half of this report outlines, for both investors and companies, the changes to CDP's carbon pricing questions starting in 2017 and detailed guidance for corporate disclosure and emerging best practice.

Paula DiPerna
Special Advisor
CDP

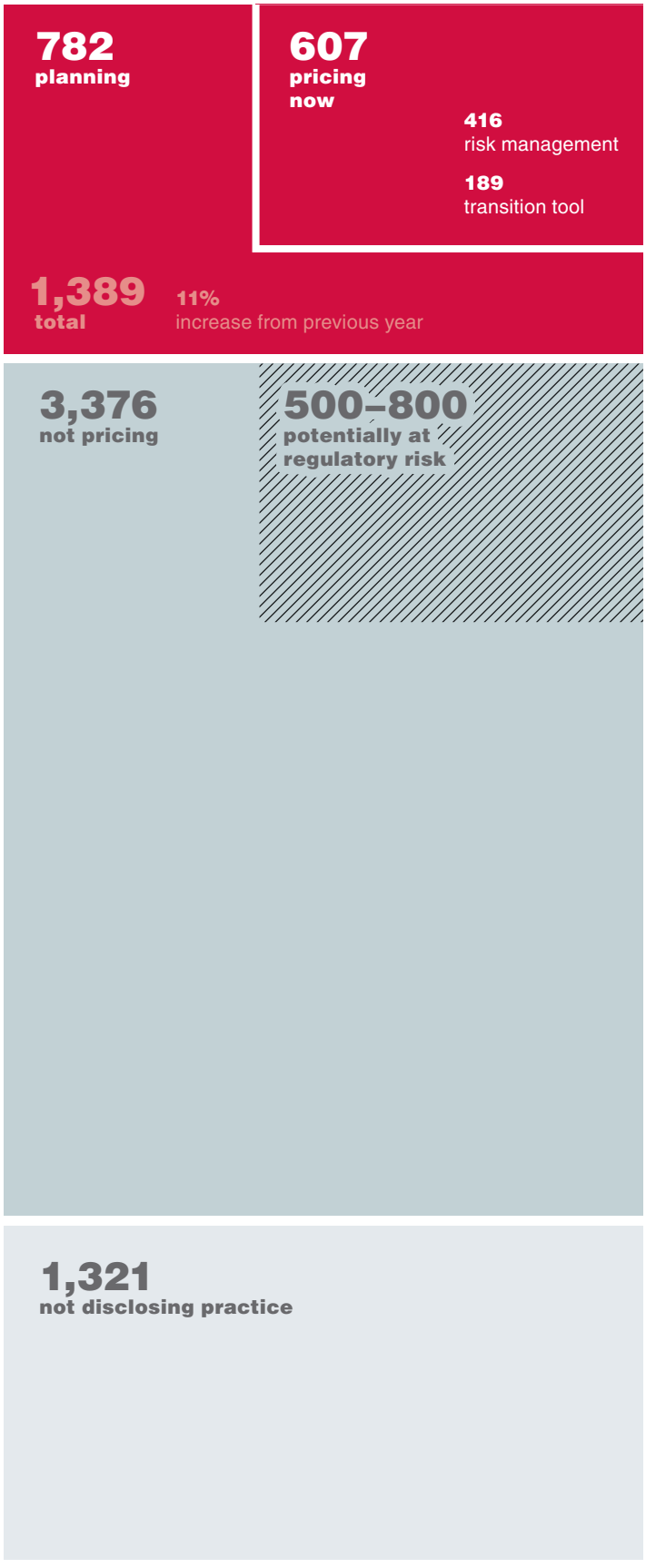
A price on carbon emissions is the best way for society and the economy to make visible the otherwise invisible cost of greenhouse gas emissions, as well as the risks of those emissions to climate stability and the comparative costs of different future choices. In 2013, CDP released the world's first report on how companies were addressing carbon price concerns, and we have been tracking this trend ever since. Why?

Because farsighted companies, whether subject to mandatory carbon regulations or not, can use the mechanism of internal carbon pricing to gauge whether business planning and operations are sufficiently astute to current and future risks of climate instability and new business opportunities inherent in addressing climate change through new technologies and practices.

CDP is the only platform globally that tracks both the potential impact of explicit carbon pricing policy development on the private sector, and the adoption of internal carbon pricing. This annual tracking makes transparent to investors and the public whether emitting companies are coherently planning for financial risks of climate instability while also taking advantage of opportunities for jobs creation and economic growth inherent in proactively addressing climate change.

Paula DiPerna served as President of the International division of the Chicago Climate Exchange (CCX), which was the world's first and still only comprehensive cap-and-trade system covering all six greenhouse gases, which operated from 2003–2010 and had affiliates and members worldwide. While at CCX, DiPerna also helped spearhead the landmark joint venture between CCX and PetroChina that created the Tianjin Climate Exchange (TCX), the first of China's pilot cap-and-trade system, which opened in 2008.

Internal carbon pricing: 2017 in numbers



Headline numbers

Disclosures to CDP in 2017 capture the continuing corporate trend: 1,389 companies are disclosing to CDP their plans or current practice of putting a price on carbon emissions because they understand that carbon risk management is a business imperative. This represents an 11% increase from 2016.

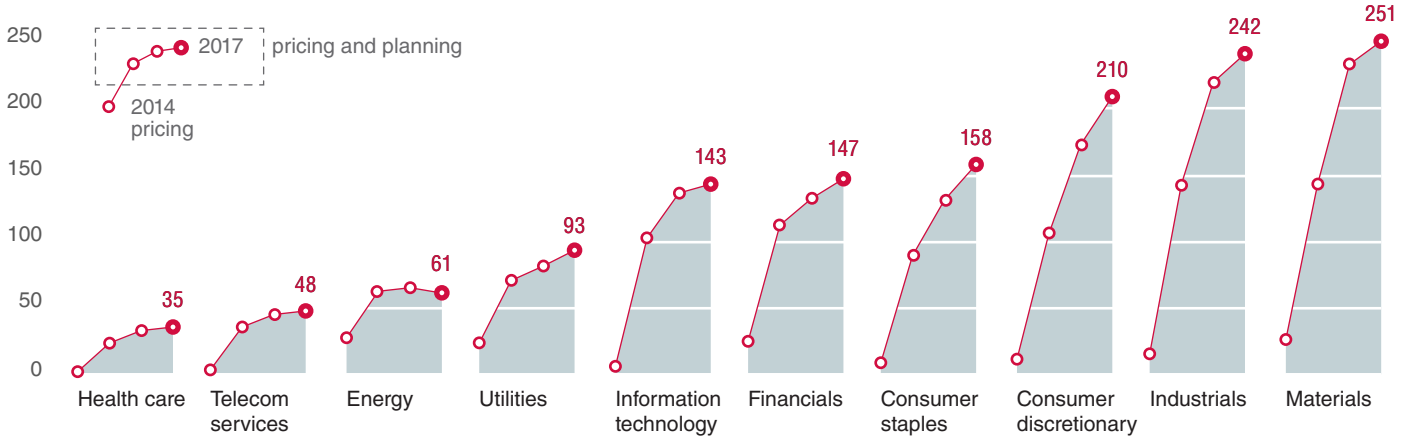
The image to the left illustrates the breakdown of CDP's global sample of companies into distinct stages of internal carbon pricing approaches. In the planning stage, 782 companies are considering whether an internal carbon price can assist the business's strategic approach or operations, or how their business should use a price on carbon.

Six hundred and seven companies are currently using an internal price within their business. Of these companies, 416 are identified as using an internal carbon price as an approach to carbon risk management. A smaller group of companies are embedding an internal carbon price ever deeper within business strategies. These 189 companies have identified carbon pricing as a transition tool that drives emissions reductions and related targets mandated by management. This group saw a 29% increase from 2016.

It is critical for investors to know whether companies in their portfolio expect to be impacted by a pricing system in the future; and if so, whether these companies are using internal carbon pricing to manage that risk. In 2017, nearly 500 companies disclosed to CDP that they already participate in, or expect to participate in an ETS within the next 2 years, yet they do not use an internal carbon price.

In addition, of the 3,376 companies which disclosed to CDP that they do not use an internal price on carbon and do not plan to adopt this approach in the next two years, over 800 of these companies are potentially at risk of carbon price exposure given their sector and country of headquarters. This number is likely to be even larger given the multinational nature of many of these companies and the wider sectoral coverage of some carbon taxes. As data around carbon exposure continues to improve, investors may question the risk-preparedness of these companies for climate regulations. CDP's new question in the 2018 climate change request around carbon pricing systems will allow for more direct and consistent tracking of this information moving forward.

Growth of internal carbon pricing, by sector



2014 numbers only include the number of companies that disclosed "Yes" to using an internal carbon price, whereas 2015–2017 also include companies that disclosed plans to use an internal carbon price within 2 years

Sector trends

2014–2017 growth

Over the past four years, all GICS sector groups have experienced an increase in the number of companies reporting the use of an internal carbon price or plan to price in the next two years. Part of this growth can be attributed to an increase in the number of companies disclosing to CDP year-on-year; however, there has been a clear adoption of internal carbon pricing across sector groups.

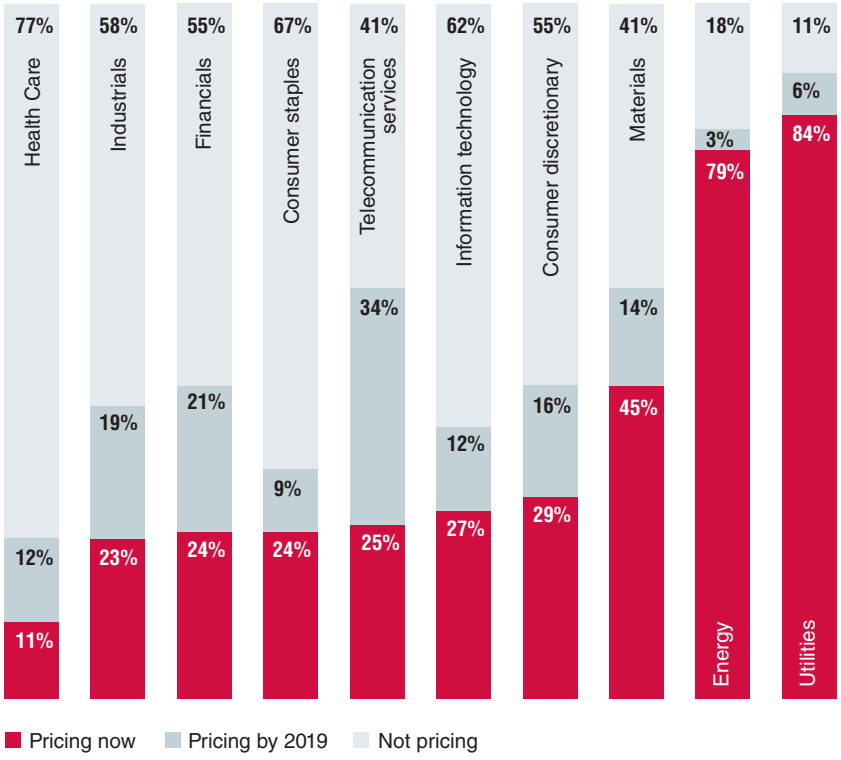
2017 breakdown

The graph on the left illustrates how companies responded to the internal carbon pricing question in 2017, by percentage of market-cap across each GICS sector group. An internal carbon price is used by 84% and 79% of the market-cap in the utility and energy sectors respectively. In the materials and telecommunications sectors, over 50% of the sector's market-cap intends to use an internal carbon price by 2019.

It is logical that the leading sectors are energy-intensive, as they have more exposure to material risk related to the use of fossil fuel–based energy. Further, the utility and energy sectors fundamentally rely on the extraction and combustion of fossil fuels, leaving them exposed to carbon asset risks—investments and reserves that may never be economic to use or extract in the future. Therefore, these sectors have been measuring carbon risks as a part of every-day business for several years.

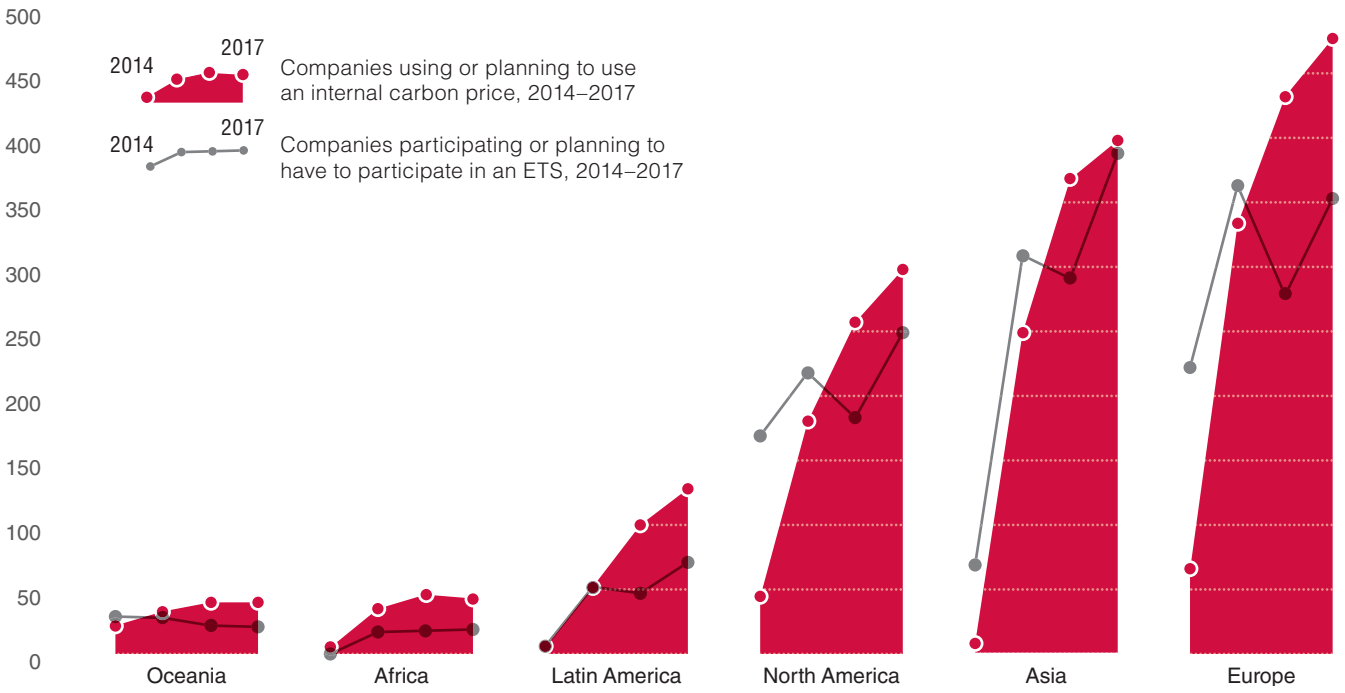
Interestingly, many lower-carbon sectors are also using the tool, including financial institutions, information technology, and consumer staples. Several of the companies in these sectors have identified potential business opportunities associated with lower-carbon activities—for example, new cost-cutting products and services, branding opportunities, or participation in a carbon market. Many of these companies are using an internal carbon price as a 'transition tool', as described on page 8.

Sector breakdown, by market-cap



This sample only includes investor-requested companies where financial information is publicly available. Average annual market-cap figures from 2016 were used.

Growth of internal carbon pricing and policy expectations, by region



Regional trends

As the international community acts to implement the Paris Agreement, carbon pricing has emerged as a key policy mechanism to drive emission reductions. In fact, the potential role of carbon pricing to reduce global emissions is recognized in the Paris Agreement's Article 6.

When creating carbon pricing policies, governments assign a cost to carbon pollution through regulation—through ETS or taxation—to incentivize polluters to reduce the amount of carbon they emit in what economists deem to be the most flexible (in some cases) and least-cost way to society. Well-designed carbon pricing policies also have the potential to stimulate market innovation and the development of new low-carbon drivers of economic growth.

In 2017, over 40 national and 25 regional governments have already put a price on carbon, covering about 15% of global GHG emissions.[4]

This number has doubled over the past decade. With several new systems in development—including the Chinese ETS—it is expected that 20–25% of global carbon emissions will soon be covered by a carbon price[5]. Additionally, 101 nations that signed The Paris Agreement plan to use carbon pricing and other market mechanisms to achieve their emissions reduction goals, as stated in their 'nationally determined contributions' (INDCs).[6]

The corporate response to the development of carbon pricing regulations is visible in CDP's data. The image above illustrates the relationship between corporate responses to two CDP questions related to carbon pricing. First, the red shows the number of companies that are using or planning to use an internal carbon price from 2014–2017 across all regions. Second, the black lines represent the number of companies that report that they currently participate in an ETS, or expect to be required to within the next 2 years.

4 World Bank and Ecofys, Carbon Pricing Watch 2017, May 2017.

5 World Bank; Ecofys; Vivid Economics. 2016. State and Trends of Carbon Pricing 2016.

6 Ibid.

The parallel growth of ETS participation and internal carbon pricing suggests that regulations that put a price on carbon trigger the adoption of internal carbon pricing in the private sector. However, this does not prove the effectiveness of policy at incentivizing emissions reductions within these companies. In fact, companies have been publicly outspoken about the fact that existing market prices are too low to drive the needed level of investments to change carbon-intensive processes and investments. Schneider Electric, a French industrials company, reiterated this point in their 2017 disclosure: "…During the Business & Climate Summit 2015 we called policymakers to a robust and predictable carbon pricing for companies…we advocate that achieving robust pricing on carbon that is high and stable enough to change behaviors and investment decisions will strengthen incentives to invest in economically and environmentally sustainable technologies."

This sentiment was recently echoed by the High-level Commission on Carbon Prices[7] chaired by economists' Joseph Stiglitz and Lord Nicholas Stern, who recently published a report concluding that "the explicit carbon-price level consistent with achieving the Paris temperature target is at least USD40–80/tCO_2 by 2020 and USD50–100/tCO_2 by 2030." In contrast, nearly 75% of emissions currently covered by a carbon pricing regulation are priced below USD10/metric tonne[8]. The more clarity governments provide to the private sector regarding the development of policies that put a price on carbon, the better companies will be able to build the low-carbon transition into their medium- to long-term planning.

The European Union Emissions Trading System

The EU Emission Trading System dominates corporate disclosure on carbon pricing via CDP; as the oldest regulated cap-and-trade system (trading started in 2005), this is unsurprising. It has experienced significant price volatility, with allowance prices of trading as high as almost €30 in 2008, dropping to lower than €10 a year later, back up to €15 in 2011, and finally dropping to below €10 that same year and ever since. Reform is currently underway. Between 2015 and now, the EU Commission, Parliament, and Council have been working on proposals for Phase IV of the system, which will start in 2021, and which aims to tighten the market.

While this change's potential impact on allowance price levels is not yet clear, a recent Barclays report[9] predicts that if the reforms are completed successfully, EUAs (EU Allowances) are set to rebound strongly over 2018-2020. The bank states that it expects the price to break the €10 mark in 2018, reaching €15–€20 by 2020. The electricity and aviation sectors will likely feel the pinch most over the next few years, while those sectors with a current surplus of allowances (such as steel and cement) become reluctant to sell. European utilities may not be ready for this pinch if their expectations of EUAs stay low.

Regional changes will also include steps taken by the EU Commission that will bring the EU-ETS and the Swiss ETS closer to being linked, although it is not anticipated that this will happen until 2019/2020.[10] Additionally, EU regulators have begun to prepare for the possibility of the UK falling out of the system as it leaves the European Union, adding further complexity for UK companies that currently participate.

Apart from the EU-ETS, there are also several carbon taxes across member countries, including Norway, Sweden, France, and Finland.

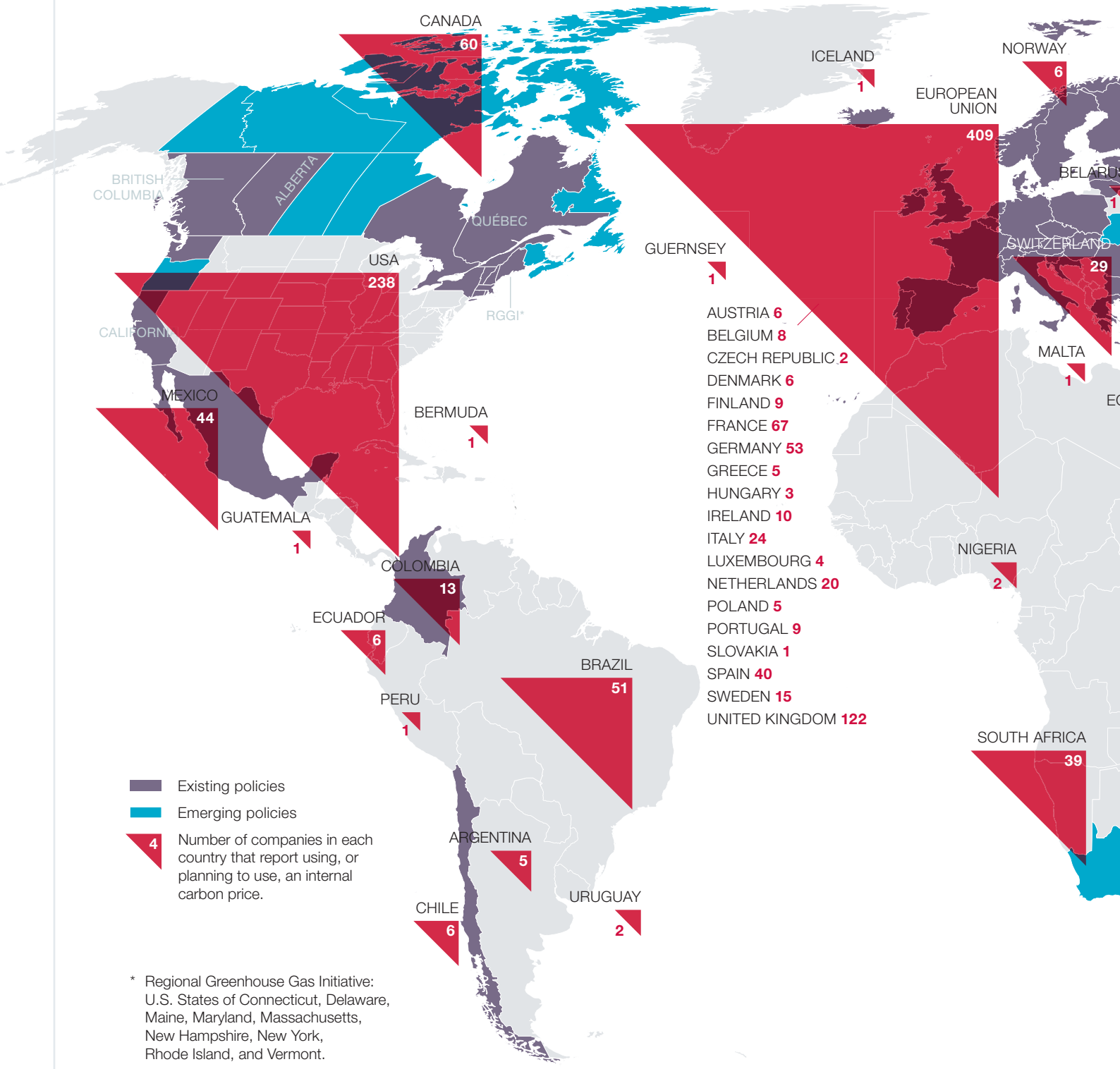
7 Report of the High-level Commission on Carbon Prices.

8 World Bank and Ecofys, Carbon Pricing Watch 2017, May 2017.

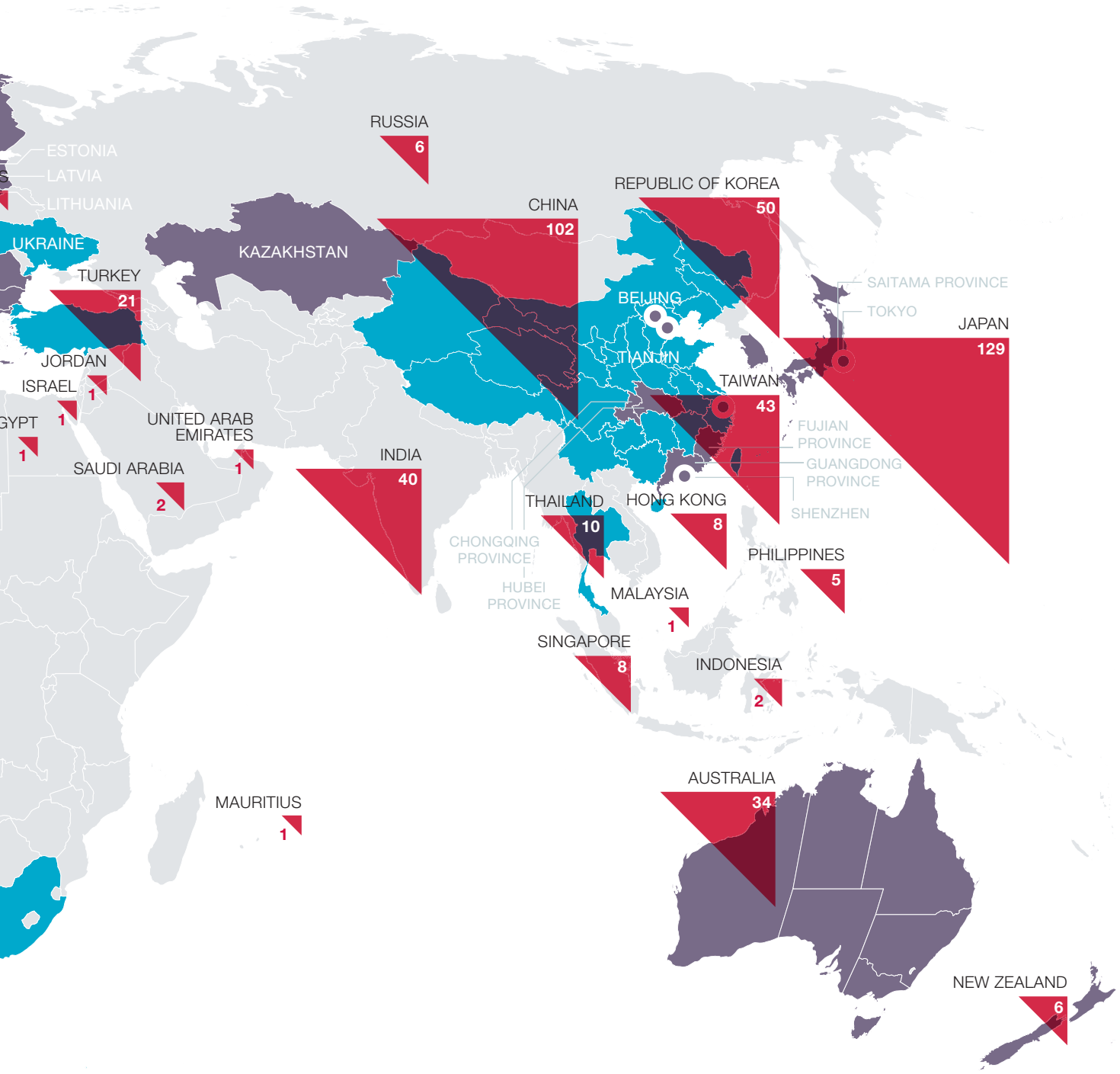
9 Mark C. Lewis, Monica Girardi, Catherine Hubert-Dorel, Stephen Hunt; "German Utilities—The Auguries Of Autumn," Barclays, September 2017.

10 "EU and Switzerland join forces on emissions trading," European Commission Climate Action News, August 16, 2017.

Policy and internal carbon pricing



* Regional Greenhouse Gas Initiative: U.S. States of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont.



World Bank and Ecofys, *Carbon Pricing Watch 2017,* May 2017.

Note: Implemented policies re-categorized as existing, and scheduled policies and policies under consideration re-categorized as emerging.

The government of Brazil is currently considering carbon pricing policy proposals.

Katie Sullivan
Managing Director, IETA

North America

It's been a whirlwind year for North American carbon markets, with new markets coming online, new partnerships being formed, and new challenges to overcome.

California Market Stays on Course

July saw California lawmakers approve a much-anticipated extension of the state's cap-and-trade market to 2030. The extension passed with a critical supermajority vote in both houses, ending months—if not years—of legislative and legal uncertainty around the future of California's market. Given that both North American and global jurisdictions are not only watching but also replicating California's economy-wide cap-and-trade system, this summer's news from Sacramento was a positive signal and boost for carbon markets across the continent and globally. The move also sparked relief across business sectors as well as its linked partner, Québec, and future market linkage allies, including Ontario (beginning 2018), Oregon, and Mexico.

Regional Greenhouse Gas Initiative

As part of its—lengthier than expected—2016 comprehensive program review, the nine-state Regional Greenhouse Gas Initiative (RGGI) has finally published proposed changes to its power sector-only cap-and-trade system. The group, along with neighboring states, is also considering widening its eight-year-old market through either linkage or bringing new RGGI State Partners aboard. Virginia, Pennsylvania, and New Jersey are potential candidates.

Canadian Carbon Markets

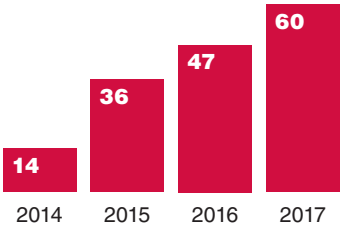
North of the border, Canada has become one of the clearest examples of climate momentum—and sub-national carbon market cooperation—globally. The Canadian federal government is attempting to coordinate with provincial and territorial leaders on how climate and carbon pricing programmes—under the 2016-adopted Pan-Canadian Framework (PCF) on Clean Growth & Climate Change—will evolve across the nation. The PCF should not only enable Canada to cost-effectively reach its 2030 climate goal, but also empower provinces and territories to tackle greenhouse gas emissions via market mechanisms that are best suited to their unique economies, industrial emissions profiles and land-use sector profiles.

Since its official launch in January 2017, Ontario has seen all three of its initial allowance auctions sell out. Not only do these results signal the impressive confidence of business and market participants in Ontario's nascent program, they also translate into roughly C$1.5 billion for clean investments across the province[11].

Despite significant political uncertainty in the United States around climate-related regulation, the number of U.S. companies reporting the use of an internal carbon price continues to increase year-on-year. In 2014 only 29 companies reported using an internal carbon price; today 96 are pricing, with an additional 142 planning to implement one by 2019.

This steady increase suggests that U.S. companies, many of which have transnational operations and supply chains, are responding to carbon pricing regulations in regional and international markets. In fact, 203 US companies disclosed to CDP that they already participate, or plan to participate, in an ETS by 2019. Most of these companies are participating in the EU-ETS (72) and regional US markets, such as California's Cap & Trade program (22) and the East Coast Regional Greenhouse Gas Initiative (6).

The number of Canadian companies pricing and planning to price carbon has steadily increased over the past four years alongside the development of provincial carbon pricing systems.



The stability and coordination of provincial and federal Canadian climate policy has provided companies with clarity regarding the future increase of the price of carbon in the economy. As such, Canadian companies stand out for utilizing differentiated internal carbon price levels that vary by region and across different time horizons. These prices are frequently pegged directly to forward-looking policy prices. Over half of the companies already pricing carbon in Canada reference current and future provincial carbon price levels as major inputs in setting their internal carbon price levels.

11 To learn more about IETA: http://www.ieta.org/

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The Pacific Alliance and Climate Change

Latin America and the Caribbean region are moving quickly to introduce market incentives as a component of their climate change mitigation policy. Twenty-four countries have identified fiscal measures as a tool to implement their Nationally Determined Contribution. A carbon market presents enormous opportunities for the Latin American region. Not only can such a system reduce national emissions at a lower cost, but because the region accounts for around 7% of global emissions and holds considerable forest reserves, there is the possibility of offering offsets or compensations at the global level, allowing access to resources for investment in new technologies.

The Pacific Alliance countries are leading the region. The Pacific Alliance is a regional agreement seeking to create a common market among its member countries (Chile, Colombia, Mexico, Peru) with the objective of promoting sustainable development. Three of these countries (Chile, Mexico, and Colombia) have implemented carbon taxes, and Mexico has gone further, committing to link to the Western Climate Initiative in the near future.

This summer, in Cali, Colombia, the Pacific Alliance Presidents made an explicit commitment to promote a green growth strategy to face the challenges of climate change, and to move towards a voluntary CO_2 emissions market for the region, including a common Measuring, Reporting and Verification (MRV) system. Specifically, the Cali declaration states: "[o]ur conviction to continue to implement a green growth strategy as the only avenue to face the challenges of climate change that especially affect the region; we reaffirm the COP20/CMP 10 declaration in Lima in 2014, as well as our support for the Paris Agreement of December 2015; and we will intensify the efforts in our countries with respect to MRV of CO_2 emissions and other GHG with the objective of identifying possible voluntary market mechanisms in the region."

With this, the Pacific Alliance Environment and Green Growth Group, created in July 2016, has a mandate to continue to work on sustainable consumption and production, green growth, and now MRV and GHG voluntary markets.

The number of companies disclosing to CDP in the Latin American region has grown more than threefold from 2014–2017. The quick development of carbon pricing systems will require a large-scale adoption and standardization of Measuring, Reporting, and Verification (MRV) practices among companies in the region.

Given Mexico's commitment to linking with the Western Climate Initiative—a group of U.S. states and Canadian provinces linking their cap-and-trade programs—it is possible to imagine a world where the Latin American carbon market will be directly linked with the North American carbon market. In the past year, the number of Mexican companies pricing carbon has grown from 26 to 44—a response to a changing policy environment.

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Professor of International Studies at Korea University

Carbon pricing takes shape in Asia

Major Asian economies are shaping the next generation of global carbon pricing. China enjoys the lion's share of regional attention as it prepares to rollout the largest emissions trading scheme in the world in late 2017. After economic transformations grew its GDP some 500 percent since 1980, China now seeks cleaner, more balanced growth and is deploying a national ETS toward this end. Building from the opening of the Tianjin Climate Exchange in 2008 and additional pilot systems launched in 2013, Chinese authorities must now determine the industry coverage of a national system, build a robust MRV system, coordinate provincial reporting on more than 8,000 entities, and use this information to create a coherent national quota allocation plan. The initial roll-out will likely only include the power sector, with plans to expand in the future. The national launch will have significant material impacts, while setting the foundation for future coverage expansion and operational maturity.

Beyond China, the Republic of Korea (ROK) already operates the first national ETS in the region, and the Korean-ETS will complete Phase I of a three-part progression in late 2017. The second and third phases are poised to expand coverage, scale-up auctioning, and ultimately enable limited international linkage and offsetting. The Korean authorities are spending 2017 developing market stabilization strategies to improve banking and borrowing provisions and to facilitate the use of international credits. Meanwhile, Japan continues to operate subnational carbon markets as it explores the potential shape of a future national scheme. Vitally, the ROK, Japan, and China are increasing levels of dialogue on carbon market cooperation with an eye toward future linkage and club possibilities.

Action outside the major East Asian economies likewise warrants tracking. In February 2017, Singapore became the first Southeast Asian country to introduce plans for a mandatory carbon pricing scheme. Its carbon tax will take effect in 2019 and apply to power stations and emitters that produce over 25,000 tons of CO_2 equivalent per year. Kazakhstan intends to reconstitute its ETS in 2018 following a two-year suspension, Thailand's current development plans include ETS provisions, and Vietnam's Green Growth Strategy introduces market-based instruments. India has a Renewable Energy Credit trading system and is exploring pilot carbon market systems in three major states. These actions throughout the region have unique tracks and trajectories, but in sum reveal a sea change in the prioritization of carbon pricing in the environmental and economic policies of major Asian states[12]. Their degree of success will prove vital to carbon pricing agendas around the world, and to collective efforts to address global climate change.

Over the past year, the number of companies setting an internal carbon price in China, Japan, and South Korea has increased from 170 to 281.

102 Chinese companies disclosed using or planning to implement an internal carbon price in 2017—nearly doubling from 54 companies in 2015. This increase in the adoption of internal carbon pricing in China correlates with the announcement of the national carbon market and a reported 46% increase in the number of companies participating/planning to participate in an ETS.

The adoption of internal carbon pricing continues across Japanese industry. One hundred and twenty-nine companies report they are already using or plan to use an internal carbon price, up from 104 in 2016. Seventy-eight of these companies report that they are participating or anticipate having to participate in an ETS, the majority from the Tokyo Cap-and-Trade, with 14 in the EU-ETS. It is not clear what is driving this continuous increase in the adoption of internal carbon pricing and whether it has led to significant changes in business decision-making to date.

This year, 50 South Korean companies reported that they use or plan to adopt an internal carbon price. Most of these companies also disclose that they participate, or expect to participate, in the Korean ETS. Again, it is unclear from the disclosures whether the market is driving any significant changes in investments.

12 Roadmap to a Northeast Asian Carbon Market, Jackson Ewing, ASPI.

Enhanced disclosure of carbon pricing

Investor focus on carbon pricing

Investor concern about climate risk is on the rise, from major institutional investors to the biggest players in the asset management world. Even the passive funds are increasing their engagement: within the last year, the world's two largest issuers of passive funds, BlackRock ($5.1 trillion in Assets Under Management) and Vanguard ($4.4 trillion in Assets Under Management), both voted against the management of ExxonMobil and Occidental, and instructed the oil giants to report on the impact of global measures designed to keep climate change to 2°C.[13] Both asset management firms have indicated that this will be a focus area moving forward.[14]

This interest comes on the back of increasing concern about the financial implications of climate risk. In a 2016 paper by BlackRock Investment Institute, the firm notes that they believe "climate factors have been under-appreciated and underpriced…" but that this could change as the effects of climate change become more visible.[15] They show that a group of global companies that reduced their carbon footprints indeed outperformed companies which did not, albeit in time-limited and small sample size tests. Blackrock Investing Institute goes on to note that climate change factors play out in different time horizons, with regulatory factors often having an immediate effect, technological factors affecting companies in the medium-term, and physical impacts becoming more significant in the long-term.

Carbon pricing and its ripple effects are also moving up the agenda for investors as factors that companies must consider in decision-making. A recent model developed by Schroders, the "Carbon Value at Risk"[16] (Carbon VaR) framework, shows that "almost half of listed global companies would face a rise or fall of more than 20% in earnings if carbon prices rose to $100 a tonne."

The Task Force on Climate-Related Financial Disclosure

The G20's Financial Stability Board (FSB) announced the creation of an industry-led Task Force on Climate-related Financial Disclosures (TCFD) in 2015 with the objective of providing guidance on how to integrate climate risk and opportunities into mainstream financial reporting. The TCFD developed and published a standardized framework for climate-related financial disclosure in June 2017, drawing on member expertise, stakeholder engagement, and existing climate-related disclosure regimes, such as the Climate Disclosure Standards Board's work to institutionalize climate change in mainstream reporting.

The final recommendations of the TCFD explicitly list internal carbon pricing as a key metric that an organization can use "to assess climate-related risks and opportunities in line with its strategy and risk management process," and they call for organizations to provide details of the methodologies and application of the metric. The TCFD's recommendations are intended to provide investors with a proper understanding of the reasonableness of assumptions made as input for their risk assessment.

For many organizations, the most significant impacts of these transition risks will emerge over time, and their magnitude is uncertain. Therefore, the TCFD recommends that organizations should use scenario analysis—a process of analyzing possible future events by considering alternative possible outcomes—"as a tool to assess potential business, strategic, and financial implications of climate-related risks and opportunities and disclose those in their financial filings." Scenario analysis helps organizations identify indicators to monitor changes in the external environment, allowing them to adapt their strategies and financial planning accordingly.

In their technical supplement on scenario analysis, the TCFD outlines the following details that they recommend companies disclose regarding their use of internal carbon prices:

- "what assumptions are made about how carbon price(s) would develop over time (within tax and/or emissions trading frameworks),
- geographic scope of implementation,
- whether the carbon price would apply only at the margin or as a base cost,
- whether the price is applied to specific economic sectors or across the whole economy, and in what regions
- whether a common carbon price used (at multiple points in time) or differentiated prices
- assumptions about scope and modality of a CO_2 price via tax or trading scheme"

Asset managers are starting to recognize the importance of disclosure around this metric. In a recent paper, State Street Global Advisors[17] call for high-impact sector companies to disclose their assumptions about the range and average carbon price they include in their planning.

13 Steven Mufson, "Financial firms lead shareholder rebellion against ExoonMobile climate change policies," The Washington Post, May, 31, 2017.

14 "Vanguard defies companies to back climate change resolutions," Financial Times, August 31, 2017.

15 "Adapting portfolios to climate change," Blackrock Investing Institute, September 2016.

16 "Carbon Value at Risk" framework, Schroders, September, 14, 2017.

17 SSGA's Perspectives on Effective Climate Change Disclosure, State Greet Global Advisors, August 14, 2017.

Mark Lewis

Managing Director, Head of European Utilities Equity Research, Barclays; Member of the Task Force on Climate-related Financial Disclosure

Internalizing carbon price signals is something the Task Force spent much time discussing. It can play an important role in companies internalizing transition risk and making different decisions within the company as a result.

This latter piece is the key—how can we in the investment world know that companies are truly internalizing the changes in the markets that policy, technology and litigation risks will bring? It is important for us to know what assumptions the company is making in setting its internal carbon price. But this is not just about the price level—a company can disclose that it tests CAPEX decisions against a relatively significant price level but it is important to understand how it is weighted against other variables in project analysis, such as assumptions made about the cost of capital, the lifetime of an asset or time it will take to get an asset up and running.

So how can an investor gauge this from a company's disclosure about its internal carbon price? Details about how a company is using this price is therefore important. Is the company embedding it deeper into its business strategy? There is an important signaling impact that this can have on corporate planning—for example, if a company is embedding it into operational decisions as well as CAPEX decisions, it signals that a company's management has begun to take this seriously. It can also mean that the relative weighting that the carbon price will have against other factors could change. The key question is to what degree does it influence decision-making?

Another place to look is at the company's governance around climate change and carbon pricing. Are incentive structures aligned with managing climate risk? If not then it is not surprising that some analysts will question the value of the metric being used by the company, no matter how high the price level is or how rigorous the scenario analysis seems in a company's disclosure.

Finally, to what degree is a company applying this metric to its Scope 3 emissions? This will be where the true risks and opportunities lie for some sectors. Are R&D decisions changing as a result of the internal carbon price? Are there hidden risks and opportunities lurking in the supply chain? Are assumptions about market demand for a product/service taking a carbon cost into account?

It is exciting to see CDP's disclosure platform aligning itself with the TCFD's recommendations and to see the tracking of internal carbon pricing develop even further. It is an area that analysts in the investment world will watch with interest.

Future tracking of carbon pricing via CDP reporting

To meet the growing interest in climate-related disclosure, CDP is committed to implementing the TCFD's recommendations, and is therefore requesting enhanced disclosure around corporate internal carbon pricing practices. By further standardizing best practice in disclosure of this metric, CDP aims to provide actionable insights for companies and investors, as well as policymakers, that enable better planning for the transition to a low-carbon economy. Starting in 2018, A section of CDP's climate change questionnaire will be dedicated to the topic of carbon pricing—including an expansion of the carbon pricing regulation questions (previously question cc13.1-2) and internal carbon pricing question (previously questions cc2.2c-d).

Carbon Pricing Systems

To date, CDP requested information from companies participating in Emissions Trading Systems. This question has evolved to ask companies to disclose whether they are currently regulated by a carbon pricing system—including carbon markets or taxation—and if there is an expectation of future regulation.

Companies that respond "yes" will be prompted to provide further details about their exposure to these systems, and to identify the systems in which they are compliant. This information will allow investors to consistently track and analyze corporate expectations of carbon pricing regulations, as well as what costs they currently bear, in a more detailed and consistent manner.

Internal Carbon Pricing

CDP will continue asking companies if they use an internal carbon price. However, to assess the quality of a company's internal carbon pricing approach, investors need to understand why and how internal carbon pricing is used as a tool to assess and manage carbon-related risks and opportunities within a business' operations, supply chain, and investments. This information will be tracked in more detail beginning in 2018.[18] Information gathered from the new carbon pricing section will provide investors with a proper understanding of the reasonableness of assumptions made as input for their risk assessment.

Carbon pricing systems

Are any of your operations or activities regulated by a carbon pricing system (i.e. ETS, Cap & Trade or Carbon Tax)?

- Yes
- No, but we anticipate being regulated in the next 5 years
- No, and we do not anticipate being regulated in the next 5 years

Please select the regulation(s) in which you are compliant. Multi-select from a list of carbon pricing regulations taken from the World Bank's State and Trends of Carbon Pricing report

Internal carbon pricing

Does your company use an internal price on carbon?

- Yes
- No, but we anticipate doing so in the next 2 years
- No, and we don't anticipate doing so in the next 2 years

18 Companies that disclose "yes" to the internal carbon pricing questions, will be prompted to provide additional information regarding the details of their assumptions and practices. Refer to page #x for detailed guidance for disclosing companies.

Medium- to long-term planning

As previously mentioned, nearly 500 companies disclose participation, or expectations of having to participate, in an ETS within the next two years. The improvements to CDP's carbon pricing questions will allow investors to identify more precisely the companies potentially at risk of carbon pricing policy exposure in the future.

A key aspect of a company's disclosure of its internal carbon pricing practices is the assumptions the company makes about how the prices will develop over time—i.e. is the company using an evolutionary price metric or a static one? And if a static one is used, does the company build the potential increase in these costs into its current price up front? This latter practice tends to be used more by companies adopting this metric as a transition tool, whereas the former evolutionary model tends to be used by those who are seeking to reflect explicit carbon pricing policies as part of their risk management practices.[19]

In 2017, only 15% of companies that use an internal carbon price to stress test their investments and operations disclose using forward-looking prices—i.e. that they assume the price level will rise in the future. The remaining 85% of the companies either assume a static price or do not disclose these details. Additionally, most companies that do assume an evolving price only disclose their assumptions in the short-term. Fewer than ten companies disclose price assumptions past 2025, although the ROI period for the assets of certain energy-intensive sectors extends beyond this date.

How does an investor ensure that a company's assumptions about how a price will evolve are reasonable? The TCFD recommends that organizations should use scenario analysis to test their business models and investments against a range of forward-looking scenarios; including 2°C scenarios from publicly available sources such as the IEA, DDPP, IRENA, and Greenpeace. Stress-testing against a 2°C scenario "provides a common reference point that is generally aligned with the objectives of the Paris Agreement and will support the evaluation, by analysts and investors, of the potential magnitude and timing of transition-related implications for individual organizations, across different organizations within a sector, and across different sectors."[20]

The models used to calculate the scenarios for a 2°C transition are heavily influenced by technology cost and deployment assumptions. Therefore, many such scenarios include a techno-economic carbon price signal as a proxy for the complex explicit and implicit pricing signals needed from low-carbon policies. Carbon pricing has the potential to serve as a uniform, globally understood metric. Through the Carbon Pricing Corridors Initiative, CDP and partners are working with industry leaders to develop a range of 2°C reference scenarios for companies using such a metric in specific sectors.

Carbon Pricing Corridors: a 2-degree reference scenario

In 2017, The Carbon Pricing Leadership Coalition, We Mean Business Coalition, and CDP launched the Carbon Pricing Corridors: an industry-led initiative aimed at defining the carbon prices needed for industry to meet the Paris Agreement. It is being delivered through an ongoing inquiry with a high-level panel drawn from industry, the finance sector, and international experts. Over the next two years, they will shape and create an informed view of the range of carbon-related price signals that are needed to decarbonize electricity generation and heavy industry through the short to medium-term (2020, 2025 and 2030).

In the initial report, *The market view,* released in May 2017,[21] the corridor is focused on the power sector, with its next report expanding to include high-emitting industries.

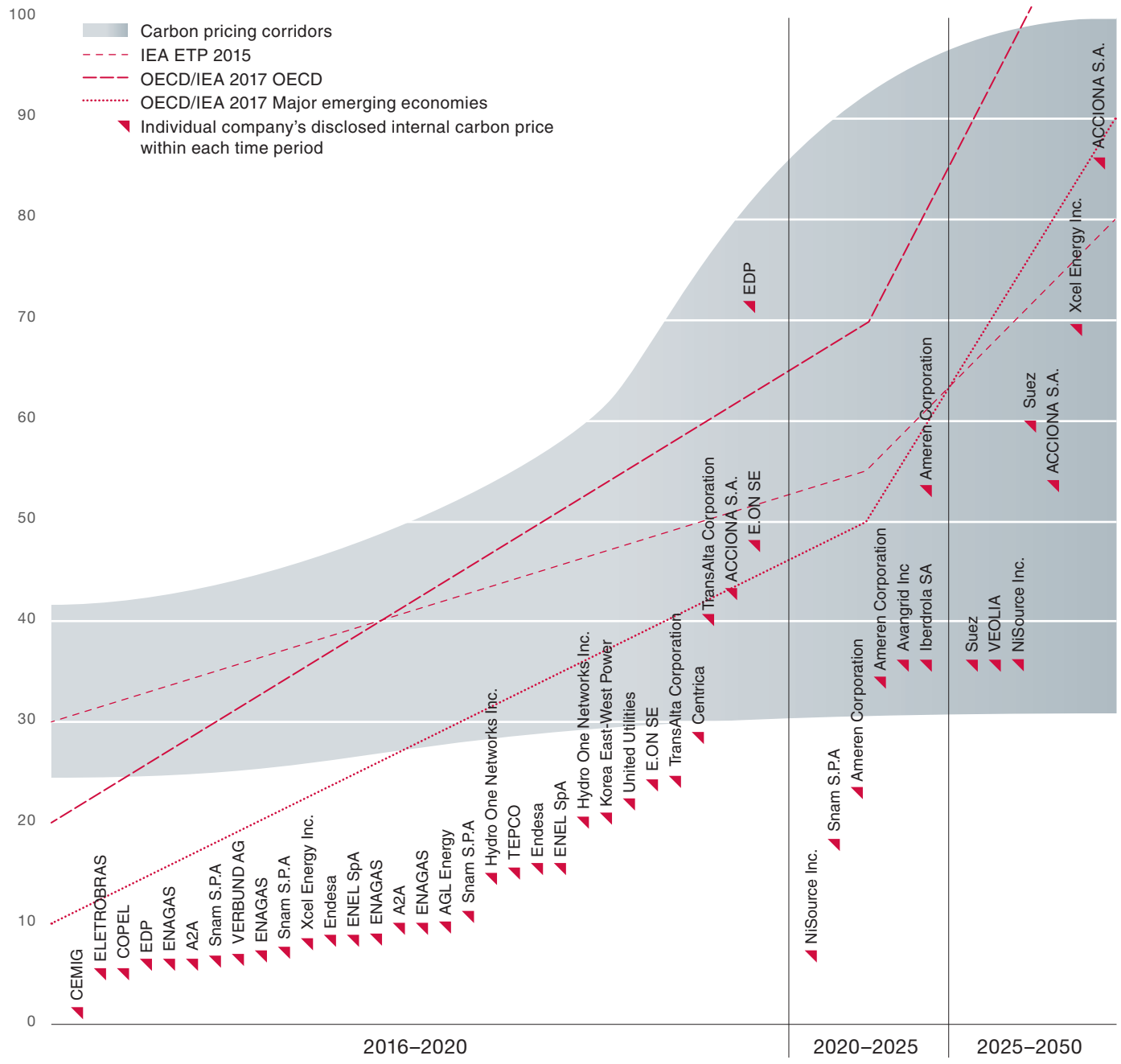
The following graph illustrates the degree to which companies may be failing to plan for the medium- to long-term realities of the cost of carbon. Each red triangle represents an internal carbon price level, associated with a specific time period, that was disclosed to CDP in 2017 from a company in the utility sector. Many of the physical assets in the power sector have a technical lifetime of 40+ years and CAPEX invested today has ROI of 10–15 years. Therefore, it is concerning that a small number of utility companies disclose their internal carbon pricing assumptions post-2020.

19 See page 25 for definitions and examples of the different pricing approaches.

20 Technical Supplement, Task Force on Climate-related Financial Disclosures, June 2017.

21 *Carbon Pricing Corridors: The Market View,* CDP, May 2017.

Utility carbon price levels and 2°C reference scenarios



The shaded grey corridor represents what the Carbon Pricing Corridor expert panel members deem to be the necessary price levels for 2020, 2025, and 2030, to decarbonize the power sector by 2050 and meet the targets under the Paris Agreement. For 2020, the needed carbon price corridor runs from 24–39 USD/tonne, increasing to 30–60 USD/tonne in 2025; and to 30–100 USD/tonne for 2030. The red lines represent additional 2°C reference scenarios from the IEA and OECD. Overlapping the reference scenarios and disclosed corporate prices reveals the low-leaning price levels of the utility sector more generally across time periods. For the 2020 period, this gap can be partially explained by the low ambition of current carbon pricing regulations. However, as investors request stress-testing against 2°C scenarios, companies will need to consider the carbon price trajectory forecasted by macroeconomic and industry-developed scenarios.

Policymakers will also need to question the effectiveness of their carbon pricing systems if they are not providing price signals at the levels that experts deem necessary to decarbonize industry.

Impact on decision-making and implications

In addition to price assumptions, investors should also consider the degree of influence that the use of internal carbon pricing has on business decision-making. Corporate disclosure of details about the scope of a company's emissions the metric is applied to, the degree of influence it has on decision-making, and the impact it has already had (i.e. has it shifted capital towards energy efficiency measures, low-carbon initiatives, energy purchases, or product offerings?) will further support an investor's ability to assess the depth of a company's internal carbon price. The 2017 climate disclosure to CDP from ENGIE, a French utility, is an example of the internal carbon price impacting business decision-making in a significant way.

> …The impacts of carbon pricing scenarios on the new investment projects proposals are reviewed in light of the specific context of the host country and of its regulatory framework, and inform decision making. The Group has decided to no longer pursue new developments in coal, believing that a carbon price will steadily be established in the world's various regions and that coal-fired power plants will be adversely affected in the future. ENGIE announced in 2016 that it will close/sell coal assets progressively.
>
> **ENGIE, France, Utility**

In the short-term, investors are also interested in what a company expects regarding the implication of carbon prices on their revenues and profitability, in addition to how a company plans to mitigate such costs. The more precise a company's response about how these costs will impact the company, the easier it becomes for investors to assess a company's governance on climate risk and its strategic response. The 2017 climate disclosure to CDP from Teck Resources, a Canadian materials company, clearly discloses the expected carbon costs associated with specific facilities and projects.

> …We also calculate and consider our carbon exposure in terms of absolute costs incurred on an annual basis and projected out to at least 2020. Where a clear and certain carbon price is present, we incorporate that price and any known and/or planned changes to the carbon price. Where uncertainty exists, we conduct sensitivity analyses to better understand what our exposure and risk are under different carbon pricing and regulatory scenarios. For example, forecasting using a variety of scenarios that span a $30/tonne carbon tax to a $50/tonne carbon tax suggests carbon costs in 2022 will range from $45 million to $80 million for our BC Operations. In Alberta, based on scenarios which include reduction requirements ranging from 12% to 40%, and carbon costs ranging from $15 to $40 per tonne of CO_2e, we estimate that our compliance costs might be $0.5 million—4.5 million/year for our Cardinal River operations. Assessing the same scenarios for our Fort Hills project, compliance costs could range from $1 million–$8 million/year…As details of these policies become more clear, our forecast will be updated to reflect a range of possible carbon costs.
>
> **Teck Resources Canada, Materials**

Internal carbon pricing: enhanced disclosure and best practice

As outlined in the first chapter, companies disclose a variety of objectives for using an internal carbon price: to reveal hidden carbon risks and opportunities, or even as a deliberate tool to transition a company to a low-carbon business model. As the use of this tool continues to develop, investors need more consistent disclosure around a company's intention for deploying, and approach to embedding, the tool within business decisions. The remainder of the chapter provides guidance to companies regarding how to effectively respond to CDP's expanded internal carbon pricing question starting in 2018.

Objective

What is your organization's objective for implementing an internal carbon price?

In many cases, companies report multiple objectives for their internal carbon price – particularly as internal and external developments occur that require a readjustment of the pricing approach to maximize its effectiveness. The table below shows the three common purposes for implementing internal carbon pricing and the associated objectives/outcomes.

Purpose	Potential objectives/outcomes
Tool to assess and manage carbon-related risks	• Assess risk exposure • Inform strategic response & future-proof assets and investments against regulatory risk, including investment in new technologies or energy efficiency to decrease cost • Demonstrate management of risk to shareholders
Tool to identify carbon-related opportunities	• Reveal cost-cutting and resiliency investment opportunities throughout value chain • Change employee and supplier behavior • Discover new market and revenue opportunities • Influence R&D investment decisions
Transition tool	• Align investment strategy with 2-degree scenario and align business with the Paris Agreement • Accelerate reduction of GHG emissions; drive investment in energy efficiency initiatives, renewable energy procurement, R&D of low-carbon products/services • Generate revenue to re-invest in low-carbon activities

GHG scope coverage

What scope(s) of greenhouse gas emissions are covered by the internal carbon pricing mechanism?

Each company has both a unique GHG emissions profile and a unique decision-making process. In combination, these determine the degree of influence that individual business units have over GHG emissions spread throughout the value chain. Examples of how different GHG emissions relate to different types of business decisions are provided in the table below.

GHG emissions	Examples of relevant decisions
Scope 1	Investment and production decisions
Scope 2	Energy purchasing decisions
Scope 3 upstream	Materials sourcing and procurement decisions
Scope 3 downstream	R&D decisions for innovative products for the current/ future market

Price level & variance

How is the carbon price level(s) or range determined; are there any variances across geography, time horizon, or business unit?

Companies disclose a variety of approaches to determining an internal carbon price level(s) depending on the intended objective for its use as a tool. Due to competitiveness concerns, some companies do not disclose the actual price level(s) used; however, investors do seek this information, as well as the methodology used to determine the price. Commonly used methodologies are outlined below:

Common price determination methods[22]	
For scenario analysis/assessment of risk and opportunities	**For a transition tool that drives decarbonization**
Based on price projections from existing or emerging carbon pricing regulations	Based on internal consultation (to determine price level needed to influence business decisions, or accelerate decarbonization)
Based on a benchmark against peers within a sector	Based on technical analyses of investment needed to achieve a specific climate-related objective (MAC curve)

For companies using internal carbon pricing in stress-testing or scenario analysis, it is important to disclose assumptions-made about how price(s) would develop over time; the geographic and economic scope of application; whether the price is applied across the entire company or to specific business units or decisions, and whether a uniform or differentiated price is used. This information can help an investor gauge the efficacy of a company's application of the carbon price in terms of meeting its objectives. A framework[23] and set of examples for the common types of pricing are outlined on the next page.

22 Ecofys, The Generation Foundation and CDP, How-to guide to corporate internal carbon pricing—Four dimensions to best practice approaches, Consultation Draft, September 2017.

23 Ibid.

1. Uniform pricing: a single price that is applied throughout the company independent of geography, business unit, or type of decision.

IVL currently uses an internal shadow cost of carbon, primarily at this stage for scenario analysis of potential financial risks to the business from expanding number of cap-and-trade and carbon tax systems globally. IVL currently uses a shadow cost of carbon at $15/ton of CO_2e. Few of our business facilities exist in jurisdictions with external carbon prices, and only three locations have direct carbon compliance costs. However, IVL is aware of a number of new regulations that will impose a cost of carbon and may cover the types of processes and activities of our businesses. As such, we are using a global shadow price to evaluate site level risks.

Indorama Ventures PCL Thailand, Materials

2. Differentiated pricing: a price that varies by region, business unit or type of decision.

Vermilion currently considers the reasonable price for carbon in the short term (1–2 years) impacting our Canadian operations to be $30 CAD per tCO_2e. This is based on the commitments made by the government relating to the economy wide tax. In our European operations in the near and long term, we believe that a carbon price of 20-30€ per tCO_2e, which aligns with government assertions relating to a floor on carbon pricing in France, and represents carbon pricing assumptions also reasonable for our Netherlands and German assets. For our Australian operations, though we are not being impacted by carbon taxation, we believe the previously asserted cost of $20AUD per tCO_2e to be reasonable. Based on assertions made by the USA government, we do not believe our operations will be impacted by carbon pricing in the form of taxation, however, we consider $20USD per tCO_2e to be reasonable from a planning perspective.

Vermilion Energy, Inc., Canada, Energy

3. Static pricing: a price that is constant over time.

…in 2010, DANONE put a price on carbon in its capital expenditures approval process to redirect investments toward lower carbon solutions, clean technologies, renewable energy, any project contributing to cut emissions. In 2016, after a benchmark study and a regulatory watch, DANONE updated its internal price of carbon and decided to set it at a relatively high level, 35€/t to internalize potential future cost of carbon in long term. The return of investments are assessed with the impact of the carbon implication. It enables the management to arbitrate between different options, to choose the most virtuous and efficient ones to achieve the goals of Danone's Climate Policy.

DANONE, France, Consumer Staples

4. Evolutionary pricing: a price that develops over time.

ACCIONA stays ahead of the creation of new carbon pricing mechanisms and the price increase in existing markets by establishing an internal price for its medium to long term projects. This shadow price drives investments in technology and low carbon production processes so as to mitigate the risk created by the possible inclusion of certain activities of ACCIONA in systems that tax emissions with high prices, such as those estimated by the European Investment Bank or the European Bank for Reconstruction and Development of €36/tCO_2 in 2016, €45/tCO_2 in 2030 and €72/tCO_2 in 2050. The Company uses shadow prices to promote the choice of energy efficient options and clean fuels. For example, the price has been used in the bid for a public tender in Australia which valued actions to minimize GHG emissions.

ACCIONA, Spain, Utilities

Business application

What part(s) of the business decision-making process does an internal carbon price apply to, and what degree of influence does it have on business decisions?

An internal carbon pricing mechanism can be integrated into a company's business decision-making process in a variety of ways. Each company has a unique application approach based on multiple factors, such as a company's internal corporate governance structure, emissions profile, position in the value chain, and intended objective(s). In fact, some companies deploy multiple mechanisms within their organization to achieve distinctly different outcomes.

Assessing a company's pricing approach involves understanding how the tool is **applied to business decisions**, and the **level of influence** it has on the decision-making process (i.e. to what degree does a company enforce the use of the price).

Commonly disclosed operational applications include:

- Capital expenditure decisions
- Operational decisions
- Procurement decisions
- Product and R&D decisions
- Remuneration decisions

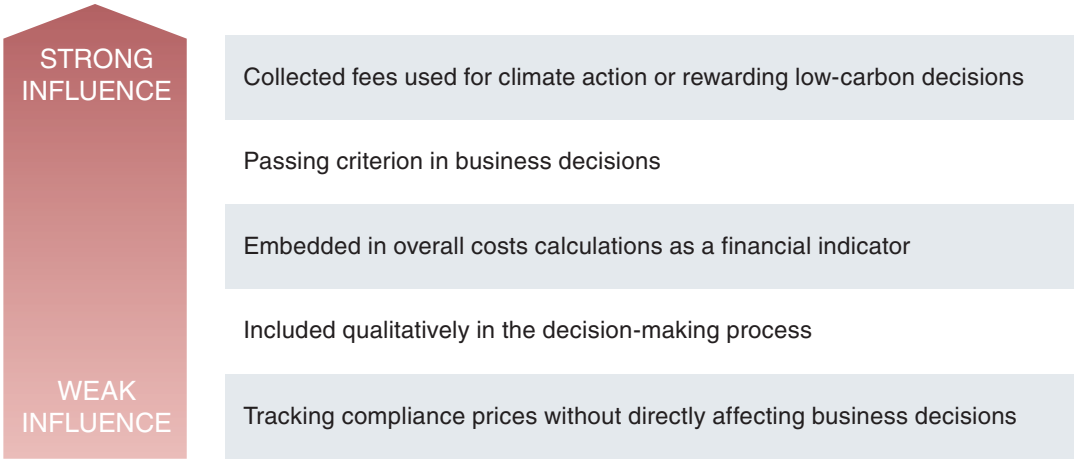
Degrees of influence can range significantly—from including the internal carbon price in cost calculations as a passive indicator to imposing it as a passing criterion in project decisions. The image below shows examples of different applications of an internal carbon pricing mechanism and the associated level of influence on day-to-day business decisions.[24]

Popular 'types' of internal carbon pricing approaches have emerged in recent years and are commonly referenced in corporate disclosure. Definitions of the two main types are outlined below and with illustrative examples of application approaches.

1. Shadow price: Most companies utilize a shadow price—attaching a hypothetical cost of carbon to each tonne of CO_2e—as a tool to reveal hidden risks and opportunities throughout its operations and supply chain and to support strategic decision-making related to future capital investments. Some companies with emissions reduction or renewable energy targets calculate their 'implicit carbon price' by dividing the cost of abatement/procurement by the tonnes of CO_2e abated. This calculation helps quantify the capital investments required to meet climate-related targets and is frequently used as a benchmark for implementing a more strategic internal carbon price.

2. Internal fee: Internal fee mechanisms take this approach a step further by charging responsible business units for their carbon emissions. These programs frequently reinvest the collected revenue back into clean technologies and other activities that help transition the entire company to low-carbon.

The combination of the type of pricing system used and the degree of influence it has can give a clear indication of the degree to which it affects decision-making within the company, and therefore of its effectiveness in terms of achieving the outcome sought.



24 Ecofys, The Generation Foundation and CDP, *How-to guide to corporate internal carbon pricing—Four dimensions to best practiceapproaches, Consultation Draft*, September 2017.

Impact

How has an internal carbon price impacted business decisions?

Finally, it is important to monitor and report the impact of an internal carbon pricing mechanism. For companies using the tool to assess and manage carbon-related risks, it is important to report the implications of an internal carbon price on the business. Did it reveal material risk within your business? Has it influenced business strategy or affected investment decisions? If the internal carbon price has not impacted your business in any way, it is equally important to explain why—are there specific challenges associated with your current mechanism? Are carbon-related risks immaterial or already managed?

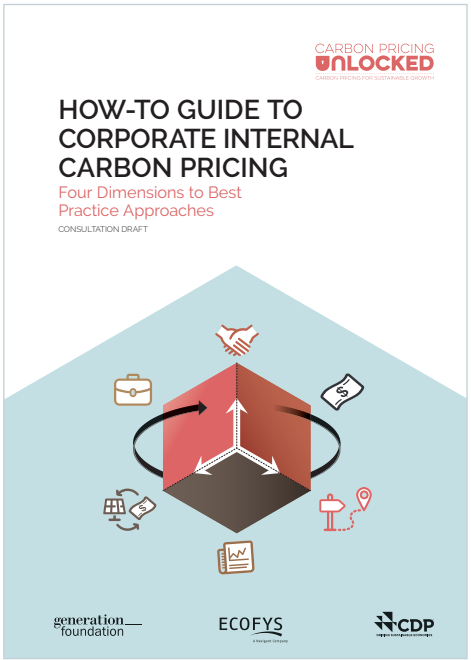
For companies deliberately implementing an internal carbon price as a tool to achieve a climate-related goal: has there been a tangible impact? Has the tool shifted investments toward energy efficiency measures, low-carbon initiatives, energy purchases, or product offerings?

Reflecting on the impact, or lack thereof, it is also important to report any plans to refine or evolve your approach to internal carbon pricing in the future.

Emerging best practice

Internal carbon pricing is a multifaceted tool that can help companies identify and act on the risks and opportunities that accompany this transition, which is also recommended by the FSB-TCFD. However, the full potential of internal carbon pricing is insufficiently embedded in the daily decision-making process of most companies. Based on findings from the Carbon Pricing Unlocked[25] research partnership, Ecofys, a Navigant company, the Generation Foundation and CDP published practical guidance to enable a wider use of best practice approaches to internal carbon pricing globally.

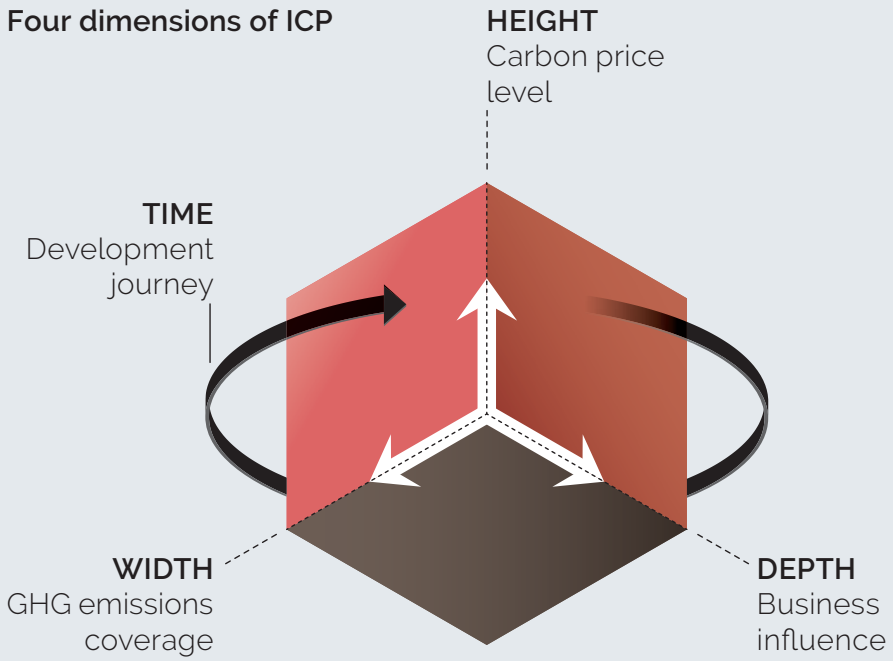
The how-to guide provides step-by-step guidance for designing and implementing an internal carbon price approach, while a special C-suite version helps board members to identify the most appropriate solution for their company. The guides complement existing research by providing a new 4D framework to approach internal carbon pricing, combined with the latest insights and experiences gathered through interviews with leading companies.[26] Read the full guides for more information.



24 http://www.ecofys.com/en/projects/carbon-pricing-unlocked/

26 http://www.ecofys.com/en/news/

How-to Guide to Corporate Internal Carbon Pricing



A how-to guide gives concrete guidance for designing and implementing an internal carbon pricing approach, while a special C-suite version helps board members to identify the most appropriate solution to their company. The guides complement existing research by providing a new 4D framework to approach internal carbon pricing, combined with the latest insights and experiences gathered through interviews with leading companies in the food industry value chain.

Four dimensions to design a best practice

A four-dimensional framework (4D framework) was developed to support the implementation of best practice approaches to internal carbon pricing. The 4D framework presented in the figure above provides companies with a structure to align their existing approach to best practices or establish their internal carbon pricing approach in a best practice way from the outset, as described in the table below. A best practice internal carbon pricing approach must have clear objectives and find the optimal combination of the four dimensions of internal carbon pricing. This forms the 4D shape of the internal carbon pricing approach.

Four dimensions and how to shape best practice ICP approaches

DIMENSION	ICP PARAMETER	BEST PRACTICE ICP APPROACH
Height	Price level per unit of GHG emitted (e.g. US$/$tCO_2$) that the company uses in business decisions	Rise to a carbon price capable of changing decisions in line with the ICP objectives
Width	The GHG emissions covered throughout the value chain by the ICP approach	Grow to cover all GHG emissions hotspots in the entire value chain that can be influenced
Depth	The level of influence the ICP approach has on the business decisions of a company and its value chain partners	Become increasingly influential to have a material impact on business decisions
Time	The development of the first three dimensions over time	Be evaluated regularly to bring the company's business strategy in line with a low-carbon economy

Appendix

Africa
Carbon price disclosure by GICS sector

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companies in Africa are pricing carbon now.[1]

Currency conversion information

Currency	Exchange rate (to USD)
AUD	1.25
BRL	3.14
CAD	1.24
CHF	0.96
COP	2935.15
EUR	0.84
GBP	0.77
HKD	7.82
HUF	257.00
INR	63.94
JPY	110.03
KRW	1124.24
MXN	17.83
RMB	6.56
TRY	3.44
ZAR	12.97

Companies currently using an internal price on carbon

	Company	Country	Price (US$)[1]
Consumer Staples	Pick 'n Pay Stores Ltd	South Africa	9.26
	The Spar Group Ltd	South Africa	9.26
	Tiger Brands	South Africa	9.26
Energy	Exxaro Resources Ltd	South Africa	9.26
	Sasol Limited	South Africa	
Financials	Investec Limited	South Africa	
	Nedbank Limited	South Africa	
	Redefine Properties Ltd	South Africa	3.70; 9.26
Health Care	Netcare Limited	South Africa	
Industrials	Group Five Ltd	South Africa	2.16
	Murray & Roberts Holdings Limited	South Africa	
	Transnet	South Africa	
Materials	Anglo American Platinum	South Africa	3.70; 9.26
	AngloGold Ashanti	South Africa	9.30
	Arcelor Mittal South Africa Ltd	South Africa	
	Gold Fields Limited	South Africa	0.47; 3.79
	Harmony Gold Mining Co Ltd	South Africa	1.85
	Impala Platinum Holdings	South Africa	
	Kumba Iron Ore	South Africa	3.70; 9.26
	PPC Ltd	South Africa	
	Sibanye Gold Ltd	South Africa	2.70
Telecom. Services	MTN Group	South Africa	

Companies that anticipate using an internal price on carbon in the next two years

Consumer Discretionary
Imperial Holdings, South Africa
Woolworths Holdings Ltd, South Africa

Consumer Staples
Golden Sugar Company Ltd, Nigeria
RCL Foods Ltd, South Africa
Tongaat Hulett Ltd, South Africa

Financials
Barclays Africa, South Africa
Emira Property Fund, South Africa
Firstrand Limited, South Africa
Liberty Holdings Ltd (incorporating Liberty Life Group Ltd), South Africa
Standard Bank Group, South Africa

Health Care
Mediclinic International, South Africa

Industrials
Basil Read, South Africa
Grindrod Ltd, South Africa

Materials
MISR Glass Manufacturing Company, Egypt
GZ Industries Limited, Nigeria
African Rainbow Minerals, South Africa
Sappi, South Africa

Telecommunication Services
Telkom SA Limited, South Africa
Vodacom Group, South Africa

1 All prices have been converted to USD/metric ton, based on an annual average exchange rate from June 2016–June 2017. Some companies disclose a range of prices (ex: 10-50), or distinct, multiple prices (ex: 10; 50).

Asia
Carbon price disclosure by GICS sector

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companies in Asia are pricing carbon now.[1]

Companies currently using an internal price on carbon

	Company	Country	Price (US$)
Consumer Discretioary	Shaoguan Hongda Gear Co., Ltd	China	
	Mahindra & Mahindra	India	10.00
	Sundram Fasteners Limited	India	
	Benesse Holdings, Inc.	Japan	13.63
	Bridgestone Corporation	Japan	
	FUTABA INDUSTRIAL CO.LTD	Japan	
	Mazda Motor Corporation	Japan	
	Nissan Motor Co., Ltd.	Japan	
	NITTAN VALVE CO.LTD.	Japan	
	Toyo Tire & Rubber Co Ltd	Japan	
	Yamaha Motor Co., Ltd.	Japan	
	Coway Co Ltd	South Korea	8.89
	Hankook Tire Co Ltd	South Korea	15.45
	LG Electronics	South Korea	
Consumer Staples	KAO Corporation	Japan	
	Lawson, Inc.	Japan	
	CJ Cheiljedang	South Korea	
	Pulmuone Co., Ltd.	South Korea	
Energy	Essar Oil	India	15.00
	PTT	Thailand	18.70
	PTT Exploration & Production Public Company Limited	Thailand	
Financials	Swire Pacific	Hong Kong	
	Daito Trust Construction Co., Ltd.	Japan	51.30
	Mizuho Financial Group, Inc.	Japan	
	Nomura Holdings, Inc.	Japan	
	Sumitomo Mitsui Trust Holdings, Inc.	Japan	
	Tokio Marine Holdings, Inc.	Japan	
	Ayala Land Inc	Philippines	
	KB Financial Group	South Korea	17.79
Health Care	Mindray Medical Intl Ltd-Adr	China	
	Alps Pharmaceutical Industry Co., Ltd.	Japan	
	Astellas Pharma Inc.	Japan	908.85
	Daiichi Sankyo Co., Ltd.	Japan	9.09–27.27
Industrials	Hangzhou Greatstar Industries	China	
	Shanghai Electric Group (H)	China	
	Cathay Pacific Airways Limited	Hong Kong	
	Hong Kong Aircraft Engineering	Hong Kong	3.36
	Dai Nippon Printing Co., Ltd.	Japan	
	East Japan Railway Company	Japan	

1 28 companies submitted private responses and are not listed in the appendix.

Asia
Carbon price disclosure by GICS sector

Continued from previous page

	Company	Country	Price (US$)
Industrials, continued	JTEKT Corporation	Japan	
	Kawasaki Kisen Kaisha, Ltd.	Japan	85.00
	Kokuyo Co., Ltd.	Japan	10.00
	LIXIL Group Corporation	Japan	
	Mitsubishi Electric Corporation	Japan	
	Shimizu Corporation	Japan	
	Sun Messe Co., Ltd.	Japan	
	Taisei Corporation	Japan	
	Toppan Printing Co., Ltd.	Japan	
	Toto Ltd.	Japan	
	Doosan Heavy Industries & Construction	South Korea	
	Korail Railroad Corp.	South Korea	
	LG	South Korea	
	Global Brands Manufacture Ltd	Taiwan	
Information Technology	APT Electronics	China	
	Faratronic	China	
	Goodwell	China	
	Henghao	China	
	Longwell	China	
	Picotronics Industries Limited	China	
	T&W	China	
	Infosys Limited	India	10.50
	Tech Mahindra	India	10.00
	Canon Inc.	Japan	
	Fujitsu Ltd.	Japan	
	Hirose Electric Co., Ltd.	Japan	
	Hitachi, Ltd.	Japan	
	NEC Corporation	Japan	
	Rohm Co., Ltd.	Japan	
	Daeduck Electronics Co., Ltd.	South Korea	
	Samsung Electro-Mechanics Co., Ltd.	South Korea	
	AU Optronics	Taiwan	11.90–14.30
	Darfon Electronics Corp	Taiwan	6.09
	Delta Electronics	Taiwan	9.60; 5.10; 50.00
	Taiwan Semiconductor Manufacturing	Taiwan	
	Well Shin Technology	Taiwan	
	Zhen Ding Technology Holding Ltd	Taiwan	6.09
	Delta Electronics (Thailand) plc	Thailand	

	Company	Country	Price (US$)
Materials	Ming Fai International Holdings Limited	China	
	ACC	India	
	Ambuja Cements	India	29.41
	Dalmia Bharat Ltd	India	
	GULSHAN POLYOLS LIMITED	India	
	JSW Steel	India	
	Tata Chemicals	India	20.00
	Tata Steel	India	
	Denka Company Limited	Japan	18.18
	Hitachi Chemical Company, Ltd.	Japan	
	JSR Corporation	Japan	27.27
	Mitsui Chemicals, Inc.	Japan	
	Sumitomo Chemical Co., Ltd.	Japan	
	Toyo Ink SC Holdings Co., Ltd.	Japan	
	Ube Industries, Ltd.	Japan	9.09
	Hansol Paper Co	South Korea	8.89
	Kumho Petrochemical	South Korea	
	LG Chem Ltd	South Korea	
	Lotte Chemical Corp	South Korea	18.50
	POSCO	South Korea	
	Golden Arrow	Taiwan	
	Indorama Ventures PCL	Thailand	15.00
Telecom. Services	Hengtong Group / Photoelectric Heng Tong	China	
	KDDI Corporation	Japan	9.09; 18.18
	NTT Docomo, Inc.	Japan	
	True Corporation	Thailand	
Utilities	Electric Power Development Co.,Ltd (J-POWER)	Japan	
	Osaka Gas Co., Ltd.	Japan	
	The Kansai Electric Power Co., Inc.	Japan	
	The Tokyo Electric Power Company Holdings, Inc (TEPCO)	Japan	15.00
	Korea District Heating Corp.	South Korea	
	Korea East-West Power	South Korea	20.46
	Korea Electric Power Corp	South Korea	
	Korea South-East Power	South Korea	

Asia
Carbon price disclosure by GICS sector

Continued from previous page

Companies that anticipate using an internal price on carbon in the next two years

Consumer Discretionary
Bestway (Hong Kong) Int, China
Green Guard Industy Co., Ltd., China
LIO HO MACHINE WORKS LTD, China
Minth Group Ltd, China
SHANDONG HELON POLYTEX, China
Top Victory Electronics(Fujian) Co. Ltd, China
WESTFIELD OUTDOOR, INC., China
YANFENG, China
YUELI, China
ZHEJIANG KANGLONGDA SPECIAL PR, China
ZINWELL CORPORATION, China
ARVIND Ltd, India
Bharat Forge, India
Indian Hotels Co., India
INDO COUNT INDUSTRIES L, India
JK Tyres & Industries, India
Tata Motors, India
Asics Corporation, Japan
Askul, Japan
Bic Camera Inc, Japan
Dentsu Inc., Japan
Honda Motor Company, Japan
J. Front Retailing Co., Ltd., Japan
Marui Group Co., Ltd., Japan
Mitsubishi Motors Corporation, Japan
Nikon Corporation, Japan
Panasonic Corporation, Japan
Pioneer Corporation, Japan
Pyramid Corporation, Japan
SIIX, Japan
Toyota Motor Corporation, Japan
Daerimtex Co., Ltd, South Korea
DONG YANG PISTON Co., Ltd., South Korea
erae Automotive Systems Co., Ltd, South Korea
HANON SYSTEMS, South Korea
Hansoll Textile Ltd, South Korea
JEONGSAN INTERNATIONAL CO., LTD, South Korea
KORENS INC., South Korea
Sebang Global Battery CO LTD, South Korea
WOOIL PRECISION INDUSTRIES CO LTD, South Korea
Liufeng Machinery Industry Co., Ltd., Taiwan

Consumer Staples
Extra Light Electrical, China
HCP Packaging, China
Shanghai Himalayas Plastic Packaging Co. Ltd., China
Broadway Precision Technology Limited, Hong Kong
Godrej Consumer Products, India
NIHON KAJITSU KOGYO CO., LTD, Japan
Seven & I Holdings Co., Ltd., Japan
Shiseido Co., Ltd., Japan
Olam International, Singapore
Charoen Pokphand Foods PCL, Thailand

Energy
Inpex Corporation, Japan

Financials
China Vanke, China
ZHEJIANG YAT ELECTRICAL APPLIANCE CO., LTD., China
Mahindra & Mahindra Financial Services, India
Mahindra Lifespace Developers Limited, India
YES BANK Limited, India
Daiwa House Industry Co., Ltd., Japan
Fuyo General Lease Co Ltd, Japan
Japan Retail Fund Investment, Japan
ORIX Corporation, Japan
Ricoh Leasing Co., Ltd., Japan
City Developments Limited, Singapore
DGB Financial Group, South Korea
Hana Financial Group, South Korea
MIRAE ASSET DAEWOO CO., LTD, South Korea
Samsung Fire & Marine Insurance, South Korea

Health Care
SHENGDA, China
WuXi AppTec, China
Dr. Reddy's Laboratories, India
Piramal Enterprises, India

Industrials
CHANGZHOU HUADA KEJIE OPTO-ELECTRO INSTRUMENT CO., LTD, China
HURRYTOP CHINA NETWORK LOGISTICS, China
Juteng, China
KUNSHAN MEI-HE MACHINERY CO., LTD., China
LOROM INDUSTRIAL, China
NINGBO JIAYIN, China
NINGBO KLITE, China
SALOM, China
Sengled Optoelectronics Co.,Ltd, China
SINOTRANS Limited, China
SUZHOU BENTENG SCIENCE AND TECHNOLOGY CO.,LTD., China
SUZHOU TIANYE COMMERCIAL, China
Suzhou Victory Precision Manufacture Co., Ltd, China
Universal Global Technology(Shenzhen)Co.,Ltd., China
VICTORY GIANT TECHNOLOGY, China
Welco Technology (Suzhou) Limited, China
Jubilant Life Sciences Ltd, India
LAUTAN LUAS, Indonesia
Aeon Delight Co., Ltd., Japan
ANA Holdings Inc., Japan
Fujikura Ltd., Japan
Furukawa Electric Co., Ltd., Japan
Kajima Corporation, Japan
Kurita Water Industries Ltd., Japan
Secom Co., Ltd., Japan
Sumitomo Heavy Industries. Ltd., Japan
Aboitiz Equity Ventures, Philippines
SUNNINGDALE TECH LTD, Singapore
Daewoo E&C, South Korea
Hyundai E&C, South Korea
Samsung C&T, South Korea

Samsung Heavy Industries Co Ltd, South Korea
King Slide Technology Co., Ltd, Taiwan
YZC Kunshan, Taiwan

Information Technology
ARCATA ELECTRONICS, China
BEGHELLI, China
CAMBRIDGE INDUSTRIES Group Ltd, China
Chongqing Linteng Machinery & Electronics Co., Ltd., China
CYBERTAN TECHNOLOGY INC, China
Founder PCB, China
Lightning optoelectronic technology Co., Ltd.,, China
Luxshare, China
NVC LIGHTING TECHNOLOGY CORPORATION, China
SHANGHAI MEIXING, China
SHENZHEN GRENTECH, China
SHENZHEN SUN AND LYNN, China
SIRTEC, China
Wuhu Kinyi Machinery Co Ltd., China
YanTat Printed Circuit (Shenzhen) Co., Ltd, China
Wipro, India
Brother Industries, Ltd., Japan
Konica Minolta, Inc., Japan
Nomura Research Institute, Ltd., Japan
RUBYCON, Japan
TDK Corporation, Japan
Tokyo Electron Ltd., Japan
Go Foton, Philippines
Elec & Eltek Co Ltd, Singapore
ISU PETASYS CO LTD, South Korea
LG Display, South Korea
LG Innotek, South Korea
Samsung SDI, South Korea
Samsung SDS, South Korea
SK Hynix, South Korea
Advanced Semiconductor Engineering, Taiwan
Cheng Uei Precision Industry, Taiwan
Chicony Electronics Co. Ltd, Taiwan
Compal Electronics, Taiwan
GOLD CIRCUIT ELECTRONICS LTD, Taiwan
Innolux Corporation, Taiwan
JESS LINK PRODUCTS, Taiwan
Lite-On Technology, Taiwan
Powertech Technology Inc, Taiwan
Qisda, Taiwan
Quanta Computer, Taiwan
Siliconware Precision Industries Co., Taiwan
Simplo Technology Co Ltd, Taiwan
TPK Holding Co., Ltd., Taiwan

Materials
BEUKAY, China
CHANGSHU LEAGUE CHEMICAL CO., LTD, China
DRAGON, China
Jiangxi Black Cat Carbon Black Co., Ltd., China
Luencheong, China
NANYI ZHI PIN PACKAGING CO., LTD, China
Porton, China
QUAN ZHOU HUA SHUO SHI YE YOU XIAN, China
RONG HUA(QING YUAN) OFFSET PRINTING, China
Shanghai Huachi Printing Co., Ltd, China
Shenma, China
SHYA HSIN PACKAGING INDUSTRY(CHINA)CO.,LTD., China
SINORGCHEM CO., China
Spread Profit, China
STARLITE PRINTERS (SZ) CO.,LTD, China
Wanchen Plastic Products (Shanghai) co ltd, China
STARLITE PRINTER LIMITED, Hong Kong
Essar Steel Limited, India
Galaxy Surfactants Ltd., India
Godrej Industries, India
Hindustan Zinc, India
Mahindra Sanyo Special Steel Pvt. Ltd, India
PARKSONS PACKAGING LIMITED CHAKAN, India
Uflex Limited, India
DYNAPLAST, Indonesia
Adeka Corporation, Japan
Nitto Denko Corporation, Japan
Shin-Etsu Chemical Co., Ltd., Japan
Toda Kogyo Corp, Japan
Tokyo Steel Manufacturing Co., Ltd., Japan
Unitika Ltd., Japan
Yamashita Printing Carton Box Corporation, Japan
KISWIRE Ltd., South Korea
China Steel Corporation, Taiwan
PTT Global Chemical, Thailand

Telecommunication Services
Airsys, China
CHENGDU BELL COM.IND, China
China Mobile, China
Innolight, China
NANJING XINWANG TELETECH, China
SingTel, Singapore
KT Corporation, South Korea
LG Uplus, South Korea
SK Telecom, South Korea
Taiwan Mobile Co. Ltd., Taiwan

Utilities
CLP Holdings Limited, Hong Kong
GAIL, India
JSW Energy, India
Energy Development Corp, Philippines
Global Power Synergy Public Company Limited, Thailand

Europe
Carbon price disclosure by GICS sector

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companies in Europe are pricing carbon now.[1]

Companies currently using an internal price on carbon

	Company	Country	Price (US$)
Consumer Discretioary	JCDecaux SA.	France	
	Kering	France	73.67
	Michelin	France	59.41
	Renault	France	
	Sodexo	France	
	Bertelsmann	Germany	
	BMW AG	Germany	
	Daimler AG	Germany	
	PUMA SE	Germany	
	Volkswagen AG	Germany	
	Fiat Chrysler Automobiles NV	Italy	
	MAZZUCCONI, FONDERIE	Italy	
	Roechling Automotive	Italy	
	IBERICA DE SUSPENSIONES S.L.	Spain	
	Inditex	Spain	30.00
	IKEA	Sweden	
	Compagnie Financière Richemont SA	Switzerland	
	ARÇELIK A.S.	Turkey	
	VESTEL ELEKTRONIK SANAYI VE TICARET A.S.	Turkey	
	Crest Nicholson PLC	United Kingdom	
	Domino's Pizza Group plc	United Kingdom	11.88; 22.26
	Jaguar Land Rover Ltd	United Kingdom	11.88; 22.26
	Liberty Global plc	United Kingdom	21.87
	Marks and Spencer Group plc	United Kingdom	
	Mindshare	United Kingdom	47.83
	N Brown Group Plc	United Kingdom	20.83
	RELX Group Plc	United Kingdom	
	Sky plc	United Kingdom	21.87
	WPP Group	United Kingdom	47.83

1 43 companies submitted private responses and are not listed in the appendix.

	Company	Country	Price (US$)
Consumer Staples	Carlsberg Breweries A/S	Denmark	
	Carrefour	France	8.32–23.76
	Danone	France	41.59
	Sofidel S.p.A.	Italy	
	Rixona	Netherlands	
	Jerónimo Martins SGPS SA	Portugal	5.94
	Arnest	Russia	
	ANDRES SERRANO SA	Spain	
	Coca-Cola HBC AG	Switzerland	
	Nestlé	Switzerland	
	MIGROS TICARET A.S.	Turkey	
	Associated British Foods	United Kingdom	
	Dairy Crest Group	United Kingdom	
	J Sainsbury Plc	United Kingdom	22.26
	MUNTONS PLC	United Kingdom	
	Unilever plc	United Kingdom	35.65
Energy	OMV AG	Austria	
	Neste Oyj	Finland	
	Total	France	30.00–40.00
	MOL Nyrt.	Hungary	
	Eni SpA	Italy	47.53
	Royal Dutch Shell	Netherlands	40.00
	Vopak	Netherlands	47.53
	Aker BP ASA	Norway	
	Statoil ASA	Norway	50.00; 59.00
	Galp Energia SA	Portugal	40.00
	PJSC Gazprom	Russia	
	Compañía Española de Petróleos, S.A.U. CEPSA	Spain	
	Repsol	Spain	15.00
	Lundin Petroleum	Sweden	50.00
	Premier Oil	United Kingdom	
	Tullow Oil	United Kingdom	40.00

Europe
Carbon price disclosure by GICS sector

Continued from previous page

	Company	Country	Price (US$)
Financials	BNP Paribas	France	25.00–40.00
	Credit Agricole	France	
	Gecina	France	29.71
	Societe Generale	France	11.88
	Commerzbank AG	Germany	
	Piraeus Bank	Greece	8.32
	Allied Irish Banks plc	Ireland	
	DNB ASA	Norway	
	Banco de credito social cooperativo	Spain	
	Banco Popular Espanol S.A.	Spain	
	Banco Santander	Spain	2.70
	CaixaBank	Spain	5.94
	Berner Kantonalbank AG BEKB	Switzerland	
	Credit Suisse	Switzerland	
	Swiss Re	Switzerland	
	Zurich Insurance Group	Switzerland	
	T.GARANTI BANKASI A.S.	Turkey	
	T.SINAI KALKINMA BANKASI A.S.	Turkey	
	TÜRKIYE HALK BANKASI A.S.	Turkey	
	TÜRKIYE KALKINMA BANKASI A.S.	Turkey	
	Aviva plc	United Kingdom	
	Barclays	United Kingdom	
	Ernst & Young LLP UK	United Kingdom	21.87
	Henderson Group	United Kingdom	
	Legal and General Investment Management	United Kingdom	
	Old Mutual Group	United Kingdom	
	Unite Students	United Kingdom	21.87
	Workspace Group	United Kingdom	
Health Care	Lundbeck A/S	Denmark	
	Novartis	Switzerland	100.00
	CENTAUR GUERNSEY LPÃ‚Â INC (Systagenix)	United Kingdom	
	Nuffield Health	United Kingdom	
	Spire Healthcare	United Kingdom	22.26

	Company	Country	Price (US$)
Industrials	Palfinger AG	Austria	35.65
	Kingspan Group PLC	Europe	
	ADP (Aeroports de Paris)	France	23.76
	Air France - KLM	France	
	Bic	France	11.00–20.00
	Groupe Eurotunnel	France	
	LEGRAND	France	35.65
	Saint-Gobain	France	35.65; 118.82
	Schneider Electric	France	35.65
	Vallourec	France	47.53
	HOCHTIEF AG	Germany	
	Danieli & C Officine Meccaniche S.p.A.	Italy	7.13
	Leonardo – Finmeccanica	Italy	5.70
	Arcadis	Netherlands	
	Philips Lighting	Netherlands	1.19–11.88
	Royal BAM Group nv	Netherlands	
	CTT - Correios de Portugal SA	Portugal	41.59
	FERROVIAL	Spain	
	Gamesa Corporación Tecnológica, S.A.	Spain	
	Grupo Logista	Spain	
	International Consolidated Airlines Group, S.A.	Spain	
	Obrascon Huarte Lain (OHL)	Spain	4.63
	Prosegur	Spain	
	SAS	Sweden	
	MSC Mediterranean Shipping Company	Switzerland	
	SGS SA	Switzerland	
	PEGASUS HAVA TASIMACILIGI A.S.	Turkey	5.94
	Balfour Beatty	United Kingdom	20.44
	CNH Industrial NV	United Kingdom	
	Go-Ahead Group	United Kingdom	20.71
	Linklaters LLP	United Kingdom	
	Morgan Advanced Materials	United Kingdom	
	Morgan Sindall Group plc	United Kingdom	
	Senior Plc	United Kingdom	24.59
	Spirax-Sarco Engineering	United Kingdom	
	Stephenson Harwood	United Kingdom	
	Travis Perkins	United Kingdom	
Information Technology	Atos SE	France	1.37–23.67
	Sopra Steria Group	France	8.32
	SAP SE	Germany	
	Methode	Malta	
	Sage Group	United Kingdom	22.00
	Sungard Availability Services (Sungard AS)	United Kingdom	22.26

Europe
Carbon price disclosure by GICS sector

Continued from previous page

	Company	Country	Price (US$)
Materials	Solvay S.A.	Belgium	29.71; 89.12
	Novozymes A/S	Denmark	
	Metsä Board	Finland	11.88
	Outokumpu Oyj	Finland	
	Stora Enso Oyj	Finland	
	Air Liquide	France	
	ARKEMA	France	
	MMP PACKETIS	France	38.02
	MMP Premium	France	38.02
	Aurubis AG	Germany	
	BASF SE	Germany	
	D.G.W.	Germany	
	Edelmann	Germany	
	Felix Schoeller Group	Germany	
	HeidelbergCement AG	Germany	23.76
	thyssenkrupp AG	Germany	
	Smurfit Kappa Group PLC	Ireland	
	Palladio Group SPA	Italy	5.57; 24.52
	Zignago Vetro SpA	Italy	
	ArcelorMittal	Luxembourg	23.88–33.27
	AkzoNobel	Netherlands	59.41; 160.41
	Koninklijke DSM	Netherlands	59.41
	Borregaard ASA	Norway	
	Norsk Hydro	Norway	
	Arkhangelsk Pulp and Paper Mill	Russia	17.82
	ACERINOX	Spain	
	Miquel Y Costas	Spain	
	Boliden Group	Sweden	
	SSAB	Sweden	
	TETRA PAK	Sweden	11.88
	Glencore plc	Switzerland	5.00–140.00
	LafargeHolcim Ltd	Switzerland	31.19
	Anglo American	United Kingdom	3.50–8.74
	BHP Billiton	United Kingdom	24.00; 50.00; 80.00
	Hill & Smith Holdings	United Kingdom	
	Lonmin	United Kingdom	9.26
	Marshalls	United Kingdom	
	Mondi PLC	United Kingdom	35.65
	Petra Diamonds Ltd	United Kingdom	
	Rio Tinto	United Kingdom	

	Company	Country	Price (US$)
Telecom. Services	Magyar Telekom Nyrt.	Hungary	
	Koninklijke KPN NV (Royal KPN)	Netherlands	
	Euskaltel SA	Spain	
	Swisscom	Switzerland	87.80
	BT Group	United Kingdom	4.09; 9.94
	TalkTalk Telecom Group	United Kingdom	22.26
	Vodafone Group	United Kingdom	
Utilities	VERBUND AG	Austria	6.42
	Fortum Oyj	Finland	
	EDF	France	
	ENGIE	France	
	Suez	France	35.65; 59.41
	VEOLIA	France	35.65
	E.ON SE	Germany	23.76; 47.53
	EnBW Energie Baden-Württemberg AG	Germany	
	A2A	Italy	5.94–9.51
	ENEL SpA	Italy	8.32–15.45
	ERG S.p.A	Italy	
	Hera	Italy	
	Snam S.P.A	Italy	6.25–17.82
	Terna	Italy	
	EDP - Energias de Portugal S.A.	Portugal	5.94–71.29
	REN - Redes Energéticas Nacionaisw	Portugal	
	ACCIONA S.A.	Spain	5.94; 42.78–85.55
	ENAGAS	Spain	5.94–9.51
	Endesa	Spain	8.32–15.45
	Gas Natural SDG SA	Spain	11.88–17.82
	Iberdrola SA	Spain	35.65
	Vattenfall Group	Sweden	
	Centrica	United Kingdom	28.47
	National Grid PLC	United Kingdom	50.00
	Pennon Group	United Kingdom	
	Severn Trent	United Kingdom	
	SSE	United Kingdom	
	United Utilities	United Kingdom	21.87

Europe
Carbon price disclosure by GICS sector

Continued from previous page

Companies that anticipate using an internal price on carbon in the next two years

Consumer Discretionary
Groupe Fnac, France
Groupe PSA, France
Groupe SEB, France
Ipsos, France
MarieLaurePLV, France
Axel Springer SE, Germany
IWIS MOTORSYSTEME, Germany
ProSiebenSat.1 Media SE, Germany
ADLER PLASTIC SPA, Italy
BITRON INDUSTRIE SPA, Italy
YOOX Net-A-Porter Group, Italy
IEE, Luxembourg
Gestamp, Spain
Melia Hotels International SA, Spain
NAGARES. S.A., Spain
NH Hotel Group, Spain
H&M Hennes & Mauritz AB, Sweden
APG SGA SA, Switzerland
AROMSA BESIN AROMA VE KATKI MALZEMELERI A.S., Turkey
EKOTEN TEKSTIL SANAYI VE TICARET A.S., Turkey
IHLAS EV ALETLERI IMALAT SANAYI VE TICARET A.S., Turkey
Arlington Automotive NE, United Kingdom
Berkeley Group, United Kingdom
CMS CAMERON MCKENNA, United Kingdom
Dentsu Aegis Network, United Kingdom
Norton Rose, United Kingdom
Redrow Homes Ltd, United Kingdom
Thomas Cook Group, United Kingdom

Consumer Staples
Casino Guichard-Perrachon, France
Pernod Ricard, France
Beiersdorf AG, Germany
METRO AG, Germany
SEKE SA, Greece
Luis Simoes, Portugal
REVADA, Russia
Barry Callebaut AG, Switzerland
Emmi AG, Switzerland
ÜLKER BISKÜVI SANAYI A.S., Turkey
British American Tobacco, United Kingdom
Britvic, United Kingdom
Coca-Cola European Partners, United Kingdom
Cranswick, United Kingdom
KEPAK CONVENIENCE FOODS, United Kingdom

Energy
Tecnicas Reunidas, Spain
OPHIR ENERGY PLC, United Kingdom

Financials
Atenor, Belgium
Befimmo SA, Belgium
Aktia Bank, Finland
AXA Group, France
CNP Assurances, France
ICADE, France
Nexity, France
Allianz SE, Germany
National Bank Of Greece, Greece
UniCredit, Italy
ING Group, Netherlands
Bankia, Spain
Bankinter, Spain
BBVA, Spain
Castellum, Sweden
Nordea Bank, Sweden
AKBANK T.A.S., Turkey
ALBARAKA TÜRK KATILIM BANKASI A.S., Turkey
YAPI VE KREDI BANKASI A.S., Turkey
De Vere Limited, United Kingdom
Hammerson, United Kingdom
Land Securities, United Kingdom
Prudential PLC, United Kingdom

Health Care
Ion Beam Applications S.A. (IBA), Belgium
UCB SA, Belgium
Shire, Europe
Ipsen, France
SANOFI, France

Industrials
Österreichische Post AG, Austria
A.P. Moller - Maersk, Denmark
DANFOSS, Denmark
Finnair, Finland
Valmet, Finland
DE RIJKE, France
Gefco, France
Nexans, France
Tarkett, France
Vinci, France
Deutsche Post AG, Germany
Siemens AG, Germany
SUEDKABEL GMBH, Germany
Weener Plastik GmbH, Germany
DEMA SERVICE SPA, Italy
Airbus, Netherlands
CEVA, Netherlands
Koninklijke Philips NV, Netherlands
VAN ROOIJEN LOGISTIEK, Netherlands
Ficosa, Portugal

PAMPULHA ENGENHARIA LTDA, Spain
SAAB, Sweden
Skanska AB, Sweden
Adecco Group AG, Switzerland
Huber + Suhner AG, Switzerland
Kuehne + Nagel International AG, Switzerland
Swiss Post, Switzerland
KAYSERI ULASIM A.S., Turkey
ADDISON LEE PLC, United Kingdom
BBA Aviation, United Kingdom
Costain Group, United Kingdom
ED&F Man, United Kingdom
ERITH GROUP, United Kingdom
FirstGroup Plc, United Kingdom
GLOBAL MARINE SYSTEMS LTD, United Kingdom
Interserve Plc, United Kingdom
Keller, United Kingdom
MACANDREWS AND CO, United Kingdom
METROSHIPPING LIMITED, United Kingdom
National Express Group Plc, United Kingdom
NINGBO AIJIA ELECTRICAL APPLIANCES CO.,LIMITED, United Kingdom
PROJECT PEOPLE, United Kingdom
Rolls-Royce, United Kingdom
Unipart, United Kingdom
Volex Group, United Kingdom

Information Technology
AT&S Austria Technologie & Systemtechnik AG, Austria
Barco NV, Belgium
MORAVIA, Czech Republic
Cap Gemini, France
ADVA Optical Networking SE, Germany
Amdocs Ltd, Guernsey
Ericsson, Sweden
STMicroelectronics International NV, Switzerland
Alpine Electronics, United Kingdom
ARRIS International PLC, United Kingdom
NSC GLOBAL LTD, United Kingdom

Materials
Byelorussian Steel Works, Belarus
Moravia Cans, Czech Republic
CRH Plc, Europe
Chimex, France
Geka, Germany
KUTTERER, Germany
LANXESS AG, Germany
Tubex, Germany
NUCERIA ADESIVI SRL, Italy
Orion Engineered Carbons, Luxembourg
Yara International ASA, Norway
PCC Exol, Poland
United Co RUSAL PLC, Russia
Grafobal a.s, Slovakia
ALLIABOX, Spain
Norgraft Packaging S.A., Spain
Clariant AG, Switzerland
FIRMENICH SA, Switzerland
Givaudan SA, Switzerland
AFYON ÇIMENTO SANAYI T.A.S., Turkey
Vedanta Resources PLC, United Kingdom

Telecommunication Services
Deutsche Telekom AG, Germany
UTIMACO SAFEWARE, Germany
Rostelecom, Russia
Telefonica, Spain
Millicom International Cellular SA, Sweden
TÜRK TELEKOMÜNIKASYON A.S., Turkey

Utilities
Landsvirkjun, Iceland
Red Eléctrica S.A.U, Spain
AKENERJI ELEKTRIK ÜRETIM A.S., Turkey

Latin America
Carbon price disclosure by GICS sector

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companies in Latin America are pricing carbon now.[1]

Companies currently using an internal price on carbon

	Company	Country	Price (US$)
Consumer Discretioary	Grupo Televisa S.A.	Mexico	
Consumer Staples	Natura Cosmeticos SA	Brazil	90.00; 93.00
	CAROZZI NORTH AMERICA INC	Chile	
	Vina Concha y Toro S A	Chile	1.00
	INCUBADORA SANTANDER	Colombia	
Energy	Petróleo Brasileiro SA–Petrobras	Brazil	
Financials	Banco Santander Brasil	Brazil	2.70
	Itaú Unibanco Holding S.A.	Brazil	
	Itausa Investimentos Itau S.A.	Brazil	
Industrials	Ecorodovias Infraestrutura e Logística S.A	Brazil	
	Edenred Brasil	Brazil	
	Transportes Cavalinho	Brazil	
	Colcafe	Colombia	0.01
	TECNIAMSA S.A E.S.P	Colombia	
	ALCOHOLES DEL URUGUAY SA	Uruguay	
Materials	Braskem S/A	Brazil	
	Duratex S/A	Brazil	
	FIBRIA Celulose S/A	Brazil	5.00; 10.00; 30.00
	Enaex	Chile	
	Cementos Argos SA	Colombia	5.00
	CEMEX	Mexico	30.00
Utilities	AES Tiete Energia SA	Brazil	
	Centrais Eletricas Brasileiras S/A (ELETROBRAS)	Brazil	5.00
	Cia Paranaense de Energia - COPEL	Brazil	5.00
	Companhia Energetica Minas Gerais - CEMIG	Brazil	1.13
	CPFL Energia SA	Brazil	
	Colbun SA	Chile	5.00
	Empresa de Energia de Bogota S.A. E.S.P.	Colombia	
	Interconexion Electrica Sa	Colombia	

1 5 companies submitted private responses and are not listed in the appendix.

Companies that anticipate using an internal price on carbon in the next two years

Consumer Discretionary
Sintaryc, Argentina
Aethra Sistemas Automotivos S/A., Brazil
B2W Companhia Global do Varejo, Brazil
Esmaltec S/A, Brazil
Lojas Americanas S/A, Brazil
MRV Engenharia e Participações, Brazil
Via Varejo, Brazil
DISTRIB DE ROPA VIVA SA CV, Mexico
FABRICAS SELECTAS SA DE CV, Mexico
INDUSTRIAS TAMER SA DE CV, Mexico
Janesville de México, S.A. de C.V., Mexico
KARMATEX, Mexico
PROD INFANTILES SELECTOS SA CV, Mexico
STUDIO 208 SA DE CV, Mexico

Consumer Staples
Algarve (Campo Lacteos Poblet), Argentina
Main Process SA, Argentina
Paladini, Argentina
JBS S/A, Brazil
Marfrig Global Foods S/A, Brazil
MIX INDUSTRIA E COMERCIO DE CEREAIS LTDA, Brazil
UNIVERSAL CHEMICAL LTDA, Brazil
VIGOR, Brazil
Colombina S.A., Colombia
HORTALIZAS GOURMET S.A, Colombia
Hortalizas Zamorano, Ecuador
Life Food Products, Ecuador
Industrias ODI, Guatemala
Agroindustrias Unidas De Cacao SA DE CV, Mexico
CACAHUAT DE MORELOS S DE RLCV, Mexico
CONGELADORA NINO SA CV, Mexico
EMPACADORA NORVER SA CV, Mexico
INDUSTRIAS COR SA DE CV, Mexico
Innophos Mexicana S. de R.L. de C.V., Mexico
METCO SA DE CV, Mexico
SALCHICHAS Y JAMONES MEX SACV, Mexico
Guerra Espinosa Gabriela, Uruguay

Financials
Banco Bradesco S/A, Brazil
BanColombia SA, Colombia
Grupo Financiero Banorte SAB de CV, Mexico

Health care
Odontoprev S/A, Brazil

Industrials
BAUMGARTEN, Brazil
Companhia de Concessões Rodoviárias - CCR, Brazil
HIDROJATO NACIONAL SC LTDA, Brazil
Iochpe-Maxion SA, Brazil
JSL S.A., Brazil
GRUPO VASCONIA S A B, Mexico

Information technology
MEIA BANDEIRADA, Brazil
International Manufacturing and Assembly, Mexico

Materials
Grupo Antilhas, Brazil
Klabin S/A, Brazil
Vale, Brazil
Empresas CMPC, Chile
Grupo Familia, Colombia
Sigmaplast, Ecuador
BARDAHL DE MEXICO SA CV, Mexico
CEAPSA, Mexico
Cydsa, Mexico
DETERGEN JABONES SASIL SAPI CV, Mexico
Fresnillo plc, Mexico
Grupo La Esperanza, Mexico
MAQUILADORA GRAFICA, Mexico

Telecommunication Services
Axtel, Mexico

Utilities
Clesse do Brasil, Brazil
CPFL Energias Renovaveis SA, Brazil
EDP - Energias do Brasil S.A., Brazil
Eletropaulo Metropolitana Eletricidade de São Paulo S/A, Brazil
LIGHT SA, Brazil
Celsia SA ESP, Colombia

Middle East
Carbon price disclosure by sector

Companies that anticipate using an internal price on carbon in the next two years

Materials
Altajir Glass, United Arab Emirates

Telecommunication services
ECI Telecom, Israel
Gulf Business Horizon, Saudi Arabia

Utilities
Philadelphia Solar LTD.CO, Jordan

North America
Carbon price disclosure by GICS sector

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companies in North America are pricing carbon now.[1]

Companies currently using an internal price on carbon

	Company	Country	Price (US$)
Consumer Discretioary	Aimia Inc.	Canada	
	Canadian Tire Corporation, Limited	Canada	12.06–24.11
	Freeze	USA	
	Fruit of the Loom	USA	
	General Motors Company	USA	5.34; 20.00
	Hanesbrands Inc.	USA	
	SUPERIOR INDUSTRIES INTERNATIONAL	USA	
	Walt Disney Company	USA	
Consumer Staples	Archer Daniels Midland	USA	
	Campbell Soup Company	USA	
	Cargill	USA	30.00
	Colgate Palmolive Company	USA	
	Dean Foods Company	USA	
	Kellogg Company	USA	
	Mars	USA	5.94
	Philip Morris International	USA	17.00
	WhiteWave Foods	USA	
Energy	ARC Resources Ltd.	Canada	
	Cenovus Energy Inc.	Canada	
	Encana Corporation	Canada	
	Enerplus Corporation	Canada	
	Husky Energy Inc.	Canada	
	Imperial Oil	Canada	
	Inter Pipeline Ltd.	Canada	24.11
	Keyera Corp.	Canada	24.11
	MEG Energy Corp.	Canada	24.11
	Peyto Exploration & Development Corp.	Canada	16.08–40.19
	Seven Generations Energy	Canada	
	Suncor Energy Inc.	Canada	24.11–52.25
	TransCanada Corporation	Canada	64.30
	Vermilion Energy Inc.	Canada	15.94; 24.11; 20.00; 23.76–35.65
	California Resources Corp	USA	
	Chevron Corporation	USA	
	ConocoPhillips	USA	9.00–43.00
	Devon Energy Corporation	USA	16.08–24.11
	Exxon Mobil Corporation	USA	
	Gladieux Trading and Marketing	USA	
	Hess Corporation	USA	40.00
	Occidental Petroleum Corporation	USA	

1 15 companies submitted private responses and are not listed in the appendix.

	Company	Country	Price (US$)
Financials	Bank of Montreal	Canada	16.08
	Canadian Imperial Bank of Commerce (CIBC)	Canada	
	Great-West Lifeco Inc.	Canada	24.11; 40.19
	INTRIA ITEMS INC	Canada	
	Power Corporation of Canada	Canada	24.11; 40.19
	Power Financial Corporation	Canada	24.11; 40.19
	TD Bank Group	Canada	6.43
	BNY Mellon	USA	21.87
	Goldman Sachs Group Inc.	USA	
	Wells Fargo & Company	USA	
	World Bank Group	USA	30.00; 80.00
Health Care	Allergan plc	USA	
	Biogen Inc.	USA	
	DIVAL SAFETY EQUIPMENT INC	USA	
Industrials	Air Canada	Canada	
	Canadian National Railway Company	Canada	12.86–24.11
	Inscape Corporation	Canada	
	Teknion Limited	Canada	
	BECK GROUP - HC BECK	USA	
	Brady Corporation	USA	
	Covanta Energy Corporation	USA	
	Cummins Inc.	USA	
	Delta Air Lines	USA	
	General Electric Company	USA	
	Harvard Maintenance, Inc.	USA	
	Jacobs Engineering Group Inc.	USA	21.22
	Owens Corning	USA	10.00; 60.00
	Parker-Hannifin Corporation	USA	
	Stanley Black & Decker, Inc.	USA	18.00; 23.00; 25.00; 150.00
	Tennant Company	USA	
	United Continental Holdings	USA	
	United Technologies Corporation	USA	21.48
	Waste Management, Inc.	USA	
	Wisconsin Energy Conservation Corporation (WECC)	USA	12.94
Information Technology	Adobe Systems, Inc.	USA	
	Alphabet, Inc.	USA	
	Amphenol Corporation	USA	
	Autodesk, Inc.	USA	
	Corning Incorporated	USA	
	Microchip Technology	USA	24.80; 83.40
	Microsoft Corporation	USA	

North America
Carbon price disclosure by GICS sector

Continued from previous page

	Company	Country	Price (US$)
Materials	Barrick Gold Corporation	Canada	
	Catalyst Paper Corporation	Canada	24.11
	HudBay Minerals Inc.	Canada	16.08–40.19
	Resolute Forest Products Inc.	Canada	
	Teck Resources Limited	Canada	24.11; 4.19; 12.06–32.15
	Cabot Corporation	USA	
	Caraustar Industries, Inc.	USA	
	E.I. du Pont de Nemours and Company	USA	
	Eastman Chemical Company	USA	
	LyondellBasell Industries Cl A	USA	
	Monsanto Company	USA	
	Newmont Mining Corporation	USA	25.00–50.00
	Owens-Illinois	USA	13.22
	The Dow Chemical Company	USA	
	The Mosaic Company	USA	
Telecom. Services	Rogers Communications Inc.	Canada	
	WORLD WIDE TECHNOLOGY HOLDING COMPANY	USA	
Utilities	Capital Power Corporation	Canada	
	Hydro One Networks Inc.	Canada	14.47–20.09
	TransAlta Corporation	Canada	24.11–40.19
	Ameren Corporation	USA	23.00–53.00
	American Electric Power Company, Inc.	USA	
	Avangrid Inc	USA	35.65
	CMS Energy Corporation	USA	
	DTE Energy Company	USA	
	Duke Energy Corporation	USA	
	Eversource Energy	USA	
	Exelon Corporation	USA	
	FirstEnergy Corporation	USA	
	Los Angeles Department of Water and Power	USA	
	NiSource Inc.	USA	6.75–35.70
	NRG Energy Inc	USA	
	OGE Energy Corp.	USA	1.00
	Ormat Technologies Inc	USA	
	PG&E Corporation	USA	
	Pinnacle West Capital Corporation	USA	
	Public Service Enterprise Group Inc.	USA	
	Sempra Energy	USA	
	SMUD	USA	
	WEC Energy Group	USA	
	Xcel Energy Inc.	USA	8.00–69.00

Companies that anticipate using an internal price on carbon in the next two years

Consumer Discretionary
VUTEQ CORP, Canada
ACTIVE KNITWEAR RESOURCES INC, USA
All Access Apparel, Inc., USA
Automotive Rentals Inc, USA
CABLE CONNECTION & SUPPLY, USA
CAP Barbell, Inc., USA
CUSTOM ACCESSORIES INC, USA
Detroit Manufacturing Systems, USA
Epic Designers, USA
Jjs Mae Inc Dba Rainbeau, USA
Kent International Inc, USA
Kreher Steel Company, LLC, USA
Neapco, USA
Newell Rubbermaid Inc., USA
PENCOM, USA
Renfro Corporation, USA
Royal Caribbean Cruises Ltd, USA
VF Corporation, USA
Whirlpool Corporation, USA
Wyndham Worldwide Corporation, USA

Consumer Staples
Cott Corporation, Canada
Loblaw Companies Limited, Canada
Maple Leaf Foods Inc., Canada
Thompson Group, Canada
Alliance One International Inc., USA
Berwick Offray Hong Kong, USA
Cosmetic Essence Innovations, USA
Creative Werks, LLC, USA
Hormel Foods, USA
Leprino Foods, USA
Lion Raisins Inc, USA
Massimo Zanetti Beverage USA, USA
Mercer Foods. LLC, USA
Molson Coors Brewing Company, USA
Norpac Foods, Inc., USA
OXYGEN, USA
Paris Presents LTD, USA
SHANGHAI YINGSHUO PLASTIC CO;LTD, USA
Supreme Rice Mill`, USA
Tanimura & Antle, Inc., USA
Walter P. Rawl & Sons, Inc., USA

Energy
Crescent Point Energy Corporation, Canada
Baker Hughes Incorporated, USA

Financials
Bank of Nova Scotia (Scotiabank), Canada
Bentall Kennedy, Canada
Manulife Financial Corp., Canada
Royal Bank of Canada, Canada
Genworth Financial, Inc., USA
Host Hotels & Resorts, Inc., USA
Huntington Bancshares Incorporated, USA
Invesco Ltd, USA
JPMorgan Chase & Co., USA
Morgan Stanley, USA
State Street Corporation, USA

Health Care
Baxter International Inc., USA
Boston Scientific Corporation, USA
Bristol-Myers Squibb, USA
Catalent Pharma Solutions, USA
Lnk International, Inc., USA
Tessy Plastics, USA
Valeant Pharmaceuticals International, Inc., USA
Zimmer Biomet Holdings, Inc., USA

Industrials
Canadian Pacific Railway, Canada
TTR Transport, Canada
3M Company, USA
Abt Associates Inc., USA
Active on Demand, USA
ASPLUNDH TREE EXPERT, USA
CAVALRY LOGISTICS LLC, USA
CREATA MACAO COMMERCIAL OFFSHORE LTD, USA
CROSS COUNTRY COURIER, USA
FLYTE TYME LIMOUSINE, USA
IWCO DIRECT, USA
Protection One Inc., USA
Republic Services, Inc., USA
Wabtec Corp., USA

Information Technology
Celestica Inc., Canada
BOYD, USA
eBay Inc., USA
EQUINIX, INC., USA
GENESIS NETWORKS INC, USA
Hewlett Packard Enterprise Company, USA
Mini-Circuits Laboratories, USA
PCTEL, USA
QUALCOMM Inc., USA
salesforce.com, USA
Synaptics, USA
VMware, Inc, USA
WageWorks, USA
Western Digital Corp, USA
Yahoo! Inc., USA

North America
Carbon price disclosure by GICS sector

Continued from previous page

Companies that anticipate using an internal price on carbon in the next two years

Materials
Agnico-Eagle Mines Limited, Canada
Detour Gold Corporation, Canada
Lundin Mining Corporation, Canada
Accurate Box, USA
Appleton Coated, USA
Avery Dennison Corporation, USA
Berje Inc, USA
Berry Plastics, USA
Diamond Packaging, USA
EXSIF WORLDWIDE, USA
FLOW POLYMERS, USA
Koppers Holdings Inc, USA
Moses Lake Industries, USA
Novelis Inc., USA
PAPER MAGIC GROUP HONG KONG LTD, USA
Precision Valve Corporation, USA
Silgan Plastics, USA
YONYU Plastics (Shanghai) Co.,Ltd, USA

Real estate
Iron Mountain Inc., USA

Telecommunication Services
Telus Corporation, Canada
AirSpeed LLC, USA
CenturyLink, USA

Utilities
Emera Inc., Canada
Evoqua, USA
Idacorp Inc, USA
The AES Corporation, USA

Oceania
Carbon price disclosure by GICS sector

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companies in Oceania are pricing carbon now.[1]

Companies currently using an internal price on carbon

	Company	Country	Price (US$)
Consumer Staples	Wesfarmers	Australia	
	Woolworths Limited	Australia	
Energy	Origin Energy	Australia	
	Woodside Petroleum	Australia	
Financials	AMP	Australia	
	GPT Group	Australia	
	Insurance Australia Group	Australia	
	Investa Office Fund	Australia	
	National Australia Bank	Australia	
	Platinum Asset Management	Australia	
	Stockland	Australia	
	Westpac Banking Corporation	Australia	
Health care	Fisher & Paykel Healthcare Corporation	New Zealand	
Industrials	Aurizon Holdings	Australia	
	Cleanaway Waste Management	Australia	
Materials	Incitec Pivot	Australia	
	South32	Australia	
Telecom. Services	Spark New Zealand	New Zealand	
Utilities	AGL Energy	Australia	9.64

Companies that anticipate using an internal price on carbon in the next two years

Consumer Discretionary
Super Retail Group, Australia
Warehouse Group, New Zealand

Consumer Staples
Fonterra Co-operative Group, New Zealand

Energy
Oil Search, Australia

Financials
Australia and New Zealand Banking Group, Australia
BT Investment Management, Australia
Macquarie Group, Australia
QBE Insurance Group, Australia
Suncorp Group, Australia
Vicinity Centres, Australia

Industrials
Australia Post, Australia
New Zealand Post Group, New Zealand

Materials
Alumina, Australia
Boral, Australia
Fortescue Metals Group, Australia
Sandfire Resources NL, Australia
Sims Metal Management, Australia

Telecommunication Services
Chorus, New Zealand

Utilities
APA Group, Australia

1 2 companies submitted private responses and are not listed in the appendix.

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