

Briefing

Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment, Working Group 3 report

Questions and answers in advance of publication

The Intergovernmental Panel on Climate Change is a UN body tasked with producing five yearly updates of knowledge on the scientific, technical and socio-economic aspects of climate change. It has three scientific working groups each producing and publishing a detailed report. These are synthesised into one document after completion of all three.

The first group Working Group 1, The Physical Science Basis (WG1) published its report in September 2013. A Friends of the Earth summary of its findings is available [here](#).¹ Working Group 2 (WG2) will publish their report on climate impacts on 31st March 2014 and the Working Group 3 report on pathways to prevent dangerous climate change will be published on 13th April 2014.

This Questions and Answers briefing is on the Working Group 3 report. It explains what the report will cover, what their last report said, and predicts the content of the forthcoming report. An advance briefing on WG2 is available [here](#).²

Summary

The WG3 report will identify a number of plausible socio-economic pathways for the world to take. In doing so it will demonstrate that to avoid 2 degrees of global warming compared to pre-industrial times it will be necessary to pursue a pathway fundamentally different to the existing high fossil fuel, large economic inequalities pathway. In other words, avoiding dangerous climate change will require not just rapid reductions in fossil fuels but also a revolution in how our economies and societies are structured. A climate friendly is only possible if the world is much fairer with much reduced economic inequalities.

This future climate friendly world makes economic sense as well, with benefits outweighing the costs, the report will say.

In addition it is likely to say that greenhouse gas emissions must peak by 2015 in order to avoid 2 degrees warming, although some leeway (5-10 years maximum) may be possible if carbon pollution can be removed from the atmosphere.

Many of the technologies that are necessary to achieving the reductions in carbon pollution already exist the report will say. Renewable energy technologies have the potential to provide three-quarters of the energy needed by 2050 and more after that.

And although consumption habits will need to change, particularly within rich countries but also the wealthy in developing countries, some of these changes can also be good for health (e.g. sustainable diets) and more efficient (energy use).

Take home messages

It is still possible to reduce global carbon pollution fast enough and deep enough to make 2 degrees of global warming unlikely and provide a small chance of avoiding 1.5 degrees of warming, but only by making far-reaching socio-economic changes.

Achieving the necessary reductions will require sustained efforts to: achieve development goals; significantly reduce resource intensity and fossil fuel dependency; reduce inequalities between and within countries; develop and share technology, including new technologies; and make consumption sustainable, including sustainable diets.

The economic benefits of rapidly reducing carbon pollution will outweigh the costs, but the costs will not be trivial.

Questions and answers

Note that the predictions of what will be in the report are based on reading of science over past years plus media reports and rumours about the forthcoming report. They should therefore be treated with caution.

What is the report and how was it produced?

The WG3 report will have 16 chapters produced by 272 authors. The summary report will be agreed line by line by up to 195 countries and published in Bonn on the 13th April 2014. The report can therefore be considered very robust and, because of the nature of the process, is likely to be conservative in its conclusions.

What does it cover?

It will cover mitigation of climate change in energy, industry, transport, agriculture, forestry, buildings, etc. It will also look at finance, equity, and national/sub-national policies.

It will describe a number of possible shared socio-economic pathways (SSPs) that describe what are said to be different plausible futures e.g. in economies, population, technology, governance, etc³: These different pathways will pose different challenges to both adaptation and mitigation. Only one of these pathways is likely to be compatible with ensuring global temperatures do not exceed 2 degrees above pre-industrial levels. It is worth noting that these pathways may be based on inbuilt assumptions, for example on the dominant economic model, and therefore not represent a full-range of plausible futures.

What doesn't it cover?

It doesn't cover the physical evidence of climate change. This was covered in the Working Group 1 report published in September 2013, a summary of which is available [here](#). Nor does it cover the impacts of climate change, covered in Working Group 2 report.

What did the last report say?

It identified that carbon pollution had increased substantially between 1970 and 2004. Emissions from energy supply had increased by 145% whereas emissions from transport had increased by 120%, industry 65% and carbon pollution from land use, land use change and forestry had increased by 40%.

It said the enormous increase in emissions from energy supply were due to increased economic growth and population growth. Energy production had been getting more efficient between 1970 and 2000 but after 2000 the amount of carbon pollution produced per unit of energy starting rising again.

The wealthiest countries, with a 20% share of the global population, accounted for around half of total emissions.

They predicted that without new policies carbon pollution would continue to grow over coming decades, despite their scenarios suggesting a need to achieve a peak in global emissions between 2000 and 2015 in order to prevent more than 2 degrees centigrade warming compared to pre-industrial levels.

However, they also suggested that “there is substantial economic potential for the mitigation of global GHG emissions over the coming decades, that could offset the projected growth of global emissions or reduce emissions below current levels.” They said that no one sector or technology can address the entire mitigation challenge. They identified the key mitigation technologies and practices for different sectors (see table below)

Sector	Key mitigation technologies and practices currently commercially available	Key mitigation technologies and practices projected to be commercialized before 2030
Energy supply	Improved supply and distribution efficiency; fuel switching from coal to gas; nuclear power; renewable heat and power (hydropower, solar, wind, geothermal and bioenergy); combined heat and power; early applications of Carbon Capture and Storage (CCS, e.g. storage of removed CO ₂ from natural gas).	CCS for gas, biomass and coal-fired electricity generating facilities; advanced nuclear power; advanced renewable energy, including tidal and waves energy, concentrating solar, and solar PV.
Transport	More fuel efficient vehicles; hybrid vehicles; cleaner diesel vehicles; biofuels; modal shifts from road transport to rail and public transport systems; non-motorised transport (cycling, walking); land-use and transport planning.	Second generation biofuels; higher efficiency aircraft; advanced electric and hybrid vehicles with more powerful and reliable batteries.

Buildings	Efficient lighting and daylighting; more efficient electrical appliances and heating and cooling devices; improved cook stoves, improved insulation ; passive and active solar design for heating and cooling; alternative refrigeration fluids, recovery and recycle of fluorinated gases.	Integrated design of commercial buildings including technologies, such as intelligent meters that provide feedback and control; solar PV integrated in buildings.
Industry	More efficient end-use electrical equipment; heat and power recovery; material recycling and substitution; control of non-CO ₂ gas emissions; and a wide array of process-specific technologies.	Advanced energy efficiency; CCS for cement, ammonia, and iron manufacture; inert electrodes for aluminum manufacture.
Agriculture	Improved crop and grazing land management to increase soil carbon storage; restoration of cultivated peaty soils and degraded lands; improved rice cultivation techniques and livestock and manure management to reduce CH ₄ emissions; improved nitrogen fertilizer application techniques to reduce N ₂ O emissions; dedicated energy crops to replace fossil fuel use; improved energy efficiency.	Improvements of crops yields.
Forestry /forests	Afforestation; reforestation; forest management; reduced deforestation; harvested wood product management; use of forestry products for bioenergy to replace fossil fuel use.	Tree species improvement to increase biomass productivity and carbon sequestration. Improved remote sensing technologies for analysis of vegetation/ soil carbon sequestration potential and mapping land use change.
Waste	Landfill methane recovery; waste incineration with energy recovery; composting of organic waste; controlled waste water treatment; recycling and waste minimization.	Biocovers and biofilters to optimize CH ₄ oxidation.

Table: SPM 3 – WG3, AR4: Key mitigation technologies and practices by sector.

They did warn that delaying emissions reductions would ‘lock-in’ more emission-intensive infrastructure and “significantly constrain” the chances of avoiding more severe climate change impacts.

The report did not favour one set of policy options over another (e.g. regulation versus market-instruments) although a higher price of carbon was seen as necessary to ensure greater use of energy efficiency, renewable, nuclear power and carbon capture and storage (CCS).

The report suggested that biofuels would have an important role in reducing carbon pollution from transport, perhaps providing up to 10% of transport energy demand. The report was written well before the impacts of biofuel use on food supply became apparent.

The report did not consider geoengineering in detail, merely noting that “geo-engineering options, such as ocean fertilization to remove CO₂ directly from the atmosphere, or blocking sunlight by bringing material into the upper atmosphere, remain largely speculative and unproven, and with the risk of unknown side-effects.”

What is likely to be different this time?

The Working Group 1 report identified that only one of its emission pathways scenarios is unlikely to exceed 2 degrees by 2100 (RCP 2.6). Likewise, the Working Group 3 report is also likely to identify that only one of its shared socio-economic pathways is likely to avoid 2 degrees warming. This WG3 pathway is a scenario that requires: sustained efforts to achieve development goals; resource intensity and fossil fuel dependency to be significantly reduced; a reduction in inequality between and within countries; technology to be developed rapidly; and consumption more sustainable, including diets.

Probably the most contentious difference between the last WG3 report and the 2014 report will be that it will consider geoengineering in greater depth¹. In part this is because the 2013 WG1 report stated that half the models that achieved the necessary reductions for a pathway to avoid 2 degrees of warming would require less than zero emissions by 2100 (i.e. negative emissions).

The WG3 report is likely to say that global emissions must peak by 2016 to avoid 2 degrees of warming unless carbon pollution can be taken from the atmosphere through negative emissions, in which case a peak must still occur by 2020 to 2025 at the latest.

Since the 2007 WG3 report the working group has produced a special report on renewable energy. This found that the technical potential for renewable energy exceeds current demands. The most optimistic of the four in-depth scenarios they looked at projected renewable energy accounting for as much as 77 percent of the world's energy demand by 2050. They also found that whilst renewable energy is more currently expensive than fossil fuels (except in some locations for some technologies) the costs are falling rapidly. However, renewables will not achieve its potential without policy support, including making fossil fuels more expensive they said.

The 2014 WG3 report is likely to be more cautious on bioenergy and biofuels than the previous report, noting that done badly bioenergy can be worse than fossil fuels for the climate, as well as negatively impact food security and biodiversity protection.

The report will outline possible policies and technology pathways but it will not be prescriptive. It is likely to suggest that energy efficiency, renewable power (including bioenergy), nuclear power and carbon capture & storage all have a role to play. It may also, for the first time, identify the importance of sustainable diets to achieving greenhouse gas reductions (for example, diets with significantly less meat than is the norm in developed countries).

There has been considerable work published on the economics of climate change since the 2007 WG3 report, including the influential Stern Review carried out for the UK Government which suggested unabated climate change could cost the globe 20% of GDP per year.

¹ Friends of the Earth opposes the use of solar radiation management to cool the climate because of the risks and substantial side effects (for example, injecting aerosols to cool the northern hemisphere could result in reduced rainfall in the southern hemisphere)¹. We produced an assessment of technologies and techniques to take carbon out of the atmosphere, noting that some like enhancing the amount of carbon held in the soil or restoring wetlands are very sensible, whereas some others bring substantial risks and should be avoided (such as fertilising the oceans)¹.

This time it is possible that the WG3 report will be clear that the benefits of mitigation outweigh the costs in 2030, 2050 and 2100 - even potentially for the most ambitious reduction pathway.

Reasons to be worried

Although the WG3 report will show that the potential to cut carbon pollution sufficiently to make 2 degrees warming unlikely exists, it will also illustrate the very significant socioeconomic changes that are needed to do so. Currently the political will to make these changes, for example reducing fossil fuel use or reducing inequalities between and within countries, is sorely lacking.

Because of current and past failures to reduce carbon pollution it is not surprising that the IPCC has investigated geoengineering options. However, by doing so it potentially normalises these approaches alongside energy efficiency, renewables, etc. The risks of particularly solar radiation management are very high and this will need to be made clear.

What are others likely to say?

It is likely that climate deniers will identify the high costs of mitigation whilst ignoring the considerable benefits which outweigh the costs.

It is also possible that right-wing think tanks and the media focus on the potential for geoengineering as a potentially low cost response to climate change, particularly regarding the extremely risky strategy of injection of aerosols into the stratosphere as a form of solar radiation management. Friends of the Earth is opposed to the deployment of solar radiation management.

There is also the danger that some commentators also reject all negative emissions technologies in addition to rejecting solar radiation management. This is simplistic and could create opposition to development of necessary technologies to remove carbon pollution from the atmosphere (e.g. air capture of carbon utilising carbon capture and storage).

Where are the reports?

The Summary for Policy Makers of the 2007 Working Group 3 report is available at: https://www.ipcc.ch/publications_and_data/ar4/wg3/en/contents.html

The 2014 Working Group 3 report will be published on 13th April at: <http://www.ipcc-wg3.de/assessment-reports/fifth-assessment-report> The 2014 Working Group 2 report will be published on March 31st at: <http://www.ipcc-wg2.gov/AR5/ar5.html>

A summary of the 2013 Working Group 1 report is available at: http://www.foe.co.uk/sites/default/files/downloads/ipcc_report_2013.pdf

References ¹ Friends of the Earth (2013), Climate Change - What the scientists say

http://www.foe.co.uk/sites/default/files/downloads/ipcc_report_2013.pdf

² Friends of the Earth (2014) Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment, Working

Group 2 report

Questions and answers in advance of publication

<http://www.foe.co.uk/sites/default/files/downloads/advance-briefing-ipcc-report-climate-impacts-45439.pdf>

³

O'Neill, B.C., Carter, T.R., Ebi, K.L., Edmonds, J., Hallegatte, S., Kemp-Benedict, E., Kriegler, E., Mearns, L., Moss, R., Riahi, K., van Ruijven, B., van Vuuren, D. (2012). Meeting Report of the Workshop on the Nature and Use of New Socioeconomic Pathways for Climate Change Research, Boulder, CO, November 2-4, 2011