Negotiations heading towards high warming, high cost pathway

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Summary

- The current pledges are heading towards a global emissions pathway that will take warming to 3.5°C.
- The current pledges are very far from a cost-optimal emission pathway to hold warming below 2°C.
- The current pledges will require very high annual reduction rates after 2020, increasing the risk of not being able to hold warming below 2°C.
    - If 2020 emissions are at the level consistent with a below 2°C pathway of 44 $GtCO_2e$/year then a reduction rate to 2050 of 2%/year relative to 2000 emissions is needed globally
    - If 2020 emissions are at 55 $GtCO_2e$/year, the level consistent with the current pledges, then a reduction rate to 2050 of 3.8%/year relative to 2000 emissions is needed globally
    - This rate is almost two times faster than would be needed if the pledges are increase to the necessary level
- If governments delay increasing pledges until 2015 - or later, the mitigation opportunities for 2020 drop substantially. Halving the time to act between now and 2020 roughly halves the potential in 2020.
- Fragmentation of emission accounting rules will make it very difficult for scientific comparison of pledges and decrease the transparency of government actions.

Current pledges on a high warming, high cost, high risk pathway

With the Copenhagen pledges, we are heading towards an emissions pathway to hold warming below 2°C that is (far) beyond cost optimal and that will require much higher annual reduction rates in later years.

As the rates of required emissions reduction increase, so will the risk that these rates will not be achievable in practice. If governments delay action until 2015 or later, it may be too late to decrease global emissions to 44 $GtCO_2e$/year in 2020 in line with a 2°C pathway.

To hold global average temperature increase to below 2°C or 1.5°C above pre-industrial levels in the long term, the total amount of greenhouse gas emissions over time has to be limited to within a cumulative emission budget during the twenty-first century.

To stay within this budget we can - to some extent - choose how to distribute emissions over time. However, while *theoretically* there are an infinite number of pathways that achieves this, there are now very strong limits on pathways that are *feasible*.

Such a global emissions path is constrained by our current scientific knowledge about technological and economic limitations.

Doing less mitigation now will require doing more later, and at a higher cost

In other words, the higher emissions are in 2020, the steeper and the deeper the reductions have to be afterwards.

So we need to have a close look at which emission trajectories are economically and technologically feasible, and which effects they will have on cost and risks.

The recent UNEP "Bridging the Emissions Gap" report[1] assessed how high emissions in 2020 are in economically and technologically feasible pathways.

The report finds that emissions in 2020 consistent with a likely (greater than 66%) chance to limit global warming to 2°C above pre-industrial are about **44 $GtCO_2e$[2]/year**. No pathway with emissions higher than 50 $GtCO_2e$ was found in the current scenario literature with a likely, nor even with a medium chance (50 to 66%) of staying below the 2°C limit.

Based on the current state of the negotiations, the Climate Action Tracker estimates global emissions of more than **55 $GtCO_2e$/year** in 2020. This value is substantially above the 2020 emissions deemed consistent with 2°C of below **44 $GtCO_2e$/year**.

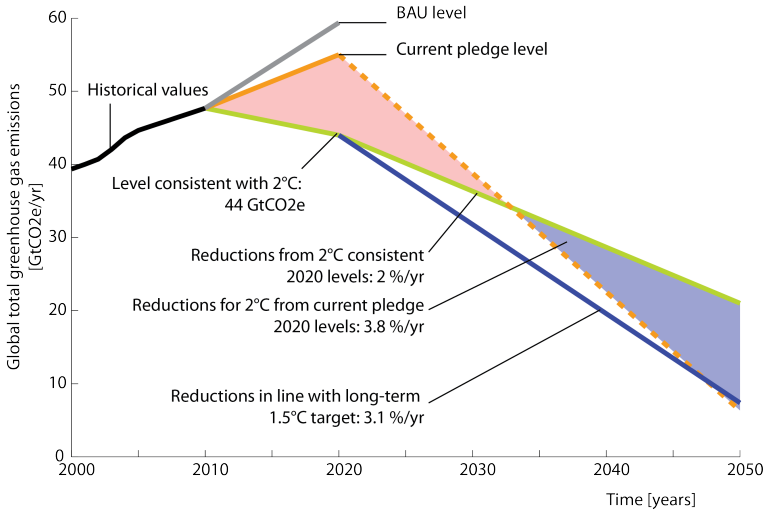


Figure 1 Total global GHG emissions and resulting reduction rates under current pledges and under a pathway consistent with 2°C

If 2020 emissions are at the level consistent with a below 2°C pathway of 44 $GtCO_2e$/year then a reduction rate to 2050 of **2%/year** relative to 2000 emissions is needed globally.

[1] UNEP (2011) Bridging the Emissions Gap http://www.unep.org/publications/ebooks/bridgingemissionsgap/. The Climate Action Tracker contributed significantly to this report.

[2] With a range of 41 to 46 $GtCO_2e$

However, if 2020 emissions are at the level consistent with the current pledges of 55 $GtCO_2e$/year then a reduction rate to 2050 of **3.8%/year** relative to 2000 emissions is needed globally.

This rate is almost two times faster and has major implications on technical feasibility and cost.

Recently published assessments find strong evidence of increasing cost and risk of delay. The latest UNEP report highlights that the cost of reductions increases with higher emissions in 2020.

This also means that one has to rely on faster deployment of technologies that are not yet established on a large scale, such as some renewable power systems and others such as CCS. The ability of these technologies to deploy and scale up more rapidly is more uncertain. The faster the rate of required the less confidence there in the ability of these technologies to deploy fast enough, and hence an increasing risk of failure.

The International Energy Agency's "World Energy Outlook 2011" (IEA WEO2011) carries a similar message. It indicates that for every US$1 of investment not spent on reducing emissions in the power sector before 2020 an additional US$4.3 would need to be spent after 2020 to compensate for the increased emissions.

The UNEP "Bridging the Gap" assessment shows that technological options exist to fully close the gap in 2020 at moderate cost and with known technologies.

It also shows that with any delay of action, mitigation options diminish fast. The longer we wait to take ambitious action, the more costly it will get. If governments delay discussing increasing their pledges until 2015 or later, they will reduce opportunities for the mitigation options available today.

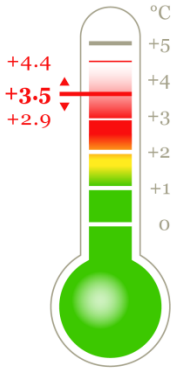
The time available to implement measures after 2015 is too short to implement the emission reduction potential still available today. As a first order estimate, halving the time to act between now and 2020 roughly halves the potential in 2020.

Pledges heading towards a 3.5°C increase in global temperature

The Climate Action Tracker added up the international reduction targets and pledges of individual countries, and has estimated that global emissions in 2020 would total **55 $GtCO_2e$/year**. This assumes confirmed unconditional pledges and lenient accounting rules.

This is an increase of 2 $GtCO_2e$/year over our previous calculations due to new and improved estimates of emissions from developing countries. These increases are not related to changes in pledges, but to changes in historic data on emissions for non-Annex I countries that ultimately influence the projections of future emissions.

Pledges lead to a warming of **3.5°C** (with a range of 2.9-4.4°C) above pre-industrial levels by 2100 and a CO_2 concentration of about 690 ppmv by that time. This level is far above the temperature limits of 2°C and 1.5°C mentioned in the Cancun Agreements.



The Climate Action Tracker is constantly updating its calculation according to the latest information available. We continuously update the underlying data as Annex I countries submit new data to the UNFCCC and updates of non-Annex I emissions and new projections become available.

In doing this we need to make expert judgements on the reliability and accuracy of different data sources. So far we have used National Communications as first priority sources for non-Annex I historic emissions.

However, these are often not complete, do not cover all sectors and not all gases. This motivated us to now prefer an independent and comprehensive data source[3] that recently became available. Upcoming new National Communications are expected to be more complete.

This highlights the fundamental importance of reliable and comparable data to be able to assess the adequacy of pledges - and actions.

Overall, the aggregated emission-reduction pledges of all Parties fall far short of what is needed to get the world on track for limiting global warming to 2 and 1.5°C above pre-industrial levels.

The emission levels needed to meet both temperature targets overlap in 2020: Global emissions need to be at about 44 $GtCO_2e$/year by 2020, and to steeply decline afterwards. Reductions for 1.5°C need to decline more rapidly than the 2°C pathway after 2020. Given the 'pledge level' of 55 $GtCO_2e$/year in 2020, a **gap of 11 $GtCO_2e$** remains to reach the reduction level required.

This is in line with the latest finding of the UNEP Bridging the Gap Report, which identifies a gap between 7 and 16 $GtCO_2e$ for the case closest to our analysis.

If governments implemented the most stringent reductions they have proposed, with the most stringent accounting for developed countries, the Climate Action Tracker has calculated the remaining gap would shrink to 9 $GtCO_2e$/year. The range estimated in the UNEP report for the equivalent case is 3 - 11 $GtCO_2e$/year.

[3] European Commission, Joint Research Centre (JRC)/Netherlands Environmental Assessment Agency (PBL). Emissions Database for Global Atmospheric Research (EDGAR), release version 4.2. (2011), http://edgar.jrc.ec.europa.eu

Need for a common accounting system

Fragmentation of emission reporting and accounting rules makes it more difficult for scientific comparison of pledges thus decreasing the transparency of countries actions

As scientists we are faced with an increasingly complex and fragmented information base, making it more and more difficult to compare countries' proposals for action and assess their stringency.

Pledges are based on a number of different assumptions, conditions and implied rules. This complexity is increasing since some Parties are using Kyoto Protocol rules for counting their pledge and others are not.

Multilaterally-agreed and common rules form the basis for the climate regime that has evolved since adoption of the UNFCCC in 1992. Moving towards a bottom up approach - as is currently happening in the LULUCF discussions - will make it increasingly difficult to ensure comparability across Parties and consistency with the Kyoto Protocol's first commitment period. This, in turn, will increase the level of uncertainty in evaluating what global emissions we really have now - and where they are headed. It also makes discussions on whether a country's pledge constitutes a fair share of the mitigation effort difficult.

Without a common accounting system to compare government actions, scientists are forced to make assumptions on what lies behind Parties' pledges. While we are transparent on the assumptions made, the variety of such assumptions does not add to the transparency of Parties real actions.

A set of common rules would ensure a higher level of transparency, ensure comparability and build confidence. This would help our work and - we think - would also benefit the overall process.

Illustrative examples are provided below:

Which sectors are included under the emission reduction pledge?

Australia	**Reduction below 1990 in 2020**
Australia's accounting (including Annex A emissions and afforestation, reforestation and deforestation)	**-5%**
Reductions of sectors covered in Annex A of the Kyoto Protocol	**+17% to +26%**

Australia states that it pledged to *reduce* emissions by 5% below 2000 level, while the emission of the sectors listed in the Kyoto Protocol's Annex A would be allowed to *increase* 17% to 26% above 1990 levels.

The key is that Australia calculated its emission reduction target for 2020 based on the sectors listed in Annex A of the Kyoto Protocol (energy, industrial and agricultural emissions) *plus* the emissions from afforestation, reforestation and deforestation, based on a similar rule of the Kyoto Protocol. As emissions from afforestation, reforestation and deforestation are projected to be significantly lower in 2020 compared to 1990, emissions of all other sectors can be higher.

What is the exact data source for the pledge?

Does the pledge by the USA for 2020 represent a reduction below the 1990 level, comparable to other pledges or not?

USA	Effective 2020 target excluding LULUCF relative to 1990
Using the greenhouse gas inventory of 2009	**+3%**
Using the greenhouse gas inventory of 2010	**-1%**
Using the greenhouse gas inventory of 2011	**0%**

The USA has revised its emission estimates for land use, land-use change and forestry (LULUCF) between 2009 and 2011. Not only have absolute emissions of LULUCF removals estimated for 1990 changed but, more importantly, the increase rate of the overall trend has changed with each of the submissions. Using the greenhouse gas emissions reported in 2009, the pledge would be an increase above 1990 level, using the emissions reported in 2010 it would be below.

The USA also takes a different approach to LULUCF accounting by wanting to account LULUCF on a land based approach (based on Convention reporting) rather than an activity based approach which is consistent with Kyoto Protocol Annex I countries.

In April 2011 Brazil presented a new business-as-usual scenario that forms the basis for its internationally pledged 36% to 39% reduction from BAU. The emissions level presented is significantly higher (over 0.5 $GtCO_2e$ or 18%) than the level that had been previously used. With higher BAU emissions, the international pledge will result in significantly higher emissions.

BRAZIL	Emissions in 2020	
Previous BAU estimates	2,704 Mt CO_2e	
Latest official BAU data	3,236 Mt CO_2e	
Difference	**532 Mt CO_2e**	**18%**

China pledged to reduce its emissions intensity (carbon dioxide emissions/GDP) by 40-45% reduction by 2020 from 2005 levels. To evaluate the resulting emissions in 2020 one needs to assume a GDP growth until 2020, which was not provided with the pledge.

CHINA	BAU Emissions in 2020
Previous estimates[4]	12.5-14 Gt CO_2e
Latest estimates based on new data	13.5-14 Gt CO_2e
Difference	**1 - 0 Gt CO_2e**

The Climate Action Tracker updated its analysis in October 2011. A range of data, consistent with the 2011 IMF economic growth outlook for China over the next five years, indicate that China's BAU emissions will likely be around 13.5 to 14 GtCO2e per year in 2020 - about 1 GtCO2e per year above earlier estimates. Previously, the full range estimated was 12.5 to 14 GtCO2e.

[4] Our assumptions are based on a comparison of various sources, including the WEO 2010, ERI 2009 data, China Statistical Report, World Bank and IMF.

Will surplus emission units be used?

Governments need to be clear if they intend to use surplus emission units from the first commitment period towards meeting their pledge. This includes using potential own surpluses as well as buying surplus units from other countries.

GLOBAL	Emissions in 2020	Contribution to gap
Potential impact from surplus emissions	0.5-1.5 $GtCO_2e$	**5%-17%**

What do different accounting rules for forest management mean?

As part of the Cancun Agreements, Annex I parties in the Kyoto Protocol were requested to submit information on their preferred forest management reference levels as part of the Land Use, Land Use Change and Forestry (LULUCF) discussions.

ANNEX I*	Potential additional 2020 emissions from LULUCF accounting
Current Kyoto Protocol rules	170-390 $MtCO_2e$
Reference level option for forest management	360-580 $MtCO_2e$

Instead of using the current Kyoto rules, Governments proposed a number of different rules: 31 countries submitted reference levels based on projections; three countries submitted historical reference levels based on a single year 1990; one country chose the average removals during a historical time series (1990-2006); and one country kept the Kyoto rules from the first commitment period: gross–net accounting using a narrow approach.

This means that countries have been able to choose reference levels which best suit their own favourable national circumstances without review of the environmental integrity of these reference levels. Furthermore, comparing across countries and over time will become extremely difficult and consistency with the first commitment period accounting rules will not be possible. Ensuring transparency of country reporting will be essential to ensure the environmental integrity of the sector.

The USA has not provided sufficient information to estimate LULUCF accounting with these options. Therefore we provide two values for each option where the low end shows the estimate with no contribution from the USA, and the high range includes an estimate of the preferred accounting option for the USA of land-based accounting (baseline not defined yet, 1990 taken).

To what extent will emission offsets be counted?

While the above examples highlight issues that can contribute to closing the gap, the treatment of offsets could potentially increase the gap beyond our current estimate.

GLOBAL	Emissions in 2020	Contribution to gap
Potential impact from double counting[6]	1.6 $GtCO_2e$	**10%-23%**

Some developed countries want to achieve their emissions reduction targets in part by purchasing carbon credits from developing countries. Developing countries meanwhile will achieve their pledge in part by enacting measures resulting in the sale of carbon credits to developed countries.

But these reductions can only be counted towards one country, not both. Such double counting could **further increase** the gap by around 1.6 GtCO2e/year[7].

All these examples demonstrate the importance of clarity on accounting rules and the potentially large impact of different choices and interpretations. Untangling individually chosen rules requires a large number of assumptions and explanations.

[6] UNEP Bridging the Emissions Gap, 2011

[7] Our calculations so far assume that there is no double counting

But the question of transparency is broader than comparing emissions. We see a similar challenge in different streams of the process, especially in negotiations on finance. The example below only highlights one of the difficult aspects of providing transparent and comparable information on financing flows.

Assessing Fast Start Finance pledges?

Japan pledged to contribute USD $15 billion in fast start finance between 2010 and 2012. This pledge consists of a public ODA component of USD $11 billion and USD $4 billion in *Other Official Flows* such as co-financing of the Japan Bank of International Cooperation (JBIC) and private finance catalysed on the basis of public financing as well as trade insurance.

JAPAN	**FSF Implemented as of March 2011**
Total reported (as of 31 March 2011)	**9.7 billion**
Public Finance (implemented from January 2010 onwards)	**6.3 billion**
Difference	**3.4 billion**

In May 2011 Japan submitted information on resources provided to fulfil its commitment to the UNFCCC, reporting that as of 31st March 2011 more than USD $9.7 would have been implemented. Japan specified that when restricted to public funding implemented from January 2010 onwards the amount of assistance implemented so far would be only USD $6.3 billion.

There are other possible definitions for the scope of fast start finance and the determination of its additionality. Each of these would result in a different amount for delivered funding.

Background on the Climate Action Tracker

The "Climate Action Tracker", www.climateactiontracker.org, is a science-based assessment by Ecofys, Climate Analytics and the Potsdam Institute for Climate Impact Research (PIK) that provides regularly updated information on countries' reduction proposals.

The Climate Action Tracker[8] reflects the latest status of the progress being made at international climate negotiations. The team that performed the analyses followed peer-reviewed scientific methods (see publications in Nature and other journals)[9] and significantly contributed to the UNEP Bridging the Gap Report[10].

The Climate Action Tracker enables the public to track the emission commitments and actions of countries. The website provides an up-to-date assessment of individual country pledges about greenhouse gas emission reductions. It also plots the consequences for the global climate of commitments and actions made ahead of and during the Copenhagen Climate Summit.

The Climate Action Tracker shows that much greater transparency is needed when it comes to targets and actions proposed by countries. In the case of developed countries, accounting for forests and land-use change significantly degrades the overall stringency of the targets. For developing countries, climate plans often lack calculations of the resulting impact on emissions.

Contacts

Dr. Niklas Höhne (n.hoehne@ecofys.com) - Director of Energy and Climate Policy at Ecofys and lead author at the IPCC developed, together with Dr. Michel den Elzen from MNP, the table in the IPCC report that is the basis for the reduction range of -25% to -40% below 1990 levels by 2020 that is currently being discussed for Annex I countries.

Dr. h.c. Bill Hare (bill.hare@climateanalytics.org) (PIK and Climate Analytics) was a lead author of the IPCC Fourth Assessment Report, is guest scientist at PIK and CEO at Climate Analytics.

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8 www.climateactiontracker.org

9 e.g. http://www.nature.com/nature/journal/v464/n7292/full/4641126a.html and http://iopscience.iop.org/1748-9326/5/3/034013/fulltext

10 http://www.unep.org/pdf/UNEP_bridging_gap.pdf

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Potsdam Institute for Climate Impact Research (PIK)

The PIK conducts research into global climate change and issues of sustainable development. Set up in 1992, the Institute is regarded as a pioneer in interdisciplinary research and as one of the world's leading establishments in this field. Scientists, economists and social scientists work together, investigating how the earth is changing as a system, studying the ecological, economic and social consequences of climate change, and assessing which strategies are appropriate for sustainable development.

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