

Briefing Paper

# The Net-Zero Challenge: Global Climate Action at a Crossroads (Part 1)

In collaboration with Boston Consulting Group

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World Economic Forum  
91-93 route de la Capite  
CH-1223 Cologny/Geneva  
Switzerland  
Tel.: +41 (0)22 869 1212  
Fax: +41 (0)22 786 2744  
Email: [contact@weforum.org](mailto:contact@weforum.org)  
[www.weforum.org](http://www.weforum.org)

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# Foreword



**Patrick Herhold**  
Managing Director  
and Partner,  
Centre for Climate  
Action, Boston  
Consulting Group



**Emily Farnworth**  
Head of Climate  
Change Initiatives,  
World Economic  
Forum

Four years after world leaders met in Paris to agree on the historic Paris Climate Agreement, it is time to take an honest look at the progress on global climate action to date.

This World Economic Forum and Boston Consulting Group paper is the first in a two-part series on *The Net-Zero Challenge* that examines what corporations, governments and civil society have achieved since the accord was drafted in 2015 and assesses the current state of global climate action. The full report, which includes a set of proposals to accelerate climate action, will be published in January 2020.

A series of momentous events for the future of climate action – the United Nations Framework Convention on Climate Change COP25 at the end of 2019, the World Economic Forum Annual Meeting 2020 in January, and the COP26 in 2020 – provide the opportunity to build a strong, unified call for accelerated action among business and government leaders. Greater action is needed to deliver a safer world for future generations.

Nations are still far from reaching the emissions trajectory needed to ensure that global warming stays within safe limits. While the risks of inaction are mounting, it is still possible to prevent the worst effects of global warming. The costs of abatement are falling and the technological solutions needed to decarbonize our economies are available. Many of these technologies can even have positive effects on other environmental challenges such as pollution, thereby providing opportunities for governments and businesses to establish a first-mover advantage.

It is within everyone's power and responsibility to act. This paper and the complete report aim to help clarify the path ahead and encourage a greater push for the action needed today.

# Executive summary

In 2015, government representatives from 197 countries met in Paris and agreed to limit a global temperature rise by the end of the century to well below 2°C and to pursue efforts to limit the temperature increase even further to 1.5°C. In the four years since the historic meeting and 24 years after the first Conference of the Parties (COP) in 1995, however, progress on climate action has been limited at best. Global greenhouse gas emissions continued to increase by 1.5% per year in the past decade, with no signs of peaking. A reduction of approximately 5% per annum is needed to limit global warming to 1.5°C.

Government commitments so far are far from sufficient. Only 67 countries – among them none of the top five emitters – have committed to the goal of achieving net-zero carbon dioxide emissions. And even most countries with this commitment have not enacted sufficiently robust policies to attain the emission reductions required.

Corporations have begun to recognize that voluntarily bringing down the emissions footprint of their business models can enhance long-term value. Yet, only a third of the approximately 7,000 companies that report to the Carbon Disclosure Project fully disclose their emissions. Even fewer have set reduction targets and developed plans in line with the Paris Agreement.

Investors have an even larger incentive to ensure companies assess climate-related risks and opportunities, given their more immediate exposure to portfolio companies' long-term risks. But while investor pressure on companies to manage these risks increases, the focus on short-term performance continues to prevent progress for many of them.

In light of this global inertia, public pressure and global activism have surged in recent years, especially by youth and in Western countries. Much more – and geographically broader – citizen and consumer awareness is needed, however, to trigger a turnaround in public responsiveness on a global scale.

The world needs cohesive and swift international policy action. But as long as this remains wishful thinking, individual governments and corporations can and should move ahead with unilateral initiatives. While no single actor can halt global warming alone, efforts by leading industrial nations or large corporations can have a multiplier effect.

Companies should reduce the emission intensity of their businesses and seek opportunities in new low-carbon business models. By acting with others in their ecosystems, they can unlock further opportunities that might not be viable for solo players. Governments should come forward with Paris-compliant commitments and design policy frameworks to decarbonize their economies. By applying instruments such as cross-border carbon taxes or low-carbon product standards, they can protect vulnerable industries from unfair high-carbon competition – and potentially trigger a domino effect.

The world is at a crossroads. The coming decade will decide whether humanity can achieve the goal of limiting warming to 1.5°C. Without a meaningful reduction in emissions in the next five years, the ability to act will increasingly be lost, resulting in damage that could become irreversible.

# The world needs to move to net zero – yet emissions continue to rise

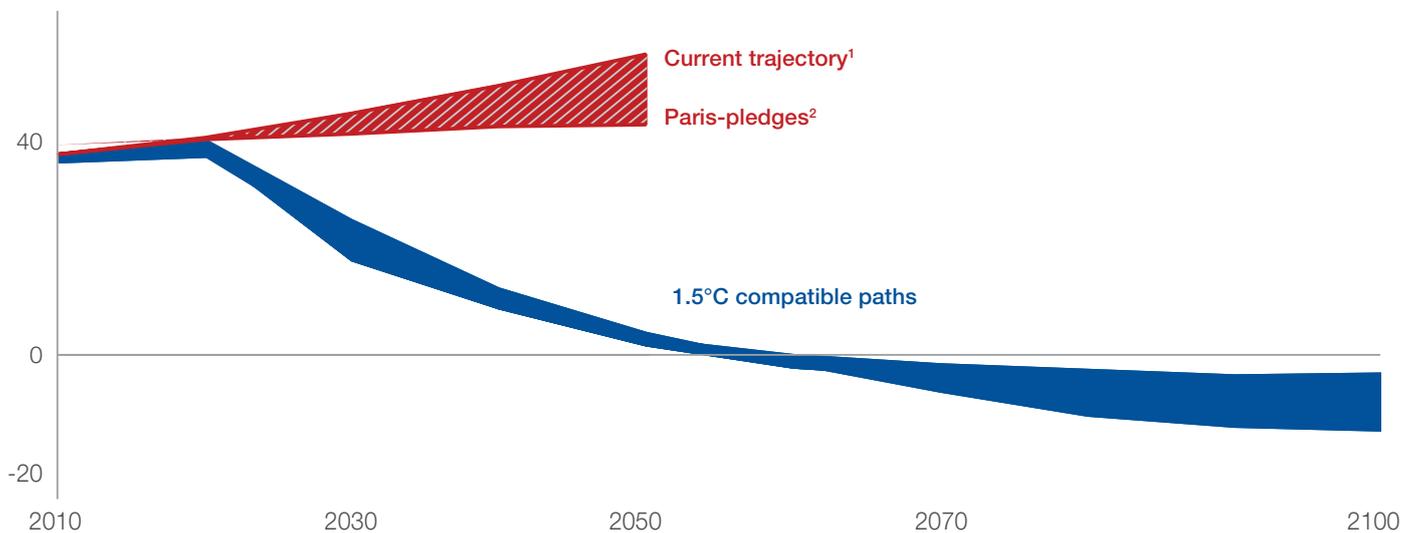
The UN Environment Programme's *Emissions Gap Report 2019* found that global greenhouse gas (GHG) emissions, including from land-use changes such as deforestation, hit a new high of 55.3 gigatonnes (Gt) of CO<sub>2</sub> equivalent in 2018.<sup>1</sup> Despite commitments from individual governments and companies this past decade, emissions have risen by 1.5% per year. Should this trajectory continue, the world is projected to warm by 3°C to 5°C by 2100, with catastrophic effects on human civilization.

According to the Intergovernmental Panel on Climate Change (IPCC), limiting global warming to 1.5°C requires net human caused carbon dioxide (CO<sub>2</sub>) emissions to fall by 45% by 2030 and to reach net zero by 2050. Other GHG emissions must also dramatically decrease.<sup>2</sup>

**Figure 1: The world needs to move to “net zero”, 2010-2100**

Global net CO<sub>2</sub> emissions pathways

Gt per year



1. Assumes CO<sub>2</sub> emissions grow from 2018 to 2050 at the same rate as the Current Policies Scenario in UNEP's *Emissions Gap Report 2019* (1.1% CAGR); 2. Assumes countries decarbonize beyond the same annual rate that was required to achieve their INDCs between 2020 and 2030. Note: Other GHG emissions are also to be reduced by more than 50% in pathways limiting global warming to 1.5°C  
Sources: IPCC, UNEP Emissions Gap Report, Climatewatch

Source: Boston Consulting Group analysis

Globally, emissions are stagnating or rising in all major economic sectors. So far, the substantial efficiency improvements accomplished in many spheres of activity have not been sufficient to offset the upsurge from a rising global population and increasing living standards. Based on today's policies, this dynamic is not forecast to change over the next 10 to 20 years. For example:

1. Demand for energy continues to increase – and much is being met by non-renewables. Global energy demand rose by 2.3% in 2018 and is expected to grow further by over 25% until 2040.<sup>3</sup> Much is coming from emerging economies investing in carbon-heavy projects to boost economic growth.
2. Volume growth in emissions-intensive industry sectors is projected to continue, for example in cement (plus 30% by 2040) and steel (plus 10-15% by 2040). These sectors have few low-carbon alternatives, and those that exist are costly. The demand for plastics, another

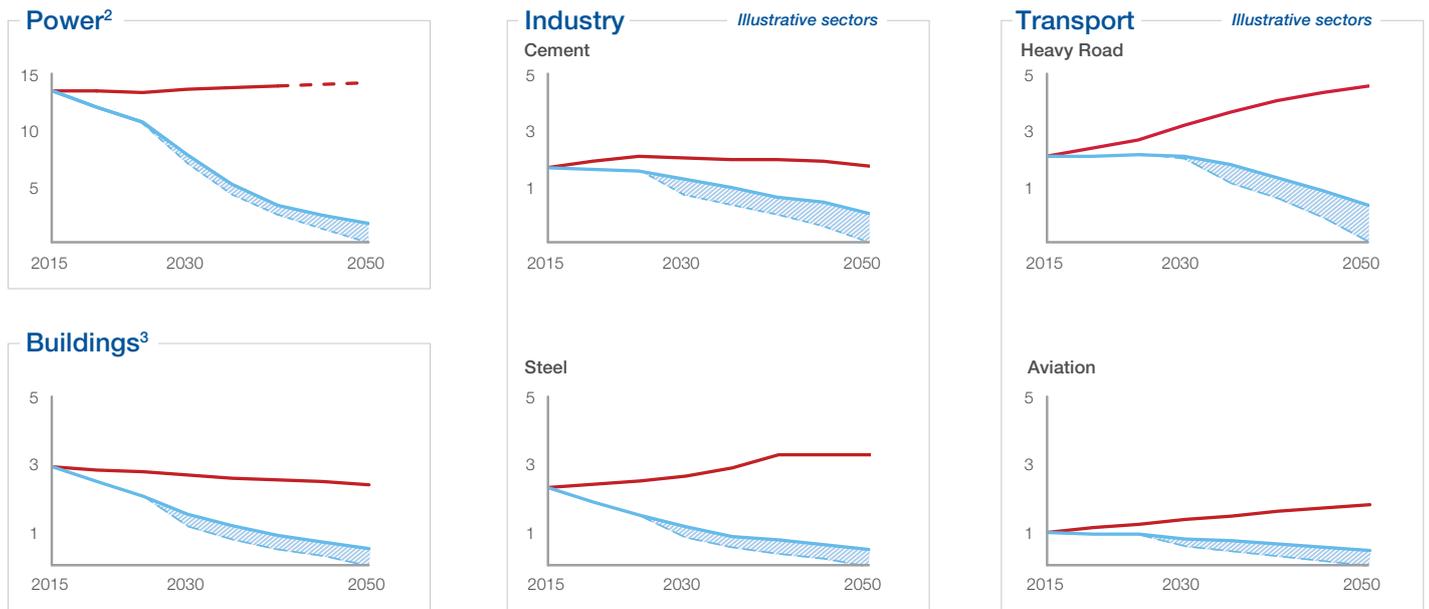
high-emission industry with limited economically viable low-carbon production alternatives, could increase by up to 150% by mid-century.<sup>4</sup>

3. Also hard-to-abate transportation sectors are still growing considerably. By 2050, freight demand is expected to triple, and demand in aviation will likely more than double.<sup>5</sup>

**Figure 2: Major turnaround needed across all sectors, 2015-2050**

Emissions trajectories (Gt CO<sub>2</sub>e from 2015 to 2050)

— Current trajectory<sup>1</sup> — Below 2°C path



1. IEA Reference Technology Scenario; 2. IEA Current Policies Scenario only estimates emissions to 2040 – From 2040 to 2050, same CAGR assumed for each trajectory as from 2020 to 2040; 3. Buildings includes heat, electricity & cooking  
Source: IEA, Tracking Clean Energy Progress

Source: Boston Consulting Group analysis

A major turnaround is needed in all sectors to limit the rise in surface temperatures. The world needs to achieve a net-zero emissions level in order to prevent catastrophic climate change effects.



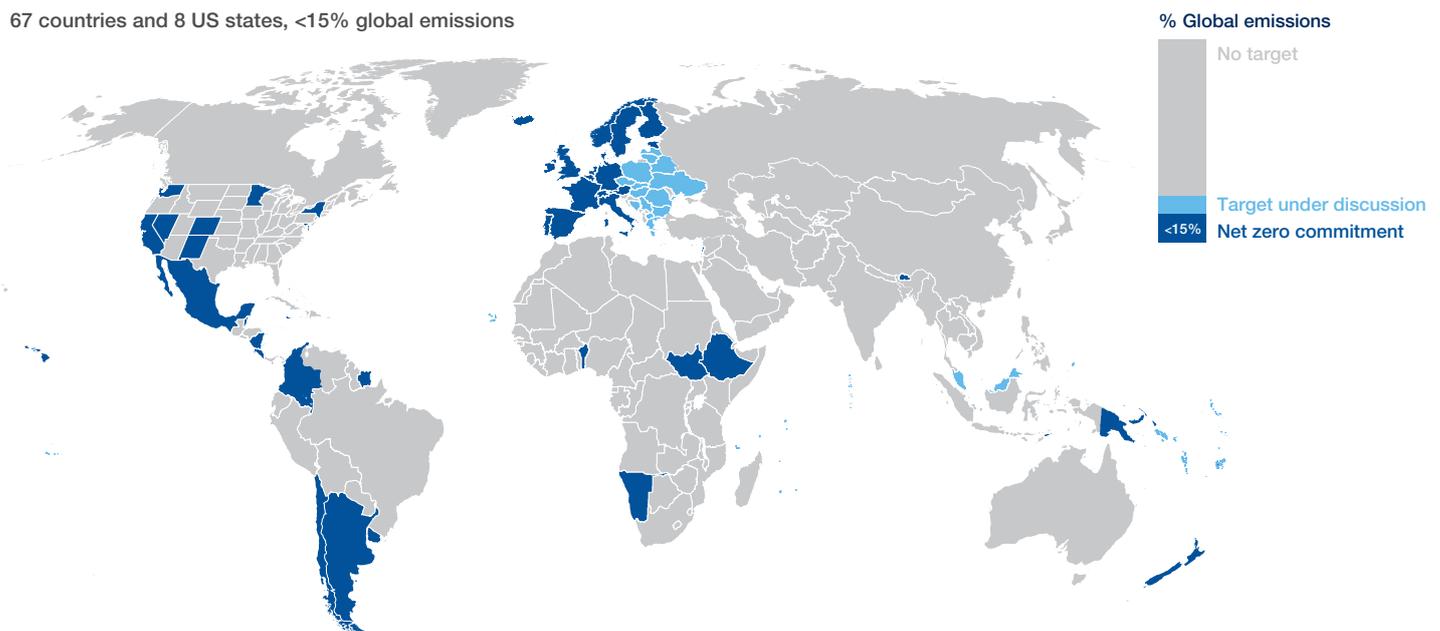
# Governments: Commitments and policies are dramatically insufficient

So far, only 67 of the UN's 193 member states – accounting for less than 15% of global emissions – have a net-zero ambition in place.

The world's largest CO<sub>2</sub> emitters, in particular, are not doing enough to address the problem. China, which is responsible for a quarter of current global emissions, has reportedly resumed construction of the world's largest pipeline of new coal power plants. In the United States, which is responsible for the planet's largest share of accumulated atmospheric CO<sub>2</sub>, senior government officials are openly denying climate science and backtracking on previous regulations and international commitments, including their commitment to the Paris Agreement.<sup>6</sup>

**Figure 3: Few countries have a net-zero ambition to date**

67 countries and 8 US states, <15% global emissions



Note: 8 US states - California, New York, Hawaii, Washington, New Mexico, Nevada, Colorado, Minnesota (Washington, New Mexico, Colorado, Minnesota & Nevada committed to 0 carbon energy rather than to full carbon neutrality)

Sources: UNFCCC; Government websites; CAIT data from World Resources Institute

Source: Boston Consulting Group analysis

Even the front runners are off track. Of the 67 countries with net-zero goals, only seven have actually broken this target down into intermediate sector-level targets and roadmaps, and have policies in place that could realistically trigger the reductions.<sup>7</sup> Although they help point the way for others, the combined GHG emissions of these seven actors account for less than 2% of the world's total emissions.

Nordic countries have been among the few to take truly decisive steps, supported by favourable public opinion and social contexts. For example, Sweden's climate act of 2018 enforces yearly reporting, sets targets at 1.5°C or below and calls for forceful climate policy through the country's dedicated Climate Policy Council.<sup>8</sup> Sweden has set the highest carbon tax in the world, at €114 per tonne,<sup>9</sup> is engaging industry in sector-specific dialogue to create meaningful policies and has invested heavily in R&D and new technology pilots,<sup>10</sup> along with climate-resilient development projects through the UN Green Climate Fund.<sup>11</sup>

The Netherlands has also taken decisive steps, putting in place a Climate Agenda<sup>12</sup> and ambitious targets for renewables, reinforced by subsidies and biofuel mandates. The country has regulations on new building energy performance and aims to phase out gas boilers by 2050, supported by tax breaks and subsidies. Industrial sectors are also subject to energy efficiency and best available technique (BAT) standards.<sup>13</sup>

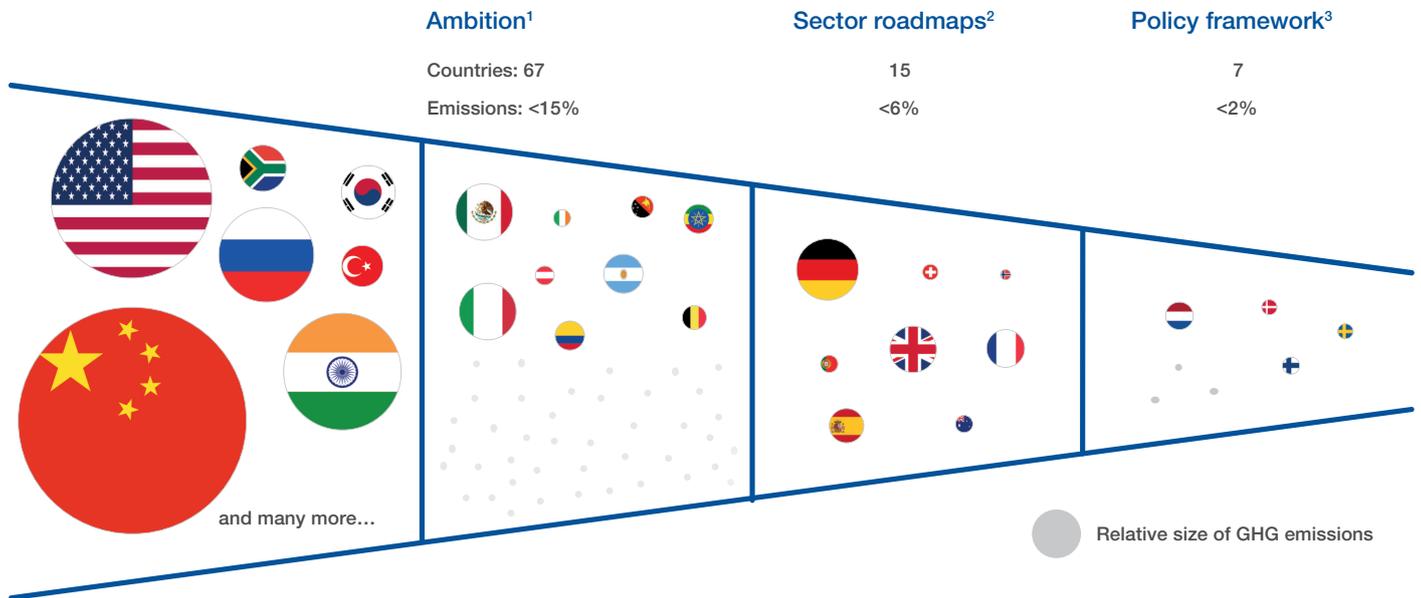
A number of emerging economies, too, are starting to set ambitious renewable targets, even if they do not yet have a full carbon-neutrality plan. India is currently implementing the largest renewable power programme in the world – targeting 175 GW of installed capacity by 2022. Morocco has developed the world's largest concentrated solar farm, with the objective of making more than 50% of its electricity generation renewable in just 10 years.

Regions and cities are also moving ahead. Eight US states are now aiming for zero-carbon energy systems by 2050, including California. The State of South Australia is targeting 50% renewable power by 2025.<sup>14</sup> Twenty-one cities around

the world have signed on to the Carbon Neutral Cities Alliance,<sup>15</sup> following Copenhagen's lead in setting standards for household and workplace energy efficiency, using public transport and recycling waste for energy generation.

Still, the vast majority of governments have held back from taking decisive action. Despite the positive business case for many countries to act, even if unilaterally,<sup>16</sup> nations often have to overcome considerable barriers, whether perceived or real, including vested interests, polarized electorates and the fear of damaging economic competitiveness.

**Figure 4: Even fewer countries have sufficient policies**



1. Countries with a carbon-neutrality ambition; 2. Ambition translated into sector roadmap with targets; 3. Targets supported by an effective policy framework. Note: All countries with emissions <40 million tonnes are represented by a small dot instead of a flag  
Sources: Emissions data from CAIT with the World Resources Institute; Policy analysis by BCG, referencing IMF, Climate Action tracker, government websites

Source: Boston Consulting Group analysis

# Corporations: Only a minority are taking the lead

The apparent failure of governments to act increases the responsibility for corporations to fill the void. A number of companies have produced ambitious plans to decarbonize their operations and supply chains, recognizing the beneficial business case for doing so, by safeguarding future licences to operate, preparing for more demanding future regulation or developing innovative business models. More companies are disclosing their emissions, more are signing up to ambitious reduction targets (the Science Based Targets initiative, for instance, recently surpassed 300 member companies) and more are transforming their businesses. For example:

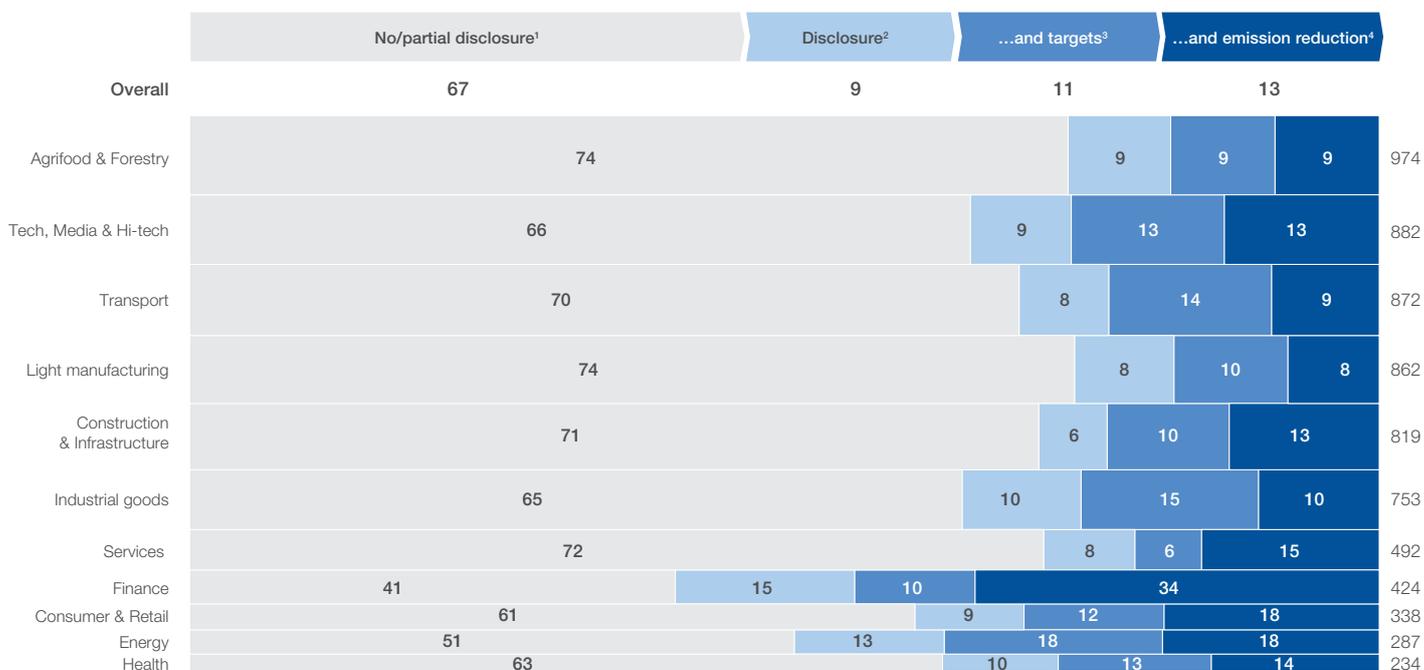
- The Italian multinational energy corporation Enel has set a carbon-neutral ambition for “well before 2050”, a 2030 target certified according to the latest Science Based Targets criteria, and an ambitious global investment plan to consolidate its position in renewables generation.
- In India, Dalmia Cement has set a goal to become carbon negative. It already has the lowest cement CO<sub>2</sub> intensity in the world, producing one ton of cement at 500 kg of CO<sub>2</sub> vs a global average of 900 kg.
- Automotive supplier Bosch has committed to making the direct Scope 1 and indirect Scope 2 emissions from its production sites fully carbon neutral by 2030, triggering other players in the industry to consider similar targets.

- The Dutch nutrition and materials multinational DSM has announced plans to reach net-zero emissions by 2050, having implemented an internal carbon price and linked management incentives to environmental outcomes to drive efforts. Moreover, DSM is supporting global action, advocating for carbon pricing.
- In addition to achieving 100% renewable grid electricity in its worldwide operations, Unilever is actively advocating for policy frameworks consistent with a 1.5°C pathway, including asking trade associations to align behind this position.
- Technology companies such as Siemens are clearly targeting the opportunities arising from the transition to net zero and have begun to communicate the impact they have achieved in helping their clients lower emissions.

However, these examples constitute a minority, frequently driven by a CEO’s personal convictions and intentions to secure an executive legacy, or by a particularly engaged workforce or investor group. Of the millions of corporations worldwide, only around 7,000 disclose their emissions to CDP,<sup>17</sup> the non-profit organization that monitors global emissions. Of those that do report their numbers to CDP, only a third provide full disclosure, only a quarter set any type of emission reduction target, and only one in eight actually reduce their emissions year-on-year.

**Figure 5: Too few companies are acting decisively**

% responses from 6,937 companies



1. Do not disclose/only disclose partial emissions data; 2. Say there is no facility/source of Scope 1 or 2 emissions excluded from disclosure; 3. Have any form of emissions reduction target; 4. Have reduced emissions vs last year. Note: >250m tonnes and <100 tonnes disclosures are excluded, as likely data errors  
Source: CDP data (2018)

Source: Boston Consulting Group analysis



And even where companies do report targets, most still fall below the requirements set in the Paris Agreement. Around 65% of all company targets reported to CDP are short term with an end date of no more than five years. On average, both short-term and long-term targets are about half of what would be needed for a 1.5°C world; short-term targets aim for minus 15% instead of minus 30%, while longer-term targets look for 50% reductions instead of carbon neutrality.<sup>18</sup>

In addition, the lack of common reporting standards makes it hard to compare targets. Companies report very different base and end years. When they commit to targets, they might be referring to absolute emission reduction, emission intensity, renewable energy use, or any other measure, and the volume metrics they use are inconsistent. As a result, to date no robust way of benchmarking corporate climate action exists even among industry peers. This lack of transparency suggests that companies may be providing window dressing and doing very little to reduce emissions in reality.

Companies are even less rigorous in tracking and addressing the indirect emissions from their value chains and products, known as Scope 3. Fewer than one in 10 companies reporting to CDP has a target on these emissions, although given the potentially enormous leverage large companies have on supplier behaviour, recent announcements that such companies as Apple and Walmart will scrutinize supply chain emissions offer encouragement.

“

**Climate change is the single greatest threat that humanity faces. Businesses that don't take climate action will be punished by their stakeholders as well as by the planet.**

”

**Alan Jope**, Chief Executive Officer, Unilever, United Kingdom

# Investors: Action on long-term climate risks and opportunities is still limited

Investors are in a unique position in the climate debate, given their short-term financial exposure to long-tail carbon-related risks. Corporations will feel the effects of global warming when their markets are disrupted or their assets are stranded due to a climate-change related disaster. But well before cataclysmic events become more common – as the general public and financial markets become more aware of climate-related risks to corporate balance sheets – investors are likely to see valuations decline.

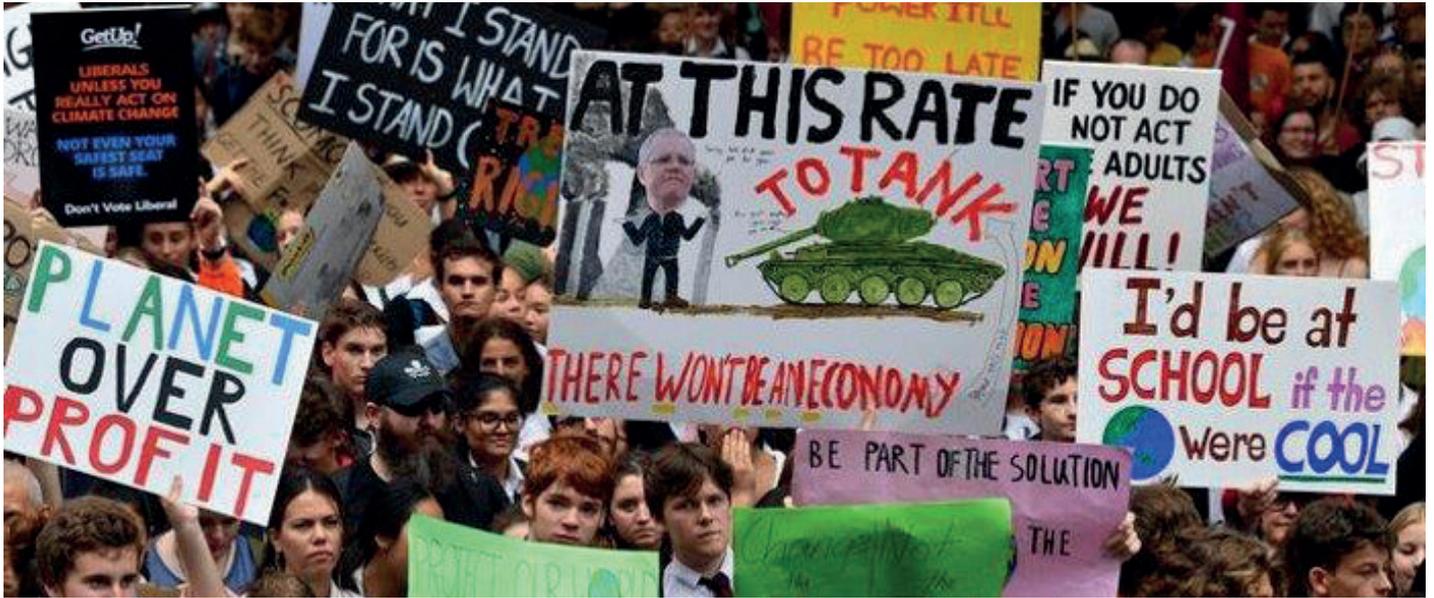
To mitigate this risk, investors have started to put pressure on companies to better understand and disclose their carbon-related risks and develop resilience strategies – individually or through activist groups. For example, Climate Action 100+ has brought together a consortium of investors managing a total of \$35 trillion to push for disclosure and emission reductions in their portfolio companies.<sup>19</sup> Private equity firms are beginning to screen corporations for climate-related risks that could lower their value to potential buyers. The UN-convened Net-Zero Asset Owner Alliance has brought together investors managing a total of \$4 trillion in assets committed to transitioning their portfolios to net-zero emissions by 2050.<sup>20</sup> There has also been considerable growth in the appetite for green finance products. The issuance of sustainable debt in 2019 is expected to hit a high of \$350 billion, 30% above 2018.<sup>21</sup>

On a global scale, however, the impact of investor pressure is still not sufficient. In one-on-one interviews, CEOs say the pressure to deliver short-term returns by far exceeds any demands for long-term decarbonization.<sup>22</sup> Unless this trend changes, CEOs will have little incentive to take decisive action.

Similarly, financial market supervisory boards have yet to take a clear stance on best practices for the low-carbon era. The lack of consistent corporate reporting or a reliable framework for assessing climate risk has been a major barrier to progress. Investors are faced with a plethora of environmental, social and governance frameworks, which one major bank CEO described as leading to “real confusion and little action” in the investment world. So far, the voluntary adoption of standards has been no substitute for regulated carbon accounting conventions.

The Task Force on Climate-related Financial Disclosures, which aims to develop voluntary, consistent climate-related financial risk disclosure standards, has seen a steady stream of supporters sign up but, at 898 members to date,<sup>23</sup> still represents a minority of the investment world. To trigger the acceleration that is needed, the adoption of disclosure standards would need to be mandatory.

# Public opinion: Pressure is mounting, but not fast enough

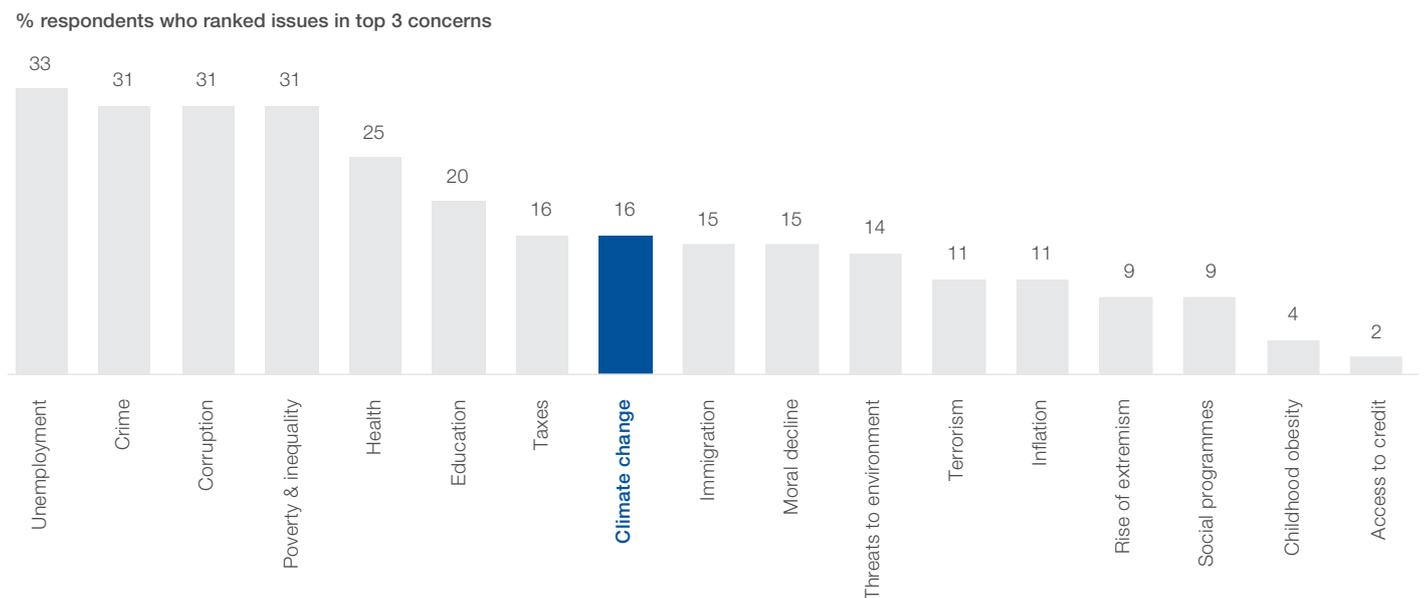


Over the past few years, the inertia on the part of the public and private sectors has caused frustration among citizens' groups throughout the world, triggering a surge in protest and climate activism. Movements like Fridays For Future and Extinction Rebellion regularly mobilize millions of people, especially among the youth. Such movements are likely to persist and multiply.

But while pressure from citizens and consumers may be mounting in some geographies, especially in Europe, climate change does not yet alarm the vast majority. Only 16% of adults globally consider climate change to be one of their top

three societal concerns, ranking well below unemployment, crime and corruption, according to a September 2019 survey by the market research firm Ipsos.<sup>24</sup> While the trend is increasing, with a steady rise from 8% in 2016 and 11% in 2018, in many countries it still does not appear among the issues that worry people the most. Moreover, two out of three respondents globally did not even rank it among their top three environmental issues; air pollution, waste generation and deforestation were larger worries, especially in emerging economies. In most cases, citizens are not linking trends in these environmental areas to GHG emissions and the interdependency with global warming.

**Figure 6:** Climate change is not a top concern globally...

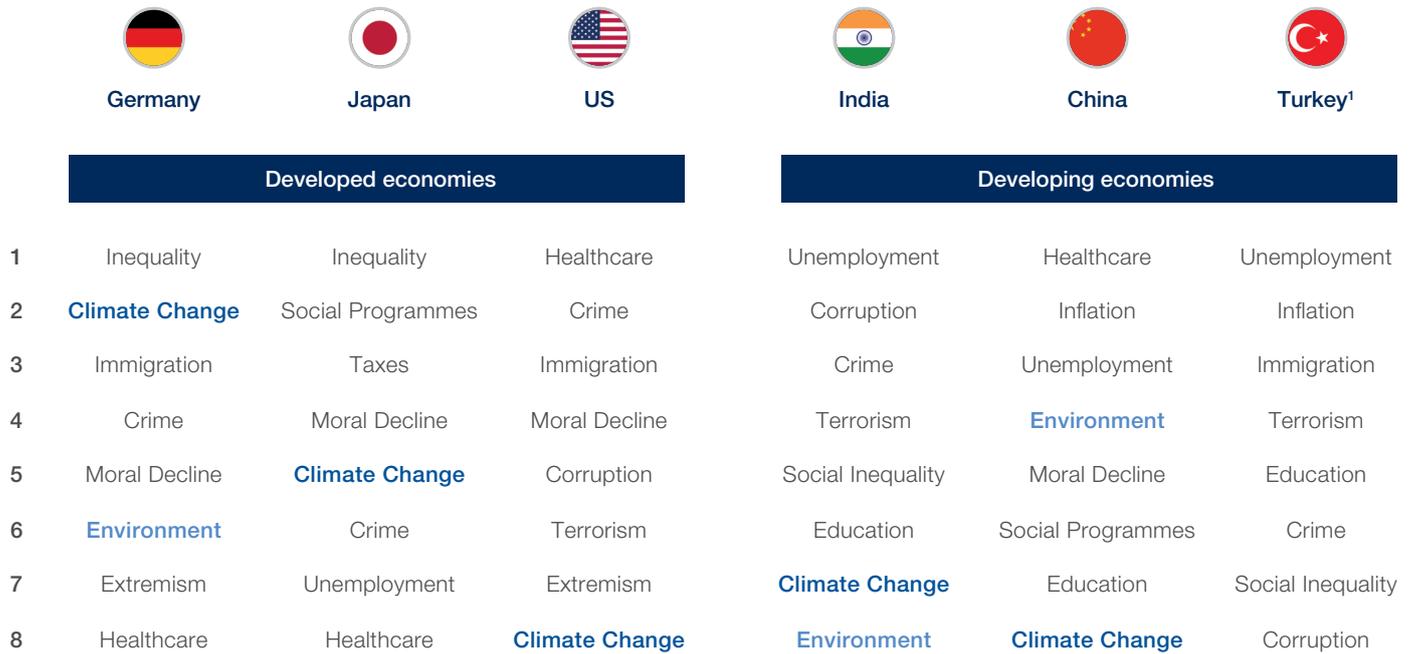


Base: Representative sample of adults aged 18-74 in the US, South Africa, Turkey, Israel and Canada, and aged 16-74 in all other countries, September 2019: 19,531  
 Source: Ipsos, Global Advisor

Source: Boston Consulting Group analysis

Until public education on climate challenges catches up, citizen pressure is not likely be strong enough to force all governments to the table. And by the time climate change starts to have a more visible impact in the daily lives of people around the world, it may already be too late.

Figure 7: ... with stark differences country-by-country



1. Turkey ranks climate change 16th out of the possible 17 concerns. Note: Representative sample of adults aged 18-74 in the US, South Africa, Turkey, Israel and Canada, and aged 16-74 in all other countries, September 2019: 19,531  
Source: Ipsos, Global Advisor

Source: Boston Consulting Group analysis

“  
There is a lot of misinformation about the transition: we need to educate people about the causes of climate change and the solutions.  
”

Francesco Starace, Chief Executive Officer, ENEL, Italy

Nevertheless, progress has been made. Many governments are gradually increasing their long-term ambitions and are beginning to implement more rigid emission policies. A number of corporate success stories provide lighthouse examples for others to follow. Companies increasingly disclose emissions, set more ambitious targets and see climate as a driver for business innovation. More have introduced low-carbon business models to provide consumers with a sustainable alternative. Investors are increasing their scrutiny of long-term carbon risk and putting more capital into green financing vehicles. Public awareness around the urgency of the issue is increasing, and with it broader support for policy measures and evolving customer behaviours. But the most important indicator remains global emissions. As long as these continue to rise, the scale, pace and extent of progress is simply insufficient.

# Some trends show progress, but long way to go

## GOVERNMENTS



Countries with a carbon neutral ambition



Countries with robust climate policy (195)



## CORPORATIONS



Corporate emissions disclosed to CDP



Companies with a Science Based Target



## INVESTORS



Sustainable debt issuance<sup>1</sup>



Task Force on Climate-related Financial Disclosures supporters



## PUBLIC OPINION



People who rank climate change in top 3 global issues



Americans who believe climate change is real



1. Sustainable debt includes green and sustainability linked bonds and loans (as per Bloomberg New Energy Finance)  
Sources: UN GC, CDP 2018 questionnaire, SBT Initiative, Institute of International Finance 2019 report on Sustainable Finance, Yale Program on Climate Change Communication, Task Force on Climate-related Financial Disclosures.

# The way forward: Decisive, cohesive action by all stakeholders

Costs of natural disasters are on the rise. More frequent droughts are already hurting agricultural productivity even in such mild regions as Central Europe. Ice shields in West Antarctica and Greenland are starting to collapse. Wildfires and extreme weather events are increasing at unprecedented rates.

If unchecked warming continues, the consequences for human civilization will be severe. Rising sea levels could encroach on coastal regions and could flood major regions and metropolitan areas before the end of this century. Extended heat waves could threaten food security for a growing world population, while longer droughts could put access to drinking water at risk. Extreme weather events and changes to current ecosystems could produce millions of “climate refugees” and cause a deterioration in global development and economic growth. According to the Intergovernmental Panel on Climate Change, the per-capita impact of “no action” on global GDP has been estimated at minus 30% as of 2100 – in other words, it would reduce global GDP per capita by 30% (vs minus 8% for 1.5°C of warming).<sup>25</sup> This dwarfs the economic costs that climate action would have in any country. For many, investing in reducing emissions would even be a positive standalone business case.<sup>26</sup>

Ours is the last generation that can prevent global disaster – and the need for action is immediate. Multilateral policy coordination would be the best solution for halting the climate crisis, and decisive progress is needed at the COP negotiations in Madrid and Glasgow over the next year. But given the slow pace of achieving multilateral progress to date and the complex geopolitical context, the reality is that a global consensus will probably not be established soon enough to counter the crisis. It therefore falls upon this generation of business, government and society leaders to accelerate action individually and through collaboration.

**Corporations can accelerate individual action and commit to meaningful short- and long-term absolute emission reductions.** Companies in all sectors can do much more to reduce the emission intensity of their business and supply chains through measures that cost them little or nothing, and can offset residual emissions. All companies should actively monitor and manage their climate-related risks and increase their efforts to achieve a 1.5°C world (for example, with internal carbon pricing). And all can develop new business models that contribute to achieving a low-carbon economy.

**Ecosystem actions can overcome barriers, through collaborations along value chains or with industry peers.** It will take a joint effort to overcome existing transformation barriers in sectors where decarbonization costs are too high for individual companies to bear alone. Through cooperation, companies can share the risks of technology development and coordinate related investments. They

can generate a demand signal through joint commitments or standards, and set up self-regulating bodies where government policies fall short.

**Investor action can enable transparency and support long-term decarbonization plans.** Investors can coordinate to define and apply standards for disclosure and reporting. Even more importantly, they can increase scrutiny on long-term climate risks and opportunities, and incentivize asset managers to set long-term targets and strategies towards net-zero emissions.

**Governments can unilaterally enact national regulation to reduce emissions immediately.** Many countries can benefit economically from carbon abatement investments. To deliver on the net-zero ambition, they would need to enact ambitious policy frameworks that include a meaningful price on GHG emissions, but also sector-specific regulations and incentives promoting remedies such as a switch from fossil fuels to renewable energies, electric mobility, efficiency, green building standards – supported by accelerated innovation. As long as the world as a whole is moving slowly, national efforts will also require measures to protect emission-intensive industries from high-carbon, low-cost competition, through mechanisms like cross-border carbon taxes and low-carbon product standards.

**Ultimately, individuals need to drive climate action in their roles as consumers, voters, leaders and activists.** The transition to a net-zero economy will be a transformational shift for all of society. Individuals will have to take the lead in inciting governments, businesses and every part of society to move.

The later humanity takes action, the more dire our position will become. The technologies for a low-carbon transformation are largely available, the barriers to action are vastly overstated and the consequences of non-action are well known. Climate action is still too often perceived as a cost or a trade-off with other priorities. In light of the facts, it should be viewed as an opportunity for businesses, countries and individuals to create an advantage in building a better, more sustainable world.

# Methodology

The government policy action analysis used publicly available resources to assess country ambition, sector targets and policy frameworks.

- Carbon-neutral ambition was assessed through reference to the UNFCCC Climate Ambition Alliance: Net Zero 2050<sup>27</sup> and government websites for countries that are already net zero (Bhutan, Suriname) or aiming to be net zero before 2050 (Norway).
- Sector roadmaps and targets were assessed by analysing the number of sectors on which the government had put specific emission reduction targets, and how ambitious they were.
- Policy frameworks were assessed through reference to incentives and regulations, which go beyond target-setting, to move the sector to action (e.g. the implementation of an overall carbon price, renewables incentives, energy efficiency mandates and deforestation regulations).
- Assessments were cross-checked against reports on policy efficacy, including those written by Climate Action Tracker and the International Monetary Fund.

Corporate and investor action was assessed through reference to CDP data from the 2018 survey and through interviews with CEOs from a range of industries and geographies.

- CDP data is voluntarily disclosed on an annual basis by member companies (almost 7,000 in 2018). The data includes both quantitative emissions disclosed for Scope 1, 2 and 3, and a qualitative survey in which companies respond to questions on a broad range of topics, from climate governance to target-setting and investment in abatement initiatives.
- To supplement this analysis, interviews were conducted with 30 leading CEOs over a three-month period in the third and fourth quarters of 2019 to identify barriers and drivers to climate action as well as recommendations on policy levers required to abate emissions across sectors.

The assessment of public opinion sentiment on climate change was based on the September 2019 Ipsos “What Worries the World” survey.

# Contributors

## World Economic Forum

**Dominik Breitinger,**  
Project Lead, Climate Governance and Finance;  
Global Leadership Fellow

**Emily Farnworth,**  
Head of Climate Change Initiatives

**Dominic Waughray,**  
Managing Director, Centre for Global Public Goods



## Boston Consulting Group

**Jens Burchardt,**  
Associate Director, Climate Impact

**Marco Duso,**  
Principal;  
World Economic Forum Fellow

**Michel Fredeau,**  
Managing Director and Senior Partner

**Miranda Hadfield,**  
Consultant

**Patrick Herhold,**  
Managing Director and Partner

**Cornelius Pieper,**  
Managing Director and Partner

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- United Nations Environment Programme (UNEP), *Emissions Gap Report 2019*, 2019.

# Endnotes

1. This includes CO<sub>2</sub> emissions of approximately 37.5 Gt and 17.8 Gt of CO<sub>2</sub>e emissions from other GHGs including methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O). See UNEP, *Emissions Gap Report 2019*, <https://www.unenvironment.org/resources/emissions-gap-report-2019>.
2. The IPCC 1.5°C path assumes a reduction of approximately 50% CH<sub>4</sub>, 30% N<sub>2</sub>O and 60% black carbon emissions by 2050 vs 2010 levels.
3. International Energy Agency (IEA), “Global energy demand rose by 2.3% in 2018, its fastest pace in the last decade”, 26 March 2019.
4. Energy Transitions Commission, *Mission Possible 2018*.
5. Ibid.
6. President Donald Trump has referred to climate change as a “hoax” and has vowed to take the USA out of the Paris Agreement.
7. Many countries that have set a net-zero ambition lack the set of policies that would enable them to fully decarbonize. For example, in Germany, the long-awaited “climate package” falls far short of the possible and required ambition on emission reductions.
8. Swedish government websites: Naturvårdsverket (Swedish Environmental Protection Agency), “Sweden’s Climate Act and Climate Policy Framework”, <http://www.swedishepa.se/Environmental-objectives-and-cooperation/Swedish-environmental-work/Work-areas/Climate/Climate-Act-and-Climate-policy-framework-/>; Klimatpolitiska rådet (Swedish Climate Policy Council), “The Swedish Climate Policy Council”, <https://www.klimatpolitiskaradet.se/summary-in-english/>.
9. Government Offices of Sweden, “Sweden’s carbon tax”, January 2019, <https://www.government.se/government-policy/taxes-and-tariffs/swedens-carbon-tax>.
10. The Government of Sweden funded one-third of the pilot costs of Hybrit, a project to create zero-emission steel using green hydrogen, established by the LKAB mining company, the multinational power company Vattenfall and steel company SSAB.
11. Sweden has contributed more to the UN Green Climate Fund than any other nation per capita: 4 billion Swedish krona (€400 million) allocated for 2015-2018. See Sweden Sverige, “Sweden Tackles Climate Change”, October 2018, <https://sweden.se/nature/sweden-tackles-climate-change/>.
12. Government of the Netherlands, “Climate Agenda: Resilient, Prosperous, and Green”, <https://www.government.nl/topics/climate-change/documents/reports/2014/02/17/climate-agenda-resilient-prosperous-and-green>.
13. Rijkswaterstaat Environment, Ministry of Infrastructure and Water Management, “Mid-sized Combustion Plants”, <https://rwsenvironment.eu/subjects/air/mid-sized-combustion/>; NL Agency, Ministry of Economic Affairs, Agriculture and Innovation, “LTA: Long-Term Agreements on energy efficiency in the Netherlands”, [https://www.rvo.nl/sites/default/files/bijlagen/2MJAP1171\\_Long\\_Term\\_Agreements.pdf](https://www.rvo.nl/sites/default/files/bijlagen/2MJAP1171_Long_Term_Agreements.pdf).
14. Government of South Australia, *South Australia’s Climate Change Strategy 2015-2050: Towards a low carbon economy*.
15. The members of the Carbon Neutral Cities Alliance aim to reduce emissions by 80-100% by 2050. See <https://carbonneutralcities.org/>.
16. Boston Consulting Group, “The Economic Case for Combating Climate Change”, 2018, <https://www.bcg.com/en-gb/publications/2018/economic-case-combating-climate-change.aspx>.
17. A total of 6,937 companies answered the 2018 CDP survey, of which only about 33% said they were fully disclosing their emissions (not excluding sites/facilities from their disclosure).
18. Targets classified as short term are those with a target date of 2025 or earlier, while those classified as long term have a target date of 2026 to 2050.
19. Climate Action 100+ [website], “About Us”, <https://climateaction100.wordpress.com/about-us/>.
20. United Nations Environment Programme (UNEP), UN-convened Net-Zero Asset Owner Alliance [website], <https://www.unepfi.org/net-zero-alliance>.
21. Institute of International Finance, “Sustainable Finance in Focus: Green Is The New Gold”, 2019, <https://www.iif.com/Publications/ID/3557/Sustainable-Finance-in-Focus--Green-Is-The-New-Gold>.

22. 30 CEO interviews were conducted by BCG and the World Economic Forum between August and November 2019.
23. Task Force on Climate-related Financial Disclosures [website], <https://www.fsb-tcfd.org>.
24. Ipsos, "What Worries the World – September 2019", <https://www.ipsos.com/en/what-worries-world-september-2019>.
25. Burke, Marshall et al., "Large potential reduction in economic damages under UN mitigation targets", *Nature*, vol. 557, 2018, pp. 549-553; IPCC, *Global Warming of 1.5°C*, 2018.
26. Boston Consulting Group, "Flipping the Script on Climate Action", 2019; Boston Consulting Group, "The Economic Case for Combating Climate Change", 2018.
27. United Nations Framework Convention on Climate Change (UNFCCC), Non-state Actor Zone for Climate Action (NAZCA), Climate Ambition Alliance: Net Zero 2050, <https://climateaction.unfccc.int/views/cooperative-initiative-details.html?id=94>.



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World Economic Forum  
91–93 route de la Capite  
CH-1223 Cologny/Geneva  
Switzerland

Tel.: +41 (0) 22 869 1212  
Fax: +41 (0) 22 786 2744

[contact@weforum.org](mailto:contact@weforum.org)  
[www.weforum.org](http://www.weforum.org)