

## **We have three years to stabilize the climate, let's go**

### **Christiana Figueres and colleagues set urgent milestones for turning around the world's carbon emissions by 2020, before it is too late.**

In the past 3 years, global emissions of carbon dioxide from the burning of fossil fuels have leveled after rising for decades. This is a sign that policies and investments in climate mitigation are starting to pay off. The US, China and other nations are replacing coal with natural gas and boosting renewable energy sources. There is almost unanimous international agreement that the risks of abandoning the planet to climate change are too great to ignore.

The technology driven transition to low-carbon energy is well underway, a trend that made the 2015 Paris Agreement possible. But there is still a long way to go to decarbonize the world economy. The political winds are blustery. President Trump has announced that the United States will withdraw from the Paris Agreement when legally able to do so in November 2020.

The year 2020 is crucially important for another reason, one that has more to do with the unbending realities of physics than with the cycle of politics.

### **Timing is everything**

When it comes to climate, timing is everything. According to a joint report released this April from Climate Tracker, the Climate Action Tracker consortium, the Potsdam Institute for Climate Impact Research and Data-Driven Yale, the year 2020 is a pivotal one for climate change action. Should emissions continue to rise beyond 2020, or even remain level, the temperature goals set in Paris become virtually unattainable. The UN Sustainable Development Goals that were agreed in 2015 would also be at grave risk.

That's why we launched Mission 2020 - a collaborative campaign to raise ambition and action across key sectors to bend the greenhouse gas emissions curve downwards by 2020, as science demands.

As 20 leaders of the world's top economies gather at the G20 summit in Hamburg next week, we call on them to highlight the importance of the 2020 climate turning point on greenhouse gas emissions and demonstrate what they and others are doing to meet this challenge. Lowering emissions globally is a monumental task, but research tells us it is necessary, desirable and achievable.

Already, after roughly 1°C of global warming driven by human activity, ice sheets in Greenland and Antarctica are losing mass at an increasing rate. Summer sea ice is disappearing in the Arctic and coral reefs are dying from heat stress - entire ecosystems like the Great Barrier Reef are starting to collapse. The social impacts of climate change, from intensified heat-waves, droughts and from sea-level rise are inexorable and affect the poorest and weakest first.

The magnitude of the challenge can be grasped by computing a 'budget' for carbon dioxide emissions (CO<sub>2</sub>)— the maximum amount of the gas that can be released before the temperature limit is breached (see fig 1). After subtracting past emissions, humanity is left with a 'carbon credit' of between 150 and 1050 Gt of CO<sub>2</sub> to meet the Paris target<sup>1</sup> of 1.5°C or well below 2°C. The range is wide because it encompasses (and updates to 2017) the various recent budget calculations.

So, at the current rate of 41 GtCO<sub>2</sub> per year, the lower limit of this range would be crossed within four years, and the midpoint of 600 GtCO<sub>2</sub> within 15 years. If we stay at the current rate of annual emissions we would have to incur a drastic cut down to near zero emissions once we reach the carbon budget, stranding many currently valuable assets. It is therefore critical that we initiate a gradual descent of emissions early enough to allow time for a smooth transition of the global economy. A "jump to distress" is in no one's interest.

The good news is that it is still possible to meet the Paris temperature goals if emissions begin to fall by 2020. (see figure 1).

### **Harness momentum**

Already, greenhouse-gas emissions are decoupling from production and consumption. For the past three years, the worldwide rates of CO<sub>2</sub> emissions from fossil fuels have stayed flat, while the global economy and the GDPs of major developed and developing nations have grown by at least 3.4% per year<sup>2</sup>. This plateau is only the fourth occasion in the past 40 years during which emission levels stagnated or fell; the previous three occasions—the early 1980s, 1992 and 2009— were associated with global economic predicaments, which the current one is not<sup>3</sup>.

Emissions from the United States fell the most: by 3% last year, while GDP grew 1.6%. In China, CO<sub>2</sub> emissions fell 1% in 2016, while the economy expanded by 6.7%<sup>4</sup>. Although it's too early to tell whether the current plateau will presage a fall, the signs are encouraging.

In 2016, two thirds of China's 5% extra demand for electricity was supplied by carbon-free energy resources, mostly hydro and wind<sup>5</sup>. In the European Union, wind and solar technologies accounted for over three-quarters of new energy capacity installed; coal demand reduced by 10%<sup>6</sup>. In the United States, almost two thirds of the electricity-generating capacity installed by utilities was based on renewables<sup>7</sup>.

The International Energy Agency has predicted that by 2020 renewable sources could deliver 26-27% of the world's electricity needs, compared with 23.7% of electric power at the end of 2015<sup>8</sup>. But that clearly underestimates the pace of change in energy systems.

Growth in electric vehicles alone could displace 2 million barrels of oil per day (mbd) by 2025, according to Carbon Tracker's February 2017 report 'Expect the Unexpected'. The report suggests that, by 2050, it could be 25 mbd, in stark contrast to fossil industry expectations that oil demand will rise. (The recent 2014-15 oil price collapse was the result of a two mbd (2%) shift in the supply-demand balance). In addition, the report notes that solar power alone could supply 29% of global electricity generation by 2050, eliminating the need for coal and leaving natural gas with just a 1% market share. ExxonMobil sees all renewables supplying just 11% of global power generation by 2040.

Investors, meanwhile, are growing wary of carbon risks. Blackrock and Vanguard, the two largest fund managers in the world, voted against management at Exxon's annual general meeting on May 31 and succeeded in instructing the company to report on the impact of global measures designed to keep climate change below 2°C on its profits. In June Norway's \$960 Bn sovereign wealth fund declared it will ask the banks in which it has invested to disclose how their lending contributes to global greenhouse gas emissions.

Investment levels in renewable energy set new installation records of 160 GW and reached \$286 billion worldwide in 2015, more than six times greater than in 2004. Over half that investment, \$156 billion, was for projects in developing and emerging economies.

We cannot escape the fact that there is a strong headwind against the transition in some places, which may impede progress towards the 2020 turning point. For example a new bill - the Financial Choice Act - passed by the US House of Representatives on June 8th would make it nearly impossible for investors to challenge companies on climate-risk disclosure through shareholder proposal processes like those that succeeded recently at Exxon and Occidental.

However, as the UN Secretary General said in New York last month "the sustainability train has left the station" - global momentum for the low-carbon transition is moving at speed there is no turning back.

This is a financial opportunity and will continue a-pace because the fossil-free economy is already profitable<sup>9</sup> and creating jobs<sup>10</sup>. In fact, IRENA released a report this year showing that efforts to stop climate change could boost the global economy by \$19 trillion, while the IEA said that implementing the Paris Agreement will unlock \$13.5 trillion or more before 2050.

In addition, recent geopolitical events have glvanized a groundswell of citizen, state, city, business and investor activity in support of the Paris Agreement. For example, the #WeAreStillIn campaign, a cross cutting collaboration of over 1,000 governors, mayors, businesses, investors, and colleges and universities from across the U.S. or with significant operations in the U.S, who have declared their intent to ensure the U.S. remains a global leader in reducing carbon emissions.

## Six milestones

To prioritize actions, we identify milestones in six sectors. These were developed with knowledge leaders and then reviewed and refined in collaboration with analysts and experts at Yale University, the Climate Action Tracker consortium, Carbon Tracker, We Mean Business, SLoCaT, SYSTEMIQ, the New Climate Economy and Conservation International. The collaborators synthesised existing peer reviewed literature and data to identify the most significant areas where breakthroughs on emissions reductions could be achieved by 2020.

From where we stand these milestones may be visionary at best, unrealistic at worst. However, we are in the age of exponential transformation in many areas and believe that such a focus will unleash ingenuity. These milestones represent our vision for 2020, so that by then:

**Energy:** Renewables make up at least 30% of the world's electricity supply —up from 23.7% in 2015<sup>11</sup>. No new coal-fired power plants being built beyond 2020, and all existing ones in the process of being retired.

**Infrastructure:** Cities and states initiate action plans by 2020 to fully decarbonize edifices and infrastructures by 2050, and fund these plans to the tune of \$300 billion annually. Cities upgrade 3% of their building stock to zero- or near-zero emissions structures each year, starting no later than 2020<sup>12</sup>.

**Transport:** Electric vehicles are at least 15% of new car sales globally by 2020, a major uptick from the 1% market share that battery powered and plug-in hybrid vehicles now claim. Also required are commitments for a doubling of mass-transit utilization in cities, a 20% increase in heavy-duty vehicle fuel efficiencies, and a 20% decrease in greenhouse gas emissions from aviation per kilometer travelled.

**Land:** Land-use policies enacted to drastically reduce forest destruction and shift to reforestation and afforestation efforts. Current emissions from deforestation and land-use changes are 11% of global greenhouse gas emissions. If emissions from these two sources can be cut to zero next decade, then forests can become a carbon sink by 2030, helping push total net global emissions to zero and below, while supporting water supplies and myriad other benefits. Meanwhile, sustainable agricultural practices can reduce CO<sub>2</sub> emissions and increase CO<sub>2</sub> sequestration in healthy, well-managed soils.

**Industry:** By 2020, heavy industry develops and publishes plans for increasing efficiencies and cutting emissions, with a goal of halving emissions by 2040. Carbon intensive industries—such as iron and steel, cement, chemicals, oil and gas production—emit more than one-fifth of the world's CO<sub>2</sub>, and that's excluding their electricity and heat demands.

**Finance:** The financial sector rethinks how it deploys capital, mobilizing at least \$1 trillion a year for climate action. Most of this will come from the private sector. Meanwhile, governments, private banks and global lenders like the World Bank need to issue many more green bonds, which finance climate mitigation efforts creating an annual market by 2020 that processes more than ten times the \$80 billion issued in 2016.

### **Further, faster, together**

If we delay action, the conditions for human prosperity will be severely curtailed. There are three pressing and practical steps to avoid being late.

First, use science to guide decisions and set targets. Policies and actions must be based on robust evidence. Uncensored and transparent communication of peer-reviewed science to global decision-makers is crucial. Academic journal articles are not easily read or digested by non-experts. We need a new kind of hybrid communication where the pages of Nature meet Harvard Business Review. Science associations should provide more media training to young scientists and hold communication boot-camps on how to make climate science relevant to corporate boards and investors.

Those in power must also stand up for science. President Macron's Make the Planet Great Again campaign is a compelling example. Macron has spoken out to a global audience in support of climate scientists, and invited scientists to move to France to help accelerate action and deliver on the Paris Agreement. To encourage other leaders to speak with the same confidence, scientists should forge connections with leaders from policy, business and civil society. The Arctic Basecamp at Davos in 2017, for instance, demonstrated the power of bringing scientists into high-level discussions on global risk alongside the World Economic Forum's annual meeting.

Second, scale up existing solutions rapidly. With no time to wait, all countries should adopt a plan for achieving 100% renewable energy production, while ensuring markets can be designed to enable renewable energy expansion.

The upcoming G20 meeting on July 7-8 in Hamburg, Germany, is the perfect moment for heads of state to integrate the six milestones into their discussions on how to ensure a resilient, prosperous, inclusive and interconnected global economy. This would pave the way for a year of raised ambition in 2018, when nations take stock of progress and revise national commitments under the Paris Agreement.

The G20 is slated to adopt the recommendations of the Taskforce on Climate-related Financial Disclosures of the Finance Stability Board on how the global finance system will manage the risk of climate change. It requires financial institutions to design, disclose and start implementing a transition strategy with a view to full

decarbonisation of operations, value chains and portfolios by 2050. National governments and financial regulators must enact these recommendations swiftly.

Cities and provincial governments must also help drive the ambition of national governments on climate change, particularly through smart infrastructure and transport policy. C40, a network of the world's megacities committed to addressing climate change, has adopted a strategy called Deadline 2020 to align its emissions-reductions plans with the Paris Agreement. Other cities now have an opportunity to follow suit, for example through the Global Covenant of Mayors on Climate Change and Energy.

Third, encourage optimism. Recent political events have thrown the future of our world into sharp focus. But as was the case before Paris, we must remember that impossible is not a fact, it's an attitude. It is vital that success stories are shared. Demonstrating where countries and businesses have already over-achieved on their targets will raise the bar for others. More ambitious targets become easier to set. The challenge ahead of us is not a burden, but an opportunity. An opportunity to avoid the worst impacts of a rapidly warming world and in doing so, to create a more resilient and secure environment; to clean the air and water, and improve public health; and to create millions of jobs.

Our co-signatory list, which includes eminent scientists, business leaders, economists, analysts, influencers and representatives of NGOs is an example of the strength of radical collaboration across unusual partners who all share a mission to seize this opportunity.

There will always be those who hide their head in the sand and prefer to ignore the global risks of climate change. But there are many more of us committed to overcome this inertia and the winds of momentum are greatly in our favour. Let us stay optimistic and act boldly together.

Authors:

**Christiana Figueres**, Vice Chair, Global Covenant of Mayors and Convener of Mission 2020, [cfigueres@mission2020.global](mailto:cfigueres@mission2020.global)

**Hans Joachim Schellnhuber**, Director, Potsdam Institute for Climate Impact Research (PIK)  
P.O. Box 60 12 03, 14412 Potsdam, Germany, [john@pik-potsdam.de](mailto:john@pik-potsdam.de)

**Johan Rockstrom**, Executive Director, Stockholm Resilience Institute, Stockholm Resilience Centre, Stockholm University, Kräftriket 2B SE-10691, [johan.rockstrom@su.se](mailto:johan.rockstrom@su.se)

**Anthony Hobley**, CEO, Carbon Tracker, 40 Bermondsey St, London, [ahobley@carbontracker.org](mailto:ahobley@carbontracker.org)

**Gail Whiteman**, Pentland Centre for Sustainability in Business, Lancaster University, Bailrigg, Lancaster, LA1 1YX. Email: [g.whiteman@lancaster.ac.uk](mailto:g.whiteman@lancaster.ac.uk)

Co-signatories:

**Achala C. Abeyasinghe**, Principal Researcher, Climate Change; Team Leader, Global Climate Change Governance, International Institute for Environment and Development (IIED), 80-86 Gray's Inn Road, London WC1X 8NH. Email: [achala.abeyasinghe@iied.org](mailto:achala.abeyasinghe@iied.org)

**Anders Levermann**, Co-Chair of Research Domain Sustainable Solutions, Potsdam Institute for Climate Impact Research, Telegrafenberg A56; D-14412 Potsdam, Germany. Email: [levermann\(at\)pik-potsdam.de](mailto:levermann(at)pik-potsdam.de)

**Angel Hsu**, Director, Yale Data-Driven Environmental Solutions, Yale School of Forestry & Environmental Studies, 195 Prospect Street, New Haven, CT 06511. Email: [angel.hsu@yale.edu](mailto:angel.hsu@yale.edu)

**Barbara Buchner**, Executive Director, Climate Finance Program, Climate Policy Initiative, 235 Montgomery Street, 13th Floor, San Francisco, CA 94104. Email: [barbara.buchner@CPIClimateFinance.org](mailto:barbara.buchner@CPIClimateFinance.org)

**Feike Sijbesma**, Chief Executive Officer & Chairman of the Managing Board, Royal DSM  
Email: [Feike.Sijbesma@dsm.com](mailto:Feike.Sijbesma@dsm.com)

**Fiona Reynolds**, Master, Emmanuel College, University of Cambridge, Emmanuel College, St Andrews Street, Cambridge CB2 3AP.

**Gavin E. Patterson**, Chief Executive Officer, BT Group, Email: [Gavin.E.Patterson@bt.com](mailto:Gavin.E.Patterson@bt.com)

**Heidi Cullen**, Chief Scientist, Climate Central, One Palmer Square, Suite 330, Princeton, NJ 08542. Email: [hcullen@climatecentral.org](mailto:hcullen@climatecentral.org)

**Helena Morrissey**, Head of Personal Investing, Legal & General Investment Management, One Coleman Street, London, EC2R 5AA. Email: [Helena.Morrissey@newton.co.uk](mailto:Helena.Morrissey@newton.co.uk)

**Jeremy Oppenheim**, Partner, SystemIQ, 1 Fore Street, London, EC2Y 5EJ, Email: [Jeremy.oppenheim@systemiq.earth](mailto:Jeremy.oppenheim@systemiq.earth)

**Jim Leape**, William and Eva Price Senior Fellow - Stanford Woods Institute for the Environment and Co-Director, Center for Ocean Solutions, Email: [jleape@stanford.edu](mailto:jleape@stanford.edu)

**Joanna Haigh**, Co-Director, Grantham Institute for Climate Change & Environment, Imperial College London, South Kensington Campus, London SW7 2AZ. Email: [j.haigh@imperial.ac.uk](mailto:j.haigh@imperial.ac.uk)

**Jonathan Bamber**, Professor, Bristol University, Office G2, University Road, Clifton, Bristol BS8 1SS. Email: [j.bamber@bristol.ac.uk](mailto:j.bamber@bristol.ac.uk)

**Katherine Richardson**, Professor, Biological Oceanography, Center for Macroecology, Evolution and Climate, The Danish Natural History Museum. Email: [kari@science.ku.dk](mailto:kari@science.ku.dk)

**Katherine Richard**, Founder & Chief Executive, Warwick Energy Group, 900 W Wilshire Blvd, Oklahoma City, OK 73116.

**Keith Tuffley**, Managing Partner & CEO, B Team. Email: kt@bteam.org

**Konrad Steffen**, Director, Swiss Federal Research Institute WSL, Zürcherstrasse 111 8903 Birmensdorf. Email: Konrad.Steffen@wsl.ch

**Kornelis Blok**, Professor of Energy Systems Analysis, Delft University of Technology, Netherlands, PO Box 5015, 2600 GA, Delft

**Laurence Tubiana**, CEO, European Climate Foundation (ECF), Institut du développement durable et des relations internationales, 41, rue du Four, 75006 Paris, France, laurence.tubiana@europeanclimate.org

**Lord Mark Malloch-Brown**, Chair of the Business and Sustainable Development Commission, 6th Floor, 105 Piccadilly London W1J 7NJ. Email: mark.malloch-brown@sgo.com

**Mary Robinson**, President and Chair of the Board of Trustees, the Mary Robinson Foundation; Former President of Ireland; Former UN High Commissioner Human Rights; Mary Robinson Foundation - Climate Justice, Trinity College, 6 South Leinster Street, Dublin 2, Ireland. Email: mary.robinson@mrfcj.org

**Mattlan Zackhras**, Minister-in-Assistance to the President of the Republic of the Marshall Islands & Convenor of the High Ambition Coalition

**Michael Oppenheimer**, Albert G. Milbank Professor of Geosciences and International Affairs, Woodrow Wilson School, Princeton University, Princeton, NJ 08544-1013. Email: omichael@princeton.edu

**Michiel Schaeffer**, Director and Senior Scientist, Climate Analytics, Ritterstraße 3, 10969 Berlin, Germany. Email: michiel.schaeffer@climateanalytics.org

**Mindy Lubber**, President, CERES, Headquarters, 99 Chauncy Street, 6th Floor, Boston, MA 02111. Email: lubber@ceres.org

**Peter Bakker**, President and Chief Executive Officer, World Business Council for Sustainable Development, Maison de la Paix, Chemin Eugène-Rigot, 2B, Case Postale 2075, CH-1211, Geneva 1. Email: bakker@wbcsd.org

**Peter Seligmann, Chairman**, Chief Executive Officer & Co-Founder, Conservation International, 2011 Crystal Drive, Suite 500, Arlington, VA 22202.

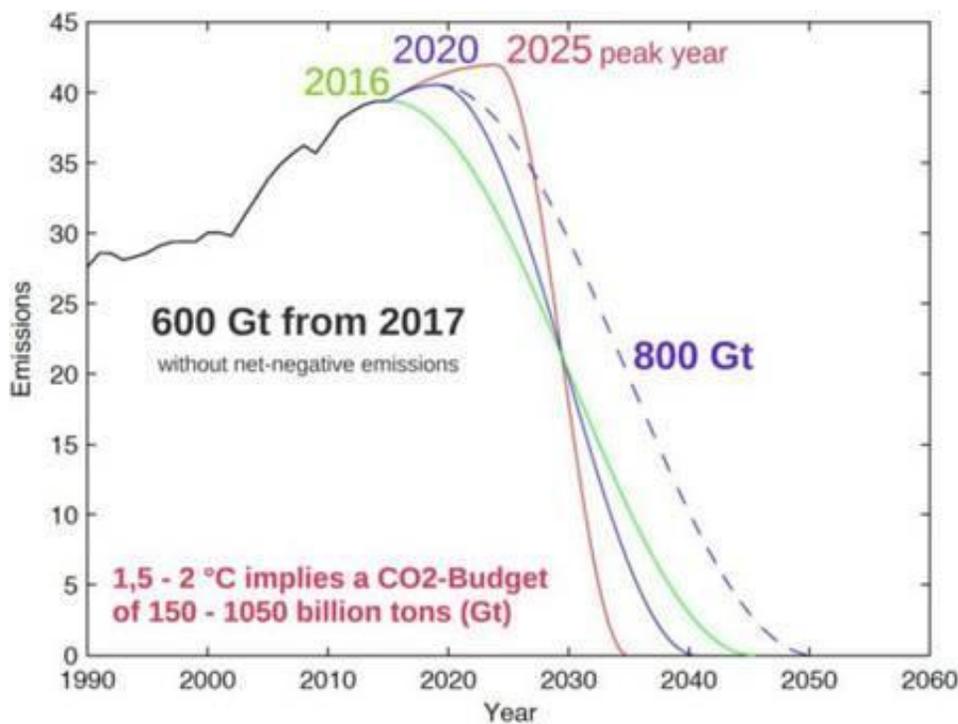
**Paul Polman**, Chief Executive Officer, Unilever plc, Unilever House, 100 Victoria Embankment, London EC4Y 0DY. Email: paul.polman@unilever.com

**Paul Simpson**, Chief Executive Officer, Carbon Disclosure Project, CDP headquarters Level 3, 71 Queen Victoria Street, London EC4V 4AY. Email: paul.simpson@cdp.net

**Stefan Rahmsdorf**, Co-Chair of Research Domain Earth System Analysis, Potsdam Institute for Climate Impact Research, P.O. Box 60 12 03, 14412 Potsdam, Germany Email: stefan@pik-potsdam.de

**Steve Waygood**, Chief Responsible Investment Officer, Aviva, Aviva Investors Administration Office, PO Box 10410, Chelmsford, CM99 2AY. Email: Steve.Waygood@avivainvestors.com

**Thomas Stocker**, Professor of Climate and Environmental Physics, University of Bern, Sidlerstrasse 5, 3012, Bern, Switzerland. Email: stocker@climate.unibe.ch



**Fig. 1** Three illustrative scenarios for spending the same budget of 600 Gt CO<sub>2</sub>, with emissions peaking in 2016 (green), 2020 (blue) and 2025 (red), and an alternative with 800 Gt (dashed). The graph shows that even bending the curve by 2020 requires reducing emissions to zero within twenty years for a 600 Gt budget. By assuming a more lenient budget of 800 Gt this can be stretched to thirty years, but at a significant risk of exceeding even 2 °C warming.

<sup>1</sup> Peters, G. How much carbon dioxide can we emit? (2017) <http://cicero.uio.no/en/posts/climate/how-much-carbon-dioxide-can-we-emit>.

<sup>2</sup> <https://www.iea.org/newsroom/news/2017/march/iea-finds-co2-emissions-flat-for-third-straight-year-even-as-global-economy-grew.html>

<sup>3</sup> International Energy Agency, "World energy outlook 2016" (International Energy Agency, Paris, 2016)

<sup>4</sup> Id.

<sup>5</sup> Id.

<sup>6</sup> WindEurope. (2017). Wind in power. 2016 European statistics. indEurope. (2017). Wind in power. 2016 European statistics.

<sup>7</sup> <https://www.eia.gov/todayinenergy/detail.php?id=29492>

<sup>8</sup> <http://doi.org/10.1787/weo-2016-en>

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<sup>9</sup> [https://www.irena.org/.../Publications/IRENA\\_RE\\_Jobs\\_Annual\\_Review\\_2017.pdf](https://www.irena.org/.../Publications/IRENA_RE_Jobs_Annual_Review_2017.pdf)

<sup>10</sup> <http://www.clean200.org>

<sup>11</sup> REN 21. (2016). Renewables 2016. Global status report. Retrieved from [http://www.ren21.net/wp-content/uploads/2016/06/GSR\\_2016\\_KeyFindings1.pdf](http://www.ren21.net/wp-content/uploads/2016/06/GSR_2016_KeyFindings1.pdf)

<sup>12</sup> [http://climateactiontracker.org/assets/publications/publications/CAT\\_10\\_Steps\\_for\\_1o5.pdf](http://climateactiontracker.org/assets/publications/publications/CAT_10_Steps_for_1o5.pdf)