



# EXECUTIVE SUMMARY: TRACKING PROGRESS OF THE 2020 CLIMATE TURNING POINT

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In 2017 several leading climate analysis organizations came together as part of the Mission 2020 campaign to define six milestones—in energy, transport, land use, industry, infrastructure, and finance—that would need to be met by 2020 to bend the curve in global greenhouse gas emissions and put the world on a pathway consistent with the Paris Agreement. To achieve each milestone, the organizations identified two or more outcomes, and this working paper takes stock of progress made toward those outcomes.

## Highlights

- For the best chance of limiting temperature increase to 1.5 degrees Celsius (°C), global greenhouse gas (GHG) emissions must peak by 2020 and dramatically decline thereafter.
- Transformations in policy, behavior, finance, and technology are needed to reach this climate turning point and meet the objectives of the Paris Agreement.
- Analysis of existing data shows that while meaningful progress has been made, we are not yet on track to achieve the 2020 climate turning point.
- Progress is uneven across the six milestones: For some underlying outcomes in several milestones, action has been progressing and accelerating. However, in most cases action is insufficient or progress is off track.

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*Working Papers contain preliminary research, analysis, findings, and recommendations. They are circulated to stimulate timely discussion and critical feedback, and to influence ongoing debate on emerging issues. Working papers may eventually be published in another form and their content may be revised.*

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Box ES-1 | **Six Milestones Identified in  
2020: The Climate Turning Point**

1. **ENERGY:** Renewables outcompete fossil fuels as new electricity sources worldwide.
2. **TRANSPORT:** Zero emissions transport is the preferred form of all new mobility in the world's major cities and transport routes.
3. **LAND USE:** Large-scale deforestation is replaced with large-scale land restoration, and agriculture shifts to earth-friendly practices.
4. **INDUSTRY:** Heavy industry—including iron and steel, cement, chemicals, and oil and gas—commits to being Paris-compliant.
5. **INFRASTRUCTURE:** Cities and states are implementing policies and regulations to fully decarbonize buildings and infrastructure by 2050.
6. **FINANCE:** Investment in climate action is beyond US\$1 trillion per year and all financial institutions have a disclosed transition strategy.

- Greater transparency is needed in many areas where outdated or insufficient data exist for assessing progress.
- Governments, businesses, and finance institutions urgently need to ramp up ambition, fulfill commitments, and deliver net zero emissions by 2050.
- Tremendous opportunities to scale up and accelerate action remain untapped across all sectors. For almost all milestones and outcomes, the opportunities must be harnessed quickly if these goals are to stay within reach.
- Under the Paris Agreement, countries have the opportunity to enhance their commitments, or nationally determined contributions (NDCs), by 2020, which can catalyze action in the short term to avoid lock-in of an emissions-intensive pathway in the longer term. These updated NDCs will in turn need to translate into changes in policy, actions, and investments.

## Background

**Climate change presents both tremendous challenges and opportunities. To avoid the worst climate impacts, the global community must first halt growth in GHG emissions, and then swiftly reduce emissions to reach net zero by midcentury as agreed in the Paris Agreement.** In doing so, the world can unlock multiple benefits, from new jobs and innovation to improved health and protection of ecosystems and their services, to name a few.

To reach our targets, we must first know where we are and how big the remaining gap in action is. That's why monitoring our progress in bending the global emissions trajectory downward is of critical importance. We already know that peaking global emissions by 2020 gives us the least-cost likely chance of limiting warming to 1.5°C by the end of the century. In 2017, the *2020: The Climate Turning Point* report took stock of what it would take to peak global GHG emissions by 2020, including transforming policy, technology, behavior, and investment (Revoll and Harris 2017). A collaboration between multiple experts in the field, the peer-reviewed report identified six milestones across key emitting sectors that must be reached to deliver such a turning point in the world's emissions trajectory (Box ES-1). Encouragingly, the milestones that *2020: The Climate Turning Point* identified are also desirable and achievable in the context of sustainable development and human well-being.

**With two years left until the end of 2020, this working paper seeks to**

- **assess the world's collective progress toward achieving the six milestones that *2020: The Climate Turning Point* identified; and**
- **identify untapped opportunities for making progress toward those milestones.**

This paper takes stock of the latest available data to determine whether the global community is on track toward meeting the above milestones, what further action is needed, and the opportunities for getting ahead.

**This paper is targeted at national and subnational leaders, as well as leaders of major corporations and investors.** A secondary audience is subject experts who support such decision-makers in strengthening implementation of existing commitments, as well as increasing ambition in the future.

## Key Findings and Recommendations

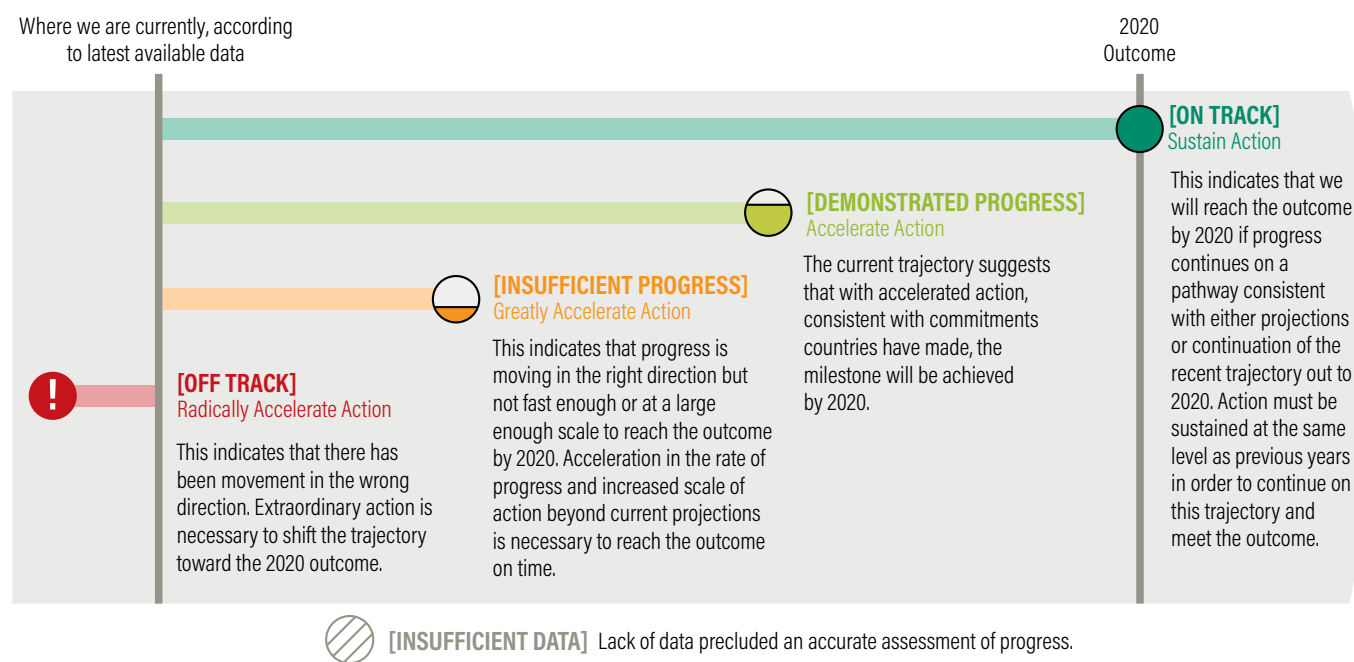
This paper reaches the following conclusions:

- **Progress is uneven across the six milestones: For some underlying outcomes in several milestones, action has been progressing and accelerating. However, in most cases action is insufficient or progress is off track (see Figure ES-1).**
- **Tremendous opportunities to scale up and accelerate action remain untapped across all sectors.** For almost all milestones and outcomes, the opportunities must be harnessed quickly if these goals are to stay within reach. Countries also have the opportunity to enhance their commitments, or nationally determined contributions (NDCs), by 2020, under the Paris Agreement, which can catalyze action in the short term to avoid lock-in of an emissions-intensive pathway in the longer term. These updated NDCs will in turn need to translate into changes in policy, actions, and investments. Related opportunities are highlighted throughout this report.

- **More transparent tracking of progress is needed across many areas.** Greater transparency and monitoring systems will allow us to more accurately track progress across all of the sector milestones. Our ability to track progress toward these milestones is limited by data availability. In some cases, there are data lags that may not accurately capture the action on the ground today, and it can take time for recent commitments to take effect. Generally, the completeness and lag in available data may distort the current evaluation of progress. In other cases, insufficient data impede any endeavor to assess progress toward reaching some milestones. Efforts are needed to increase transparency and generate necessary data to hold countries, companies, and regions accountable to achieving any individual commitments they have made that contribute to the milestones. Establishment of tracking systems can bring significant benefits and help identify opportunities, adjust existing plans, and guide the adoption of new actions.

Below are key findings for each of the outcomes under the six milestones (see Figure ES-2).

Figure ES-1 | **Explanation of Progress Designations to Achieve the Outcomes**



## 2020 ENERGY MILESTONE:

### Renewables outcompete fossil fuels as new electricity sources worldwide

The past decade has seen a remarkable shift toward electricity generation from renewable sources and away from fossil fuels, especially coal plants. This shift has been driven by rapidly declining costs and increased utilization rates of renewable generation technologies, making coal-fired power an uneconomic choice in many regions. In 2017 renewables accounted for the majority of new power-generating capacity added worldwide (IEA 2018a), a significant turnaround from just a decade ago. Deployment of renewables is growing fastest in developing nations, with new-build additions rising 20.4 percent year-on-year in these countries (BNEF 2018a).

Moving away from fossil fuels improves health outcomes, reduces healthcare costs, reduces climate impacts, contributes to emissions reduction goals, and provides more jobs than fossil fuels, among many other benefits (NCE 2018). The International Renewable Energy Agency (IRENA 2018a) estimates that benefits from a long-term energy transition would yield cost savings of \$6 trillion annually by 2050 just from reduced air pollution, better health, and reduced environmental damage. Achieving this milestone would mean:



Renewables make up at least 30 percent of the world's electricity supply:

**[DEMONSTRATED PROGRESS]** Accelerate Action

Global renewable electricity generation reached 25 percent in 2017 and renewable energy accounted for more than two-thirds of net capacity growth added to meet new electricity demand (IEA 2018b). Combined with recent analysis that finds renewable sources will be cost competitive with most fossil fuel power generation by 2020 (IRENA 2018b), the 30 percent share advised by the 2020 milestone is tentatively within reach if current trends accelerate. Given that past projections have typically underestimated the rapid growth of renewable energy, it is possible that projections made today could similarly underestimate future progress.

Recent shifts in renewable generation have been driven largely by cost declines, like that of solar photovoltaic (PV), which has seen an 81 percent price decline for modules since 2009 (REN 21 2018).

Private sector movement to divest from the fossil fuels, direct engagement efforts such as Climate Action 100+, commitments like those made by companies to use 100 percent renewable power through RE100 and increased interest in climate-related financial disclosures are all expected to help accelerate these trends. Seventeen countries were already producing more than 90 percent of their electricity from renewable sources (including hydropower) in 2017, providing a strong example of what is possible for other countries to follow (REN21 2018).



No new coal-fired power plants being built:

**[INSUFFICIENT PROGRESS]** Greatly Accelerate Action



All existing coal-fired power plants are in the process of being retired:

**[OFF TRACK]** Radically Accelerate Action

The growth of new installed capacity of coal-fired power plants has been slowing down globally—65 gigawatts (GW) of coal power capacity were added in 2017 compared to 107 GW in 2015 (CoalSwarm 2018). At the same time, the rate of coal retirement has increased, from around 2 GW in 2006 to more than 28 GW in 2017 (CoalSwarm 2018). Coal plant retirements have accelerated in parts of the developed world, while progress is more uneven in the developing world; however, in net terms coal capacity is still being added.

Many governments have recognized that the economics of coal power—combined with falling costs for renewable technology, national goals for climate action, preservation of air quality, and quantification of public health costs—make new coal power economically and socially unfavorable compared to renewable energy (IRENA 2018b).

Eighty national and subnational governments and businesses have joined the Powering Past Coal Alliance (PPCA 2018), committing to phasing out coal power and supporting clean power generation. Additionally, at least 19 major banks have declined further financial support for new coal plants (Banktrack 2018). All told, nearly 1,000 institutional investors with more than \$6 trillion in assets have committed to divesting from fossil fuels, up from just \$52 billion four years ago (Arabella Advisors 2018).


## OPTIONS FOR 2020 NDC ENHANCEMENT: ENERGY

The energy sector has been included in virtually all NDCs, whether economy-wide targets, sectoral targets, or policies and actions. Over 130 Parties mention renewable energy actions and plans in their NDCs, and 89 include a quantitative target related to renewable energy (ClimateWatch 2018). With enhanced or updated NDCs coming by 2020, countries that do not currently have specific targets for renewable energy should consider adding them. Those with targets already outlined should increase their ambition and outline specific actions or policies to achieve these targets, including for closure of coal plants and cancellation of planned capacity, expansion of energy storage and distributed renewable energy, support of renewable energy generation, and creation of favorable conditions for continued sustainable energy transitions, through commitments to reduce fossil fuel subsidies, for example.

### 2020 TRANSPORT MILESTONE:

Zero emissions transport is the preferred form of all new mobility in the world's major cities and transport routes


Transportation accounts for over 15 percent of global emissions, with international bunker fuels responsible for an additional 3 percent (WRI 2017). In addition to being a crucial step toward meeting the goals of the Paris Agreement, transitioning to zero emissions transport brings significant benefits, including lowering levels of particulate matter, which leads to improved air quality and the prevention of premature deaths. Achieving this milestone would mean:

 Electric vehicles account for 15–20 percent of new car sales globally:

**[INSUFFICIENT PROGRESS]** Greatly Accelerate Action

Global annual sales of electric vehicles (EVs) grew exponentially—by 54 percent—in a single year, reaching a record of 1.1 million in 2017 (IEA 2018c), with 4 million EVs on the road in 2018 (BNEF 2018b). However, the share of EVs in global sales of new vehicles was just 1.4 percent, and EVs are projected to only account for 3 percent of new car sales in 2020 (BNEF 2018c), falling very short of the outcome.


Announcements and targets have been made by 66 countries, 71 cities or regions, and 48 companies toward phasing out internal combustion engines and shifting to additional zero emissions vehicles. Twenty-three automobile manufacturers have also been introducing electric car models and EV sales targets (SLoCaT 2018). Many new EV commitments have been made in the last year, such as the Zero Emissions Vehicle (ZEV) Challenge by over 60 partners, including subnational states and regions, businesses, and cities. Additionally, strong policy signals, such as those sent in China and Norway, have shown that it is possible to boost EV sales significantly.

 Heavy-duty vehicle efficiency standards are 20 percent higher across all major economies; transport routes in major cities are operated with zero emissions modes:

**[INSUFFICIENT PROGRESS]** Greatly Accelerate Action

Reduction in the average fuel consumption of new heavy-duty vehicles (HDVs), through various areas of efficiency improvement, can save millions of barrels of oil per day, in addition to saving emissions (GFEI 2017). Yet only 50 percent of HDV sales are covered by fuel economy and emissions standards (IEA 2017a), and only five countries have HDV fuel economy regulations in place. While more major economies are now considering such regulations, we are not on track to achieving efficiency standards for HDVs that are 20 percent higher across all major economies.

Regarding zero emissions transport routes, pioneering leaders from 26 cities, with a combined population of over 125 million, have joined the C40 Fossil-Fuel-Free Streets Declaration (C40 2018a), which could drive demand for electric HDVs. Modal shift to rail freight also provides an alternative to heavy duty vehicles. Action needs to be rapidly accelerated if the outcome is to be reached. Realizing such an outcome lessens air pollution and brings significant health benefits.

 Public transport doubles its market share:  
**[INSUFFICIENT PROGRESS]** Greatly Accelerate Action

In 2015, the share of public transport of trips taken globally was 19 percent, falling short of the 32 percent outcome (the goal to double 2005 market share). The share also differs significantly by region, ranging from 7 percent in North America, 22 percent in Latin America, and over 27 percent in Africa (OECD 2017). Action to reach this outcome needs to be accelerated if it is to be met in 2020.



Providing convenient access to public transportation improves road safety, assists vulnerable populations, and saves millions of barrels of oil. It also improves access to employment opportunities and expands the supply of urban land, thereby driving down housing costs (NCE 2018).

 The aviation sector reduces total emissions per kilometer traveled by 20 percent below 2013 levels:  
**[INSUFFICIENT PROGRESS] Greatly Accelerate Action**

Energy intensity, which was used in this report to calculate trends in emissions intensity given a lack of data, has fallen by 4.5 percent between 2013 and 2015. An accelerated rate is needed to reach 20 percent reduction by 2020.

Members of the International Air Transport Association (IATA) and the International Civil Aviation Organization (ICAO) recently announced new initiatives to reduce emissions and improve efficiency, which can be built upon.

 The shipping sector announces plans for market measures or other instruments to eliminate emissions from their sector: **[ON TRACK] Sustain Action**

The International Maritime Organization (IMO) recently announced its initial strategy for reducing carbon emissions at least 50 percent by 2050 compared to 2007 levels, for phasing out emissions in this century, and for putting itself on a trajectory consistent with Paris Agreement temperature goals (IMO 2018). Additionally, Maersk, the world's biggest shipping company, announced a goal to be carbon-neutral by 2050.

## OPTIONS FOR 2020 NDC ENHANCEMENT: TRANSPORT

One hundred and seven NDCs include transportation actions targeting fleet efficiency, fuel use, transit-oriented planning, and more. Thirty-two NDCs include public transportation actions, six mention actions on aviation, and four include maritime emissions. Thirty-six NDCs include quantified mitigation targets for transport, of which thirteen specify emissions-reduction targets. Seven include targets for public transport, and five for electric vehicles (ClimateWatch 2018). Countries should specify further transport actions, including regarding aviation and maritime shipping at the national level, and increase the stringency of existing targets.

These plans would benefit from being further formalized through transparent data collection efforts such as the IMO's data collection system, complemented by concrete actions to achieve goals even earlier. In addition, countries can adopt initiatives and actions that complement and facilitate IMO action.

**2020 LAND USE MILESTONE:**  
Large-scale deforestation is replaced with large-scale land restoration, and agriculture shifts to earth-friendly practices

Reducing deforestation and degradation, accelerating restoration, and boosting crop and pasture yields to increase food production, without further agricultural land expansion, are critical for reducing emissions and maintaining ecosystem services. However, at present, land use—both agriculture and forests—is a major contributor to global GHG emissions. Achieving this milestone would mean:

The world's nations, civil society institutions, and corporations act to end net deforestation by the 2020s, putting us on a path to reducing emissions from forestry and other land use 95 percent below 2010 levels by 2030:


 Net natural forest loss  
**[INSUFFICIENT PROGRESS] Greatly Accelerate Action**

 Gross tree cover loss  
**[OFF TRACK] Radically Accelerate Action**

Net natural forest loss has declined in recent years while gross tree cover loss has increased (FAO 2018; Hansen et al. 2018). Net numbers count naturally reforested areas as offsetting forest loss in another location, whereas gross tree cover loss counts regrowth and loss separately. Looking just at net numbers can be misleading since forest loss in one place cannot always be counted as equivalent to regrowth in another. A more careful examination of the drivers and locations of gross forest loss shows we are not moving in the right direction regarding deforestation as a whole, even though net natural forest loss is declining. Reflecting the difference between net and gross numbers, net emissions from deforestation have declined to just over 3 gigatons of carbon dioxide equivalent (GtCO<sub>2</sub>e) in 2016 (FAO 2018), while gross emissions have increased.

Forests provide critical ecosystem services, including protection from extreme disasters such as floods and droughts, provision of food and fiber, and protection of biodiversity. If further deforestation is avoided, the global economy would be boosted by at least US\$40–80 billion per year (NCE 2018).

Nearly 500 companies have committed to reducing or eliminating supply-chain driven deforestation by different target dates (Supply Change 2018). Among companies with exposure to commodities in their supply chains, those with commitments account for at least twice the revenue of those without (Donofrio et al. 2017).

 Restore and conserve at least 150 million hectares of degraded land, enhancing biodiversity and building ecosystem resilience: [INSUFFICIENT DATA]

Under the Bonn Challenge—a global effort to bring 150 million hectares (Mha) into restoration by 2020—32 national and subnational actors have thus far committed to restoring 94 Mha. While progress has only been assessed in six jurisdictions so far, analysis shows that less than half of the committed hectares has been restored (23.2 Mha restored of 53.2 Mha pledged among those six countries) (IUCN 2017). As comprehensive data to track progress across all jurisdictions have yet to be collected and published, these values are underestimating progress to date, but the subset of data currently available shows we may not be on track to reach the 2020 milestone.

Restoration can provide new income streams that could boost smallholders' incomes in developing countries by \$35–40 billion per year within the next 15 years (NCE 2018). It is estimated that meeting the adopted 150 Mha restoration outcome alone would bring \$85 billion per year in net benefits (Ding et al. 2017).

Ramp up the implementation of sustainable agricultural practices that reduce CO<sub>2</sub> emissions, increase CO<sub>2</sub> removals, and halt the growth in non-CO<sub>2</sub> emissions:

 Practices to reduce CO<sub>2</sub> and non-CO<sub>2</sub> emissions:  
[OFF TRACK] Radically Accelerate Action

 Practices to increase CO<sub>2</sub> removals:  
[INSUFFICIENT DATA]

Direct emissions from agriculture, of which nearly all are non-CO<sub>2</sub> emissions, have increased from 4.6 GtCO<sub>2</sub>eq in 2000 to 5.3 GtCO<sub>2</sub>eq in 2016. Indirect emissions from agriculture, which include CO<sub>2</sub> emissions, are counted in other sectors and not tracked in this report. While some efforts to enhance carbon removals on farms, through soil management or cover cropping, are starting to take shape, global data tracking uptake are not available. To halt growth in direct agricultural emissions by 2020, progress must be greatly accelerated to bend the trajectory of agricultural emissions downward (FAO 2018).

On the supply side, focusing on increasing agricultural productivity without expanding land can yield direct benefits while lessening the impact on forests, and initiatives like 4 per 1000 are working to improve soil quality. On the demand side, initiatives like Champions 12.3 and shifting diets are aimed at reducing growth in demand for agricultural products and providing a foundation for scaling up action in this sector. Additionally, over 40 companies involved in the food supply chain have committed to science-based targets to reduce their emissions (SBT 2018).

#### OPTIONS FOR 2020 NDC ENHANCEMENT: LAND USE

Over 150 NDCs consider land use-related mitigation options, such as reforestation or afforestation, under their GHG reduction targets, with 124 referencing ongoing or planned efforts in the forest sector; however, only 58 of those include quantitative forest sector targets (ClimateWatch 2018).

As countries enhance or update NDCs by 2020, they should strengthen their commitments around forests and land use by laying out specific quantitative targets or by strengthening existing quantitative targets through enhancing ambition and/or specifying policies or actions to create the conditions for achieving those targets, including mobilizing finance to protect forested areas or improving monitoring programs to track impact.

For agriculture, governments can commit to reforming inefficient and environmentally harmful agricultural subsidies and to aligning fiscal and policy incentives to encourage earth-friendly agriculture, among other solutions. Investments in smallholders could spare millions of hectares from deforestation (WEF 2017).

## 2020 INDUSTRY MILESTONE:


Heavy industry—including iron and steel, cement, chemicals, and oil and gas—commits to being Paris-compliant

Heavy industries, such as iron and steel, cement, chemicals, and oil and gas, are energy intensive and collectively responsible for around a quarter of global CO<sub>2</sub> emissions (IEA 2018c). Emissions from industrial processing itself has increased almost twofold compared to 1990 levels (Gütschow et al. 2018), although the rate of growth has slowed in recent years (IEA 2018c). If no further actions are taken, emissions from the industrial sector are expected to continue to increase to over 17 percent higher than 2016 levels in 2050 (IEA 2017b).

Mitigation opportunities, however, exist on many fronts. Recent analysis has found that it is technically and economically feasible for chemicals, steel, and cement to reach net zero emissions by midcentury at a cost of less than 0.5 percent of global gross domestic product (ETC 2018). Achieving this milestone would mean:


Heavy industry firms have developed, published, and begun implementing roadmaps for their transition to a decarbonized economy in 2050:

 Heavy industry firms have developed and published roadmaps: **[INSUFFICIENT PROGRESS]** Greatly Accelerate Action

 Heavy industry firms have begun implementing roadmaps: **[INSUFFICIENT DATA]**

Various international efforts are under way to support companies, including heavy industry firms, in setting short- and long-term goals and related planning. For example, nearly 300 heavy industry companies<sup>1</sup> in the industrial, materials, and energy sectors have registered 677 cooperative and individual actions in the Global Climate Action portal of the United Nations Framework Convention on Climate Change (UNFCCC 2018), committing to various initiatives such as Science Based Targets (SBTs), the Low Carbon Technology Partnerships initiative (LCTPi), and RE100 for 100 percent renewable power, among others. Roadmaps with clear timelines and milestones, coupled with transparent systems to track progress, can support implementation and realization of the commitments.

Increased energy and material efficiency of heavy industry processes also bring benefits such as energy savings, reduced production costs, and increased jobs. Technology innovations also can bring new economic opportunities and environmental benefits (NCE 2018).

 Heavy industries are increasing their energy, emission, and material efficiencies and are on a trajectory to halve emissions by 2050 using science-based targets: **[INSUFFICIENT PROGRESS]** Greatly Accelerate Action

Positive steps have been taken in heavy industries. For example, the global carbon intensity of cement production leveled off between 2014 and 2016 (IEA 2018c). By deploying energy and material efficiency measures and best available technologies, emissions could be kept at a level below current levels through 2060 (IEA 2017b). For a trajectory to halve emissions by 2050 and to reach a Paris-compliant scenario, or limit warming even lower, switching to low-carbon fuels and innovative low-carbon technologies such as low-carbon hydrogen generation, solar thermal for alumina refining, and carbon capture and sequestration (CCS) will be needed in the longer term (IEA 2017b). Those innovative technologies are at various stages, ranging from under research and development to commercially available. Advancing those technologies and making them available in the long-term require significant investment in research, development, demonstration, and deployment, as well as a policy push to remove institutional barriers in the short term.

## OPTIONS FOR 2020 NDC ENHANCEMENT: INDUSTRY

Around 40 NDCs include actions and plans in relation to heavy industries, such as cement, chemicals, iron, and steel. Only 15 NDCs include quantitative targets related to heavy industry, such as reductions in the sector's emissions and increased share of additives in cement production (ClimateWatch 2018). While companies have a major role to play in decarbonizing heavy industries, momentum can be created and complemented by specifying actions and policies in NDCs. Countries should drive accelerated actions by nonstate actors in heavy industry sectors, advancing policies such as carbon pricing material and efficiency mandates.




In addition, 26 heavy industry companies have committed to establishing science-based targets (SBT 2018), and 5 of these have approved targets.<sup>2</sup> No sufficient public accessible data exist to assess the magnitude of those targets, such as the share of emissions in the industry sector by those companies, or how they add up and compare to a trajectory of halving emissions by 2050.

#### 2020 INFRASTRUCTURE MILESTONE:

Cities and states are implementing policies and regulations to fully decarbonize buildings and infrastructure by 2050

Infrastructure construction and operation, including electricity generation and distribution, industry, buildings, and transport systems, account for 70 percent of global GHG emissions (World Bank 2018a). Investing in low-carbon infrastructure can help mitigate GHG emissions, reduce air pollution, and improve traffic congestion. Expansion of infrastructure related to adaptation, such as seawalls and flood protection, will also help increase climate resilience and reduce vulnerability.


Cities and states have been increasingly making commitments toward decarbonizing infrastructure and buildings (C40 2018b). Over 9,000 cities registered actions on the UNFCCC's Global Climate Action portal (UNFCCC 2018). More than 70 mayors have committed to developing and implementing climate action plans by 2020 and to becoming emissions-neutral by no later than 2050. While these commitments extend beyond just buildings and infrastructure, many of them include related actions. Additionally, 815 cities signed the One Planet Charter (Global Covenant of Mayors 2018) to reinforce their commitments and take continued actions to reach zero emissions buildings and zero waste objectives. National governments will also play an important role in policy development, finance, capacity building, and other measures to build an enabling environment for further action. Achieving this milestone would mean:

 At least \$300 billion is invested annually to support infrastructure decarbonization, in addition to the necessary \$6 trillion in annual business-as-usual infrastructure:  
[INSUFFICIENT DATA]

Investment in low-carbon infrastructure is likely not commensurate with what is needed to meet the 2020 outcome. In 2017, the multilateral development banks (MDBs) reached a record high of \$32.5 billion in climate finance,<sup>3</sup> a 20 percent increase from the previous year.


Those same projects also attracted cofinancing of over \$50 billion (MDBs 2018), of which approximately \$11.5 billion was dedicated to infrastructure financing (Meltzer 2018). There are not enough data to know how much investment occurred beyond the MDBs, making it impossible to assess progress. However, if the MDBs are a significant percentage of finance to support infrastructure decarbonization, progress may very likely be insufficient. Developed countries are encouraged to fulfill their international pledges, and the private sector will need to increase investment while public financing continues to de-risk those projects.

Investing in sustainable infrastructure is not necessarily costly and can be achieved without compromising economic development (NCE 2014). Failure to invest in low-carbon technologies for infrastructure can cause lock-in to a higher emissions pathway as these assets have long lifespans.

 New buildings are built to zero or near-zero energy standards: [INSUFFICIENT PROGRESS] Greatly Accelerate Action

The number of zero energy buildings has been growing exponentially, with over 700 percent more since 2012 in the United States and Canada. However, high-performance buildings such as near-zero energy buildings account for less than 5 percent of construction in most markets today (IEA 2018c), and still well less than 1 percent of the global building stock (Laski and Burrows 2017).

However, there has been movement recently. For example, the World Green Building Council's Net Zero Carbon Building Commitment (WorldGBC 2018) has 44 signatories from cities, regions, and businesses,<sup>4</sup> committing to all new buildings reaching net zero operating emissions by 2030 and all buildings operating at net zero carbon by 2050.

 At least 3 percent of the world's existing building stock, on average, is upgraded to zero or near-zero emissions structures annually: [INSUFFICIENT DATA]

Existing buildings were retrofitted at an annual rate of around 1–2 percent as of a few years ago (GABC 2016). If this rate has remained unchanged, then retrofits will need to accelerate to 3 percent annually and increase the stringency of upgrades to meet net zero emissions standards to reach 100 percent of zero energy buildings

in 2050. Less than a third of countries had introduced mandatory building energy codes or building energy certifications in 2017, and only 18 countries have building codes targeted at the existing building stock (IEA 2018d). No publicly available data source has been found to provide a more recent and accurate estimate of the current retrofit rate of the world's existing building stock.

### OPTIONS FOR 2020 NDC ENHANCEMENT: INFRASTRUCTURE

Over 130 NDCs mention the building sector, and 45 of these put forward building-related plans and actions, with 38 including plans and policies that address building efficiency. Only 13 NDCs list specific quantitative mitigation targets such as emissions reductions and demand-side efficiency in buildings (Climate-Watch 2018). Countries should include or complement existing policies in their future NDCs. Furthermore, mentioning more specific actions, targets, and technologies in NDCs—such as new building codes, building envelope improvement, and enhanced heating and cooling efficiency—that are crucial for decarbonizing buildings would create a clearer path for achieving those ambitions.

### 2020 FINANCE MILESTONE: Investment in climate action is beyond \$1 trillion per year and all financial institutions have a disclosed transition strategy

Access to sufficient financing is a prerequisite for scaling mitigation and adaptation action. Public financing for climate has been growing over time and will need to sustain and even accelerate that growth going forward. Private investment also needs to be scaled up and better aligned with climate objectives.

There has been growing interest from the private sector in greater transparency around the climate risks of investments as these risks become more apparent and the opportunity for new and innovative instruments expands. Achieving this milestone would mean:

Invest at least \$200 billion of public and \$800 billion of private resources in climate action each year:

 Public: **[ON TRACK]** Sustain Action

 Private: **[INSUFFICIENT DATA]**


In 2016, global investment to tackle climate change—covering only a portion of the global flows due to data gaps—is estimated to have totaled between \$455 billion<sup>5</sup> and \$681 billion, with the high estimate including investment in energy efficiency<sup>6</sup> (Oliver et al. 2018; Watson et al. 2018). While it is possible the \$1 trillion outcome will be reached by 2020, especially the public finance component, lack of complete data will make it difficult to tell.

A number of recent initiatives and commitments by both private and public sector entities point to a growing pool of green finance. This growth will need to accelerate to sufficiently finance the transition to a Paris-compliant economy.

 Increase the amount of philanthropic funding for the climate movement tenfold from 2016 levels: **[INSUFFICIENT PROGRESS]** Greatly Accelerate Action

Twenty-nine philanthropies came together at the Global Climate Action Summit (GCAS) in September 2018 to announce a \$4 billion commitment toward climate action over the next five years—the largest commitment ever to climate philanthropy (ClimateWorks 2018). While it falls short of a tenfold increase from 2016 levels, which would be at least \$2.6 billion each year,<sup>7</sup> this commitment still represents a significant acceleration in giving compared to recent years. It also does not represent all philanthropic giving toward climate.

In line with the growing commitment to climate evidenced by the \$4 billion pledge, a survey of 10 major foundations in the United States and Europe, representing more than \$240 million in climate funding per year, found that the majority of foundations have increased their focus on climate and will continue to do so (Foundation Center 2018). Nearly 200 major foundations have also committed to divesting from coal or all fossil fuels (Fossil Free 2018).

 Multiply the green bond market annual issuance tenfold from 2016 levels: **[INSUFFICIENT PROGRESS]** Greatly Accelerate Action

Growth in green bond issuance has been strong over the past five years, increasing from less than \$12 billion in 2013 to \$162 billion in 2018. While 2018 saw a leveling off in this growth as compared to 2017, the overall trend reflects strong and growing interest. However, this pace of growth is not fast enough to reach the \$810 billion outcome by 2020 (which would represent a tenfold increase over 2016 levels of \$81 billion).

For issuers, green bonds provide a means to raise finance for climate friendly projects; for investors, they provide a clear indication of climate consideration as well as increased transparency of the projects and their impact.

In addition to labeled green bonds, there is a larger universe of more than \$1 trillion in outstanding bonds from issuers who derive most (75–95 percent) of their revenue from climate-aligned projects, indicating strong potential for expansion of labeling, as well as growth in overall issuance (CBI 2018).

 Institutions disclose climate-related financial risks and that credit ratings fully incorporate them: **[INSUFFICIENT DATA]**

Over 500 companies and other organizations with a combined market capitalization of nearly \$8 trillion have pledged to support the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD 2018) since they were published in 2017, and more than 1,000 companies already disclose information on physical or financial risks aligned with TCFD recommendations (CDP and CDSB 2018). Investor demand for credit rating agencies to take environmental, social, and governance risks into consideration is increasing (PRI 2017), and credit rating agencies are increasing their focus on environmental risks, but data are not available to track progress in this area.

Companies and investors need access to complete information to make informed investment decisions. Conversely, credit rating agencies need to fully incorporate climate risks into their ratings in order to provide full information for investors. The importance of this information increases as the effects of climate change become more tangible, with impacts on physical infrastructure as well as on business and profitability through the transition to a greener economy. Direct engagement efforts such as Climate Action 100+, through which nearly 300 investors representing \$31 trillion in assets under management have committed to engage with the world's largest GHG emitters to accelerate climate action, are expected to accelerate these trends.



Eliminate fossil fuel subsidies:  
**[INSUFFICIENT PROGRESS]** Greatly Accelerate Action

Fossil fuel subsidies have declined from \$443 billion in 2010 to \$373 billion in 2015. However, partial data for just member countries of the Organisation for Economic Co-operation and Development (OECD) in 2016 show a leveling off of this progress (OECD 2018). Member countries of the G7, the G20, the Asia Pacific Economic Cooperation, and the European Union have all continually committed to phasing out fossil fuel subsidies, and while the data show incremental progress at the global scale, movement at the country level is varied. All told, the Global Commission on the Economy and Climate estimates that more than 40 countries partially reduced subsidies for fossil fuels between 2015 and 2017 (NCE 2018).

Progress remains uneven, and subsidies are not currently decreasing fast enough to be eliminated in the next few years. Furthermore, a prolonged economic upswing and lower oil prices mean that reduced subsidies cannot always be attributed to policy but rather are partly due to lower prices spurring less need for subsidization.


Subsidies for coal, oil, and gas essentially act as a negative carbon price, reducing the costs for these polluting substances and taking up funding that could instead be used for other expenditures, including investment in sustainable development.



Cancel capital expenditure for coal, oil, and gas production:  
**[INSUFFICIENT DATA]**

While evidence shows a decline in capital expenditures for new fossil fuel extraction projects, particularly new coal mines, no comprehensive data set exists that tracks the cancellation of capital expenditure for all fossil fuel projects globally. Accordingly, it is difficult to track progress toward this milestone. The appetite of commercial and development banks to finance these projects has declined, with many announcing restrictions or total bans on financing of coal mines or other fossil fuel extraction projects (Banktrack 2018). If investments are not shifted, investors stand to lose \$1–4 trillion globally when fossil fuel assets become stranded (Mercure et al. 2018).

The shift away from fossil fuels, especially coal, is under way, with effects being felt as renewable energy already outcompetes coal on price in many markets (Benn et al. 2018). Looking ahead, this shift toward renewable energy is expected to continue as technologies advance and costs continue to fall.

 Implement a carbon pricing mechanism within and across all major economies: **[INSUFFICIENT PROGRESS]** Greatly Accelerate Action

As of late 2018, 52 national and subnational carbon taxes or emission trading schemes (ETS) had been implemented or were planned for implementation, including 25 ETS and 27 carbon taxes covering 19.5 percent of global GHG emissions, according to the World Bank (World Bank 2018b). This represents a nearly fourfold increase from 10 years ago when 5 percent of emissions were covered. Fourteen of the G20 economies have a national or subnational carbon tax or ETS planned or implemented. Many of these pricing initiatives, however, can increase their prices and expand the scope of their emissions coverage in order to increase their impact.

Well-designed carbon pricing schemes can be set up as revenue-neutral, and proceeds can be redistributed back to households in the form of rebates higher than the cost they incurred (Nuccitelli 2018).

## OPTIONS FOR 2020 NDC ENHANCEMENT: FINANCE

Discussion of climate finance in the first NDCs is largely with regard to countries specifying conditional elements of NDCs and describing finance needed to implement their NDCs. However, some countries also mention specific financial mechanisms. Fifteen countries mention the intention to reduce or remove fossil fuel subsidies, but these do not include the countries that provide the bulk of global fossil fuel subsidies (Climate Watch 2018). Additionally, over 80 mention market-based mechanisms and carbon pricing (DIE 2018). In enhanced or updated NDCs, there is an opportunity to accelerate and increase the ambition of these commitments and include new ones—for example, to halt production of fossil fuel reserves.

We are seeing a shift to a new, more sustainable way of living across all sectors of the economy. Shifts in investments, plummeting costs of clean energy technologies, and increased understanding of climate impacts, with communities connecting the dots between extreme events and human-induced warming, are driving scores of companies and countries to enhance their climate commitments.




Reaching most of the milestones laid out in *2020: The Climate Turning Point* is still technically feasible, but whether they are met depends upon much more concerted policy and investment action, alongside shifts in behavior and mindsets. We are already at the cusp of achieving several of them. However, across the board, we need to deepen action and unlock ambition across all sectors and geographies.

Meeting the milestones outlined in this report is far from easy, but if we are successful, we will have a better chance of peaking global emissions by 2020, our climate turning point (Revoll and Harris 2017). Realizing this vision will bring significant economic gains, create more resilient and secure livelihoods, increase job opportunities, ensure our air and water is clean, protect human health, fashion more livable cities, and protect species and ecosystems and the services they provide (NCE 2018). The 2020 turning point will allow us to make this future a reality. It's necessary, desirable, and achievable.

Figure ES-2 | Summary of Progress Toward 2020 Outcomes






## 2020 ENERGY MILESTONE

### OUTCOMES PROGRESS

-  Renewables make up at least 30 percent of the world's electricity supply **[DEMONSTRATED PROGRESS]**
-  No new coal-fired power plants being built **[INSUFFICIENT PROGRESS]**
-  All existing coal-fired power plants are in the process of being retired **[OFF TRACK]**

## 2020 TRANSPORT MILESTONE

### OUTCOMES PROGRESS

-  Electric vehicles account for 15–20% of new car sales globally **[INSUFFICIENT PROGRESS]**
-  Heavy-duty vehicle efficiency standards are 20% higher across all major economies; transport routes in major cities are operated with zero emissions modes **[INSUFFICIENT PROGRESS]**
-  Public transport doubles its market share **[INSUFFICIENT PROGRESS]**
-  The aviation sector reduces total emissions per kilometer traveled by 20% below 2013 levels **[INSUFFICIENT PROGRESS]**
-  The shipping sector announces plans for market measures or other instruments to eliminate emissions from their sector **[ON TRACK]**

## 2020 LAND USE MILESTONE

### OUTCOMES PROGRESS

- The world's nations, civil society institutions, and corporations act to end net deforestation by the 2020s, putting us on a path to reducing emissions from forestry and other land use 95% below 2010 levels by 2030:
-  Net natural forest loss **[INSUFFICIENT PROGRESS]**
-  Gross tree cover loss **[OFF TRACK]**
-  Restore and conserve at least 150 million hectares of degraded land, enhancing biodiversity and building ecosystem resilience **[INSUFFICIENT DATA]**
- Ramp up the implementation of sustainable agricultural practices that reduce CO<sub>2</sub> emissions, increase CO<sub>2</sub> removals, and halt the growth in non-CO<sub>2</sub> emissions:
-  Practices to reduce CO<sub>2</sub> and non-CO<sub>2</sub> emissions **[OFF TRACK]**
-  Practices to increase CO<sub>2</sub> removals **[INSUFFICIENT DATA]**




## 2020 INDUSTRY MILESTONE

### OUTCOMES PROGRESS

- Heavy industry firms have developed, published, and begun implementing roadmaps for their transition to a decarbonized economy in 2050:
-  Heavy industry firms have developed and published roadmaps **[INSUFFICIENT PROGRESS]**
-  Heavy industry firms have begun implementing roadmaps **[INSUFFICIENT DATA]**
- Heavy industries are increasing their energy, emission, and material efficiencies and are on a trajectory to halve emissions by 2050 using science-based targets **[INSUFFICIENT PROGRESS]**









## 2020 INFRASTRUCTURE MILESTONE

### OUTCOMES PROGRESS

-  At least USD \$300 billion is invested annually to support infrastructure decarbonization, in addition to the necessary \$6 trillion in annual business-as-usual infrastructure **[INSUFFICIENT DATA]**
-  New buildings are built to zero or near-zero energy standards **[INSUFFICIENT PROGRESS]**
-  At least 3 percent of the world's existing building stock, on average, is upgraded to zero or near-zero emissions structures annually **[INSUFFICIENT DATA]**

## 2020 FINANCE MILESTONE

### OUTCOMES PROGRESS

- Invest at least \$200 billion of public and \$800 billion of private resources in climate action each year:
-  Public **[ON TRACK]**  Private **[INSUFFICIENT DATA]**
-  Increase the amount of philanthropic funding for the climate movement by 10x from 2016 levels **[INSUFFICIENT PROGRESS]**
-  Multiply the green bond market annual issuance by 10x from 2016 levels **[INSUFFICIENT PROGRESS]**
-  Institutions disclose climate-related financial risks and credit ratings fully incorporate them **[INSUFFICIENT DATA]**
-  Eliminate fossil fuel subsidies **[INSUFFICIENT PROGRESS]**
-  Cancel capital expenditure for coal, oil, and gas production **[INSUFFICIENT DATA]**
-  Implement a carbon pricing mechanism within and across all major economies **[INSUFFICIENT PROGRESS]**



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## ENDNOTES

1. Defined as with business activity of chemicals, construction materials, mining-coal, mining-aluminum, other metals, and oil and gas.
2. Sectors: chemicals; mining—metals (iron, aluminum, other metals); mining—coal; construction materials.
3. Developed countries have the discretion to choose what counts toward climate finance and have adopted different approaches for doing so (Nakhooda et al. 2013).
4. As of January 10, 2019; <https://www.worldgbc.org/thecommitment>.
5. This includes \$224 billion from the public sector and \$230 billion from the private sector.
6. Investments in energy efficiency are excluded from the lower estimate due to lack of granularity in the data in terms of financial instrument, the source and destination of the finance, and the possibility that these investments are locking in infrastructure that is more efficient but not compatible with a 1.5°C pathway.
7. With the data available, this figure is considering only funding provided by U.S. foundations (estimated at \$259 million in 2015 by the Foundation Center) scaled up by a factor of 10, as in the outcome text.

## REFERENCES

- Arabella Advisors. 2018. *The Global Fossil Fuel Divestment and Clean Energy Investment Movement*. 2018 report. <https://www.arabellaadvisors.com/wp-content/uploads/2018/09/Global-Divestment-Report-2018.pdf>.
- Banktrack. 2018. "List of Banks That Ended Direct Finance for New Coal Mines/Plants." December 13. [https://www.banktrack.org/campaign/list\\_of\\_banks\\_that\\_ended\\_direct\\_finance\\_for\\_new\\_coal\\_minesplants](https://www.banktrack.org/campaign/list_of_banks_that_ended_direct_finance_for_new_coal_minesplants).
- Benn, A., P. Bodnar, J. Mitchell, and J. Waller. 2018. "Managing the Coal Capital Transition: Collaborative Opportunities for Asset Owners, Policymakers and Environmental Advocates." <https://www.rmi.org/insight/managing-coal-capital-transition/>.
- BNEF (Bloomberg New Energy Finance). 2018a. "Emerging Markets 2018 Outlook: Energy Transition in the World's Fastest Growing Economies." November 27. <http://global-climatescope.org/assets/data/reports/climatescope-2018-report-en.pdf>.
- BNEF. 2018b. "Cumulative Global EV Sales Hit 4 Million." August 30. <https://about.bnef.com/blog/cumulative-global-ev-sales-hit-4-million/>.
- BNEF. 2018c. "Electric Vehicle Outlook 2018." <https://about.bnef.com/electric-vehicle-outlook/>.
- C40. 2018a. "Fossil-Fuel-Free Streets Declaration." <https://www.c40.org/other/fossil-fuel-free-streets-declaration>.
- C40. 2018b. "Scores of Cities Commit to Bold Climate Action to Deliver on the Highest Ambition of Paris Agreement." [https://www.c40.org/press\\_releases/scores-of-cities-commit-to-bold-climate-action-to-deliver-on-the-highest-ambition-of-paris-agreement](https://www.c40.org/press_releases/scores-of-cities-commit-to-bold-climate-action-to-deliver-on-the-highest-ambition-of-paris-agreement).
- CBI (Climate Bonds Initiative). 2018. "Bonds and Climate Change: The State of the Market 2018." <https://www.climatebonds.net/resources/reports/bonds-and-climate-change-state-market-2018>.
- CDP and CDSB (Climate Disclosure Standards Board). 2018. "Ready or Not: Are Companies Prepared for the TCFD Recommendations?" [https://www.cdsb.net/sites/default/files/tcfid\\_preparedness\\_report\\_final.pdf](https://www.cdsb.net/sites/default/files/tcfid_preparedness_report_final.pdf).
- ClimateWatch. 2018. "Climate Watch: NDC Content." World Resources Institute. <https://www.climatewatchdata.org/ndcs-content>.
- ClimateWorks. 2018. "Philanthropy Announcement." ClimateWorks Foundation. September 14. <https://www.climateworks.org/philanthropyannouncement/>.
- CoalSwarm. 2018. "Summary Statistics." End Coal. <https://endcoal.org/global-coal-plant-tracker/summary-statistics/>.
- DIE (Deutsches Institut für Entwicklungspolitik/German Development Institute). 2018. "Klimalog: NDC Explorer." DIE, African Centre for Technology Studies (ACTS), Stockholm Environment Institute (SEI). <https://klimalog.die-gdi.de/ndc/#>.
- Ding, H., S. Faruqi, A. Wu, J.C. Altamirano, A.A. Ortega, M. Verdone, R.Z. Cristales, R. Chazdon, and W. Vergara. 2017. *Roots of Prosperity: The Economics and Finance of Restoring Land*. December. Washington, DC: World Resources Institute.
- Donofrio, S., P. Rothrock, and J. Leonard. 2017. "Supply Change: Tracking Corporate Commitments to Deforestation-Free Supply Chains." Supply Change. March. [https://www.forest-trends.org/wp-content/uploads/2017/03/2017SupplyChange\\_FINAL.pdf](https://www.forest-trends.org/wp-content/uploads/2017/03/2017SupplyChange_FINAL.pdf).
- ETC (Energy Transition Commission). 2018. *Mission Possible: Reaching Net-Zero Carbon Emissions from Harder-to-Abate Sectors by Mid-century*. [http://www.energy-transitions.org/sites/default/files/ETC\\_MissionPossible\\_FullReport.pdf](http://www.energy-transitions.org/sites/default/files/ETC_MissionPossible_FullReport.pdf).
- FAO (Food and Agriculture Organization of the United Nations). 2018. "FAOSTAT." Food and Agriculture Organization Corporate Statistical Database. February 12. <http://www.fao.org/faostat/en/#data/GT>.
- Fossil Free. 2018. "Fossil Free: Full List of Divestment Commitments." <https://gofossilfree.org/divestment/commitments/>.
- Foundation Center. 2018. "Current Trends in Philanthropy: U.S. Foundation Support for Climate Action." *PhilanTopic* (blog), November 9. <https://pndblog.typepad.com/pndblog/2018/11/current-trends-in-philanthropy-us-foundation-support-for-climate-action-1.html>.
- GABC (Global Alliance for Buildings and Construction). 2016. "Roadmap for Transition towards Low-GHG and Resilient Buildings." <https://www.globalabc.org/uploads/media/default/0001/01/0d6a71a346ea7e6841b1b29c77eba6d6ae986103.pdf>.
- GFEI (Global Fuel Economy Initiative). 2017. "Targeting Heavy Duty Vehicle Fuel Economy." <https://www.globalfueleconomy.org/data-and-research/publications/targeting-heavy-duty-vehicle-fuel-economy>.
- Global Covenant of Mayors. 2018. "Join the One Planet Charter and Let's Step Up Climate Action in 2018!" June 12. <https://www.globalcovenantofmayors.org/press/join-one-planet-charter-lets-step-climate-action-2018/>.
- Gütschow, J., M.L. Jeffery, R. Gieseke, and R. Gebel. 2018. "The PRIMAP-Hist National Historical Emissions Time Series (1850–2015), V. 1.2. GFZ Data Services." *Earth System Science Data*. doi:<http://doi.org/10.5880/PIK.2018.003>.
- Hansen, M.C., University of Maryland, Google, USGS, and NASA. 2018. "Global Forest Watch." October. <http://data.globalforestwatch.org/datasets/63f9425c45404c36a23495ed7bef1314>.
- IEA (International Energy Agency). 2017a. "The Future of Trucks—Implications for Energy and the Environment." Paris: OECD/IEA. <https://www.iea.org/publications/freepublications/publication/TheFutureofTrucksImplicationsforEnergyandtheEnvironment.pdf>.
- IEA. 2017b. "Energy Technology Perspectives 2017—Catalysing Energy Technology Transformations." Paris: OECD/IEA. <https://www.iea.org/etp2017/>.

- IEA. 2018a. "Renewables 2018: Market Analysis and Forecast 2018–2023." <https://www.iea.org/renewables2018/power/>.
- IEA. 2018b. "Global Energy and CO<sub>2</sub> Status Report: The Latest Trends in Energy and Emissions in 2017." <https://www.iea.org/publications/freepublications/publication/GECO2017.pdf>.
- IEA. 2018c. "Tracking Clean Energy Progress." <https://www.iea.org/tcep/>.
- IEA. 2018d. "Building Energy Efficiency Policies." <https://www.iea.org/beep/>.
- IMO (International Maritime Organization). 2018. "UN Body Adopts Climate Change Strategy for Shipping." <http://www.imo.org/en/mediacentre/pressbriefings/pages/06ghginitialstrategy.aspx>.
- IRENA (International Renewable Energy Agency). 2018a. "Global Energy Transformation: A Roadmap to 2050." [https://irena.org/-/media/Files/IRENA/Agency/Publication/2018/Apr/IRENA\\_Report\\_GET\\_2018.pdf](https://irena.org/-/media/Files/IRENA/Agency/Publication/2018/Apr/IRENA_Report_GET_2018.pdf).
- IRENA. 2018b. "Renewable Power Generation Costs in 2017: Key Findings and Executive Summary." [http://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Jan/IRENA\\_2017\\_Power\\_Costs\\_2018\\_summary.pdf](http://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Jan/IRENA_2017_Power_Costs_2018_summary.pdf).
- IUCN (International Union for Conservation of Nature). 2017. "Bonn Challenge Barometer of Progress: Spotlight Report 2017." <https://portals.iucn.org/library/sites/library/files/documents/2017-060.pdf>.
- Laski, J., and V. Burrows. 2017. *From Thousands to Billions: Coordinated Action towards 100% Net Zero Carbon Buildings by 2050*. World Green Building Council. [https://www.worldgbc.org/sites/default/files/From%20Thousands%20To%20Billions%20WorldGBC%20report\\_FINAL%20issue%20310517.compressed.pdf](https://www.worldgbc.org/sites/default/files/From%20Thousands%20To%20Billions%20WorldGBC%20report_FINAL%20issue%20310517.compressed.pdf).
- Lazard. 2018. "Lazard's Levelized Cost of Energy Analysis—Version 12.0." <https://www.lazard.com/media/450784/lazards-levelized-cost-of-energy-version-120-vfinal.pdf>.
- MDBs (Multilateral Development Banks). 2018. "2017 Joint Report on Multilateral Development Banks' Climate Finance." Inter-American Development Bank (IDB); European Bank for Reconstruction and Development (EBRD); World Bank (WB); African Development Bank (AfDB); IDB Invest; Asian Development Bank (ADB); European Investment Bank (EIB); Islamic Development Bank (IDB). <http://dx.doi.org/10.18235/0001336>.
- Meltzer, J.P. 2018. "Blending Climate Funds to Finance Low-Carbon, Climate-Resilient Infrastructure." Washington, DC: Brookings Institution. <https://www.ssrn.com/abstract=3205293>.
- Mercure, J.-F., H. Pollitt, J.E. Viñuales, N.R. Edwards, P.B. Holden, U. Chewpreecha, P. Salas, I. Sognnaes, A. Lam, and F. Knobloch. 2018. "Macroeconomic Impact of Stranded Fossil Fuel Assets." *Nature Climate Change* 8 (7): 588–93. doi:10.1038/s41558-018-0182-1.
- NCE (New Climate Economy). 2014. *Better Growth, Better Climate: The Global Report*. Global Commission on the Economy and Climate. <http://archives.enap.ca/bibliotheques/2014/09/030678240.pdf>.
- NCE. 2018. "Unlocking the Inclusive Growth Story of the 21st Century." Global Commission on the Economy and Climate. <https://newclimateeconomy.report/2018/>.
- Nuccitelli, D. 2018. "Canada Passed a Carbon Tax That Will Give Most Canadians More Money." *Guardian* (Manchester, UK), October 26. <https://www.theguardian.com/environment/climate-consensus-97-per-cent/2018/oct/26/canada-passed-a-carbon-tax-that-will-give-most-canadians-more-money>.
- OECD (Organisation for Economic Co-operation and Development). 2017. "ITF Transport Outlook 2017." International Transport Forum. [https://www.oecd-ilibrary.org/transport/itf-transport-outlook-2017\\_9789282108000-en](https://www.oecd-ilibrary.org/transport/itf-transport-outlook-2017_9789282108000-en).
- OECD. 2018. "OECD Companion to the Inventory of Support Measures for Fossil Fuels 2018." [https://read.oecd-ilibrary.org/energy/oecd-companion-to-the-inventory-of-support-measures-for-fossil-fuels-2018\\_9789264286061-en#page24](https://read.oecd-ilibrary.org/energy/oecd-companion-to-the-inventory-of-support-measures-for-fossil-fuels-2018_9789264286061-en#page24).
- Oliver, P., A. Clark, and C. Meattle. 2018. "Global Climate Finance: An Updated View 2018." Climate Policy Initiative. November. <https://climatepolicyinitiative.org/wp-content/uploads/2018/11/Global-Climate-Finance-An-Updated-View-2018.pdf>.
- PPCA (Powering Past Coal Alliance). 2018. "Members." [https://poweringpastcoal.org/about/Powering\\_Past\\_Coal\\_Alliance\\_Members](https://poweringpastcoal.org/about/Powering_Past_Coal_Alliance_Members).
- PRI (Principles for Responsible Investment). 2017. "Shifting Perceptions: ESG, Credit Risk and Ratings Part 1: The State of Play." <https://www.unpri.org/download?ac=256>.
- REN21. 2018. *Renewables Global Status Report 2018*. [http://www.ren21.net/gsr-2018/chapters/chapter\\_01/chapter\\_01/#sub\\_4](http://www.ren21.net/gsr-2018/chapters/chapter_01/chapter_01/#sub_4).
- Revill, C., and V. Harris. 2017. "2020: The Climate Turning Point." Mission 2020 Campaign. <http://www.mission2020.global/climate-turning-point/>.
- SBT (Science Based Targets). 2018. "Companies Taking Action." <https://sciencebasedtargets.org/companies-taking-action/>.
- SLoCaT (Partnership on Sustainable, Low Carbon Transport). 2018. "E-Mobility Trends and Targets." July 27. [http://www.slocat.net/sites/default/files/e-mobility\\_overview.pdf](http://www.slocat.net/sites/default/files/e-mobility_overview.pdf).
- Supply Change. 2018. "Global Market Overview." <http://www.supply-change.org/#remove>.

- TCFD (Task Force on Climate-Related Financial Disclosures). 2018. *Task Force on Climate-Related Financial Disclosures: Status Report*. <https://www.fsb-tcf.org/wp-content/uploads/2018/09/FINAL-2018-TCFD-Status-Report-092618.pdf>.
- UNFCCC (United Nations Framework Convention on Climate Change). 2018. "Global Climate Action NAZCA." 2018. <http://climateaction.unfccc.int/views/total-actions.html>.
- Watson, C., A. Ballesteros, B. Buchner, P. Oliver, C. Ott, and G. Simon. 2018. *2018 Biennial Assessment and Overview of Climate Finance Flows*. UNFCCC Standing Committee on Finance. <https://unfccc.int/sites/default/files/resource/2018%20BA%20Technical%20Report%20Final.pdf>.
- WEF (World Economic Forum). 2017. "Commodities and Forests Agenda 2020: Ten Priorities to Remove Tropical Deforestation." World Economic Forum, September 2017. [https://www.tfa2020.org/wp-content/uploads/2017/12/TFA2020\\_CommoditiesandForestsAgenda2020\\_Sept2017.pdf](https://www.tfa2020.org/wp-content/uploads/2017/12/TFA2020_CommoditiesandForestsAgenda2020_Sept2017.pdf).
- World Bank. 2018a. "Private Participation in Low-Carbon Infrastructure Investment, 2002–H1 2017 Investment in Low-Carbon Infrastructure." [http://ppi.worldbank.org/~media/GIAWB/PPI/Documents/Global-Notes/2017\\_Low\\_Carbon\\_Infrastructure\\_PPI.pdf](http://ppi.worldbank.org/~media/GIAWB/PPI/Documents/Global-Notes/2017_Low_Carbon_Infrastructure_PPI.pdf).
- World Bank. 2018b. "Carbon Pricing Dashboard." [https://carbonpricing.dashboard.worldbank.org/map\\_data](https://carbonpricing.dashboard.worldbank.org/map_data).
- WorldGBC (World Green Building Council). 2018. "Leaders Commit to Save 209 Million Tonnes of Carbon Emissions Equivalent (CO<sub>2</sub>e) by 2050 at Launch of World Green Building Council's Net Zero Carbon Buildings Commitment." World Green Building Council. <https://www.worldgbc.org/news-media/WorldGBC-Launches-Net-Zero-Carbon-Buildings-Commitment>.
- WRI (World Resources Institute). 2017. "CAIT Country GHG Emissions." Washington, DC: WRI. <http://cait.wri.org/historical>.

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## ABOUT WRI

World Resources Institute is a global research organization that turns big ideas into action at the nexus of environment, economic opportunity, and human well-being.

### Our Challenge

Natural resources are at the foundation of economic opportunity and human well-being. But today, we are depleting Earth's resources at rates that are not sustainable, endangering economies and people's lives. People depend on clean water, fertile land, healthy forests, and a stable climate. Livable cities and clean energy are essential for a sustainable planet. We must address these urgent, global challenges this decade.

### Our Vision

We envision an equitable and prosperous planet driven by the wise management of natural resources. We aspire to create a world where the actions of government, business, and communities combine to eliminate poverty and sustain the natural environment for all people.

### Our Approach

#### COUNT IT

We start with data. We conduct independent research and draw on the latest technology to develop new insights and recommendations. Our rigorous analysis identifies risks, unveils opportunities, and informs smart strategies. We focus our efforts on influential and emerging economies where the future of sustainability will be determined.

#### CHANGE IT

We use our research to influence government policies, business strategies, and civil society action. We test projects with communities, companies, and government agencies to build a strong evidence base. Then, we work with partners to deliver change on the ground that alleviates poverty and strengthens society. We hold ourselves accountable to ensure our outcomes will be bold and enduring.

#### SCALE IT

We don't think small. Once tested, we work with partners to adopt and expand our efforts regionally and globally. We engage with decision-makers to carry out our ideas and elevate our impact. We measure success through government and business actions that improve people's lives and sustain a healthy environment.



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