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The IPCC Report and Its Political Implications

Article by Bert Metz
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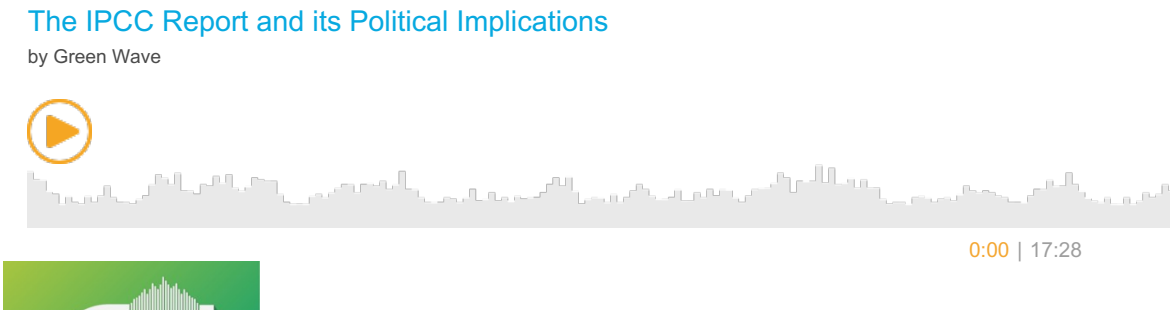
The recent IPCC report made international headlines for underlining that countries have as little as 12 years to take steps to avoid the worst effects of climate change. Bert Metz, fellow at the European Climate Foundation, explains what the report means for the planet, the economy, and for Europe.

This article is also available in audio as part of the Green Wave podcast.



At the climate summit in Paris in 2015, consensus was reached and all countries agreed to hold "the increase in the global average temperature to well below 2 degrees above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 degrees above pre-industrial levels." The agreement thus set a clear threshold for avoiding the worst impacts and damages from climate change. Countries vulnerable to climate change, particularly low-lying island states, were pivotal in driving through the deal.

At the Paris summit, world governments also asked the Intergovernmental Panel on Climate Change (IPCC), the preeminent scientific body on climate change, to prepare a special report on the risks of 1.5 degrees of global warming and what the limit means for emissions reductions and adaption measures. After two years of work by over 200 of the best scientists, who assessed over 6 000 scientific studies in a process that involved two rounds of review and 42 000 comments from experts and governments, the report and its key findings were approved by IPCC member governments on October 6 2018.

The IPCC's findings

The IPCC's report contained a number of important messages. First, at the current level of warming, 1 degree, we are already witnessing more frequent and severe extreme weather events – as this summer's temperatures in Europe confirmed. The report went on to show that current trends will lead to warming of 3degrees or more by the end of the century.

Second, the report demonstrates that the risks of climate change at 1.5 degrees are significantly smaller than at 2 degrees, let alone those at 3 degrees. This difference in risk applies to impacts on health, crop yields, fisheries, water stress, biodiversity, sea-level rise, and the economy as a whole. Marine ice sheet instability in Antarctica and irreversible loss of the Greenland ice sheet could lead to multi-metre sea-level rise and the threshold for this could lie between 1.5 and 2 degrees warming.

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It makes clear that the economic benefits of limiting warming to 1.5 degrees are huge, potentially saving 1.5 to 2.0 per cent of gross world product (GWP) by 2020 and 3.5 per cent of GWP by the end of the century (not including the impact of long-term rise in sea level). It is been estimated that it would result in benefits of 0.5 to 0.6 per cent of GWP due to air pollution reductions. So-called 'costs' turn out to be investments that avoid future damages and improve infrastructure, health, geopolitical stability, and resilience.

IPCC scientists argue that humanity possesses the means to limit climate change, build a more sustainable and resilient future, and that it is clearly still possible to meet the 1.5 degrees limit, if we see ambitious policies in all sectors. It also underlines that it would be much easier to achieve the United Nations' Sustainable Development Goals in a 1.5 degrees world. However, the report warned that sticking to the current 2030 country pledges (so-called Nationally Determined Contributions), prepared a year before the Paris Agreement was adopted, would make the 1.5 degrees goal infeasible.

Calculating the carbon budget

How hot our planet gets by the end of the century is directly related to the total amount of carbon dioxide (CO_2) emitted over the century. That is because CO_2, once emitted into the atmosphere, stays there for a very long time. The more we emit, the higher the temperature will be. For each temperature limit, you can calculate the 'carbon budget', or total amount of CO_2 that can be emitted.

The carbon budget that remains from now on for the world to achieve a 1.5 degrees limit is fairly small. Since the industrial revolution, we have emitted large amounts of CO_2 from burning coal, oil, and natural gas and cutting down large areas of forest. Emissions of other greenhouse such as methane and nitrous oxide, which also contribute significantly to warming, have also risen. If we maintain the current level of global CO_2 emissions, the remaining budget will have been exhausted in less than 10 years' time. The question is then: how can we stay within the budget?

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The answer is pretty simple. First, we have to reduce emissions as fast as possible to zero, because any remaining emission will further increase the total amount released. Second, if we are not reducing emissions fast enough (and that is practically inevitable with a 1.5 degrees limit and given that global emissions of CO_2 are still rising), temperatures will rise above 1.5^{o}C and we will have to remove CO_2 from the atmosphere to reduce the temperature to below 1.5^{o}C again at the end of the century. Third, the slower the emission reductions, the more we have to rely on CO_2 removal.

Carbon can be removed from the atmosphere by planting more trees (and stopping deforestation) and changing agricultural practices to increase organic material in soils. Carbon capture and storage use biomass in power plants and industrial installations to first capture carbon from smoke stacks to then store it in geological formations. All these practices are technically mature and can be scaled up. But carbon removal techniques can only help to a point because of potential conflicts with the use of land for food production, the necessary protection of biodiversity, and the number of installations necessary for carbon capture and storage. In other words, CO_2 removal can only help so much. Emissions need to be reduced to zero quickly.

Keeping warming below the 1.5-degree limit

In light of the limited carbon budget and constraints on carbon removal, global emissions need to reach 'net zero' by 2050 if we want to keep warming below 1.5 degrees by the end of the century. Net zero means that any remaining CO_2 emissions are compensated by an equal amount of CO_2 removal from the atmosphere. For all greenhouse gases, the 'net zero' point needs to be reached between 2060 and 2080. That is a huge challenge, given that global emissions are still rising. To put it in different terms, assuming that global CO_2 emissions peak by 2020, to linearly decrease to zero by 2050 emissions will have to be reduced every year by about 1.5 gigatonnes of CO_2. That is equal to about half of the EU's current annual carbon emissions.

The energy system needs to be radically transformed for this to happen: fossil fuels must be phased out, energy needs to be used more efficiently, and we need to shift from fuel to electricity wherever possible.

Today fossil fuels represent 83 per cent of global energy use. This share has to be cut to near-zero by 2050. At least net emissions from fossil fuel use, because carbon capture and storage could be used in some situations. Coal, having the highest CO_2 emission per unit of fossil energy, will see its share in electricity generation go to virtually zero by 2050, from a share of about 32 per cent today. Renewable sources of energy (solar, wind, hydro, biomass, geothermal, and in the future 'green hydrogen' plus tidal and wave energy) will have a big role to play.

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From 15 per cent of global energy use today, the share of renewables will have to go to around 60 per cent by 2050, and even to around 80 per cent in electricity generation. Rapid drops in the costs of solar and wind energy, which have made renewable power cheaper than coal- or gas-based electricity in many countries, gives hope that this can be realised. However, policies need to be introduced to ensure that it happens. Nuclear power and carbon capture and storage will cover the remaining part of electricity generation, although some scenarios do with only a very small share of nuclear by assuming higher shares of renewable energy. There is thus room for national choices.

Energy efficiency savings in industry, buildings, and transport will be crucial to the fundamental shift towards non-fossil energy sources. If energy consumption is too high, providing enough non-fossil energy supply and avoiding lock-in in fossil fuel energy infrastructure will just be impossible. With current trends, based on growth of population and the economy, global energy use would increase by about 75 per cent from 2010 levels by 2050. In studies to keep warming to 1.5 degrees, this is limited to around 10 per cent, representing an enormous improvement in energy efficiency.

Transport, where fossil fuels currently supply 92 per cent of energy, will need to shift to alternative renewables including electricity, sustainable biofuels, and 'green hydrogen' by 2050. For passenger vehicles, electricity is most promising in light of current trends in driving range, battery performance, and the cost of electric vehicles. For freight transport, shipping, and aviation biofuels or 'green hydrogen' will be more important, as electrification is more difficult. But for transport too improvements in energy efficiency are needed and electric vehicles, public transport, a shift to rail and water freight transport, and structural changes leading to lower transport demand can all contribute. Active government intervention through investments in transport infrastructure, vehicle emissions standards, and fuel composition standards will be essential to make the transition happen.

In buildings, energy efficiency and replacing fossil fuels with (non-fossil) electricity are the main interventions required. In studies on 1.5 degrees, electricity should cover 55-75 per cent of energy use in 2050. The greatest challenge is phasing out fossil fuels for space heating, cooking, and hot water, particularly in existing buildings. In the Netherlands, where natural gas is the dominant energy source for buildings at the moment, the government has announced an end to natural gas for 2050. Municipalities are being charged with a district-by-district planned operation to get seven million residential buildings off fossil fuel.

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In industry, there are some hard nuts to crack. The chemical industry relies on fossil fuels as raw materials. Coal is a key input for steel making. Cement production releases CO_2 due to its carbonate raw material. Then chemical, steel, cement, glass, paper, and aluminium production all require large amounts of energy for heating and processing. So apart from improving energy efficiency and shifting from fossil to renewable energy sources and non-fossil electricity, fundamental changes in production processes are also needed. For the chemicals, this means a shift to biological raw materials and green hydrogen. For steel making, electric processes and again green hydrogen have to replace coal. Given the long investment cycles in industry, there is no time to waste. Studies that keep warming below 1.5 degrees show that CO_2 emissions from industry in 2050 will have to be 75 to 90 per cent below their 2010 level.

Agriculture and forestry are an important part of the picture too when it comes to limiting warming to 1.5degrees. Not only do they have to provide food for a growing population without the large methane emissions from meat and dairy production and without fossil fuel input or large amounts of nitrogen fertilisers, they also have to provide biomass for energy and remove carbon from the atmosphere through forest expansion and an increase in organic matter in agricultural soils. Pasture land will have to decrease, as meat and dairy production declines, freeing up land for forests. In cropland the production of animal feed will have to decline, with a shift to plant protein production. The dietary changes implied will pose challenges to food preferences.

Time for European ambition

In light of the findings, the only logical and responsible reaction for the EU and its member states would be to make their policies consistent with a 1.5 degrees scenario. This would deliver on their Paris commitment and aim to avoid the most severe damage globally and domestically.

The IPCC report shows that for limiting warming to 1.5 degrees, global greenhouse gas emissions have to be net zero around 2070. To allow poor countries more time, the EU would have to reach that point earlier, i.e. 2050. Even for a ‘well below 2°C’ scenario, a reduction of at least 95 per cent of all greenhouse gases by 2050 compared to the level of 1990 would be needed. This means that the transformation outlined above needs to be even faster in Europe, a significant departure from the current policy track based on an 80 per cent reduction target by 2050. Under both pathways, it is essential that additional emission reductions occur over the next decade, especially in the transport and energy sector. Hence, increasing the EU’s 2030 reduction target from the current 40 per cent to a range of 55 to 60 per cent compared to 1990 is an imperative.

Questions will of course be raised about the costs of strengthening climate action. It will require billions of euros in investment. But there are large benefits to gain as well. The 400 billion per year spent in the EU on fossil fuel imports will be freed up by a phase-out. Increasing low-carbon investments within the EU will be a source of new jobs and reducing air pollution promises huge health benefits. And last but not least, taking the action and investing now will greatly reduce the costs of eventual climate change damage and adaption measures.

Bert Metz is a fellow at the European Climate Foundation (ECF) focused on science and policy issues and a member of several scientific advisory boards of international institutes and projects. He was co-chairman of the Climate Change Mitigation Working Group of the United Nations Intergovernmental Panel on Climate Change (IPCC) from 1997 to 2008.

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