TRANSPARENCY: THE PATHWAY TO LEADERSHIP FOR CARBON INTENSIVE BUSINESSES

CONSTELLATION Calvert CDP 3M the answer company™ THOMSON REUTERS®

Table of Contents

Note from the authors: Members of the G250 mentioned in this report are all critically important companies regionally and in many cases globally, often providing essential products and services to millions of customers. Each is at its own stage of the decarbonization journey, driven by many different and sometimes conflicting demands. These demands can be regulatory, investor, customer, NGO, activist or personal. Each of these firms should be evaluated in its own context, and we hope this report encourages consideration of the increasing benefits of beginning, continuing or even accelerating their business model transformation to preserve the climate we want to leave for the generations to come.

– David Lubin, Chris Mangieri and Tim Nixon

"For this enhanced disclosure to be truly effective, we need to develop information systems that allow company management, consumers, regulators, the public and investors to have insight into the social and environmental impacts that companies are creating."

– John Steur, President and CEO, Calvert

Executive Summary

Transparency: The Pathway to Leadership for Carbon Intensive Businesses

Effectively measuring emissions and managing decarbonization strategies can often take a decade or more. Our prior research on the largest and most carbon intensive global businesses indicates that there are a growing number of firms that have successfully translated leadership, vision and strategy into results both for shareholders and the planet. This new report provides additional insight on the pathway nearly all large businesses have followed to deliver these results, and the increasing evidence of financial benefits accruing to those who do.

As companies mature in their capacity to transform their products and processes, they typically follow a six-step pattern reflecting increasing transparency on their greenhouse gas emissions (GHG) and plans to decarbonize their businesses.

This progression moves from initial policy goals to performance, as described below:

Policy. First, publicly stating an intention or *policy* to mitigate climate impacts.

Initial Emissions Reporting. Second, companies initiate emissions reporting often only on a portion of the business and limited to internal operations.

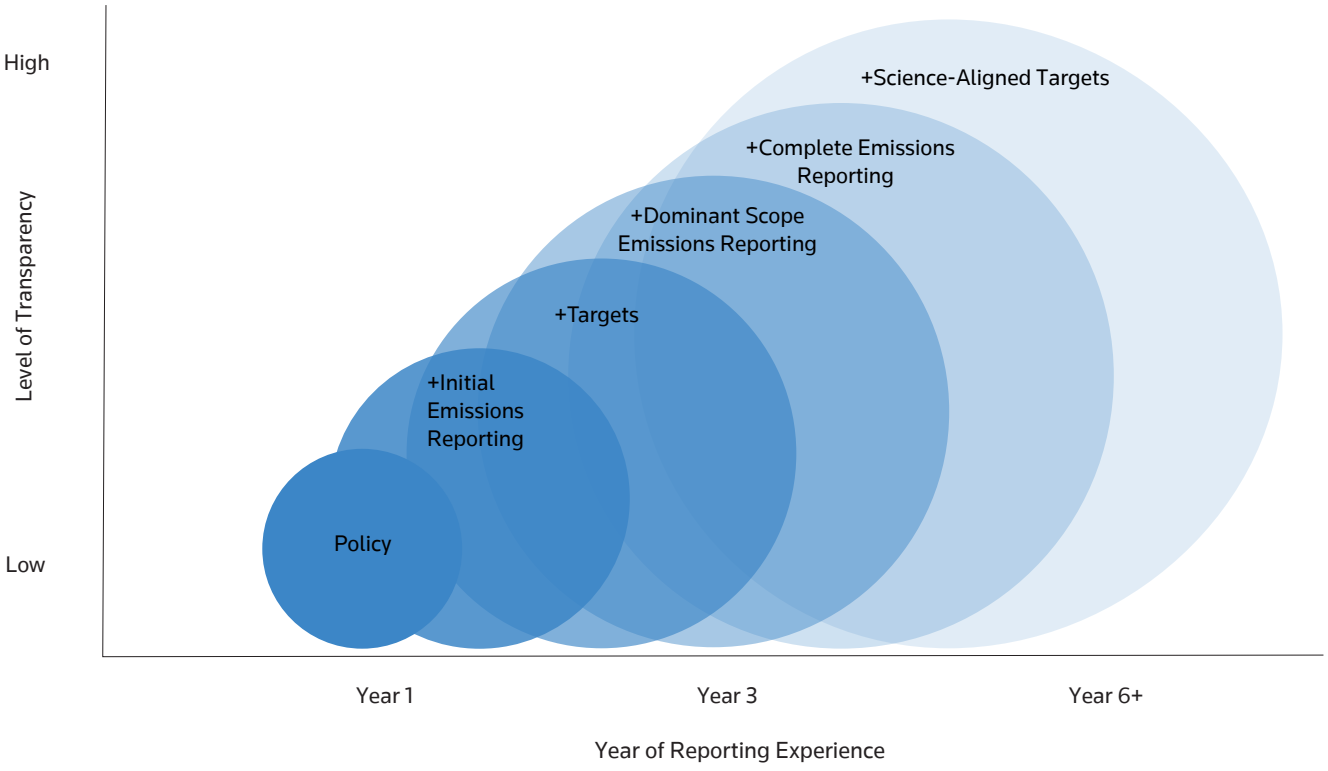
Targets. Third, initial publicly announced emissions reductions targets are set, often geared to short-term incremental improvements.

Dominant Scope Emissions Reporting. Fourth, as emissions reporting matures, companies recognize and report on the sources of emissions that make up the majority of their impacts – for many companies that requires initiating reporting on supply chains and product use (Scope 3).

Complete Emissions Reporting. Fifth, demonstrating leadership in transparency, companies report (and frequently acquire third-party verification) for their full GHG footprint.

Science-Aligned Targets. Sixth, signaling a commitment to decarbonization in line with the Paris Accords and the best scientific guidance, companies publicly announce ambitious, long-range emissions targets and their plans to execute.

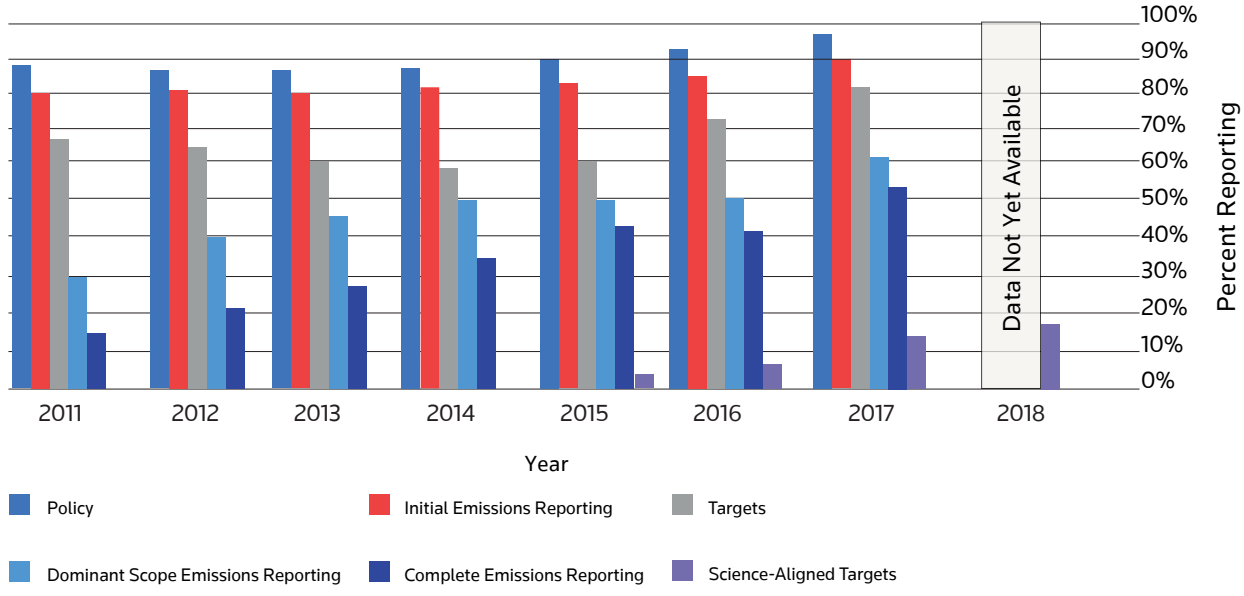
Typical Progression In Coporate Transparency



Source: Refinitiv ESG, Constellation Research and Technology, Inc., and CDP

Moving along this *transparency pathway* is a journey that is typically years in the making. Progress up the curve requires a commitment from company leadership and may be one of our best indicators of corporate *readiness* to meet the challenges of commerce in the near future. A high-level view of transparency in the G250 from 2011 to 2018, to be discussed in more detail below, is as follows:

The Multi-Year Trends in Transparency Among the G250



Source: Refinitiv ESG, Constellation Research and Technology, Inc., and CDP

This paper concludes that of the 250 companies (G250) responsible for approximately 1/3 of annual GHG anthropogenic emissions, approximately half are now measuring and reporting relatively complete emissions data and demonstrating at least a *readiness* to manage the decarbonization of their businesses in line with the Paris Accords. While this number has more than tripled since 2011, significant progress among the other half in the next several years – or lack thereof – will greatly affect efforts to avoid the most severe consequences of climate change.

Key observations about transparency and performance:

1) For the majority of companies, establishing a policy mitigating climate impact is a first step, and almost all follow with initial emissions reporting. While a higher percentage of the G250 reached full emissions disclosure in 2017 (52%) compared to 2011 (15%), significant growth of firms offering Complete Emissions Reporting is still needed.

2) Companies often significantly expand coverage of emissions reporting in their initial years of disclosure. Greatly increased year-over-year emissions can be a sign of improving awareness and management of emissions, not an indicator of worsening performance.

3) Companies evolve from what's easiest to measure, to measuring what matters most. For approximately 73% of the G250 companies that's the hard-to-calculate emissions from product use, supply chains and other indirect factors (Scope 3).

4) Target-setting capabilities and ambitions evolve together – typically from short-term tactical objectives to long-term strategic goals impacting core business processes, product design and supplier operations. Approximately 20% of the G250 are pursuing transformational goals to decarbonize their businesses.

5) Among the G250 firms, those exhibiting higher levels of transparency than their sector competitors have tended to outperform their peers on total shareholder return. Those shareholder gains are greatest for firms combining transparency with effective execution of their decarbonization strategies.

Whether these findings on transparency reflect the added value of good management or some emerging premium for companies positioned to compete in a fast-approaching carbon constrained world, they should be especially relevant to firms still on the transparency sidelines, and particularly to their stakeholders. Given the long timeframes needed to build readiness to decarbonize and transform, firms who are at the knee of the transparency curve may discover that risks from limited engagement on climate impact have accumulated, and may further impair future business performance.

The Situation

2018 will likely be remembered as the time when apprehensions of risks from a changing climate became realizations of the costs, damages and challenges we will face as we seek to manage climate disruption. Mega-storms, rising seas, fires and floods have plagued us from the Florida Panhandle to the East China Sea. With each passing year, stronger climate signals emerge from the noise to warn us of what is coming. While only a few years ago our focus might have been polar bears and coastal living, we are now learning about the latest modelling from the Intergovernmental Panel on Climate Change (IPCC) that tells us how hard it will be for people to maintain stability in the basics of adequate food, drinkable water and habitable settlements – even in places where availability of those resources is taken for granted today.

A quick snapshot of the most recent reports is ominous:

1) The melting poles are potential for runaway methane release that could initiate a positive and uncontrollable feedback loop adding the equivalent of another U.S. economy to the atmosphere. ...

Are we risking global climate destabilization?

2) The regional downturn in food production due to heat, drought and flooding includes declining wheat. ...

Are we prepared for mass migration away from the equator?

3) Heat above levels that, at a minimum, constrain activity or cause illness and death in regions around the world that have never experienced such events. ...

Could major cities become unlivable?

4) Growth in losses from billion dollar climate-related events – in the U.S. only – from three events and $70B lost in 1980 to 16 events and $340B lost in 2017. ...

Can we actually afford to suffer such losses if these numbers keep climbing?

5) Perhaps most shocking, after all of the evidence of accumulating risk, global emissions are now headed back up again, and in the U.S. the spike occurred even though 2018 saw a record number of shutdowns of coal-fired power plants – the fuel highest in carbon emissions per gigawatt when burned. ...

As time runs out, how can we get many more of the big emitters committed to bending their GHG emissions curve?

The Good News?

Without a doubt, the Paris Accords are an important first step in mustering the will to change and resources to execute. Despite the announced withdrawal of the U.S. government, cities, states and a growing share of the business community in the U.S. and around the world recognize the need to move onto the decarbonization pathway.

Until there is a global plan and system in place to force down GHG emissions, we must strengthen the case for the key contributors to the climate crisis to voluntarily accelerate execution of their decarbonization strategies soon enough to avoid the more extreme downside scenarios, both for companies themselves, and the planet.

The good news, if there is any, is that a large portion of the GHG emissions come from a relatively small number of businesses. Our 2017 report estimated that the G250, or the companies responsible for running the most GHG-intensive business processes (e.g. energy, cement and steel production) or building the most GHG-intensive products (e.g. autos, aviation and HVAC systems), are responsible for as much as 1/3 of all anthropogenic emissions. So, while ultimately change is a team sport that will require all of us to play, the captains who must create our planetary game plan are already on the field. Their readiness to contribute to a win is our most pressing question.

Focus: Executive Interview: Paul Simpson, CEO of CDP

In this interview with Paul Simpson, CEO of CDP, we explore the foundational role of transparency in the journey towards decarbonization. Transparency is both crucial for transformation of carbon-intensive business models, and unfortunately all too rare in the companies which matter most for reducing emissions. – Tim Nixon, Managing Editor, Thomson Reuters Sustainability

Tim: Why is transparency important? What are the benefits?

Paul: Transparency is the foundation of any solution to the climate change crisis. Once companies know where their key impacts, risks and opportunities lie, only then can they focus their resources effectively. You can't manage what you don't measure – disclosure allows companies to understand and manage their own emissions, and reduce them towards a target. It also allows external stakeholders – such as investors, customers and governments – to understand a company's readiness to compete in a carbon-constrained world, and gives them the information they need to support more sustainable businesses. And the benefits of transparency are only increasing. Preparing for new regulations like mandatory disclosure and carbon pricing, meeting the evolving needs of investors and customers, attracting the best talent, maintaining the trust of consumers and enhancing brand value – all these points combine to create an ever-stronger business case for disclosure.

And of course, the converse is also true. As costly climate impacts increase and the economic trends towards low-carbon continue apace, those companies not adapting will face increasing financial risks.

Tim: How is CDP's data actually used?

Paul: Our data is made available on a number of investor research platforms, and is used by the whole market – by companies themselves when assessing their own environmental impacts, by big purchasers when choosing which suppliers to work with and crucially by investors when informing their engagement strategies, investment research and stock selection. Our data is at the heart of the growing ESG investment market – many investors wouldn't be able to offer the products and services they do, without the data we collect on their behalf.

One trend we are increasingly seeing is investors using our data to create tailored financial products. For example, our climate change data powers the STOXX Low Carbon Indices and the New York State Common Retirement Fund's low carbon index. And in 2018, the Euronext CDP Environment France Index was launched, making it the first index globally to base its selection on how companies perform across not just climate change, but water security and deforestation metrics too.

Tim: How accurate is reporting? Are we at a point where company emissions data is useful for sector-level comparisons?

Paul: Reporting methodologies are built on similar tools and reflect guidance from globally accepted protocols. There is also an increasing level of third-party verification on the emissions reported by companies. So, where you have enough large players at the sector level reporting with verified data, sector comparisons are possible.

Over 7,000 companies reported through CDP in 2018 and this provides a comprehensive dataset for comparison. For each of those companies, a complete, verified dataset is important, but it isn't going to be immediately attainable, and the process of collecting and improving data is itself valuable.

When companies start disclosing through CDP, we tend to find their reported emissions actually increase year-on-year at first, because they are improving the scope and quality of their data collection. This is a valuable process, as companies start to identify the low-hanging fruit of energy efficiency. Of course, once a company has disclosed for a number of years and has a system in place, it is important to get the data verified. External verification demonstrates that the information disclosed is robust while providing an external perspective that can challenge assumptions and help companies improve.

With that being said, we still have a long way to go on transparency in some areas. As is evidenced in CDP's work and in this report, Scope 3 emissions reporting is still relatively low, and represents a big part of the emissions profile of some companies – especially in sectors like retail, hospitality and finance, where their direct emissions are relatively low, but significant emissions come from what they buy, sell and throw away, or the investments they make. With this report showing a shortfall in the quality of emissions reporting by the world's most carbon-intensive companies, it is clear more work needs to be done here.

Tim: Given the cost and uncertainties of collecting data and reporting it publicly, some say firms should spend their resources reducing energy or resource consumption and emissions will take care of themselves – what do you think?

Paul: All firms are on a journey when it comes to emissions reduction and they can only do that effectively with data and disclosure. The first part of this journey often starts with reducing energy consumption as it is easy to measure and has a clear cost benefit.

Companies can and do set internal targets, which have the benefit of reducing costs and emissions. And while those steps are very important, they are no longer sufficient for a carbon-intensive company to harvest the benefits of leadership. A company can set a target by itself, but it cannot stay on track and be accountable without communication, feedback and engagement with its investors, regulators, customers and other stakeholders. This transparency builds trust and accountability.

Over the last three years we have seen a new norm begin to emerge on target setting amongst leading companies, with around 500 companies setting or committing to set a science-based target within two years.

For companies themselves, the process of disclosure builds up a picture of what progress is being made, enables better peer-to-peer benchmarking and allows them to track which actions have had the greatest impact, so they can meet their targets efficiently. This saves money and time, and can also unlock opportunities. For example, if they look at the data and find most of their emissions are in the use of their products, then efficiency savings in their buildings may not be the best place to focus. Instead, they may want to focus more on product innovation.

Crucially, the 2018 IPCC report tells us that we need wholescale transformation of the global economy to halve emissions by 2030 and reach net-zero by mid-century. This means transforming business models, not just tweaking efficiency savings.

Tim: How real is the regulatory requirement to report? How important is it to our progress?

Paul: Regulatory requirements to disclose are increasing but they are still not real enough in many jurisdictions. At a minimum, we need to mandate reporting on a global basis from the companies that represent a significant portion of global emissions. This report documents the current rates of transparency from these firms, and it is clear we are not where we need to be yet.

That said, where we do see regulation, we also do tend to see much higher rates of transparency. Europe is a good example of this and we now see China developing an ESG disclosure directive, which is a significant development.

Part of the challenge is how quickly this regulatory wave will progress across the rest of the world. From what we see, it is not coming quickly enough for the speed of transition we need.

A welcome boost to the mainstreaming of corporate transparency on environmental risk comes from the Financial Stability Board's Task Force on Climate-Related Financial Disclosures (TCFD), with the recommendations now endorsed by 513 companies and rising. The fact that financial heavyweights like Mark Carney are leading the TCFD is shifting the dialogue on environmental disclosure, moving it from the CSR departments into the boardroom.

Of course, regulation will be necessary in many cases, but it is not sufficient as a tool in and of itself to accelerate our progress on this existential challenge. We need other levers, particularly investor engagement and leadership from the CEOs of high-emitting companies, which will position them and their value chains for business success in the unprecedented times ahead.

A Close-up on the Top 25 GHG Super Emitters

In the chart below, we have listed the Top 25 of the G250 companies responsible for approximately 15% of annual anthropogenic emissions. These firms are on this list because they are big, and bigness can be an asset, as well as a liability in the drive to create a sustainable future.

Figure 1 indicates the wide variation in the level of transparency and likely readiness to decarbonize among this group of super emitters. Our *Transparency Bar* displays the key elements of climate-related transparency demonstrated by each company, as follows:

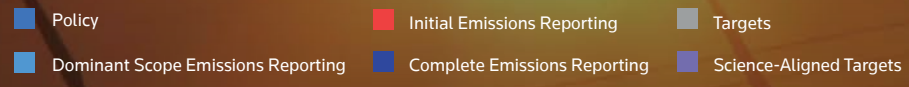


Figure 1. Top 25 of the G250 with Transparency Bar (see Appendix 1 for full G250 Transparency Bar)

Rank	Company	Performance
1	Coal India	
2	PJSC Gazprom	
3	Exxon Mobil Corporation	
4	Cummins Inc.	
5	Thyssenkrupp AG	
6	Rosneft OAO	
7	Royal Dutch Shell	
8	China Petroleum & Chemical Corporation	
9	China Shenhua Energy	
10	Rio Tinto	
11	PETROCHINA Company Limited	
12	BHP Bilton	
13	Petróleo Brasileiro SA - Petrobras	
14	Korea Electric Power Corp	
15	BP	
16	Total	
17	Valero Energy Corporation	
18	Chevron Corporation	
19	Toyota Motor Corporation	
20	Wistron Corp	
21	United Technologies Corporation	
22	Peabody Energy Corporation	
23	YTL Corp	
24	Phillips 66	
25	Volkswagen AG	

Source: Refinitiv ESG, Constellation Research and Technology, Inc. and CDP

Note from Authors: All of these firms are on a journey, and may be progressing further than indicated as of the date of publication of this report. We invite the reader to closely assess the firm's current progress using this framework. We also invite the G250 firms themselves to provide updated information to their stakeholders, including the authors of this report. We are committed to providing the most accurate and up-to-date view of performance possible.

As is shown in Figure 1, three companies among the Top 25 (Cummins, UTC and Toyota) who publicly disclose targets and periodic progress reports have signed on to the Science Based Targets initiative signaling their commitment to decarbonization in line with scientific guidance for a 2°C scenario. Of the 10 additional firms among the Top 25 disclosing emissions with a degree of completeness that allows observers to assess progress, five firms (Royal Dutch Shell, Petrobras, BP, Chevron and KEPCO) all report reducing their carbon intensity defined as GHG emissions normalized by revenue, and three others (Total, BHP Billiton and Rio Tinto) report decoupling GHG emissions from growth – defined as absolute reductions in emissions with increasing annual revenues. Total is notable in that it has decreased aggregate absolute emissions by 3% or more over the last three reporting periods, grown its business and has systematic public plans for decarbonization through 2050, thus achieving performance aligned with the targets of the Paris Accords. Roughly half of our Top 25 are committed to and making meaningful progress on decarbonization strategies, having achieved step 5 or 6 in their decarbonization journey. This is an encouraging result among these emissions giants demonstrating the potential for even the largest carbon intensive businesses to transform.

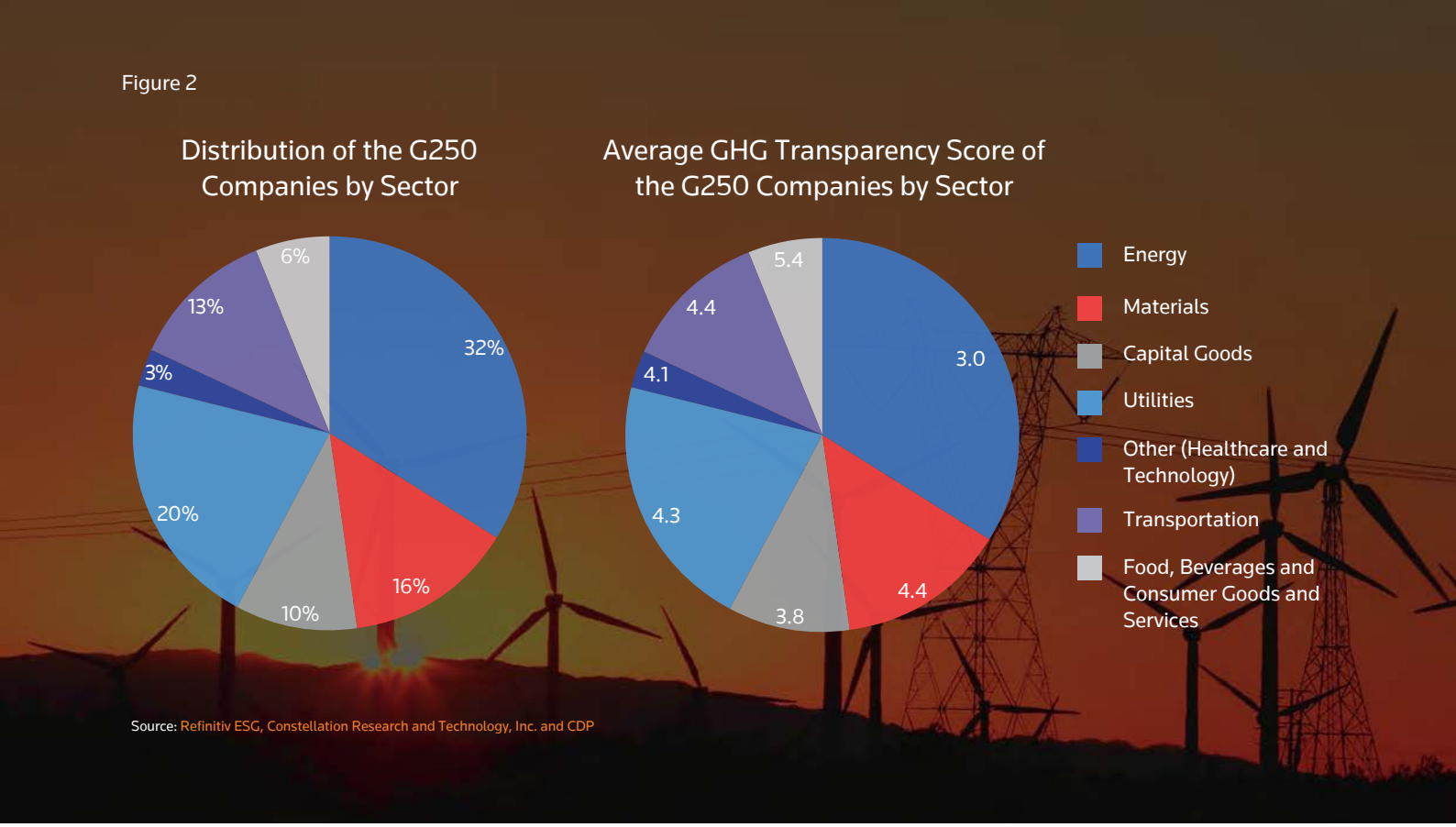
However, what is also true and crucially important is that among the Top 25, seven companies including Coal India, China Petroleum, China Shenhua, PetroChina, Valero Energy, Peabody Energy and Phillips 66 are at the very beginning of their decarbonization journey with only a publicly stated policy intent and incomplete disclosure. Without full transparency on their emissions and targets for GHG emission reductions, we have no way of knowing if, how and when they will become part of the solution to the growing climate crisis. These systemically important companies, like their financial counterparts, are simply too big to fail and must be recognized as undermanaged risks. Disclosure of current emission levels, along with publicly stated goals for improvement are still the best signals of translating intent into performance.

Expanding the Footprint: A Look at Transparency Among the G250

Who are the 250 world's largest publicly listed emitters of GHG emissions? First, they are very large enterprises ranging in revenues from $500,343,000,000 (Wal-Mart Stores, Inc. to $608,198,215 (African Rainbow Minerals. In every case, their businesses are energy intensive. They represent three big classes of firms – those whose core business processes result in the creation of significant volumes of GHGs such as energy, steel and cement making, those companies whose products produce significant volumes of GHGs during their use such as autos, aviation and HVAC systems and those firms that have relatively balanced emissions from operations, supply chains and/or product use, such as global conglomerates.

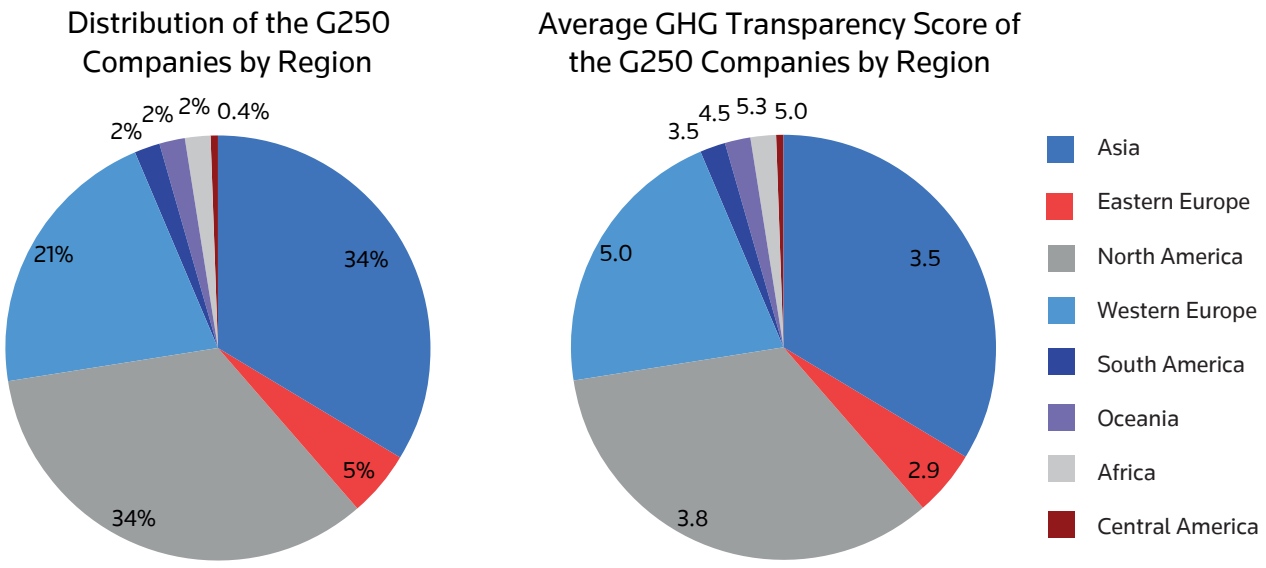
Figure 2 shows the primary business sectors that make up the G250, as well as the average level of GHG transparency of companies in each sector (a score of 6 connotes completion of the 6-step transparency journey, a 5 completion of five of the six steps, and so on.

Figure 2



Source: Refinitiv ESG, Constellation Research and Technology, Inc. and CDP

Figure 3. The geographic distribution of headquarters for these global business organizations, and similarly the relative level of transparency by geographic region.



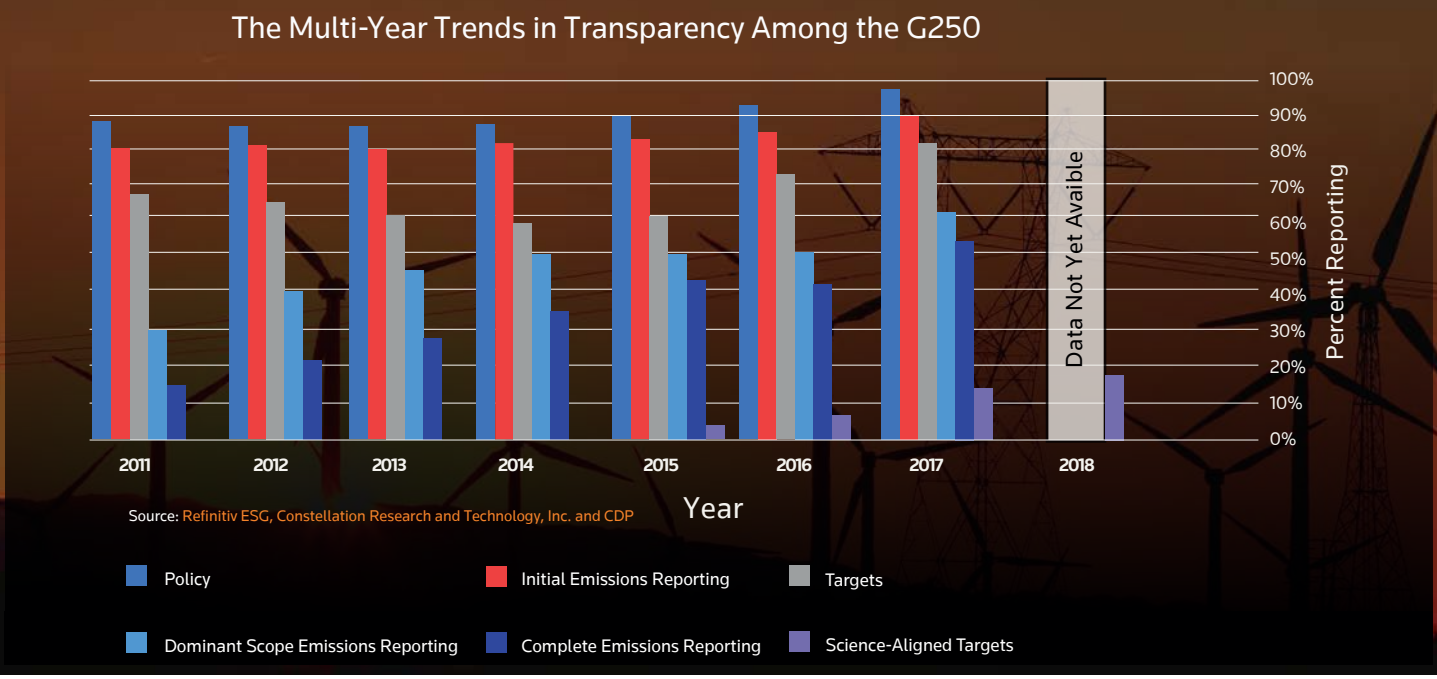
Source: Refinitiv ESG, Constellation Research and Technology, Inc. and CDP

As expected, the energy, utilities, transportation and materials sectors make up more than 80% of the G250, with North America and Asia accounting for 2/3 of the headquarters locations. Of particular interest in Figure 2 is the fact that the energy sector makes up the largest segment of the G250 (80 firms in the sector) and also has the lowest global average transparency score.

From a regional perspective, North America and Asia are home to the greatest and roughly equal number of G250 firms, and surprisingly both exhibit relatively low average transparency scores (i.e. 3.8 and 3.5). Western Europe, with the third-ranked share of companies is near the top of our transparency index with an average score of 5.0.

Figure 4

Figure 4 displays the multi-year (2011-2017/18) trend in transparency for the Global 250 companies. As can be seen, roughly 95% of the firms have promoted a policy statement on climate change and more than 85% have released some GHG emissions data. While the trend lines on comprehensive disclosure remained relatively flat from 2014 through 2016, there has been a noticeable up-tick in 2017.



Of note is that approximately 60% of the G250 now report on what we term their *dominant* emissions, meaning for each firm the source of emissions that contributes the majority of their impact, whether from their own operations and energy suppliers (Scopes 1 & 2), their supply chains and product use (Scope 3) or is some cases a more balanced emissions portfolio (Scopes 1, 2 & 3).

Notably, 2015 adds a new category to this model – companies that have publicly stated targets for emissions reduction in line with the Paris Accords. While only 4% of the G250 in 2015 indicated a readiness to publicly commit to a science-aligned target, this number has grown to 17% by the end of 2018 – a promising sign of progress.

Understanding the Progression from Policy to Performance on Climate Impact Management

Each of the steps in the transparency model is important, but even more important is the pace of progression from initial reporting to comprehensive target setting and goal achievement. Progress along this transparency continuum oftentimes reflects an on-going cultural transformation of a business. These changes do not come easy, and are not without costs and risks.

However, transparency and progress on managing climate impacts brings meaningful benefits from multiple constituencies including employees who want to work for companies making a difference, customers who want to do business with companies that are part of the solution to our climate challenge and investors who see both the potential risks of stranded assets as well as new opportunities in a post-carbon economy. Dennis Whalen, leader of KPMG's Board Leadership Center, summarizes: "Expectations and demands of not only investors, but also employees, customers and communities where companies operate, should continue to drive greater transparency. Telling the company's 'ESG story' – beyond a glossy corporate citizenship report – is quickly becoming a competitive issue."

Expanding on the telling of the story, Paul Davies, partner at Latham & Watkins, one of the largest law firms in the world, comments: "A major overhaul of environmental due diligence is required to address both conventional compliance and legacy liabilities, as well as sustainability performance and future-proofing. This should include incorporating ESG into investment analysis and decision-making processes, through early-phase ESG screening of investments." In other words, it's not just the professional community of investors that is mobilizing around the importance of transparency, but also the legal community when evaluating mergers, acquisitions, private equity deals and other related transactions.

Transparency is the pre-requisite to future-proofing these key businesses for the benefit of the many millions of stakeholders who rely on them. So now let's take a closer look at how companies progress along the disclosure pathway.

Step 1:

Policy - Expressing Intent is Often the First of Many Steps on a Long Journey

While it is easy to dismiss expressions of intent to change performance as mere public relations, it can be a useful early signal that climate and environment have made it on to the corporate agenda. While it is also true that policy statements differ in their breadth and scope, the important question is: once expressed, does policy turn into action that can drive change?

What seems clear from the data is that nearly all companies are following up policy commitments with at least some initial reporting of GHG emissions. The big gap is between companies disclosing some emissions data from those fully disclosing all material emissions. In 2011, that was a difference between 80% of companies with some reporting and only 15% with complete transparency. Few companies went the distance. Today, 90% of companies with a policy report some data, while about 50% report completely, a gap of 40%. Better, but representative of the challenge ahead.

Step 2:

Initial Disclosure of GHG Emissions – Looking Worse May Be a Signal of Getting Better

Initial disclosure of GHG emissions typically starts with what is easiest to measure for most businesses (i.e. the impacts of their primary business facilities, operations and purchased energy referred to as Scope 1 and 2 emissions. For example, a fossil fuel energy company may robustly report all emissions from their operations to extract and transport energy. While this is of course important, it would also represent but a fraction of the total emissions resulting from the actual use of the products sold (i.e. Scope 3 emissions). It often takes several years of disclosure experience for firms to cover all geographic regions and all emissions scopes, especially Scope 3.

This may be particularly true for the large and complex multinational firms among the G250 companies.

In fact, among the 199 G250 companies who began GHG reporting in 2011, 51 companies (27%) reported a 25% or greater increase in revenue normalized emissions within the first two years. Absent extraordinary changes (such as business mergers and acquisitions) it is highly unlikely that such emissions increases are a result of anything except increased emissions coverage by the company. If those early years are not understood by interested observers as *learning to report*, rather than signs of further decline, then it is possible that there could be an incentive to continue *partial reporting* or even a disincentive to begin reporting at all. For many firms, this is indeed a situation where *looking worse* may be the first sign of *getting better*.

As firms gain greater experience with transparency, stronger evidence often emerges that the intent is strategic, even transformational. Target setting is usually the next big leap for firms as they begin to gain the ability to manage down emissions. As Figure 4 above demonstrates, firms often set reduction targets ahead of being able to report their full emissions profiles.

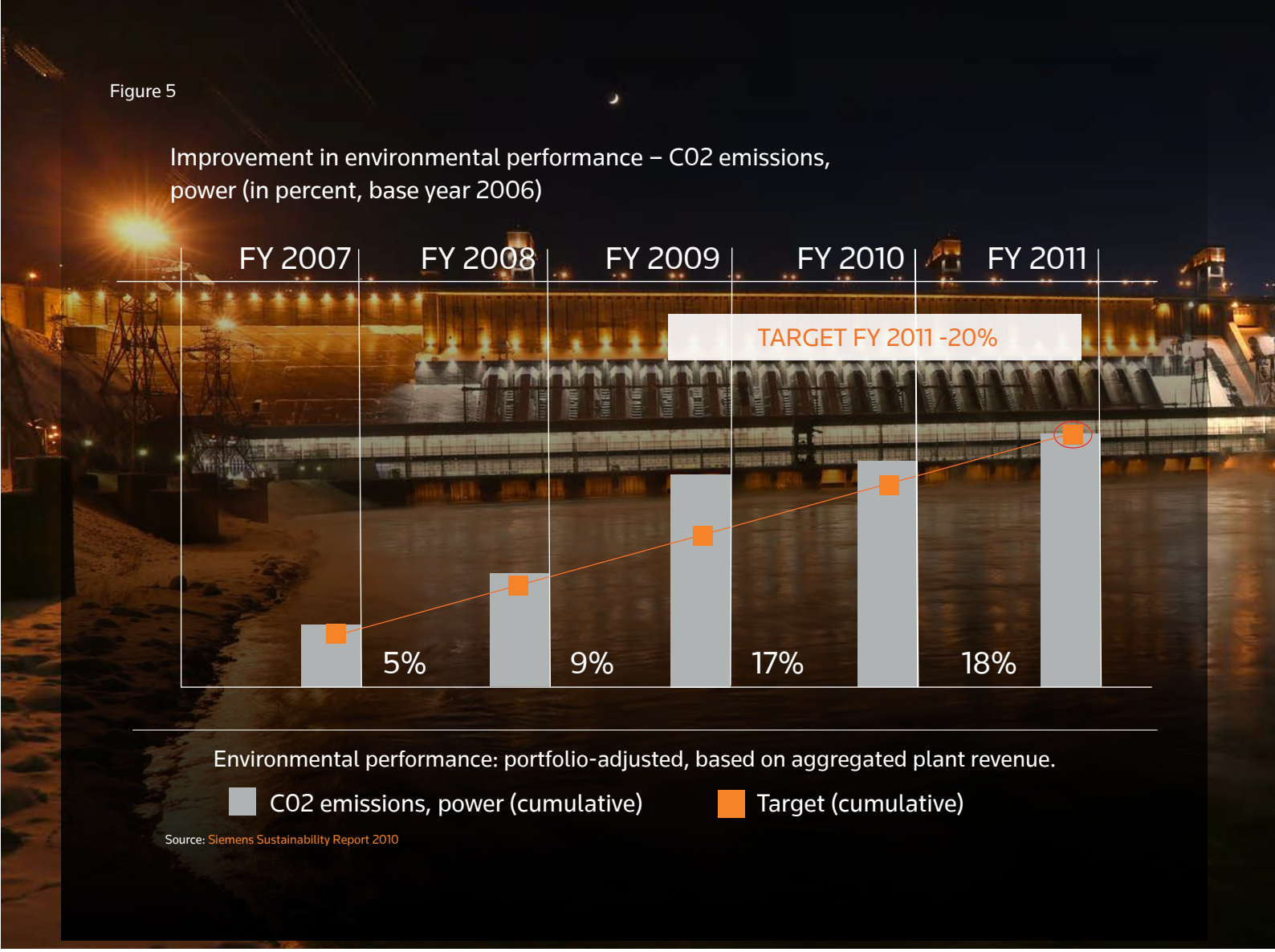
Step 3:
Target Setting – Changing the Tense of Climate Impact Management

Target setting is usually a reflection of firm's comfort level with their ability to manage down their GHG footprint. Among all G250 companies (see Figure 4 above) more than 80% of the companies have publicly stated reduction targets.

Like emissions reporting, GHG emissions target setting is often a developmental phenomenon. Early rounds of public targets are often relatively short-term and aimed at incremental improvement. Later rounds based on deeper understanding of actual impacts and opportunities may represent more long-term transformational goals.

Early on in its journey, Siemens (number 120 on the top G250 list) represents a good example of this kind of trajectory on goal setting. Looking back to their 2010 Sustainability Report, one finds a very robust set of examples of Siemens reporting on dozens of programs and product innovations aimed at improving their sustainability and that of their customers – from hybrid double-decker buses in London, to advanced low-energy lighting systems in Texas. However, Siemens' target setting for performance improvements in general were very short-term. Figure 5 (below) depicts their forecasted goals for CO^2 emissions. They looked out only one year, were based primarily on Scope 1 and 2 emissions and were their only publicly reported target.

Figure 5



Contrast that goal statement with the latest 2018 emissions target set by Siemens – carbon neutral operation by 2030. They are committed to a zero-carbon footprint and have released an overall plan to get there over the next 12 years. Siemens adds to their commitment by ensuring that through climate-related product innovation (Scope 3), they will do their part to enable customers to achieve a similar goal. Siemens, like a relatively small set of other decarbonization leaders, has the confidence to set targets it does not know exactly how it will achieve – much like President John F. Kennedy did when he set the goal to put a man on the moon within 10 years. Years of transparency have built management capability and confidence to set goals that will inspire innovation and drive growth.

Source: https://new.siemens.com/global/en/company/sustainability/decarbonization/carbonneutral.html

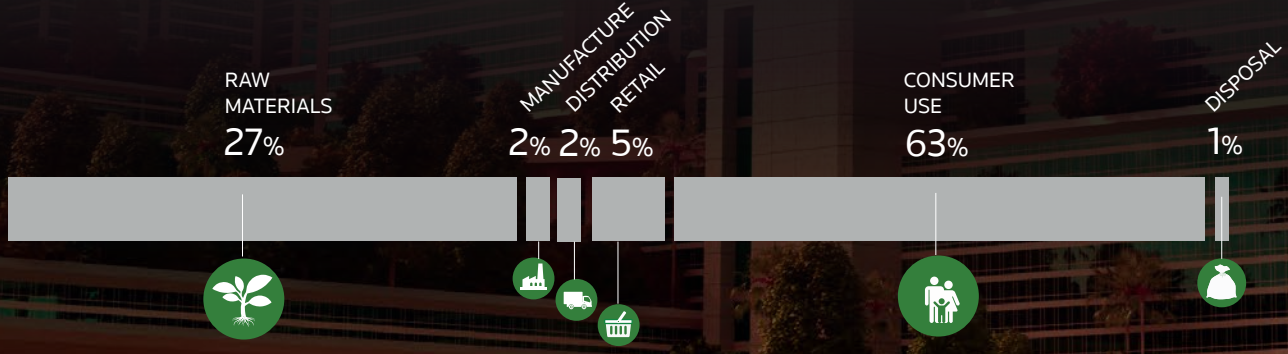
Step 4:

Dominant Scope Emissions – Measuring What Matters Most

In the roughly 100 pages of "The Green House Gas Protocol: A Corporate Accounting and Reporting Standard" considerable attention is given to the challenge of GHG reporting that meets a three-pronged objective for "accuracy, completeness and relevance." As the document states, "A 'transparent' report will provide a clear understanding of the issues in the context of the reporting company and a meaningful assessment of performance." (GHG Protocol p. 9). The protocol offers a great deal of procedural clarity on what are termed Scope 1 and 2 emissions – those under the direct operational control of the business (Scope 1) and those resulting from purchased energy (Scope 2). But it recognizes that capturing the upstream and downstream impacts of a business – even when the business does not have operational control of the emissions – is often both problematic and highly relevant to a meaningful assessment of performance.

Consider Unilever, number 175 in the G250, as one of the companies that has risen to the transparency challenge. The company, a $61B consumer and packaged goods giant, reports that 63% of its GHG emissions result from product use – mostly driven by factors like the energy required to heat wash water – and that another 27% of its impact comes from its suppliers. While the GHG Protocol describes the disclosure of these Scope 3 sources as "complex," it is clearly not possible to have a "meaningful assessment of performance" without this information on indirect emissions. Similarly, assessing automakers or energy companies without consideration of product use – the model making variable –leaves interested observers well short of data that is accurate, complete and relevant.

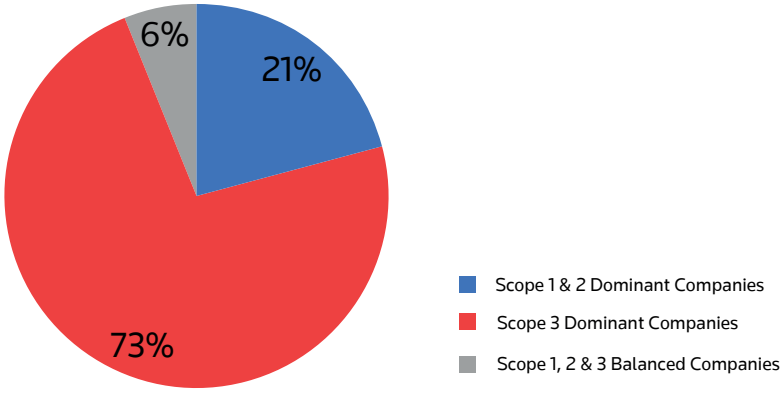
Unilever's Green House Emissions by Source: An Example of Indirect Impacts



Source: https://www.unilever.com/sustainable-living/reducing-environmental-impact/greenhouse-gases/reducing-transport-emissions/

Looking more broadly at the reporting challenge, Figure 6 (below) displays the distribution of the G250 by their dominant type of emissions. Approximately 73% of the companies are in Scope 3 dominant businesses – meaning, like Unilever, the majority of their emissions come from their supply chains and/or product use. This graphic tells us how important it is for nearly 3/4 of the G250 to fully report Scope 3 emissions. The GHG Protocol further suggests that such reporting is best used as a point in time measurement, enabling a company to assess its rate of improvement over time.

Figure 6 Classification of the G250 Companies by Dominant Emissions Scope



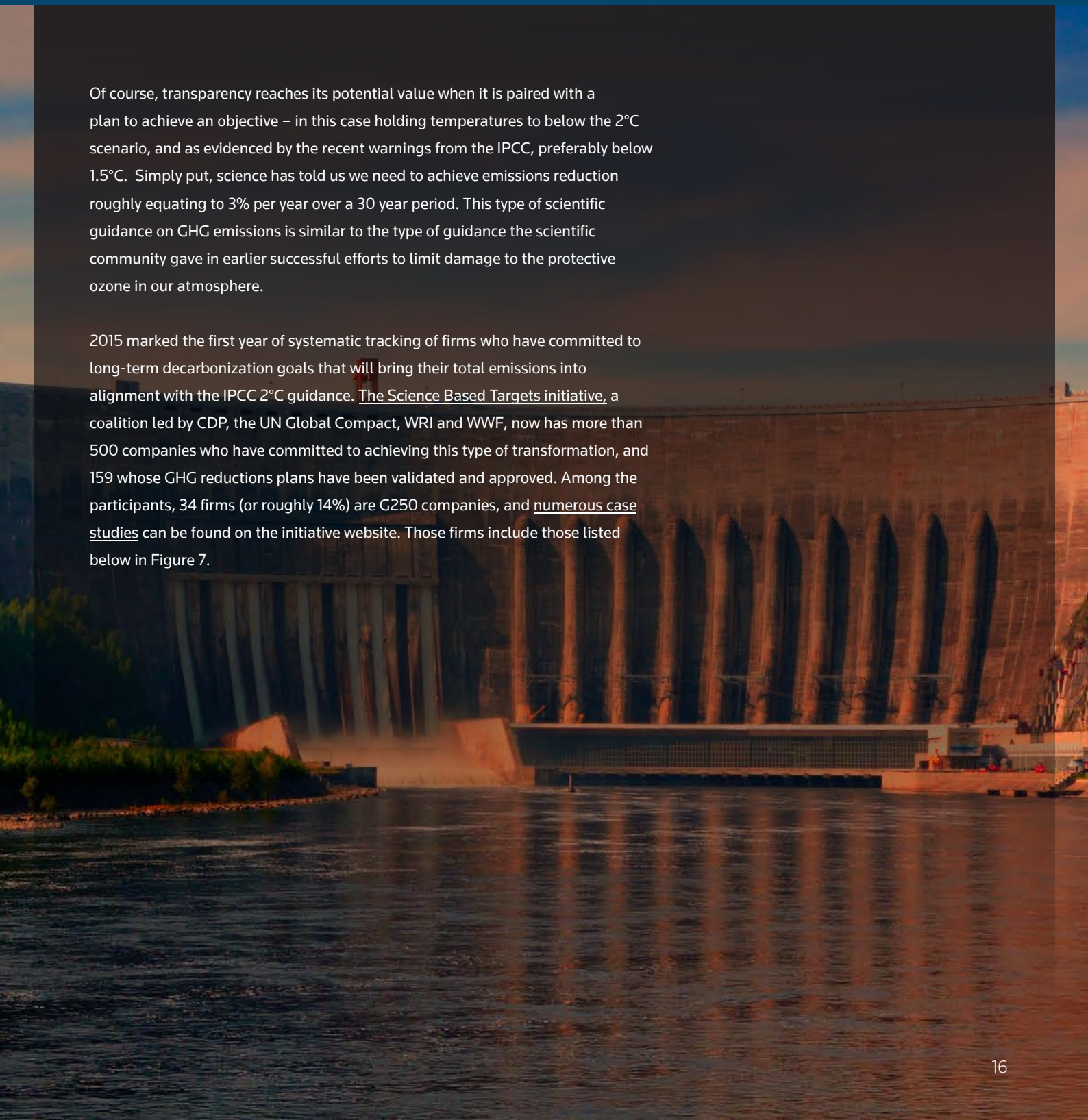
Source: Refinitiv ESG, Constellation Research and Technology, Inc. and CDP

Step 5:
Systematic Management of Climate Impact – Moving Slowly Toward Readiness to Reduce Impacts

As has been discussed above, reporting emissions for a global business and its supply chain represents an investment in time, culture and treasure. Going from some GHG reporting to reporting on the most material (dominant) sources of emissions, and then on to a complete disclosure of all emissions (Scope 1, 2 & 3) is a multi-year journey for even the most committed companies. Given the rapidly evolving picture of climate risk and the role of the largest emitters in either exacerbating or reducing those risks, forward-looking companies must know where they stand today. Not knowing a firm's GHG footprint may be a cause for concern among external stakeholders. However, it should be a greater concern for senior managers and directors who will be at a disadvantage in the inevitable drive to reduce emissions, if they are years away from being able to fully count their current impacts when they recognize the severity of the situation.

From historical analysis, it takes about six years to move from initial policy engagement to complete reporting of a firm's emissions. Generally, complete emissions reporting has been a prerequisite before firms undertake significant emissions reductions efforts. Given that it takes most firms years to achieve this readiness to reduce, the ticking climate clock and the fact that half the G250 are not yet there, gives plenty of cause for concern and reason for action.

Step 6:
Transformational Goals – Targets Fit for Our World



Of course, transparency reaches its potential value when it is paired with a plan to achieve an objective – in this case holding temperatures to below the 2°C scenario, and as evidenced by the recent warnings from the IPCC, preferably below 1.5°C. Simply put, science has told us we need to achieve emissions reduction roughly equating to 3% per year over a 30 year period. This type of scientific guidance on GHG emissions is similar to the type of guidance the scientific community gave in earlier successful efforts to limit damage to the protective ozone in our atmosphere.

2015 marked the first year of systematic tracking of firms who have committed to long-term decarbonization goals that will bring their total emissions into alignment with the IPCC 2°C guidance. The Science Based Targets initiative, a coalition led by CDP, the UN Global Compact, WRI and WWF, now has more than 500 companies who have committed to achieving this type of transformation, and 159 whose GHG reductions plans have been validated and approved. Among the participants, 34 firms (or roughly 14%) are G250 companies, and numerous case studies can be found on the initiative website. Those firms include those listed below in Figure 7.

Figure 7

Number	G250 Rank	Company
1	4	Cummins Inc.
2	19	Toyota Motor Corporation
3	21	United Technologies Corporation
4	30	Honda Motor Company
5	34	Ingersoll-Rand Co. Ltd.
6	38	Daikin Industries, Ltd.
7	46	Nissan Motor Co., Ltd.
8	48	Procter & Gamble Company
9	63	Gas Natural SDG SA
10	74	Michelin
11	82	Wal-Mart Stores, Inc.
12	85	Hitachi, Ltd.
13	93	Nestlé
14	94	ENEL SpA
15	98	Renault
16	117	Groupe PSA
17	129	Daimler AG
18	132	Panasonic Corporation
19	133	Electrolux
20	135	Exxaro Resources Ltd
21	157	PepsiCo, Inc.
22	173	Tesco
23	175	Unilever plc
24	183	NRG Energy Inc
25	191	Origin Energy
26	196	Colgate Palmolive Company
27	208	VEOLIA
28	211	Iberdrola SA
29	217	Deutsche Post AG
30	219	CLP Holdings Limited
31	223	CVS Health
32	224	Mitsubishi Electric Corporation
33	226	McDonald's Corporation
34	246	HP Inc

Source: sciencebasedtargets.org

Science-Aligned Targets

There are also a significant number of firms not on the list above, but who have reached full disclosure (step 6), and are demonstrating a commitment to at least a 2°C world. These are firms like Xcel Energy, 172 on the G250 list. Specifically, this means performance resulting in at least a 3% reduction in aggregate absolute emissions over the last three reporting years coupled with specific, public long-term goal setting aligned with the Paris Accords. This has all been achieved without a downturn in their business revenues. In the G250, these firms include Eni, RWE AG, ENGINE, Total SA, Sempra Energy, PG&E, National Grid, Lafarge-Holcim, Hino Motors and Xcel Energy.

Focus: Xcel Energy

Xcel Energy®

Aims for zero-carbon electricy by 2050
Company sets new, industry-leading carbon reduction goal

Source: https://www.xcelenergy.com/

Our previous G250 Report profiled Xcel Energy, the large Minnesota-based public utility that serves 3.6 million customers across eight states. Xcel has spent more than a decade climbing the complex learning curve that has enabled significant decarbonization of their energy production. Following in the footsteps of his predecessors, CEO Ben Fowke has geared up Xcel's commitment to be the first major utility to aim for zero-carbon electricity by 2050. This 2050 goal comes on the heels of commitments made earlier in 2018 to reduce carbon emissions by 60% from 2005 levels by 2030. Xcel, having already cut carbon emissions by 35% from 2005, knows that this is just a well-executed smart business strategy.

Our analysis points to four aspects of their strategy:

1) Given Xcel's experience with renewables, they can now produce renewable energy at a lower cost than coal, even giving natural gas a run for its money.

2) As previously noted, these cost structure advantages from continually declining fuel and maintenance costs are providing new operating leverage in the business, enabling better operating results without bill rate increases.

3) That, and other factors, have enabled Xcel to outperform in the utility sector – something that has caused investors to take notice.

4) Customers, including residential, commercial and cities want clean energy, and the political climate is changing in their service areas. Xcel sees that trend increasing and wants to be in the lead, not playing defense. "When your customers are asking for this over and over," Fowke said when announcing the news, "you really do listen. Boulder, the city of Denver, Breckenridge and Pueblo, they've considered or they have already decided that they want to pursue 100% renewable."

For all these reasons, Xcel – a firm that once was tied largely to coal – is rapidly transforming into a step 6, 21st-century clean energy leader with all the business risk mitigation and opportunities for enhanced growth and profitability that make them an example of leadership for their peers.

Focus: 3M's Journey

Another example of leadership just outside of the G250 list comes from 3M, with a recent announcement to integrate sustainability into all new products by 2020.

Founded in 1902, one of the world's largest companies and a provider of nearly everything people may encounter in everyday life has just announced a transformation. 3M, with operations in 29 U.S. states, 70 countries and 91,000 employees, has committed to *sustainability* in all of its new products starting in 2019. So what does this mean and why is it important?

Increasingly, Size Matters

First, let's understand the footprint of 3M. In 2017 the company was responsible for emissions of 5.6 million metric tons of CO^2e from its Scope 1 & 2 operations, and 9.3 million metric tons CO^2e as upstream Scope 3 emissions. This puts it in the top 1,000 publicly traded global emitter category, so how it reports and manages its footprint is incredibly important as an example of leadership. There is also significant public evidence of leadership in line with the Paris Accords. The company has recorded a 68% absolute reduction in greenhouse gas emissions since 2002, while nearly doubling its revenue. If indexed to total sales, that reduction would be an 84% reduction in carbon intensity. It has also declared the following high-level targets and tracking, and like other leaders these are long-term commitments representing both steady incremental progress in areas like waste reduction and water use, alongside big leaps in renewable energy (see Figure 8 below).

Figure 8

Use of Products

Keep in mind that 3M has tens of thousands of products currently in the marketplace, with more than 1,000 new ones coming out of their innovation pipeline every year. These are things like high-voltage power-line-insulating technologies which are able to dramatically reduce GHG emissions, to cooling technology to reduce the massive amount of energy used by data servers, to lighter and more durable components in automobiles increasing fuel efficiency and safety. 3M is everywhere.

And because it is everywhere, this announcement means that integrating measurable aspects of sustainability into its products could really matter. If fully implemented, it will make 3M a better, more resilient company, but it will also make 3M's customers better and more resilient.

Gayle Schueller, 3M's chief sustainability officer, explains: "By taking responsibility for the footprint of our products and how they are used, we are doing the right thing from a transparency and reporting perspective as well as from an impact perspective."

There are many companies with very large environmental footprints who choose not to take responsibility for the impact when their products are used by their customers. In fact, many of these firms report emissions, but not for the most important part of their footprint, often called Scope 3, or most commonly, use of products. It's arguably a material omission for investors and regulators trying to evaluate risk.

Schueller continues: "A firm is responsible for the entire life cycle impact of its products. We are taking that responsibility very seriously, measuring our performance and creating opportunity for our firm and our clients. We see opportunity where others may see risk."

Public Targets

Shareholders will look forward to this example of leadership as 3M continues to measure the impact of its products against its goals. These include at least a 50% reduction in GHG (vs. 2002 baseline), a 10% reduction in water intensity, and achieving zero landfill status at more than 30% of global manufacturing sites, all by 2025. And 3M has mentioned that more aggressive goals are likely to be announced next year.

"It's about networked, measurable impact, in a positive direction," says Schueller.

As CEOs of carbon intensive businesses worldwide realize what is needed to prosper in an increasingly carbon-constrained world, we will see more firms like 3M who, as a core part of their business strategy, are fully transparent on their past emissions, and publish targets in line with the Paris Accords going forward.

Transparency and decarbonization are now a necessary part of competitive differentiation in an era of unprecedented risk and opportunity for business.

Focus: The Future of Transparency

One consistent critique of reporting is that it's self-reporting. While a fraction of firms reporting do incorporate third-party validation, most don't. For the foreseeable future emphasis must be placed on improved transparency to help drive better management. But there are new developments in measurement.

Firms like Google, Planet, Geofinancial Analytics and Descartes Labs alongside national space agencies are rapidly increasing our ability to measure and attribute ownership of emissions from orbit. This will become particularly important as so-called short-term pollutants like methane gain priority for very focused detection, measurement and attribution to corporate owners. Mark Kriss, Chairman of Geofinancial Analytics, explains: "Keeping methane in check is critical to staving off the worst effects of climate change. The U.S. oil and gas industry emits 13 million metric tons of methane from its operations each year – enough to offset much of the climate benefits of burning natural gas instead of coal. Satellites can attribute point sources of invisible methane gas emissions with resolution of 50 meters."

Reuters recently reported: "Man-made methane emissions are responsible for 25 percent of the warming our planet is experiencing right now."

The capabilities from orbit combined with land-based networks of data, citizen science and artificial intelligence, will provide a new level of transparency at the firm level. This new measurement array will reveal significant point sources of pollutants like methane, but also stand as a correction or auditing tool for many forms of GHG emissions potentially being under-reported.

"As the advantages steadily increase for carbon-intensive firms that are transforming their business models, so also will the ability to measure those transformations. Orbital platforms will continue to expand in their capabilities, and combined with artificial intelligence and ground-based sensors, our ability to measure leadership on reducing GHG emissions will become real-time for individual firms in the G250 as well as their supply chain," says Adam Smith, co-founder at Descartes Labs.

Working alongside these measurement platforms are new arrays of artificial intelligence that can knit together discrete images and data points and help establish networks of influence. Andrew Zolli from Planet.com explains: "Having real-time images from space is just the beginning. We are already able to understand much of the environmental and social *footprint* of the companies that make our chocolate bars, cars, air conditioners and nearly every other service and product in the global economy." As this data becomes integrated with public policy platforms, influence on company decision-making which affects us all, will be much more likely. Transparency is here, and in ways not foreseen by the titans of industry.

With this knowledge will come power to the *commons*. It will also deliver new business opportunity for the firms involved, particularly for those engines of commerce in the G250 who demonstrate their ability to transform their business models under this increasing scrutiny.

Linking Disclosure and Decarbonization Patterns to Shareholder Returns

The story of transparency would not be complete without reference to financial performance differences observed between companies who vary in their level of transparency. Looking at the G250 as a group and computing average Total Shareholder Returns (TSR) between 2011 and 2017, we find some interesting results.

Firms in the G250 were assigned to one of three transparency groups based on our model; 23 companies who either had No Reporting or Policy Only were categorized as Low Transparency; 97 companies who reported Initial Emissions, Targets, and/or Dominant Scope Emissions were assigned to the Medium Transparency group; or 130 companies who met the High Transparency criteria by reporting their Complete Emissions and/or committing to Science-Aligned Targets.

Figure 9 displays the G250 TSR Transparency Analysis. The results generally indicate a meaningful relationship between the level of transparency and average TSR with the Low group returning an average of 10.60%, the Medium group 11.26% and the High group returning 13.73%. What might be inferred from these differences in an admittedly small sample over a relatively short period of time?

G250 firms whose leadership teams have committed to full transparency meaningfully outperform those who have opted to avoid disclosure. Disclosure may be a very good signal of general quality of management. Management teams with a stronger commitment to disclosure, especially in carbon intensive businesses like the G250, may be signaling their growing preparedness to address the disruptive changes that lie ahead. They may be changing the culture in their organizations and, in important ways, signaling a commitment to innovation that will be essential to make transformation work. Lastly, their commitment to transparency and disclosure may be aiding them in the war for talent. These are engineering and science-intensive businesses. Graduates of the best engineering and science programs – critical to the success of the G250 – want to work for companies who are transparent and forward-thinking. Talent, culture and management leadership may be the real factors behind this positive trend on TSR, but whatever the cause, investors should be aware of the performance differentials.

Figure 9

Comparing Transparency Levels of the G250 to Total Shareholder Return (2011-2017)

Level of Transparency		Companies	TSR	Percent Change from Base
Low (Base)	No Reporting Policy Only	6 17	10.60%	0.00%
Medium	Initial Emissions Only Targets Only Dominant Scope Emissions Only	25 50 22	11.26%	0.66%
High	Complete Emissions Only Science-Aligned Targets Only	87 43	13.73%	3.13%

Source: Refinitiv ESG, Constellation Research and Technology, Inc. and CDP

Looking Beyond Disclosure: Links Between Decarbonization and Financial Performance

This analysis seeks to address another important question: How does actual decarbonizing (i.e. reducing emissions on a normalized revenue intensity basis, and/or on an absolute basis) relate to TSR? Conducting this test limits our G250 sample even further to the 91 companies among the G250 for whom relatively complete emissions data sets are publicly available, enabling multi-year assessment of the trajectory of GHG emissions. Naturally, it is not possible to comment on the link between changes in emissions and TSR for non- and partial-GHG reporters.

However, once again the trend is compelling. Companies were classified into two categories:

Carbonizers – companies showing increased revenue normalized GHG emissions intensity over a multi-year period.

Decarbonizers – companies showing decreased revenue normalized GHG emissions intensity over a multi-year period.

Results are as follows for TSR in the 2015-2017 period for which we had adequate data to analyze 91 of the G250 companies.

Source: Refinitiv ESG, Constellation Research and Technology, Inc. and CDP

Level of Transparency	Companies	Total Shareholder Return (2015-2017)
Carbonizers	31	11.70%
Decarbonizers	60	20.51%

This is a small sample and limited time period, so findings should be viewed with caution, but the results are encouraging for those who advocate for action on GHG emissions. At least in this sample of very large carbon-intensive businesses, one sees no shareholder penalty for decarbonization. With further analysis it might be possible to see positive business impacts from enhanced natural resource productivity or from accelerated revenue growth due to increased competitiveness of carbon and energy efficient products. These are the direct positive financial impacts of well formulated and executed climate impact strategies such as those undertaken by firms like Total, Xcel Energy, Ingersoll Rand, Toyota and others profiled in our previous reports.

Some might suggest it is only those firms who are more financially successful that have the financial capacity to invest in decarbonization. Perhaps that is true, but it begs the question of how such firms rose to their financial leadership positions. Again, this may be further evidence of the effectiveness of management to plan and execute, in general. In any case, it should be an encouraging result for those who seek to see capital flow toward transparent businesses who are delivering on the decarbonization challenge.

Transparency in Our Financial Markets

By John Streur, President and CEO, Calvert Research and Management

Transparency into the financial characteristics and condition of the issuers of securities that trade on our exchanges is critical for markets to function optimally. In recent years, investors throughout the world have expressed the need for enhanced disclosure of material environmental risk exposure, social and societal management practices and governance (ESG) structures. Transparency regarding ESG issues provides context to financial data and management expertise, and allows for a more comprehensive consideration of risks and opportunities while making investment decisions.

This need goes well beyond the desire for companies to have a positive impact on society and on the people and communities that they affect. Research, including several studies that Calvert has sponsored and participated in, indicates that material ESG issues can affect a company's financial performance. As the connection between ESG metrics and bottom-line financial impacts becomes better understood by the majority of investors, businesses have been more willing to measure and examine how they perform in these areas. We have also seen that companies that are not sufficiently transparent about their risk, or about addressing adverse events and controversies, are negatively impacted in areas such as stock performance and loss of goodwill and trust.

All participants in the global capital markets need this information to be made transparent in order to accurately price carbon, water, pollution and various social impacts in order to accurately price stocks and bonds. In addition, this information allows consumers to better understand a product's total cost and impact. For example, if one company produces a product that uses sustainable materials, while another produces a similar product in a way that has a destructive impact on the environment, the latter must be priced in a way that takes into account that environmental damage and risk.

Supply and Demand

As the integration of ESG data into investment decision-making has gone mainstream, more companies are providing ESG data. A report from the United States Government Accounting Office indicated that 85% of S&P 500 companies provided sustainability reports in 2017, up from just 20% in 2011. An even higher percentage of European companies report ESG data, many integrated with financial reporting. That is an important first step in the process. However, these efforts are now largely a voluntary action for companies, and the reporting has not yet been standardized. This makes it more challenging for investors to work their way through the noise and find meaningful information.

For this enhanced disclosure to be truly effective, we need to develop information systems that allow company management, consumers, regulators, the public and investors to have insight into the social and environmental impacts that companies are creating. Such systems may be leveraged to translate global norms into a framework that can be used to measure how businesses are operating, giving the necessary context to compare how businesses are performing relative to peers. At present, many companies are not conveying information about their ESG activities in ways that demonstrate the connection to business strategy, value creation and risk mitigation.

This is evolving. Recently the Sustainability Accounting Standards Board (SASB) codified its standards, after a multi-year collaboration with companies and investors to establish a framework to determine the financially material sustainability issues relevant to an industry and the companies within that industry. This complements the work done by the Global Reporting Initiative (GRI). As these standards are adopted by companies, more uniformity of data and transparency are provided to the market. This is particularly true when such systems are integrated with the United Nations Sustainable Development Goals (SDGs), which emphasize pivotal development goals for nation states and national programming.

Benefits of Transparency

In addition to the benefits for investors, companies gain from this enhanced disclosure in several ways. Making the connection between business strategy, value creation and risk mitigation allows the relevance of the company's work to be understood by investors, employees and other stakeholders. By developing internal reporting tools that tie the specific sustainability efforts to financial impacts at the company, a business can provide information that their own teams can use to drive change. Moreover, developing a standard set of information based on global norms and investor needs eliminates the inefficiency of having to provide similar information in multiple ways for various third-party examiners, which many face currently.

Benefits should only increase over time, as transparency becomes a virtuous cycle. As more companies disclose material ESG information in a standard format, investors will be able to see the full range of impacts of their portfolios. They will be able to measure investments in terms of relative carbon emissions, water usage and exposure to plastics, along with societal impacts, in addition to financial performance.

A Global Effort

The need for and value of transparency is increasingly recognized among multiple stakeholder groups – from asset owners, asset managers, regulators, issuers of securities, securities exchanges, academic researchers, policy makers and others – and there are many ways in which the effort to improve and standardize reporting on ESG issues is taking place.

Asset managers like Calvert engage with companies, directly or with coalitions of investors and industry groups, to encourage transparency and disclosure. We engage through strategies like direct dialogue, proxy voting and – where appropriate – filing shareholder resolutions. We also work as a part of coalitions like SASB's Investor Advisory Group, the UN Global Compact and the PRI to help companies improve their disclosure.

Work also is being done through engaging with policymakers by both investors and asset managers. In the United States, the Securities and Exchange Commission (SEC) has been asked by a group of institutional investors and asset managers, state treasurers and ESG advocates to mandate standardized disclosure of ESG information by publicly traded companies. Calvert Research and Management was one of the signatories on this petition. Such efforts may help companies to provide data that investors need to assess ESG risks more efficiently, and for all of us to more accurately consider the total cost and impact of our investments.

Conclusions: Time is Running Out

The irony of the climate crisis is that the very innovations that allowed us to unlock the energy stored in carbon over millions of years and quickly use that power to drive unprecedented growth in living standards, mobility, health and wealth, is the same carbon that now poses an existential threat to our way of life. While governments played a significant role in the exploitation of carbon, it is the business sector, and particularly those firms operating in carbon intensive sectors, who have swung this double-edged sword to their great advantage, and until relatively recently ours. So it is business that must now change.

Like many things in life, timing is everything. If the world had recognized and responded to the dangers of unrestrained carbon emissions when the scientific consensus emerged roughly three decades ago, then decarbonization could have proceeded at an almost leisurely pace. Were we on track to produce peak GHG emissions in 2020, then staying on a relatively safe 2°C plan would require an annual decrease of approximately 3.3% per year to achieve net zero emissions in 2050.

While not an easy target to hit, large companies in carbon-intensive sectors that have well-defined decarbonization strategies are achieving declines of this magnitude and more. They are doing so without disrupting business operations, perhaps even enhancing total shareholder returns as they become more climate resilient. However, if peak emissions do not occur until 2030, then a 7.4% annual reduction will be required to stay on the 2°C trajectory. Achieving this annual target is beyond the capabilities of all but a few of today's leaders, creating a far riskier and potentially more costly gamble.

Peaking in 2035 or later – a not unlikely scenario – puts the annual rate of improvement required to stay under 2°C of warming above 10%. This is a number so large that failure might be inevitable. And while the numbers are very concerning, climate scientists now tell us that warming above 1.5°C could bring about global disruptions on an unprecedented scale.

Transparency Is the Prerequisite

Therefore, if significant decarbonization progress must be made in the coming decade, then management must be ready for change. Beyond executive and board level commitment, the prerequisite for making change happen is an accurate understanding of the *as is* condition. Defining the companies transformation to the *to be* will involve a broad base of stakeholders in the drive to innovate – from employees, to suppliers, even NGO advisors and customers. Transparency creates trust, and is critical to prioritization, planning and collaboration. Transparency is essential for measuring progress and managing to stay on track.

Our Climate Leaders

This report has shown how close or far the G250 are from hitting the full *transparency bar* that signals readiness to begin bending the GHG emissions curve. Roughly 52% of the G250 are achieving a level of transparency needed to support meaningful change and create the conditions for their own competitiveness in the decade ahead.

Hopefully, this is the end of the beginning in the quest to scale up decarbonization efforts. The alternative is and should be unacceptable for the world and the captains of the G250. David Craig, CEO of Refinitiv, one of the largest providers of investment grade data to the world, summarizes: "The growing global awareness of the threat of climate change will drive increasing urgency for transparency from all companies, including the G250. Business leaders, consumers and employees are expecting transparency and transformation. The investment funds are changing their approach from a secondary to a primary climate lens. The demand for leadership across financial markets and within the business community is becoming the new normal."

The CEOs of the G250 play a critical role in the drive to address climate impact. As this report demonstrates, many are moving forward. But many others have not yet provided sufficient will and means to significantly reduce their emissions. As in the past, our prospects for a healthy and prosperous future will largely depend on the decisions this group makes now and over the next decade.

Note from the authors: Members of the G250 mentioned in this report are all critically important companies regionally and in many cases globally, often providing essential products and services to millions of customers. Each is at its own stage of the decarbonization journey, driven by many different and sometimes conflicting demands. These demands can be regulatory, investor, customer, NGO, activist or personal. Each of these firms should be evaluated in its own context, and we hope this report encourages consideration of the increasing benefits of beginning, continuing or even accelerating their business model transformation to preserve the climate we want to leave for the generations to come.

Appendix 1: Complete G250 Transparency Bar Chart (2017)

Rank	Company	Performance
1	Coal India	
2	PJSC Gazprom	
3	Exxon Mobil Corporation	
4	Cummins Inc.	
5	Thyssenkrupp AG	
6	Rosneft OAO	
7	Royal Dutch Shell	
8	China Petroleum & Chemical Corporation	
9	China Shenhua Energy	
10	Rio Tinto	
11	PETROCHINA Company Limited	
12	BHP Billiton	
13	Petróleo Brasileiro SA - Petrobras	
14	Korea Electric Power Corp	
15	BP	
16	Total	
17	Valero Energy Corporation	
18	Chevron Corporation	
19	Toyota Motor Corporation	
20	Wistron Corp	
21	United Technologies Corporation	
22	Peabody Energy Corporation	
23	YTL Corp	
24	Phillips 66	
25	Volkswagen AG	
26	Vale	
27	Lukoil OAO	
28	Huaneng Power International	
29	Statoil ASA	
30	Honda Motor Company	
31	Glencore plc	
32	General Motors Company	
33	Eni SpA	
34	Ingersoll-Rand Co. Ltd.	
35	ENGIE	
36	Marathon Petroleum	
37	Saic Motor Corporation	
38	Daikin Industries, Ltd.	
39	LyondellBasell Industries Cl A	
40	Reliance Industries	
41	Anglo American	
42	JX Holdings, Inc	
43	MAN SE	
44	NTPC Ltd	
45	RWE AG	
46	Nissan Motor Co., Ltd.	
47	Ford Motor Company	
48	Procter & Gamble Company	
49	ConocoPhillips	
50	ArcelorMittal	

51	Surgutneftegas OAO
52	CNOOC
53	China National Building Materials Company Limited
54	Anhui Conch Cement
55	SK Innovation Co Ltd
56	Repsol
57	China Coal Energy
58	China Resources Power Holdings Company Limited
59	LafargeHolcim Ltd
60	General Electric Company
61	Boeing Company
62	Goodyear Tire & Rubber Company
63	Gas Natural SDG SA
64	Yanzhou Coal Mining
65	PTT
66	Novatek OAO
67	South32
68	BASF SE
69	PACCAR Inc
70	PBF Energy Inc
71	Oil & Natural Gas
72	SK Holdings
73	EDF
74	Michelin
75	Canadian Natural Resources Limited
76	Airbus Group
77	Tesoro Corporation
78	Centrica
79	The Southern Company
80	Bridgestone Corporation
81	Rolls-Royce
82	Wal-Mart Stores, Inc.
83	Fiat Chrysler Automobiles NV
84	Kumba Iron Ore
85	Hitachi, Ltd.
86	A.P. Moller - Maersk
87	Kia Motors Corp
88	Exelon Corporation
89	OMV AG
90	Huadian Power International Corporation Limited
91	Anadarko Petroleum Corporation
92	DowDuPoint
93	Nestlé
94	ENEL SpA
95	Ecopetrol Sa
96	Toray Industries, Inc.
97	Duke Energy Corporation
98	Renault
99	Pinnacle West Capital Corporation
100	Formosa Petrochemical

101	Suncor Energy Inc.
102	JSW Steel
103	Occidental Petroleum Corporation
104	Westmoreland Coal Company
105	Vedanta Ltd
106	Datang International Power Generation
107	POSCO
108	Korea Gas Corp
109	American Electric Power Company, Inc.
110	The Tokyo Electric Power Company Holdings, Inc (TEPCO)
111	Idemitsu Kosan Co., Ltd.
112	HeidelbergCement AG
113	Cloud Peak Energy Inc
114	Tohoku Electric Power Co., Inc.
115	Inner mongolia Yitai Coal Company Ltd.
116	Adaro Energy PT
117	Groupe PSA
118	CONSOL Energy Inc.
119	Kawasaki Heavy Industries, Ltd.
120	Siemens AG
121	Lockheed Martin Corporation
122	AGL Energy
123	Alliance Resource Partners L.P.
124	S-Oil Corp
125	Inpex Corporation
126	Nippon Steel & Sumitomo Metal Corporation
127	Sasol Limited
128	The AES Corporation
129	Teck Resources Limited
130	Daimler AG
131	MMC Norilsk Nickel OSJC
132	Chesapeake Energy Corporation
133	Panasonic Corporation
134	Electrolux
135	FirstEnergy Corporation
136	Exxaro Resources Ltd
137	Vedanta Resources PLC
138	Tatneft OAO
139	LG Electronics
140	Hyundai Heavy Industries Co Ltd
141	Dynegy Inc.
142	E.ON SE
143	Devon Energy Corporation
144	Bristol-Myers Squibb
145	Bashneft
146	Imperial Oil
147	Tata Steel
148	EOG Resources, Inc.
149	Wesfarmers

150	Husky Energy Inc.	
151	YPF SA	
152	BMW AG	
153	Bharat Petroleum Corporation	
154	Chongqing Changan Automobile Company Limited	
155	Hino Motors, Ltd.*	
156	Caterpillar Inc.	
157	MOL Nyrt.	
158	PepsiCo, Inc.	
159	Endesa	
160	HollyFrontier Corp.	
161	KOÇ HOLDING A.S.	
162	Cenovus Energy Inc.	
163	Chubu Electric Power Co., Inc.	
164	Yara International ASA	
165	Samsung Electronics	
166	Apache Corporation	
167	Mitsubishi Chemical Holdings Corporation	
168	PPL Corporation	
169	AmerisourceBergen Corp.	
170	Electric Power Development Co.,Ltd (J-POWER)	
171	Showa Shell Sekiyu K. K.	
172	Xcel Energy Inc.	
173	Tesco	
174	The Kansai Electric Power Co., Inc.	
175	Unilever plc	
176	Alcoa Corp.	
177	Tata Power Co	
178	Sempra Energy	
179	Marathon Oil Corporation	
180	CIMIC Group	
181	Jiangxi Copper Company Limited	
182	WEC Energy Group	
183	NRG Energy Inc	
184	San Miguel Corp	
185	Adani Power Ltd	
186	Toshiba Corporation	
187	Polska Grupa Energetyczna (PGE) SA	
188	The Coca-Cola Company	
189	Cardinal Health Inc.	
190	TÜPRAS-TÜRKIYE PETROL RAFINERILERI A.S.	
191	Origin Energy	
192	CEMEX	
193	Hyundai Mobis Co Ltd	
194	Nucor Corporation	
195	Noble Energy, Inc.	
196	Colgate Palmolive Company	
197	United Continental Holdings	
198	Cosmo Energy Holdings Co., Ltd.	
199	PTT Exploration & Production Public Company Limited	
200	CRRC Corporation Limited	

201	Bayer AG	
202	Hindustan Petroleum Corporation	
203	Air Products & Chemicals, Inc.	
204	Archer Daniels Midland	
205	Honeywell International Inc.	
206	Neste Oyj	
207	PG&E Corporation	
208	VEOLIA	
209	Southwestern Energy	
210	Tata Motors	
211	Iberdrola SA	
212	Navistar International Corporation	
213	Dongfeng Motor Group	
214	Hess Corporation	
215	China Power International Development Limited	
216	Public Power Corporation SA	
217	Deutsche Post AG	
218	Polski Koncern Naftowy ORLEN	
219	CLP Holdings Limited	
220	Delta Air Lines	
221	DTE Energy Company	
222	Deere & Company	
223	CVS Health	
224	Mitsubishi Electric Corporation	
225	General Dynamics Corporation	
226	McDonald's Corporation	
227	Ashok Leyland	
228	African Rainbow Minerals	
229	Ultratech Cement	
230	Toyota Industries Corporation	
231	Taiwan Cement	
232	Toyota Tsusho Corp	
233	Encana Corporation	
234	Pirelli	
235	Costco Wholesale Corporation	
236	Siam Cement	
237	United States Steel Corporation	
238	Nextera Energy Inc	
239	Mitsubishi Heavy Industries Ltd	
240	American Airlines Group Inc	
241	Air Liquide	
242	Halliburton Company	
243	Evraz PLC	
244	Tokyo Gas Co., Ltd.	
245	Deutsche Lufthansa AG	
246	HP Inc	
247	FedEx Corporation	
248	Galp Energia SGPS SA	
249	The Chugoku Electric Power Company	
250	National Grid PLC	

* Majority owned by Toyota

Source: CDP, Refinitiv, Constellation Research & Technology, Inc

Note from authors: The specific company data in this report is the latest available at the time of publication; the authors welcome updates from the companies themselves in order to provide the most accurate and current view of performance.

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About Constellation Research & Technology

Constellation is a newly launched enterprise founded in 2016 by a team of experts in the fields of business analytics, sustainability strategy and metrics, and data science. Founded by Dr. David Lubin, and Yale University Professors Dan Esty and Jay Emerson, Constellation Research and Technology seeks to both improve the quality and reliability of ESG data and pioneer business strategy centric measures of sustainability performance. Constellation brought its Maturity-Momentum (M2) Model to the G250 Report applying its approach to the analysis of transparency. For more information on Constellation visit constellationresearch.com

Authors:

David A. Lubin
Constellation Research & Technology

David A. Lubin serves as Co-Chairman and Managing Director of the newly launched Constellation Research and Technology. He has previously founded and built to scale several technology and management consulting firms, including Renaissance Worldwide and the Palladium Group. Dr. Lubin served as Chairman of the Sustainability Innovators Working Group. His research focuses on understanding and assessing the business value of sustainability for both companies and investors. He developed reports on the Value Driver Model for the UNPRI and UNGC and on sustainable investing for the IFC/ World Bank. His work has appeared in the Harvard Business Review and the MIT Sloan Review. He sits on the board of the CDP and previously served on the faculties at Tufts and Harvard University. He received his doctoral degree from Harvard University in 1977.
dlubin@constellationresearch.com

Tim Nixon
Thomson Reuters

Tim is the Founder and Managing Editor of Sustainability at Thomson Reuters. He is a Founder and Steering Committee member to United Nations Science, Business & Policy Forum, and a member of advisory committee to the Strategic Investor Initiative (CECPwhich brings together the largest investors and corporations of the world to promote sustainability and long-term planning. He helps build new links across the global policy, investing and innovation communities, and is part of the Reuters media voice on the increasing connections between leadership in sustainability and competitive advantage. Tim is a lawyer by training and has spent most of his career building change-leading initiatives.
timothy.nixon@thomsonreuters.com

Chris Mangieri
Constellation Research & Technology

Chris Mangieri is the Director of Product Development at Constellation Research and Technology. He specializes in understanding the underpinnings of market-leading ESG data, focusing primarily on industry-specific climate change and GHG emissions data. Chris was a lead data analyst on the previous G250 report. He holds an M.S. in Sustainability Management from Columbia University and a B.S. in Environmental Engineering from The University of Vermont.
cjmangieri@constellationresearch.com