Analysis of current greenhouse gas emission trends

Climate Action Tracker

Report

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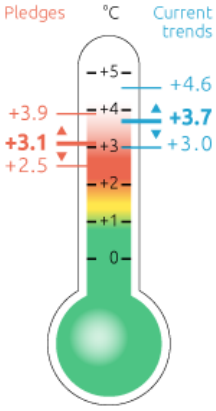
Executive summary

Through the Climate Action Tracker project, the Ecofys, Climate Analytics and PIK team have been providing an independent science-based assessment since 2009, tracking the emission commitments and actions of countries.

Conducted on behalf of ClimateWorks, the objective of the analysis presented in this report is to assess whether currently implemented domestic policies or policy packages will be sufficient to meet the pledged greenhouse gas emission reductions, for those countries that have made mitigation commitments to date. This report discusses the methodology for the policy analysis and provides a summary of results for each country assessed, including details on the policies evaluated and graphs illustrating the current trends for each country[1]. We also aggregate findings at a global level and estimate changes in global-mean temperature from the resulting emission pathways. All information in this report is also published on our website www.climateactiontracker.org.

This work builds on, and further develops the methodology used in a recent project of Ecofys together with PBL and IIASA for the European Commission, which determined current trends in emissions, including implemented and planned climate policies for a number of countries.[2]

Current policies expected to lead to a warming of 3.7˚C



Policy activity has to increase significantly in order to limit global average temperature increase to 2°C above the pre-industrial level. With currently implemented government policies, greenhouse gas emissions are projected to lead to a warming of 3.7˚C by the end of this century, about 0.6˚C higher than that under the Copenhagen pledges. Under current policies there is about a one in three chance of exceeding 4˚C by 2100. The current trend analysis of national policies and measures shows a very diverse picture. Most countries are not on track to meet their pledges, and only a few countries are on track to meet their (often inadequate) pledges. Some countries may over-achieve their (often inadequate) targets.

For Annex I (developed) countries as a group the pledges combined with available surplus emission allowances lead to a situation where no further implementation of mitigation measures is required to meet pledges until 2020. Aggregated at the global level, current trends therefore are estimated to more or less meet the (generally inadequate) pledges by 2020.

Before 2020 there is already a widening gap between pledges and current trends on the one hand and pathways consistent with 1.5-2°C warming on the other. The recently announced change in Japan's target has effectively enlarged the 2020 emissions gap by 3-4% or 356 $MtCO_2e$ in 2020. Long-term aspirational goals beyond 2020 are in in most cases not yet supported by implemented policies, hence recent trends based on implemented policies are

[1] It is important to note that for the vast majority of countries, information is not available on the share of mitigation efforts to achieve the pledge that depends on international mechanisms. In the absence of such information, our results cannot reflect intentions of countries to use international units towards meeting their pledge. Obviously, were such information to become available, this would allow an update of the analyses presented in this report.

[2] Höhne et al., 2012, Greenhouse gas emission reduction proposals and national climate policies of major economies; Roelfsema et al., 2013, Assessment of climate and energy policies of major emitting countries, Roelfsema et al. (in press), Are major economies on track to achieve their pledges for 2020? An assessment of domestic climate and energy policies, Energy Policy

even more inconsistent with the emissions reductions required for 1.5-2°C pathways than assuming the pledges are fully implemented.

This situation stands in contrast to the ample opportunities for action outlined in various reports, such as the latest UNEP Gap Report[3]. The IEA WEO 2013 identified major energy efficiency opportunities and renewable energy continue to boom globally and regionally, here illustrated by the following trends reported in IEA's renewable energy medium-term market report 2013[4]:

- In 2012, total renewable power capacity worldwide grew 8.5% from 2011.
- The most dynamic technologies onshore wind and solar PV have reached, or are approaching, competitiveness in a number of markets and have demonstrated significant development benefits for energy security, local pollution and others.
- In China, wind power generation in 2012 increased more than generation from coal and passed nuclear power output for the first time.

In the European Union, renewables accounted for almost 70% of additional electricity capacity in 2012

Countries presenting a mixed picture

Our analysis brings to light large differences between countries. The following figure A and table A summarise the key outcomes for each country analysed, including our assessment of whether each country is likely to meet their pledge for 2020 with the current policies in place.

Current projections in greenhouse gas emissions are influenced by several factors. Many countries implement dedicated policies to reduce GHG emissions, but emissions were also affected by other factors. Many economies in transition in Eastern Europe, Russia and Central Asia experienced a severe economic crisis in the 1990s, which is reflected in their historic emissions. Also, emissions of most countries assessed here were affected by the 2009 financial crisis, making the pledges 'easier' to achieve than indicated by pre-2009 projections.

In figure A and table A we compare national implementation with the pledges made by countries under the UNFCCC. Where possible, we have quantified what these pledges mean in effective emissions, taking into account the agreed set of rules under the UNFCCC. We then compare this to a range of calculations based on different effort-sharing principles and rate the pledges from 'insufficient' to 'role model'.

We find that for countries like Brazil and EU, currently implemented policies will be sufficient to meet their pledge. Many other countries still have to implement additional policies or purchase international emission units to achieve their pledges.

Significant policy making activity is underway and countries have the tools at hand to expand their policy packages. For example, almost all countries analysed here have renewable energy targets and corresponding support policies. Emission standards for cars are widely implemented. New fossil fuel power plants now have to comply with emis-

[3] UNEP, 2013, The Emissions Gap Report 2013.

[4] IEA 2013, World Energy Outlook 2013 and IEA, 2013, Renewable Energy medium-term Market Report 2013.

sion standards in some countries or are banned entirely in some provinces of China under air pollution regulation. The development of emissions trading schemes has also picked up speed globally and more countries, including China and South Korea, are implementing, scheduling or considering this mechanism in order to control GHG emissions. Hence the analysis in this report provides only a snapshot of the recent achievements of policy developments. Such analyses require regular updating to keep track of deterioration of climate-mitigation policy in some countries and rapid progress in most other countries.

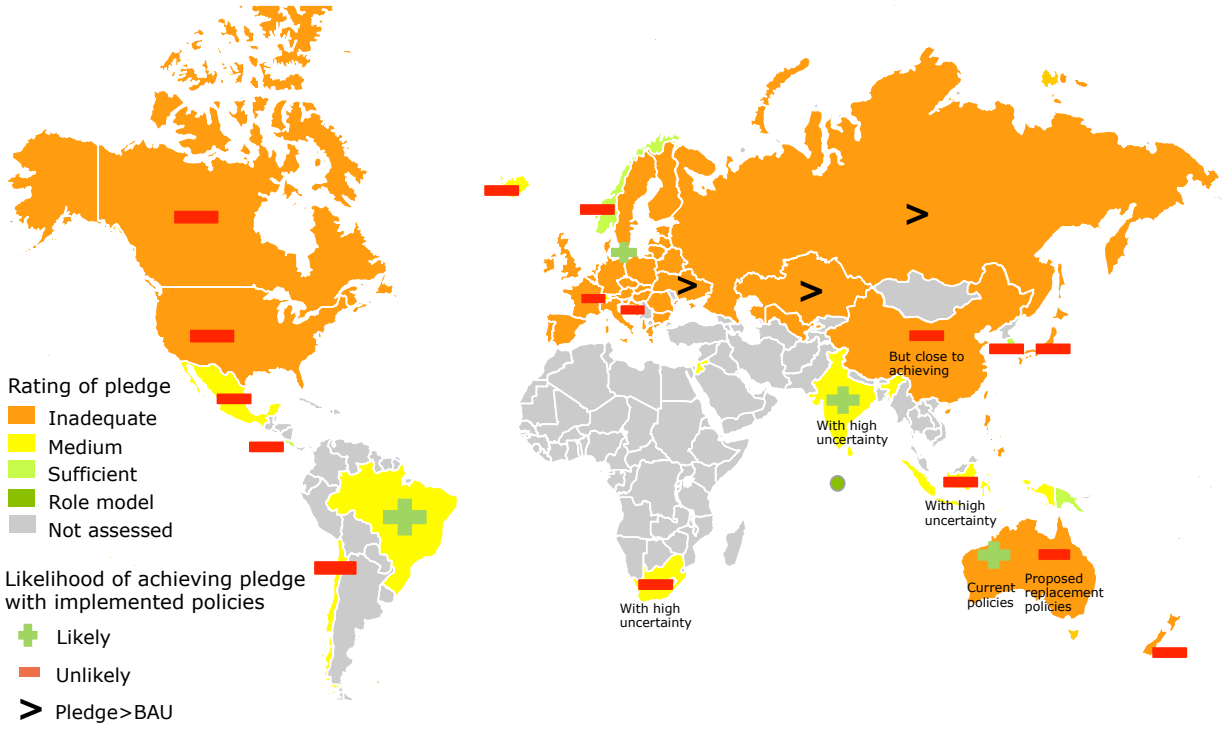


Figure A: Map - overview of country assessment

Table A: Summary of country assessments

Country	Highlights	Evaluation of pledge ambition	Likelihood of meeting pledge
Argentina	Argentina does not have a quantifiable pledge in place, but has proposed to implement a number of activities, to be defined by the national climate strategy currently under development. Current policies result in a small reduction below BAU.	Pledge not quantifiable	Not applicable
Australia	The currently implemented policies of Australia, if maintained, would be sufficient to meet its unconditional pledge, if continued. However, the Abbott Government which was elected in September 2013, moved to repeal the Clean Energy Legislation in the first sitting of the Parliament in November 2013. This repeal would dismantle most of the present policy framework including the current fixed carbon prices and the cap-and-trade system put in place in 2011. The Government does not have the majority in the Senate required for repeal of legislation, but from July 2014 it is likely that it could achieve a majority through negotiations with minor parties[5]. The Government has insisted that it will call a fresh general election should the Senate not support repeal. Given this situation, it is clear that the main assessment in this report of the effect of Australia's current policies may not stand, given a significant likelihood that current policies could be dropped or not implemented. The Abbott Government has committed AU$3.2 billion (capped) to meet the 5% reduction target and has indicated that no further funding will be made available should this fall short of meeting this goal. Our analysis indicates that this so-called Direct Action policy will fall far short of the 5% goal.		 **Current policies**  **Proposed replacement policies**
Belarus	Some policies have been implemented, but are insufficient to change the trend of growing emissions. The pledge is actually above BAU.		Pledge above BAU
Bhutan	Not quantified		

[5] Under the Australian Constitution, Senators elected in September 2013 will not take up their positions until July 2014.

Country	Highlights	Evaluation of pledge ambition	Likelihood of meeting pledge
Brazil	With currently implemented policies, Brazil will reach its pledged emission level. The policies in the forestry sector in particular will have a significant impact on the 2020 levels.		
Canada	The most significant policy is the light-duty vehicle standard. However, Canada will not achieve its pledge with currently implemented policies.		
Chile	Currently implemented policies will not be sufficient to meet the pledge. Emissions are reduced only a little below BAU. However, various smaller programmes may be scaled up in the future. Also, NAMAs close to implementation provide excellent opportunities to make long-term shifts towards sustainable development.		
China	With currently implemented policies, China is close to achieving its pledge, especially through rapid increase of renewable energy capacity. However, emissions are increasing faster than previously expected: from 14.7 to 16.1 $GtCO_2e/a$ in 2020, based on current policies.		 But close to achieving
Costa Rica	Currently implemented policies will not be sufficient to meet the aspiration of carbon neutrality. Current emission trends are projected to achieve reductions below BAU, but are steadily increasing up to 2030.		
Croatia	Current policies are insufficient to meet the pledge. It remains to be seen how inclusion of Croatia in the EU will affect its emission reduction target.		
EU	Currently implemented policies put the EU on a good trajectory towards meeting their target under the CP2 of the Kyoto Protocol. Projections show that the target can be reached without further additional policies until 2020.		
Iceland	Current policies will not be sufficient to meet the pledge. With current policies, emissions are expected to increase substantially between 25-92% above the 1990 level in 2020.		
India	India is implementing policies in the area of energy efficiency and renewable energy. The high dependence of the intensity pledge on GDP development makes the final assessment of pledge achievability difficult.		 with high uncertainty

Country	Highlights	Evaluation of pledge ambition	Likelihood of meeting pledge
Indonesia	Current policies are already reducing emissions. The assessment is difficult because of uncertainty of data in the LULUCF sector. Using official Indonesian projections, current policies will not be sufficient to meet the pledge.		 with high uncertainty
Israel	Not quantified		
Japan	In November 2013, Japan weakened the ambition of its pledge. Adoption of the new target of 3.8% reduction relative to Japan's 2005 fiscal year emissions re presents an increase of 3.1% in 2020 relative to 1990 levels. This a major degradation if its original pledge of 25% below 1990 and its Kyoto target of -6% from 1990 levels in the 2008-2012 period. The 2011 shutdown of Japan's nuclear industry cannot account for this massive degradation of ambition. Replacing all nuclear production projected for 2020 with the present fossil fuel mix would reduce the original 25% reduction to a 17-18% reduction. Even a shift to coal to replace nuclear would halve the original reduction –still far from explaining the planned increase in emissions. Currently implemented policies are not sufficient to meet the new pledge. The expected energy strategy should provide more information on future supporting policies		
Kazakhstan	Currently implemented policies are insufficient to meet the pledge. After a low in 1999 of 146 $MtCO_2e$ (60% below 1990 levels), emissions have been steeply increasing since and are projected to maintain this trend until 2030.		
Maldives	Not quantified		
Mexico	Currently implemented policies are insufficient to meet the 2020 pledge, but are close to achieving the unilateral target for 2012. Mexico has strong framework policies in place and a stable institutional set up, so the circumstances for scaling up mitigation activities are promising.		
Moldova	Not quantified		
New Zealand	With current policies and measures implemented, the target will not be achieved. Current trends project an increase in emissions above 1990 levels of about 21-33% by 2020, remaining far above its target.		

Country	Highlights	Evaluation of pledge ambition	Likelihood of meeting pledge
Norway	Currently implemented policies are not sufficient to meet the pledge. Based on current trends, emissions will increase around 6% above 1990 levels, while the unconditional Copenhagen pledge is -30%.		
Papua New Guinea	Not quantified		
Russia	Russia's pledge results in emissions that are by a substantial margin higher than likely business as usual emissions for 2020.		Pledge above BAU
Singapore	Not quantified		
South Africa	A full assessment is not possible at this point. The range of the current policy projections scenarios overlaps with the range of the reference development. The additional reduction resulting from currently implemented policies is marginal. In the future, the impact of several planned mitigation actions could, however, be significant.		 with high uncertainty
South Korea	Currently implemented policies are not sufficient to meet the pledge. South Korea provides a comprehensive policy package covering all sectors and is expected to introduce a cap-and-trade scheme in 2015.		
Switzerland	Currently implemented policies are not sufficient to meet the pledge. Current trends project a decrease in emissions below 1990 levels of about 13.6% by 2020, remaining 5 $MtCO_2e$ above the pledge.		
Ukraine	Current policies are sufficient to reach pledge, which coincides with the upper limit of BAU estimates.		Pledge above BAU
USA	Current policies are not yet sufficient to reach the pledge. If the new measures proposed under "The President's Climate Action Plan" are implemented fully and with a high level of ambition, the US would still be able to achieve it. Positive policy developments are especially within the transport sector and new measures addressing CO_2 from power generation would be very important to meet its pledge.		

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1 Introduction

With the Climate Action Tracker project, the Ecofys, Climate Analytics and PIK team have been providing an independent science-based assessment, tracking the emission commitments and actions of countries since 2009.

The team has also estimated emission reduction potentials and expected policy impacts for a variety of policies throughout the world. For example, this work builds on, and further develops the methodology used in a recent project by Ecofys; together with PBL and IIASA for the European Commission, which determined current projections in emissions including implemented and planned climate policies for a number of countries. The results of this project are published in a policy briefing paper.[6]

The objective of this analysis is to assess whether currently implemented domestic policies or policy packages will be sufficient to meet the pledged greenhouse gas emission reductions, for those countries that have made commitments. This report provides the methodology for the policy analysis and a summary of results for each country assessed. This report also includes a global emission pathway with updated temperature projections. All information in this report is also published on our website www.climateactiontracker.org.

We integrate the individual country results to estimate a global emission pathway based on current-policy-based projections. This analysis includes countries with mitigation pledges, including:

USA	Japan	Ukraine	Switzerland
EU	Mexico	Argentina	Belarus
India	Canada	Norway	Croatia
Russia	South Korea	Costa Rica	Kazakhstan
Brazil	Australia	Papua New Guinea	New Zealand
Indonesia	South Africa	Iceland	

For some countries with pledges, especially smaller countries, it was not possible to obtain the necessary data to assess the current trends. These are Bhutan, Israel, Moldova, PNG, Maldives and Singapore. Together, these countries emitted 193 $MtCO_2e$ in 2010, representing 0.39% of global emissions[7]. From a global point of view, changes in trajectories for these countries are expected to have only marginal effects. For this analysis, we make the assumption that these countries continue on their BAU trajectories.

[6] Roelfsema et al. (2013). Assessment of climate and energy policies of major emitting countries. PBL Netherlands Environmental Assessment Agency. Pub No. 1096. available at http://www.pbl.nl/sites/default/files/cms/publicaties/pbl-2013-assessment-of-climate-and-energy-policies-1096.pdf

[7] JRC/PBL (2012) EDGAR version 4.2 FT2010. Joint Research Centre of the European Commission/PBL Netherlands Environmental Assessment Agency.

2 Methodology

2.1 General method

The aim of this study is to evaluate if countries will achieve their pledged emission reductions in 2020 with current policies, and which emissions level will be reached globally, taking into account major national climate policies. Where available, we analyse existing policy scenarios. Where these scenarios do not include all current policies, we provide a bottom-up quantification of individual policies or packages and incorporate these in the scenarios. Where no scenarios with policies exist, we develop our own scenarios, based on business as usual (BAU) data or activity data. We aim to assess the actual emission reductions of major policies, not only the reductions envisaged by policy targets. That is, we focus on the effectiveness of policy instruments and expected to have significant impacts their current implementation, rather than the aggressiveness of targets.

2.2 Emission reduction pledges

We quantify the expected emission trajectories according to each country's pledges as indicated by emission reduction commitments and clarifications available from the parties. This also considers specific accounting rules suggested by the parties, specifically for Annex I countries. Pledge pathways also take into account long term goals set by countries, where available. We only evaluate pledges that are quantifiable, such as reductions below a base year, reductions below BAU, or reductions in emission intensity.

The emission levels resulting from the pledges are based on earlier work by the Climate Action Tracker (www.climateactiontracker.org). We update this quantification to include the most recent developments in UNFCCC negotiations and at the countries' national levels.

2.3 Current Trend – policy scenarios

We focus on projections through to 2020. Where sufficient data is available, we project through to 2030. Depending on the data availability, we applied one of two approaches to evaluate current policies. This evaluation is subsequently used to estimate whether pledge levels for 2020 are achieved under current policies, or not.

(1) We used existing policy scenarios from literature and checked available scenarios for completeness with respect to sectors, gases and policies covered. Where necessary, these were combined or compared with other scenarios (e.g. World Energy outlook (IEA 2012)). Emission scenarios from, for example, WEO were combined with non-CO_2 data from the United States Environmental Protection Agency (US EPA 2012) and EDGAR to ensure complete coverage. Where necessary we conducted additional bottom-up quantifications of more recently implemented policies according to the approach outlined below, and combined these results with the existing projections.

or

(2) Bottom-up quantification of selected policies (with the most significant and innovative policies selected), focusing on policies already being implemented or policies that appear certain to be implemented in the future. The emissions resulting from the implemented policies are calculated using the methodologies as described in the excel tools. Implementation barriers are taken into account in projecting the effect of specific targets, by assuming that only a fraction of the target is achieved.

Country	Own quantification of instruments	External scenarios	Emission trend not quantified
China	◆	◆	
USA		◆	
EU	◆	◆	
India		◆	
Russia	◆	◆	
Brazil		◆	
Indonesia		◆	
Japan	◆	◆	
Mexico		◆	
Canada	◆	◆	
South Korea	◆		
Australia	◆	◆	
South Africa	◆		
Ukraine	◆		
Argentina	◆		
Maldives			◆
Norway		◆	
Bhutan			◆
Costa Rica	◆	◆	
Papua New Guinea			◆
Iceland		◆	
Israel			◆
Switzerland		◆	
Chile		◆	

Country	Own quantification of instruments	External scenarios	Emission trend not quantified
Singapore			◆
Belarus		◆	
Croatia		◆	
Kazakhstan		◆	
Moldova			◆
New Zealand		◆	

Table 1 - Overview of the approach used for each country.

2.4 Extending current trend and pledge pathways to 2100

Most current trend assessments are only available for 2020 or up to 2030. To be able to determine related temperature effects we need to make assumptions on further development. We apply the growth rates of the PRIMAP4 BAU scenario (PRIMAP, 2013) to the last available data year of the current trend projections onwards and thus derive the pathway until 2100. The pledge pathways are extended in a similar manner, but for pledge pathways we include reductions beyond 2020 for the many developed countries and a few developing countries that have long term targets.

2.5 Deriving global pathways from country scenarios

The derivation of a global pathway from country scenarios comprises multiple steps. First, we aggregate all country pathways excluding LULUCF. For countries not covered individually within this analysis we assume the PRIMAP4 BAU development for all the current trend and pledge pathways.

The Doha decisions on AAU surplus are applied to the global pathways. The Doha decisions include a limit on the average emission allowances for each country during the second commitment period of the 2008-2010 average emissions (Article 3.7ter, Kyoto Protocol), and a restriction on the trading and use of surplus units. Countries that do not have a reduction target under the Kyoto Protocol for the second commitment period cannot use or sell surplus units under this agreement[8]. We calculate the surplus units available during the second commitment period (Gütschow, 2013) and make these units available for use when the pledge pathway drops below BAU. As a result, the global pledge pathway follows BAU until all surplus units are used, or until 2020, whichever is sooner. All surplus

[8] The surplus of FSU members, such as the Russian Federation, that are no longer part of the Kyoto protocol could be theoretically be transferred to other countries outside of the Kyoto protocol framework. To the extent that the difference between these country's pledges and their likely emissions in 2020 could be transferred to other parties under bilateral offsetting mechanisms or other instruments that could be developed, the "surplus" could add to global allowed emissions in 2020.

units are assumed to be cancelled after 2020 as there is currently no regulation to carry over those units into a new agreement[9].

Emissions from bunkers, i.e. maritime and aviation emissions, are added to the global pathway according to IMO data from Buhaug et al. (2009), and data from Owen et al. (2010) respectively. For the pledge pathway, global reductions were applied to IMO data, while aviation follows BAU.

For LULUCF, we use our own global pathways derived from individual assessments for the largest sources (e.g. Brazil, Indonesia) and add this to the aggregate emissions pathways excluding LULUCF.

2.6 Calculation of temperatures from global pathways

This global pathway is then used as input to a climate model (MAGICC), which is run multiple times in order to obtain a probability distribution of the global mean temperature representing the results from the C4MIP climate. The detailed methodology is outlined in Meinshausen et al. (2009). The general model parameters and the historic data used in our calculations are consistent with the model used in the UNEP Emissions Gap Report 2013 (UNEP, 2013).

Sources

Buhaug Ø. et al. (2009). Second IMO GHG Study 2009 (London: International Maritime Organization (IMO))

IEA (2012). World Energy Outlook 2012. International Energy Agency. Paris.

Gutschow, J. (2013). CP2 Surplus Calculator

Meinshausen M, Meinshausen N, Hare W, Raper S C B, Frieler K, Knutti R, Frame D J and Allen M R 2009 Greenhouse-gas emission targets for limiting global warming to 2 °C Nature 458 1158–62

Owen B, Lee D. S. and Lim L. (2010) Flying into the future: aviation emissions scenarios to 2050 Environ. Sci. Technol. 44 2255–60

PRIMAP (2013) "PRIMAP Baseline Reference", Potsdam Real-time Integrated Model for probabilistic Assessment of emissions Paths. Potsdam Institute for Climate Impact Research

UNEP (2013) The Emissions Gap Report 2013. United Nations Environment Programme (UNEP), Nairobi

US EPA (2012). Global Mitigation of Non-CO_2 Greenhouse Gases, Washington, D.C., USA.

[9] If surplus units were allowed to be carried over in the post-2020 period, this would add to the allowed emissions in this period, degrading the effect of post-2020 targets on emissions to the atmosphere.

3 Global emission and warming projections

3.1 Short- and medium-term pathways

With currently implemented policies we globally see a clear increasing trend of GHG emissions until 2030 with a relatively large range between highest and lowest scenario estimates (Figure 1). Globally aggregated national pledges in 2020 sum up to 55 $GtCO_2e/yr$. This means that current trends more or less meet the insufficient pledges in 2020. The analysis confirms that current pledges for 2020 mainly represent a business-as-usual trajectory at the global level, although there are large differences seen between individual countries. After 2020 the pledge scenario includes long-term goals, such as a reduction of 80 to 95% by 2050 for some developed countries. Currently implemented policies are not compatible with these long-term targets. With current policies global emissions in 2030 are estimated to be 6 to 8 GtCO2e/y higher than the pathway defined by reduction pledges.

Aggregate pledge levels by 2020 are considerably above the roughly 44 $GtCO_2e/yr$ consistent with the emissions for 1.5°C and 2°C scenarios identified in the UNEP Emissions Gap reports (2011, 2012, 2013) and hence aggregated pledges for 2020 remain insufficient to put the world on track for limiting global warming to below 2˚C.

The extent of implemented policies varies considerably between countries. A large number of countries are not on track to meet their pledges with domestic action. Only a few countries are in fact on track to meet or even overachieve their pledges. Some of these have pledges that we assess to be above their business-as-usual development and such pledges do not represent real emission reductions (Russia, Ukraine, Belarus). The generally inadequate pledges combined with available surplus lead to a situation where Annex I countries don't require the implementation of additional measures until 2020 to meet their pledges.

Funding for the implementation of pledges by developing countries is often not specified, whilst developed countries - with a few exceptions - do not clearly indicate the relative contribution of domestic emissions reductions and international mechanisms to their pledges. Hence, there is a considerable risk of “double counting” of pledges, resulting in aggregate reductions that ultimately fall short of ambitions.

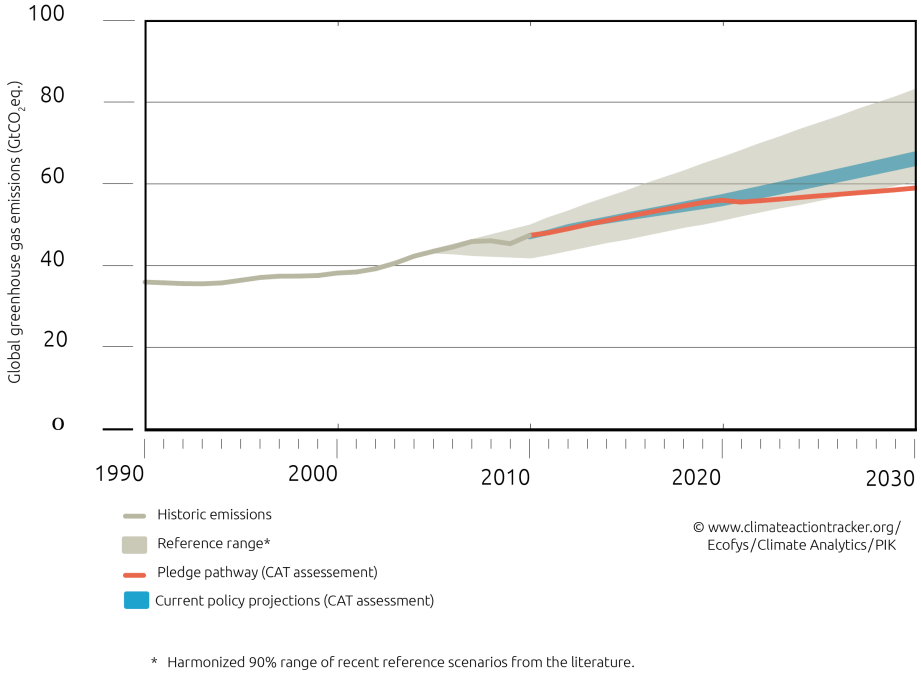

Figure 1 - Global emission pathways 2005 - 2030

3.2 Long-term development and temperature implications

As mentioned above, we account for the often ambitious long-term goals set by some countries, mostly for 2050 in the pledge scenario. Currently we do not see the necessary policies in place to achieve these ambitious long-term goals. Therefore emissions levels from current policies start to deviate from the pledge levels after 2020 with an increasing gap until around 2050 (Figure 2). However, assumptions on developments after 2030 are crucial for overall effects on temperature increase and thus these results should be interpreted with care.

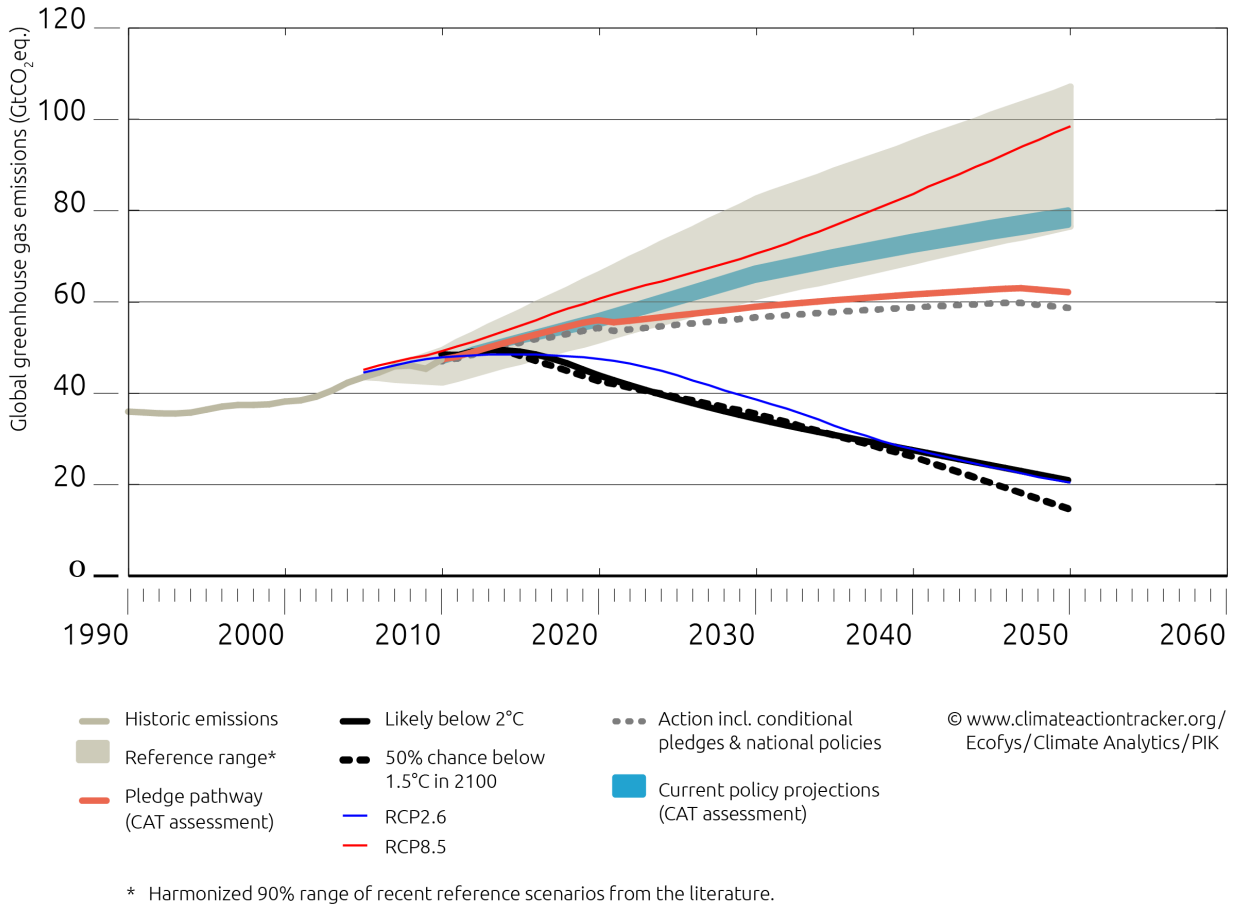

Figure 2 - Global emission pathways 1990 - 2050 Additional to our assessments of the pledge and the current policy projections this figure shows the highest and lowest IPCC AR5 emission pathways, RCP 8.5 and RCP 2.6 respectively. The former is consistent with the warming of over 4°C above pre-industrial by 2100, whilst the latter is consistent with holding warming below 2° within the 21st-century. The lowest emission pathway is technically and economically feasible as has been established by a number of studies published in recent years, and provides context to the likely below 2° pathway and 50% below 1.5° C pathways shown in the figure.

This is also reflected by the projected increases in global-mean surface-air temperatures by 2100. While the scenario of confirmed pledges would result in a median warming estimate of 3.1˚C by that time, the long-term scenarios initiated by current trends result in 3.6˚C / 3.7°C temperature increase by 2100 (Table 2).

Scenario	**Temperature increase by 2100** **Median**	Temperature increase by 2100 16% probability	Temperature increase by 2100 84% probability
BAU	**3.8**	3.1	4.8
Current trend high scenario	**3.7**	_3.0	4.6
Current trend low scenario	**3.6**	2.9	4.4
Confirmed pledges	**3.1**	2.5	3.9
Conditional pledges	**3.0**	2.4	3.8

Table 2 - Estimates of temperature increase in 2100 relative to pre-industrial levels using the MAGICC climate model.

4 Country assessment

4.1 Argentina

4.1.1 Assessment

Argentina is active in the international negotiations and has provided two national communications. Its pledge under the Copenhagen Accord was only a list of measures as NAMAs that cannot be translated into emission levels.

With currently implemented policies, Argentina could reduce emissions slightly below their BAU based on projections from 2009 when the pledge was made, as shown in Figure 3. However, faster than expected growth of emissions in recent years could drive emissions beyond what was expected when the pledge was made. Argentina is currently working on a national climate strategy, including various programmes to mitigate emissions in different sectors (International Partnership on Mitigation and MRV, 2013). With these additional measures, the country may be able to decrease emissions significantly.

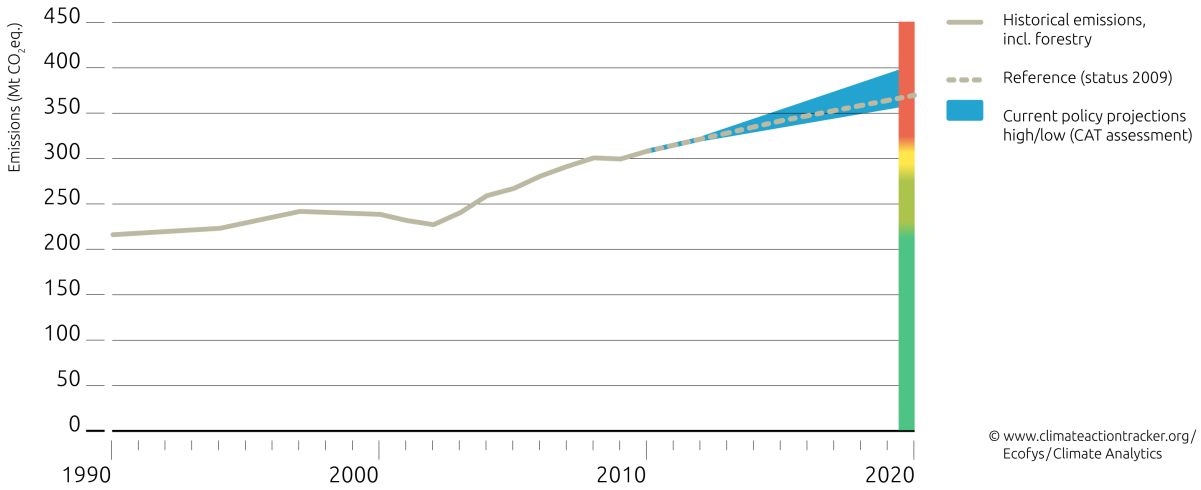

Figure 3 - Historic emissions, BAU, Copenhagen pledge and current emission trends in Argentina

4.1.2 Pledge description

Argentina submitted a list of unilateral and supported mitigation actions currently being undertaken across various sectors. The most important actions are listed in Table 3.

Convention	
Copenhagen pledge	List of NAMAs
Reference for pledge	not needed
Conditions	International financing
Long term goal(s)	none

4.1.3 Current trend description

Independently of the list of submitted NAMAs, Argentina supports the installation of renewable energy through its programme “Generación Eléctrica a partir de Fuentes Renovables” (renewable energy based electricity generation)

(Secretaría de Energía, Argentina). This includes a tendering system for renewable production capacities (excluding large hydro), and aims to achieve an 8% renewable share of electricity generation in 2016. Furthermore, Argentina has a biofuels quota and various support mechanisms for biofuels producers (El Senado y Cámara de Diputados de la Nación Argentina, 2006; Ken, 2011). We expect the impact of this policy to result in only a small deviation from BAU.

Name of Policy	Implications
Biodiesel and ethanol quota of each 5% of diesel and gasoline respectively	Small deviation from business as usual only
"Generación Eléctrica a partir de Fuentes Renovables" (= renewable energy based electricity generation)	Small impact on emissions only due to already low emission factor of electricity

Table 3 - Most relevant policies included in current trends for Argentina

4.1.4 Data sources and assumptions

GHG inventories are available for the years 1990, 1994, 1997 and 2000. For the years 2001-2010, we use growth rates of a combination of IEA CO_2 emissions from combustion (IEA 2012a), CDIAC (CO_2 process emissions) (CDIAC 2012) and US EPA (non-CO_2 emissions) until 2010 (United States Environmental Protection Agency, 2012).

For BAU projections, we use the WEO 2009 growth rates for Latin America (IEA 2009) to determine the expected emission development at the time the pledge was made.

For the current trends projections, we calculate emissions reductions based on sectoral data and subtract these from the BAU. As an alternative current trends scenario, we use growth rates from WEO 2012 for Latin America (IEA 2012b), with latest policies included.

Sources

CDIAC (2012). Global, Regional, and National Fossil Fuel CO_2 Emissions. Carbon Dioxide Information Analysis Center. Tennessee, USA.

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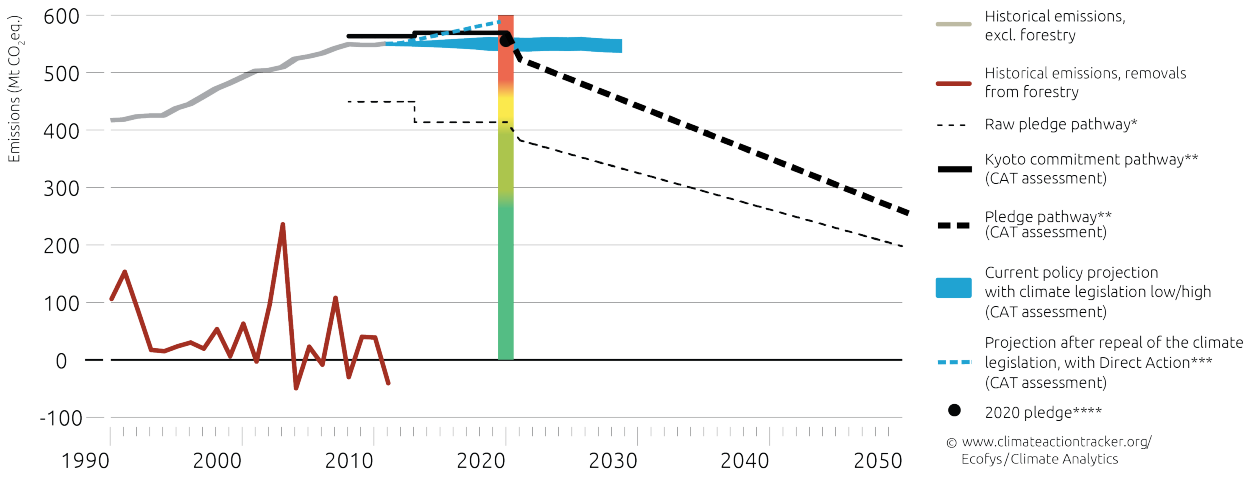
4.2 Australia

4.2.1 Assessment

Australia pledged an unconditional target of a 5% emission reduction below 2005 levels by 2020. The currently implemented policies of Australia would be sufficient to meet its unconditional pledge, if continued, see Figure 4. However, the Abbott Government, elected in September 2013 has confirmed its intent to repeal the Clean Energy Legislation[10]. At its first sitting the in mid-November 2013 the House of Representatives voted for repeal. The Government does not yet have the majority in the Senate for repeal, but may as early as July 2014, after which time it will need to be negotiated with minor parties to repeal. This repeal would dismantle most of the present policy framework including the current fixed carbon prices and the cap-and-trade system put in place in 2011. The Government insists that it will call a fresh general election should the Senate not support repeal. Given this situation, it is clear that the present assessment may not stand, given a significant likelihood that present policies could be dropped or not implemented. The new Government has committed only AU$3.2 billion (capped) to meet the 5% reduction target and has indicated that no further funding will be made available should this fall short of meeting this goal. Our analyses indicates that this so-called Direct Action policy will fall far short of the 5% goal.



* Excl. LULUCF credits and debits, excl. LULUCF base year emissions accounting rules and without application of historical threshold on emissions allowances in 2020 under the Doha decision.

** Incl. LULUCF credits and debits, incl. LULUCF base year emissions accounting rules and application of historical threshold on emissions allowances in 2020 under the Doha decision.

*** Emissions level resulting from replacement of current implemented climate legislation by Direct Action Plan.

**** Emissions level in 2020 resulting from unconditional pledge. This differs from the Kyoto commitment pathway as it depicts final 2020 levels whereas the Kyoto pathway considers the average level of emissions over the second commitment period (2013-2020).

Figure 4 - Historic emissions, BAU, Copenhagen pledge and current emission trends in Australia

[10] „The Australian Government will abolish the carbon tax from 1 July 2014. This will lower costs for Australian businesses and ease cost of living pressures for households." http://www.environment.gov.au/carbon-tax-repeal/

4.2.2 Pledge description

For the second commitment period of the Kyoto Protocol, Australia nominated a provisional Quantified Emission Limitation or Reduction Objective (QELRO) level of 99.5 over the period 2013-2020. This represents an average yearly emissions level of 99.5% of 1990 levels. They have stated this is in line with their unconditional target under the Convention of reducing emissions by 5% below 2000 levels in 2020.

Under the first commitment period, the QELRO for Australia was allowed to increase emissions by 8% over the period 2008-2012.

In contrast to the majority of Annex I countries, Australia's targets under the Convention are not set according to Kyoto architecture. The Kyoto architecture sets allowed emissions as a percentage of 1990 GHG emissions excluding LULUCF plus deforestation emissions in 1990 for countries with a net LULUCF source in 1990, which is the case for Australia.

In April 2011, new information made clear that Australia's targets are to be calculated with respect to its 2000 GHG emissions (excluding LULUCF) plus afforestation, reforestation and deforestation (ARD) emissions in that year (i.e. 2020).

Kyoto Protocol

Member of KP CP1 (2008-2012)	yes
Member of KP CP2 (2013-2020)	yes
KP CP1 target (below base year)	+8%
KP CP2 target (below base year)	-0.5%

Convention

Copenhagen pledge	-5%/-15%/-20%
Reference for pledge	2000 emissions

Conditions (for higher pledge level)

-15%: global agreement which implies atmospheric stabilisation at between 510 and 540ppm CO_2e

-25%: ambitious global deal capable of stabilising levels of greenhouse gases in the atmosphere at 450 ppm CO_2e or lower

National goals

Long term goal(s)	-80% by 2050

For 2020, Australia has proposed three targets with different conditionalities, -5%, -15%, and -25% relative to 2000. Australia has provided absolute allowed emission levels in 2020 of 530 $MtCO_2e$, 474 $MtCO_2e$, and 419 $MtCO_2e$ for the -5%, -15% and -25% targets respectively. These can be converted to 1990 levels: the -5% goal would be -3% from 1990. The Australian target in the first commitment period is +8% compared to 1990 emissions.

Taking into account projected ARD emissions 2020 and the benefits gained from the second sentence of Article 3.7 by Australia, this Kyoto equivalent target for the -5% pledge would permit an increase in GHG emissions excluding LULUCF of +17 to 26% above 1990 levels in 2020. The range is due to different estimates that can be made for likely future ARD emissions for 2020.

For the -15% goal the Kyoto equivalent target range is +3% to +13% from 1990 levels; and for the -25% goal the range is -1% to -10% from 1990 levels (GHG emissions excluding LULUCF).

In Australia's submission of its QELRC for the second commitment period of the Kyoto Protocol in 2012, Australia quantitatively defined its conditions for moving to higher levels of ambition. This is still open to interpretation. However, the election of the new Abbott Government has changed the political landscape of climate policy in Australia. The Prime Minister has vowed to repeal all the previous Government's Clean Energy Legislation including its Carbon Tax, Cap and Trade system as well as the independent policy body: the Climate Change Authority, which was tasked to look at Australia's 2020 target. The Prime Minister has also stated that its Direct Action Policy will only be funded up to AU$3.2billion (capped) to meet the 5% below 2020 reduction.

The targets and conditions for meeting them have had bipartisan support in the past, however there is no certainty on whether the current Government will move to a higher target.

The -5% target stands as their unconditional pledge.

The -15% target is conditional on a global agreement which implies atmospheric stabilisation at between 510 and 540ppm CO_2e and under which major developing economies commit to substantially restrain emissions in aggregate, in the range of 15 to 25% below 1990 levels, and advanced economies take on commitments comparable to Australia's. The condition requires substantive measurable, reportable and verifiable commitments and actions by major developing economies, in the context of a strong international financing and technology cooperation framework, but which may not deliver significant emissions reductions until after 2020 and progress toward inclusion of forests (REDD) and the land sector, deeper and broader carbon markets, low carbon development pathways (Government of Australia 2012a).

Adoption of the most ambitious target of -25% is conditional on an ambitious global deal capable of stabilising levels of greenhouse gases in the atmosphere at 450 ppm CO_2e or lower. The condition includes the need for a clear pathway to achieving an early global peak in total emissions with a nominated early deadline year for peak global emissions not later than 2020. It also requires major developing economies slowing the growth and then reducing their emissions over time, with a collective reduction of at least 20% below business-as-usual by 2020 and a nomination of a peaking year for individual major developing economies. It further requires advanced economies taking on reductions and commitments comparable to Australia, in aggregate, of at least 25% below 1990 levels by 2020, and access to the full range of international abatement opportunities through a broad and functioning international market in carbon credits.

4.2.3 Current trend description

Currently implemented policies are expected to lead to an emission level of 543 – 570 $MtCO_2$e excluding LULUCF by 2020. Emissions from land use change and land management account for around 25% of Australia's GHG emissions, a situation which stands the country apart from most of the other Annex I countries. The abatement in this sector is difficult to estimate since a future BAU scenario contains a lot of uncertainties. Australia's 6th National Communication projects emissions of 43 $MtCO_2$ in 2020 from Deforestation and Reforestation, or 19 $MtCO_2$ from the complete LULUCF sector.

Emissions excluding LULUCF have seen a significant increase since 1990 with the financial crisis mainly resulting in a halting growth of emissions. In 2011 emissions continued growth. Land use plays an important part in Australia's total emissions profile. LULUCF emissions have fluctuated widely since 1990. From 2010 to 2011 they for example moved from being a source of emissions by 40 $MtCO_2$e to being a sink with -40 $MtCO_2$e.

The calculations for Australia in this report are based on continued implementation of the Clean Energy Legislation, which means that we assume that the Carbon Pricing Mechanism (a cap-and-trade system), is continued as planned and the Clean Energy Future including its supporting policies and funds are still relevant.

However, draft legislation is in place to repeal these policies. The 'Direct Action Plan' proposed by the new government has committed AU$3.2 billion to be put in an 'Emissions Reductions Fund' to meet the 5% reduction target. The fund would provide an incentive-based scheme where the Government would purchase domestic carbon

abatement across a range of eligible activities (Australian Climate Change Authority 2013). It has indicated that no further funding will be made available should this fall short of meeting this goal.

The 'Direct Action Plan' also includes carbon sequestration activities. These are found to be highly uncertain and unlikely to be viable (Lubcke, 2013). Effects of the Emission Reduction Fund are estimated to be only between 27 $MtCO_2e$ (Reputex Carbon Analytics, 2013) and 41 $MtCO_2e$ (The Climate Institute, 2013) by 2020.

Given this situation, it is clear that our present assessment - that Australia is likely to meet its target - may not stand, considering there is a significant likelihood that present policies could be dropped or not implemented. In this case our assessment is that the "future trend" would lead to emissions of 595 $MtCO_2e$ in 2020. The proposed alternative action is expected to lead to a re-carbonisation of the power sector, which would not allow Australia to meet its target. Table 4 provides an overview of the most important policy measures included in the current trend for Australia.

The Carbon Pricing Mechanism started in July 2012 with a fixed carbon price and will be followed by a flexible carbon price (Emission Trading System-ETS) from 2015. The ETS will cover around 500 of the largest polluters in Australia and covers around 60% of national emissions. Not all sectors are directly involved: Agriculture, parts of land-sector emissions, transport fuel for households, and emissions from light-road vehicles are excluded in the ETS. According to the Australian Treasury's assessment (Australian Government) the scheme is expected to have major impacts on energy generation and industry and could lead to reductions towards the level of the unconditional pledge.

For the energy supply sector, which is the main source of CO_2 emissions in Australia, a 20% renewable electricity generation target by 2020 is set via the Renewable Energy Target Scheme (RET), introduced in 2009 (Australian Government 2013). The policy instrument is supported by a renewable portfolio standard with a high penalty for non-compliance. In order to be successful, some administrative barriers (such as spatial planning regulation) would need to be removed. The impact of RET is therefore uncertain; we project that it would lead to a share of renewables in electricity generation of 16%[11] to 20% by 2020.

Another measure targeted at energy supply is a power plant standard, which would result in closing down highly polluting coal-fired electricity production plants, which together are responsible for about 2000 MW electricity generation. Replacing them by gas power plants would decrease CO_2 emissions.

[11] A recent NGO report indicates that the country would be able to achieve a reduction of 16% to 17% by 2020.

Name of Policy	Implications
Carbon Pricing Mechanism (Australia's fixed price and cap-and-trade)	Market-based instrument that will lead to cost effective reduction in 2020 and beyond
Clean energy initiative (fund for REN and EFF) / Clean Energy future plan	Supporting the implementation of the REN targets
Closure of 2000 MW brown coal power plants and replacement by highly efficient gas power plants	Reduce emission immediately after closure
Feed-in-schemes on state level	Supporting the implementation of the REN targets.
Generator efficiency standard for new entrants	Reduce emission from energy efficiency improvements, fuel shift possible
Renewable Energy scheme with a target of 20% in 2020 in electricity generation	Diversification of energy mix, large impact on electricity sector emission in 2020
More policies that have been covered: http://climateactiontracker.org/publications/publication/49/Assessment-of-Australias-policies-impacting-its-greenhouse-gas-emissions-profile.html	

Table 4 - Most relevant policies included in current trends for Australia

4.2.4 Data sources and assumptions

Pledge

Targets for 2020 were calculated from the most recent national inventory submissions (CRF 2013).

We have applied LULUCF accounting to Australia's pledge, following special criteria in line with the definition of their pledges. As of COP 17 in Durban, it has been decided that forest management is a mandatory activity under article 3.4 and shall be accounted by all Annex I parties. We have therefore interpreted Australia's pledge as a target including ARD and forest management.

Party-provided ARD projections have not been used, instead 2020 ARD value was obtained by linear trend over the 1990-2010 period. We calculated LULUCF accounting quantities for forest management using a net-net approach with a projected reference level for 2013-2020. While Australia provided a range of possible outcomes on the force majeure (natural disturbances) provision, the reference level calculated here is without this provision and would change if this provision is included.

To keep consistency with the first commitment period, for post 2012 we assumed Australia will continue to use Article 3.7. Art. 3.7 allows deforestation emissions to be included in the base year for those parties with a net source of emissions from the land use change and forestry sector and applies to the target in the first KP commitment period. Some parties have proposed amending Article 3.7 to remove this provision. Australia wishes to retain it.

Current trends

For the current trend analysis we used the Climate Action Tracker Analysis from 2011 that comprehensively cover the key policies: Clean Energy Legislation, renewable targets with supporting policies and performance standards. The upper range is a result of a study provided by the Climate Institute in 2013 (The Climate Institute, 2013). Other sources have provided assessments in a similar range, but did not supply sufficiently detailed data (see for example Reputex Carbon Analytics, 2013). Others provide analysis on the sequestration activities included in the Direct Action Plan, which however has not been the focus of our analysis (see Lubcke, 2013).

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Government of Australia (2012b). Information by parties included in Annex I listed in annex 1 to decision 1/CMP.7 on their quantified emission limitation or reduction objectives for the second commitment period under the Kyoto Protocol

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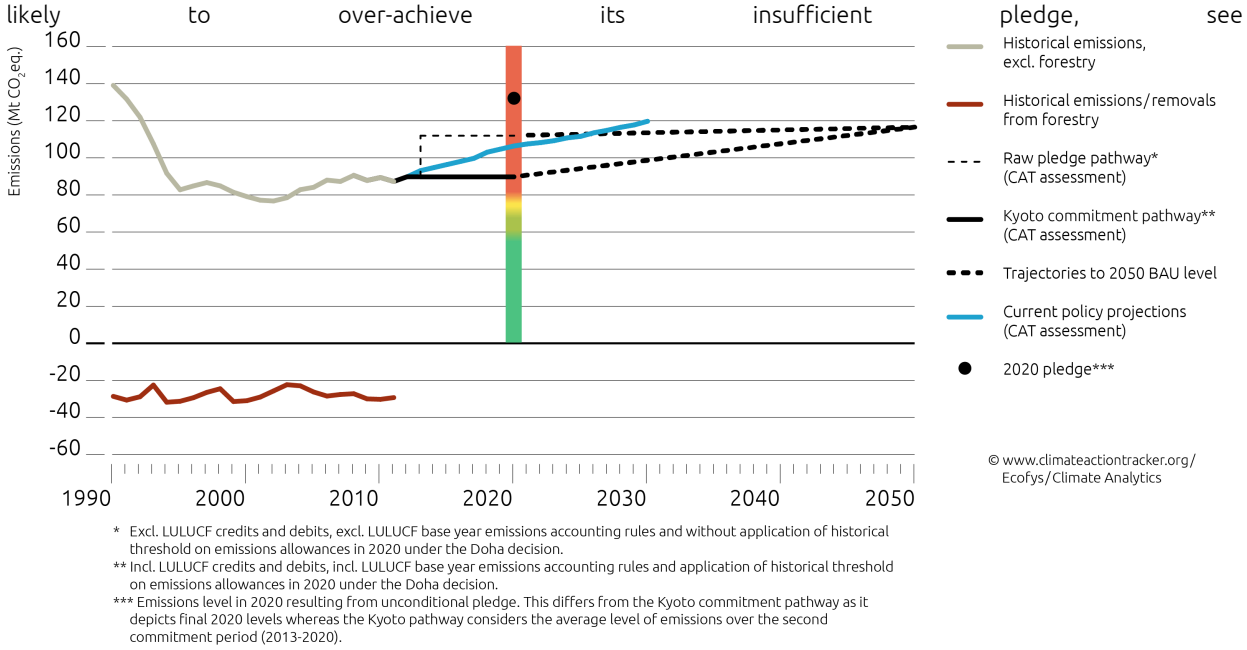
See also references for the Climate Action Tracker Australia report: see full list

4.3 Belarus

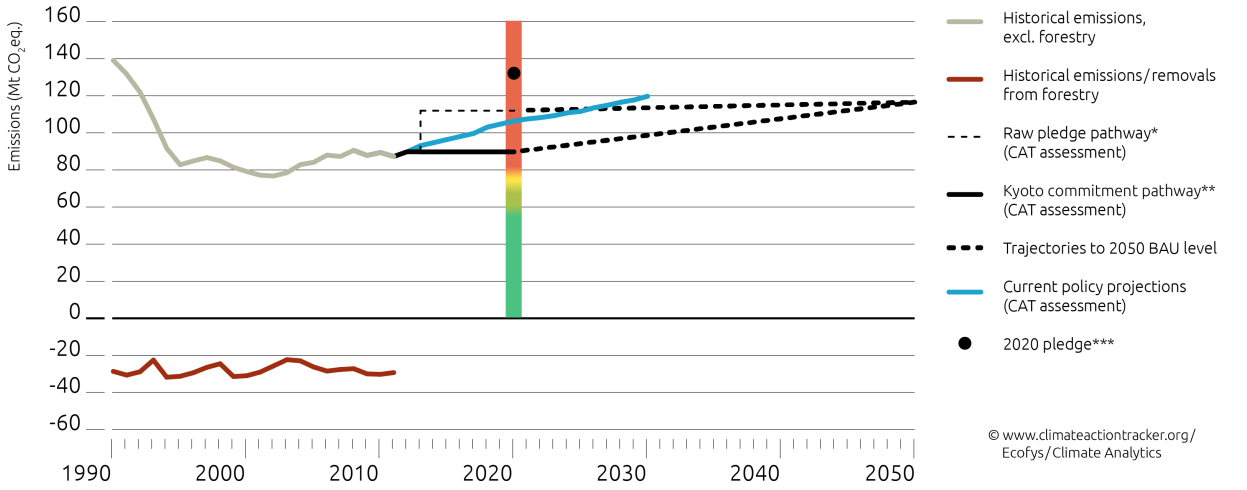
4.3.1 Assessment

Belarus has pledged to reduce its emissions by 8% relative to 1990 levels by 2020. With current policies in place it is likely to over-achieve its insufficient pledge, see



* Excl. LULUCF credits and debits, excl. LULUCF base year emissions accounting rules and without application of historical threshold on emissions allowances in 2020 under the Doha decision.
** Incl. LULUCF credits and debits, incl. LULUCF base year emissions accounting rules and application of historical threshold on emissions allowances in 2020 under the Doha decision.
*** Emissions level in 2020 resulting from unconditional pledge. This differs from the Kyoto commitment pathway as it depicts final 2020 levels whereas the Kyoto pathway considers the average level of emissions over the second commitment period (2013-2020).

Figure 5. Current policies are expected to result in a 24-30% decrease below 1990 levels, leading to an emissions level of 106 $MtCO_2e$ in 2020.



* Excl. LULUCF credits and debits, excl. LULUCF base year emissions accounting rules and without application of historical threshold on emissions allowances in 2020 under the Doha decision.
** Incl. LULUCF credits and debits, incl. LULUCF base year emissions accounting rules and application of historical threshold on emissions allowances in 2020 under the Doha decision.
*** Emissions level in 2020 resulting from unconditional pledge. This differs from the Kyoto commitment pathway as it depicts final 2020 levels whereas the Kyoto pathway considers the average level of emissions over the second commitment period (2013-2020).

Figure 5 - Historic emissions, BAU, Copenhagen pledge and current emission trends in Belarus

4.3.2 Pledge description

Kyoto Protocol	
Member of KP CP1 (2008-2012)	yes
Member of KP CP2 (2013-2020)	yes
KP CP1 target (below base year)	-8%
KP CP2 target (below base year)	-12%
Convention	
Copenhagen pledge	-8%
Reference for pledge	1990 emissions
Conditions (for higher pledge level)	
Access to the Kyoto flexible mechanisms, intensification of technology transfer, capacity building and experience enhancement	
National goals	
Long term goal(s)	none

Belarus's target for the second commitment period of the Kyoto Protocol is to reduce emissions by 12% below 1990 levels. In May 2012, Belarus submitted a provisional QELRO level of 88, which is also inscribed in the Doha Amendment. This means that Belarus's average yearly emissions during the period of 2013-2020 are proposed to be 88% of 1990 levels. Belarus is the only Annex I country that does not have a long-term target. Therefore, dashed lines after 2020 in Figure 5 illustrate the trajectories from the raw pledge/Kyoto target towards BAU in 2050.

The Doha amendment limit targets for the second commitment period to the average historic emissions 2008-2010[12]. This affects Belarus and results in an almost 23 $MtCO_2e/yr$ lower Kyoto pathway for the period 2012-2020.

Current emissions are already at 37.2% below 1990 emissions (CRF, 2013), and 31.4% below reference base year levels. This allows Belarus to substantially increase emissions from today's levels and still remain within their target.

Belarus proposed a target of -8% relative to 1990 (1995 for F-gases) for the first commitment period of the Kyoto Protocol (2008-2012). Base year emissions for this pledge are set by Belarus' initial report under the Kyoto protocol.

Under the Convention, Belarus originally proposed a target of -5 to -10% relative to 1990 emissions by 2020. This has now been clarified to -8% relative to 1990 levels by 2020. The target is still conditional on access to the Kyoto flexible mechanisms, intensification of technology transfer, capacity building and experience enhancement for Belarus. For the 2020 pledge, we assume the most recent inventory data for 1990 as the basis. These are substantially higher than the emissions stated in the initial report. Therefore, despite an unchanged pledge from the first commitment period, the actual emissions allowed by the pledge for 2020 are higher than for the first commitment period and the emissions pathway shows growing emissions from 2012 to 2020.

4.3.3 Current trend description

Currently implemented policies are expected to continue the increasing trend in emissions to reach an emissions level (excl. LULUCF) of 106 $MtCO_2e$ by 2020. Despite the growth, this is still in line with Belarus' pledge. Given the economic collapse during the early 1990's emissions dropped by almost 40% over the 90s, reaching an absolute

[12] This is part of the Doha decisions and constitutes part of the amendments to the Kyoto Protocol. Amendments only come into effect once they are ratified by Parties.

minimum in 2001/2002 with 77 $MtCO_2e$. Based on current levels of emissions and the expected trend Belarus is expected to generate additional surplus under the second commitment period of the Kyoto Protocol.

According to its Fifth National Communication (2009) Belarus had implemented all available, relatively low-cost measures for the reduction of GHG emissions at that point in time. It is envisaged that revenue from sales of surplus AAUs from the first commitment period will provide the resources for further investment in mitigation efforts.

The fuel and energy sectors show the highest potential for emissions reductions due to the high energy intensity (energy consumption per unit of GDP) in the country. It is therefore in these sectors that the effect of implemented policies to reduce emissions is mostly seen. Industrial and energetic objects are out-dated so there is a potential for GHG cuts through modernization and through a trend toward the growth in use of renewable energy resources

A National Program aimed at ensuring control of emissions growth, and developing measures for emitting industries is an important step Belarus has taken in solving the problem of climate change. Main policies included in the current trend projections are highlighted in Table 5. The main policies also contain a small number of activities that were included in the current trend projection calculations but were then not implemented in the country.

Since the last National Communication, and thus the last available projections, a number of policies were implemented (Table 6). We have not yet been able to assess and quantify these new policies for inclusion in the current trend pathway.

Policy	Implications
Program on conversion of boiler plants into small CHP plants	Not sufficient information available to assess individual implications of policies
State Program of Rehabilitation of the basic production assets of the energy system, energy saving and increase in the use of domestic resources of fuel and energy	
Program of Energy saving	

Table 5 - Most relevant policies included in current trends for Belarus

Policy	Source	Year of implementation
Tax relief for renewable energy investors	IEA	2009
National Energy Saving Programme 2011-2015	IEA	2011
Law on Renewable Energy Sources	IEA	2011
Resolution on Feed-in Tariffs for electricity generated from renewable energy sources	IEA	2011
National Program of Local and Renewable Energy Sources Development	IEA	2011
The Grodno Hydroelectric Power Plant (17 MW)	NC5	2011
Polotsk Hydroelectric Power Plant (23 MW)	NC5	2012

5 MW Wind Power Plant	NC5	2010
700 MW Combined Cycle Plant	NC5	2015

Table 6 - Recent policies/activities not included in current trends for Belarus

4.3.4 Data sources and assumptions

Pledge

Targets for 2020 were calculated from the most recent national inventory submissions (2012). We have not applied LULUCF accounting to Belarus' pledge, as they only provided data for forest management and not on the other required activities of afforestation, reforestation and deforestation. Belarus also provided reference levels for forest management which are equal to 1990 levels.

Current trends

Greenhouse gas emission inventories are available from 1990 to 2011 in the CRF 2013 submitted to UNFCCC. Current trend projections are based on emission projections from Fifth National Communication of the Republic of Belarus (Ministry of Natural Resources and Environmental Protection of the Republic of Belarus, 2009). These projections do not reflect latest historic data. We therefore use historic data up to 2011 and then apply growth rates from the two projections to determine the range.

Sources

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4.4 Brazil

4.4.1 Assessment

Brazil pledged to reduce its emissions by 36.1% to 38.9% in 2020 compared to BAU emissions. According to our analysis, the country will meet the pledge with current policies, see Figure 6.

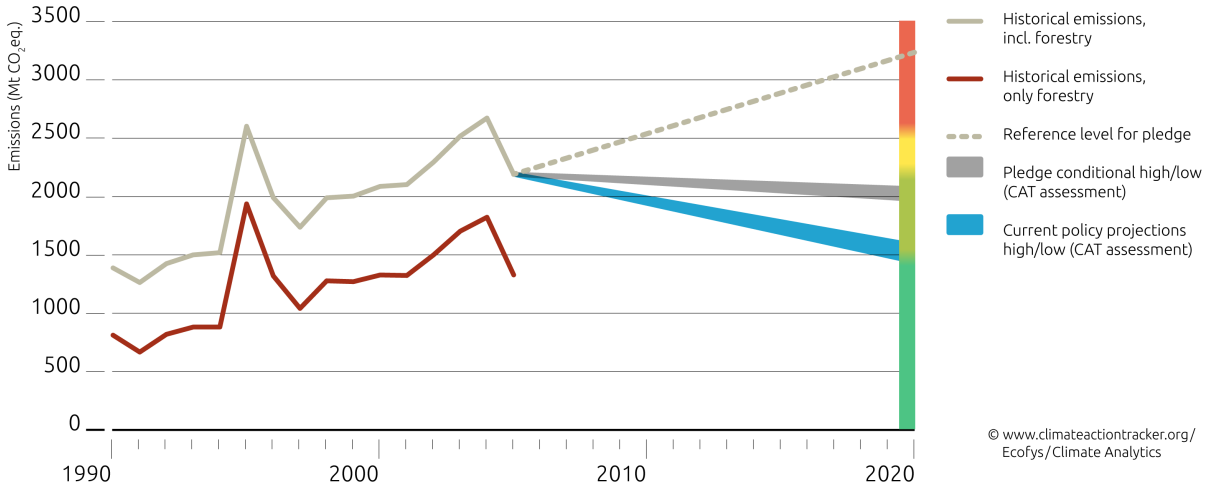

Figure 6 - Historic emissions, BAU, Copenhagen pledge and current emission trends in Brazil

4.4.2 Pledge description

Convention	
Copenhagen pledge	-36.1% / -38.9% (broken down by sector)
Reference for pledge	BAU
Conditions	Provision of adequate financial and technological support
Long term goal(s)	none

Brazil was one of the first major developing countries to set an emission target. Brazil will reduce its emissions by 36.1% to 38.9% in 2020 compared to BAU emissions.

The target is not conditional to activities of other countries, but conditional to international financing (compare with Article 4, paragraph 7 of the convention (United Nations, 1992) that was referred to in the Copenhagen pledge (Federative Republic of Brazil, 2010)). It explicitly includes emissions from LULUCF. The target was turned into national law in December 2010. The national law does not include any condition on international funding, making it more stringent than the target as presented at the international level. If Brazil were to remove the condition on international finance officially, the pledge would be rated sufficient.

The target was originally proposed in November 2009 and submitted to the Copenhagen Accord on 29 January 2010. That submission suggested a BAU level of 2,704 $MtCO_2e$. The national law however includes a BAU level of 3,236 $MtCO_2e$ with the same percentage reduction. The quantitative pledge level referring to the higher BAU is in the range of 2,068 to 1,977 $MtCO_2e$ in 2020 incl. emissions from LULUCF. Excluding LULUCF, the range is 1,419 to 1,832 $MtCO_2e$, which is equal to the BAU. LULUCF emissions between 603 and 1,404 $MtCO_2e$ will result from pledged ranges.

4.4.3 Current trend description

Currently implemented policies will lead to a range in total emissions of 1,442 to 1,584 $MtCO_2e$ by 2020, well below their target. This includes an emission level of 1,200 $MtCO_2e$ in 2020 and 1,336 $MtCO_2e$ in 2030 excluding emission from LULUCF and remaining LULUCF emissions of 242 to 384 $MtCO_2e$, depending on the reference development (BAU estimations taken from Roelfsema et al., 2013). Brazil has been very active in implementing climate related policies in all main emitting sectors. Brazil's main policies are highlighted in Table 7.

The focus of action has been on forestry laws that help especially to protect the native forest, such as the Amazon. The central pieces of action are the national Forest Code, the Action Plan for Deforestation Prevention and Control in the Legal Amazon (PPCDAm) and in the Cerrado (PPCerrado). The PPCDAm targets a reduction of 80% in the annual deforestation surface in the Amazon, compared to the 1996-2005 historical average. The national projection shows that, based on the avoided deforested surface and assuming a constant biomass density (484 tCO_2/ha), this would avoid about 760 $MtCO_2$ of emissions by 2020. The PPCerrado calls for a reduction of 40% of the annual deforestation surface in the savannahs, compared to the historical average from 1999-2008. When assuming a constant biomass density (206 tCO_2/ha) in the savannah, this would avoid about 130 $MtCO_2e$ of emissions by 2020 compared to national projections.

Assuming the full implementation of both plans for the calculation, the total reduction is expected to be about 890 $MtCO_2e$ in 2020, based on the national BAU projection for the Amazon and Cerrado of 1271 $MtCO_2e$. There are, however, largely varying estimates for BAU development. Projections by Roelfseme et al (2013). predict BAU emissions to be only 803 in 2020. This shows the high uncertainty of agricultural and forestry BAU emissions. Based on Roelfsema et al (2013) the BAU projections, we find the reduction caused by the above action plans could be much lower, namely 560 $MtCO_2e$ in 2020.

Beside its activities in forestry, Brazil's National Energy Plan states that the country will triple its use of "new" energy, excluding hydro renewables, by 2020, and that much of that will be wind energy. The significant reduction will only be achieved when additional financial resources will be available. The biofuel quotas have already had an impact on national emissions since they had been introduced before 2009.

Name of Policy	Implications
Ethanol targets in road transport 20% to 25% (Federal Law 8723/1993)	Long term effect on emission reduction from transport.
Federal Law No. 11097/2005– Mandatory Biodiesel Requirement	Long term effect on emission reduction from transport.
2011 National Energy Plan	Long term effect on emission reduction from electricity generation.
Plan for Prevention and Control of Deforestation in the Amazon (PPCD-Am)	High impact on emission reductions from deforestation, targets will be achieved by 2020.
Plan for Prevention and Control of Deforestation and Forest Fires in the Cerrado	High impact on emission reductions from deforestation, targets will be achieved by 2020.

Table 7 - Most relevant policies included in current trends for Brazil

4.4.4 Data sources and assumptions

Pledge

Historical and future emissions were taken from the calculations provided in the press release on the target. Forestry emissions were taken from the national communications (Federative Republic of Brazil, 2010) of Brazil.

Current trends

The current trend projections are based on the World Energy Outlook 2012 Current Policy scenario projections for CO_2 only (IEA, 2012) until 2030, the US EPA non-CO_2 emission projections until 2030 (US EPA 2012),inventory data submitted to the UNFCCC for historical information until 2005 and historical non-energy emissions from EDGAR (JRC/PBL 2012). For LULUCF the quantification is based on Roelfsema et al.(2013).

Sources

Federal Republic of Brazil (2010a): Brazil's pledge to the Copenhagen Accord. Compiled in: Compilation of information on nationally appropriate mitigation actions to be implemented by Parties not included in Annex I to the Convention, UNFCCC (2011)

Federative Republic of Brazil (2010b). Second national communication

Federative Republic of Brazil (2009). Mitigation scenario as the basis for the target as submitted to the Copenhagen accord in early 2010

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IEA (2012) World Energy Outlook 2012, International Energy Agency. Paris.

JRC/PBL (2012) Edgar Version 4.2 FT2010 Joint Research Centre of the European Commission/PBL Netherlands Environmental Assessment Agency.

Presidência da República (2010). National law of December 2010. Luiz Inácio Lula da Silva.

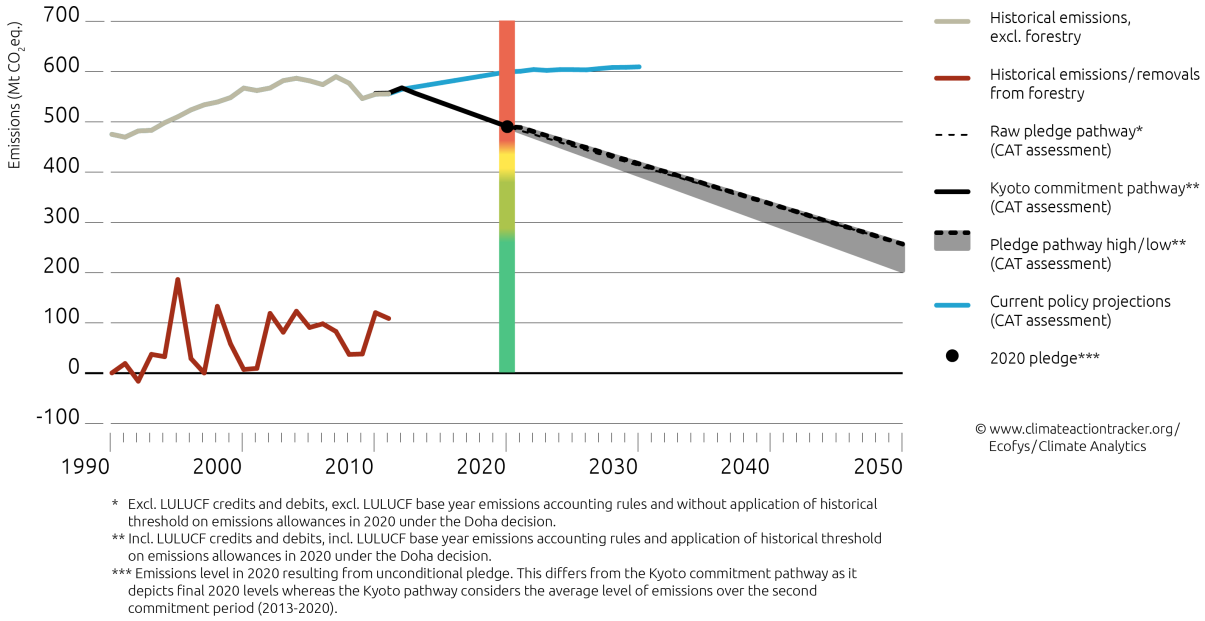
United Nations(1992). UNITED NATIONS FRAMEWORK CONVENTION

US EPA (2012). Global Mitigation of Non-CO_2 Greenhouse Gases, Washington, D.C., USA.

4.5 Canada

4.5.1 Assessment

Canada's commitment for 2020 is -17% relative to 2005 emission levels by 2020, which translates to +3% relative to 1990. With current policies in place, Canada is not on track to meet their pledge, as illustrated in Figure 7. Even taking into consideration the credits from LULUCF, the pledge would not be met.



* Excl. LULUCF credits and debits, excl. LULUCF base year emissions accounting rules and without application of historical threshold on emissions allowances in 2020 under the Doha decision.
** Incl. LULUCF credits and debits, incl. LULUCF base year emissions accounting rules and application of historical threshold on emissions allowances in 2020 under the Doha decision.
*** Emissions level in 2020 resulting from unconditional pledge. This differs from the Kyoto commitment pathway as it depicts final 2020 levels whereas the Kyoto pathway considers the average level of emissions over the second commitment period (2013-2020).

Figure 7 - Historic emissions, BAU, Copenhagen pledge and current emission trends in Canada

4.5.2 Pledge description

Canada's Kyoto Protocol target (2008-2012) was a reduction of 6% relative to 1990 emission levels. In December 2011, Canada withdrew from the Kyoto Protocol.

Canada's commitment under the Convention of -17% relative to 2005 emission levels by 2020 (+3% relative to 1990) weakens their previous Kyoto target. It also a weakens their initial pledge under the Copenhagen Accord to reduce emissions by 20% relative to 2006 emissions by 2020. The new target aligns Canada with the USA. Canada proposes to exclude emissions from natural disturbances from the base year and from the commitment period's cumulative emissions, and supports accounting for removals from harvested wood products. This could lead to higher credits (or lower debits).

Kyoto Protocol	
Member of KP CP1 (2008-2012)	withdrawn
Member of KP CP2 (2013-2020)	no
KP CP1 target (below base year)	-6%
KP CP2 target (below base year)	none
Convention	
Copenhagen pledge	-17%
Reference for pledge	2005 emissions
Conditions (for higher pledge level)	no range
National goals	
Long term goal(s)	-60% to -70% by 2050
	below 2006 emissions

In the long term, Canada has proposed to reduce emissions by -60 to -70% relative to 2006 by 2050.

4.5.3 Current trend description

With currently implemented policies, Canada will reach emissions of 762 $MtCO_2e$ in 2020 (excluding emissions from Land Use, Land Use Change and Forestry - LULUCF), reaching approximately 3.3% more than the 2005 value. According to Canada's own projections, LULUCF will decrease emissions by 258 $MtCO_2e$ in 2020. Even accounting for potential credits from LULUCF, it would still not be sufficient to reach the pledge (Environment Canada, 2013).

In comparison to previous Canadian emission projections from the year 2012 (Environment Canada, 2012), the current scenarios are higher, resulting from increased projections in most sectors. The only sector which shows a slight improvement in comparison to the previous projections is oil and gas production, but this is mainly due to changes in methodology. In comparison to 2005 levels, emissions from oil and gas production are still expected to increase significantly.

Canada has various policies in place to reduce emissions. The main policies included in current trends are highlighted in Table 8. It is important to note that no relevant new actions have been taken during the last year on federal level: Canada's Emission Trends 2013 contain the same list of policies as the report from 2012 (Partington 2013). Nevertheless, Canada has various policies in place to reduce emissions. Standards for light and heavy duty vehicles and the Federal Emissions Performance Standard for coal-fired electricity generation are aligned with regulations in the US. The standard for coal-fired power plants only applies to new power plants, and therefore implies no significant change against business as usual given the current situation of low gas prices. The second phase of the light duty vehicle standards, however, does have potential to reduce emissions. Furthermore, there are some promising state level activities, especially Ontario's decision to phase out coal-fired power plants by 2014.

Name of Policy	Implications
GHG emissions standards for light-duty vehicles of model years 2017 to 2025 and heavy-duty vehicle regulations	Mainly long-term impact (after 2020)
Federal Emissions Performance Standard for coal-fired electricity generation	No significant deviation from BAU
Quebec's cap-and-trade	Limited impact because of small share of total emissions
Nova Scotia's emissions cap for electric utilities	Limited impact because of small share of total emissions
Ontario's coal phase out by 2014	Relevant reductions on province level also reflect on national level

Table 8 - Most relevant policies included in current trends for Canada

4.5.4 Data sources and assumptions

Pledge

Targets for 2020 were calculated from the most recent national inventory submissions (2012). We calculated Canada's LULUCF accounting quantities in 2020 for afforestation, reforestation and deforestation using the current Kyoto rules, and used a net-net approach with a projected reference level for 2013-2020 for forest management.

Current trends

We used the most recent GHG inventory for historic data (CRF 2013) and applied growth rates from projections from Environment Canada for projections for the current trends.

Sources

CRF (2013). UNFCCC AWG-KP Submissions 2013. Common Reporting Format.

Government of Canada (2011). Submission to the Ad-Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP): Forest management reference level

Government of Canada (2010). Canada's pledge to the Copenhagen Accord. Compiled in: Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention, UNFCCC (2011).

Government of Canada (2009a). Further elaboration of the options, elements and issues contained in annex IV to document FCCC/KP/AWG/2008/3 and annex III to document FCCC/KP/AWG/2008/5, including on which proposals could address cross-cutting issues, and how

Government of Canada (2009b). Informal Submission to the AWG-KP: Data on forest management

Government of Canada (2007). Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP):Information and data on the mitigation potential of policies, measures and technologies

Environment Canada (2013) Canada's Emission Trends

Environment Canada (2012). Canada's Emission Trends

Partington, P.J. (2013). Trending Bad: What Environment Canada's latest climate report says about Canada's carbon pollution.

4.6 Chile

4.6.1 Assessment

Chile proposes to undertake Nationally Appropriate Mitigation Actions (NAMAs) to reach 20% below BAU in 2020 (as projected from 2007). According to our analysis, the country is still not close to achieving this level, as illustrated in Figure 7. It has various NAMA proposals moving towards implementation, which may lead the way to further emission reductions in the future.

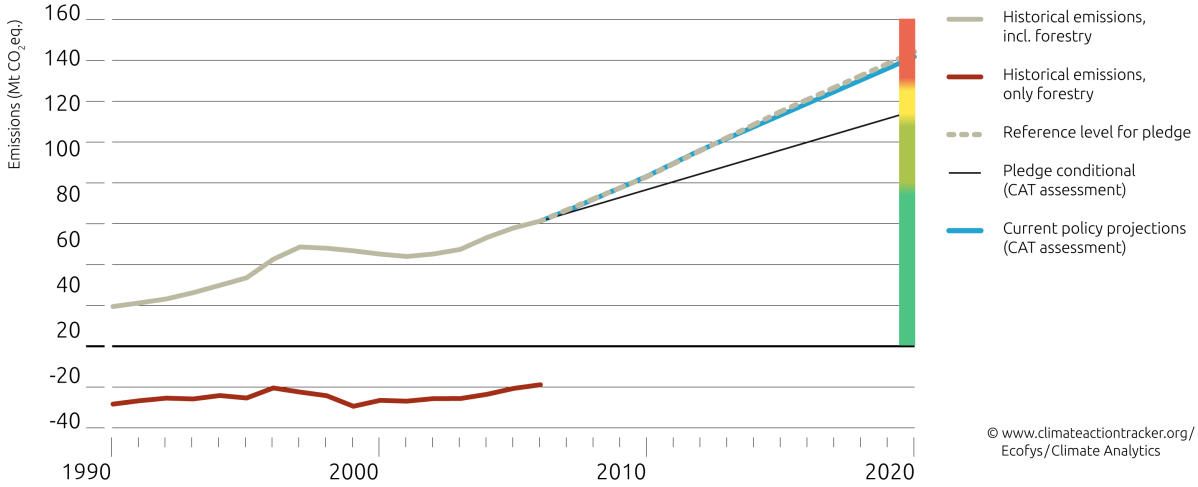


Figure 8 - Historic emissions, BAU, Copenhagen pledge and current emission trend in Chile

4.6.2 Pledge description

Chile proposes to undertake NAMAs to reach 20% below BAU in 2020 (as projected from 2007). To accomplish this Chile will need a relevant level of international support. We use business as usual data from O'Ryan et al. (O'Ryan et al., 2010) to estimate the absolute level of the pledge, which results in 115 $MtCO_2e$ in 2020.

Convention	
Copenhagen pledge	-20%
Reference for pledge	BAU
Conditions	International support
Long term goal(s)	none

4.6.3 Current trend description

Currently implemented policies are a first step towards reducing emissions. However, these policies need to be scaled up substantially to lead to significant mitigation. A potential threat to climate change mitigation in Chile are plans to meet increasing demand with additional coal fired power plants (O'Ryan et al., 2010), drawing from national resources instead of relying on imported, less carbon intensive natural gas or renewable sources. Activities in the energy sector now could therefore provide solutions leading to a long-term transformation of the sector and avoiding a lock-in to coal-fired electricity generation. Chile's most relevant policies are listed in Table 9.

Name of Policy	Implications
Energy Efficiency Action Plan 2012-2020	No concrete actions yet implemented
Non-conventional renewable energy law	Small impact in 2020 but higher potential in long term
Programa País de Eficiencia Energética	Little impact on emissions due to small scope, but potential to extend.

Table 9 - Most relevant policies included in current trends for Chile

4.6.4 Data sources and assumptions

Pledge

Three data sets of emissions are available from Institutions in Chile: The Initial National Communication to the UNFCCC including projections for 2020, the 2nd National Communication including historic emissions by sector from 1984 to 2006, and data from a research group at Universidad de Chile that includes projections until 2030 for all sectors except agriculture and waste (O'Ryan et al., 2010). For the Universidad de Chile data we assume constant agriculture and waste emissions for all future years, based on 2006 data. It is unclear to which data the pledge under the Copenhagen Accord refers to. We show most recent projections available from the Universidad de Chile.

Current trend

Chile has provided data up to 2006 in its second national communication (Government of Chile, 2011). For projections, we use growth rates from O'Ryan et al (2010). For agriculture and waste, we assume that emission levels from 2006 remain stable.

Sources

Comisión Nacional del Medio Ambiente (1999). Chile's Initial National Communication

Government of Chile, Ministerio del Medio Ambiente (2011). Chile's 2nd National Communication Santiago.

O`Ryan, Raúl; Díaz, Manuel; Clerc, Jacques (2010). Emission data Universidad de Chile

Government of Chile (2010). Chile's pledge to the Copenhagen Accord. Compiled in: Compilation of information on nationally appropriate mitigation actions to be implemented by Parties not included in Annex I to the Convention, UNFCCC (2011)

4.7 China

4.7.1 Assessment

China pledged to reduce CO_2 emissions per unit of GDP by 40-45% as compared to the 2005 level by 2020. According to the current trends, currently implemented policies will be close to sufficient to meeting its pledge in 2020, as illustrated in Figure 9.

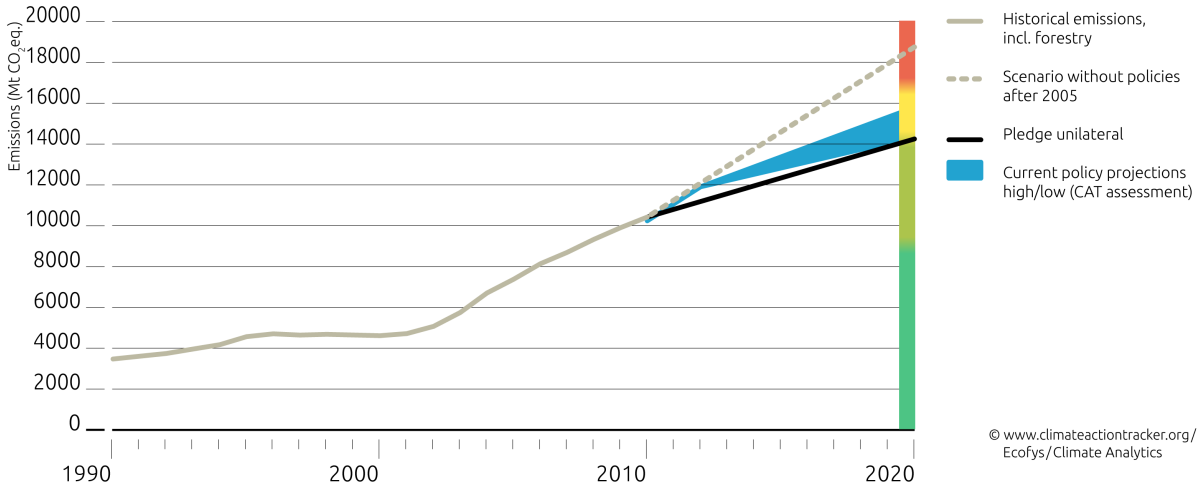


Figure 9 - Historic emissions, without policies scenario, Copenhagen pledge and current policies pathway in China

4.7.2 Pledge description

China's pledge consists of three elements:

- Overall reduction of CO_2 emissions per unit of GDP by 40-45% by 2020 compared to the 2005 level;
- Increase the share of non-fossil fuels in primary energy consumption to around 15% by 2020;
- Increase forest coverage by 40 million hectares and forest stock volume by 1.3 billion cubic meters by 2020 from the 2005 levels.

Convention	
Copenhagen pledge	
	Intensity: -40% to -45%
	Non-fossil share: +15%
	Forest cover: +40 million ha
	Forest stock: +1.3 billion m^3
Reference for pledge	various
Conditions	none
Long term goal(s)	none

We used information from China's second national communication to quantify this pledge. China presents emission scenarios for business as usual (excluding all policies implemented after 2005), for current policies, and for enhanced policies. Since the enhanced policies scenario leads to a 45% reduction of CO_2 emission intensity, we interpret it as the "pledge scenario". In that scenario combustion related CO_2 emissions are 9.9 $GtCO_2e$ in 2020 (The People's Republic of China, 2012). Including non-energy emissions this translates to an emissions level of 14.3 $GtCO_2e$ according to our assessment. This value is higher than earlier business as usual scenarios from previous years, which were based on international data sources.

The pledge was rated inadequate due to the large uncertainties associated with its quantification. In general, the resulting emission level of the intensity pledge depends critically on future GDP growth. The presented BAU scenario is significantly higher than other estimates in the literature and cannot be verified.

4.7.3 Current trend description

With currently implemented policies, China will reach emission levels between 14.7 and 16.1 $GtCO_2e$ in 2020. Although the 2020 trend is already close to the pledge, it is substantially above current emission levels and higher than previously projected emission levels in the CAT. This change is partly due to a change in data sources and definition of categories, but also the high economic growth rates in the last years, which had not been considered before.

China has a range of implemented policies in most sectors. The main policies are highlighted in Table 10. Most significant is the commitment to a strong increase of renewable energy. Since the Medium and Long Term Development Plan for Renewable Energy from 2007, China has increased its capacity plans multiple times. In the latest update of the 12th Five Year Plan, China decided to target 700 GW of renewable energy capacity in 2020. Bloomberg New Energy Finance expects an increase of RE capacity of 809 GW between 2010 and 2030 (Bloomberg New Energy Finance, 2013), which would add up to more than 1100 GW in 2030.

Furthermore, policies to reduce energy consumption exist to support the energy intensity targets in the Five Year Plan. In the industrial sector, the TOP 1000 enterprises programme has proven effective in the past and has now been extended to 10 000 installations. There is also an increasing number of efficiency standards for appliances, buildings and cars. However, these standards partially lack sufficient implementation and supportive policies (Fekete et al., 2013).

In September 2013, China published the Air Pollution Control Action Plan (Government of China, 2013), which besides other measures, bans construction of new coal-fired power plants in various coastal provinces in order to decrease air pollution there. At the moment, little background information is available on what this means for overall coal consumption. A first analysis estimates that the effect on emissions will be small, as the regions with major extension plans for coal-fired power plants are not touched by the regulation (Ailun Yang and Ryna Yiyun, 2013). Eventually, the impact on emissions will be dependent on the energy source used to replace the planned plants affected by the regulation.

Name of Policy	Implications
Renewable energy capacity plans in updated 12th Five Year Plan	Targeted share of non-fossil energy under pledge will be surpassed
TOP 10 000 enterprises	Through top-down implementation expected to be in line with FYP
Various standards and labelling programmes in various sectors	Limited impact due to week implementation

Table 10 - Most relevant policies included in current trends for China

4.7.4 Data sources and assumptions

Pledge

As China only makes available two inventory years which do not have the same scope and are thus not directly comparable, we use a combination of international data sources for energy related emissions (IEA, 2012) and non-energy emissions (EDGAR 4.2), and inventory data for LULUCF to determine historic emissions until 2010.

Current trends

For projections, we use the scenarios from the 2nd National Communication for energy related CO_2 emissions, growth rates from US EPA's anthropogenic GHG emissions projections for non-CO_2 gases applied to the historic data, and extrapolate historic trends of non-energy CO_2 emissions. For LULUCF, we assume that emission sinks will become slightly smaller (by 20% in comparison to 2005) and that emissions from forest and grass land conversion will remain stable.

In an alternative scenario, we use projections from the World Energy Outlook 2012 for energy related CO_2 emissions. This is the lower limit of the range shown in the graph.

Sources

Bloomberg New Energy Finance (2013). The future of China's power sector. From centralised and coal powered to distributed and renewable? (14 October, 2013).

Fekete, H., F. Mersmann, and M. Vieweg (2013) Climate change mitigation activities in emerging economies: From potential to actions. Federal Environment Agency (Umweltbundesamt)

IEA (2012): World Energy Outlook 2012. International Energy Agency. Paris.

The People's Republic of China (2012). Second National Communication on Climate Change of The People's Republic of China. (14 November, 2012).

The People's Republic of China (2011). China's 12th Five Year Plan (Twelfth Five-Year Guideline, 2011–2015)

The People's Republic of China (2010). China's pledge to the Copenhagen Accord. Compiled in: Compilation of information on nationally appropriate mitigation actions to be implemented by Parties not included in Annex I to the Convention, UNFCCC (2011)

The People's Republic of China (2009). Government announcement

US EPA (2012). Global Mitigation of Non-CO_2 Greenhouse Gases, Washington, D.C., USA.

4.8 Costa Rica

4.8.1 Assessment

Costa Rica has made a commitment to become carbon-neutral by 2021, conditional to external support. With only the policies and measures currently implemented it will not be able to meet its high aspirations, see Figure 10. Current trends are projected to achieve reductions below BAU of around 8%, but remain far above zero emissions with steadily increasing emissions up to 31.5 $MtCO_2e$ by 2030.

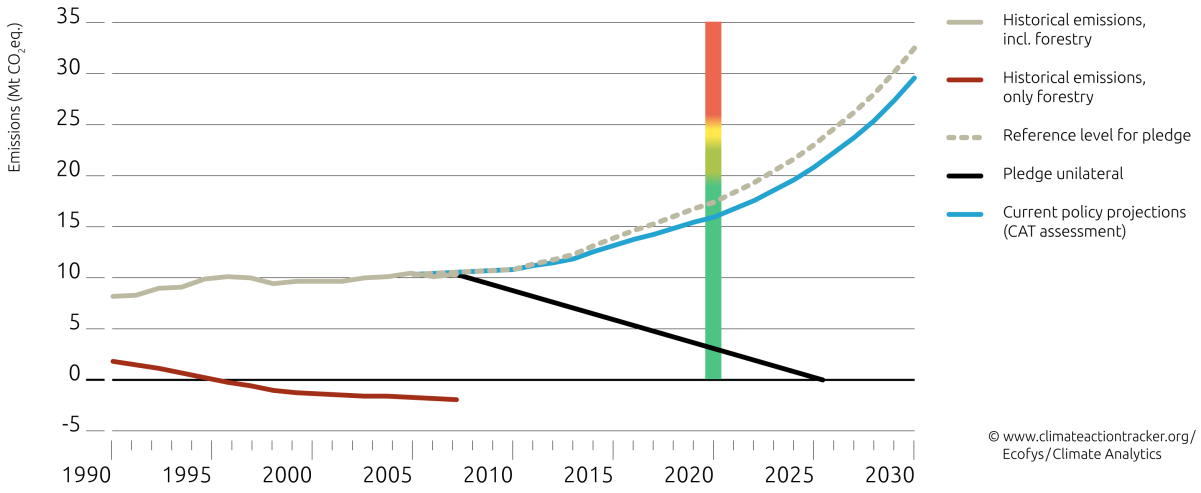


Figure 10 - Historic emissions, Copenhagen pledge and current emission trend in Costa Rica

4.8.2 Pledge description

Costa Rica aims to become carbon-neutral by 2021, but made this target conditional to external support. It intends to reduce its fossil fuel emissions and increase its carbon sinks, so that net emissions are zero. Use of offsets in other countries is not planned. Costa Rica could be rated Role Model if its pledge were unconditional.

Convention	
Copenhagen pledge	Carbon neutral by 2021
Reference for pledge	not needed
Conditions	International financing
Long term goal(s)	not needed

Costa Rica communicated to the UNFCCC that it will implement a long-term economy-wide transformational effort to enable carbon neutrality that will help the country to significantly deviate from business as usual GHG emissions projected scenarios from now on up to 2021 and beyond (Republic of Costa Rica, 2010).

4.8.3 Current trend description

With currently implemented policies and measures, Costa Rica is expected to achieve an emission level of almost 18 $MtCO_2e$ by 2020 and 31.5 $MtCO_2e$ by 2030. This is far removed from their aspirations, although still within the range rated as sufficient based on different effort sharing principles. BAU scenarios project emissions of 19 $MtCO_2e$ in 2020 and 34 $MtCO_2e$ in 2030. Implemented measures thus represent a reduction of 8% below BAU in 2020 and 2030.

Costa Rica has seen a steep increase in GHG emissions since 1990. Until 2009, the last available historic data year, emissions excluding LULUCF doubled from 6 $MtCO_2e$ in 1990 to 12 $MtCO_2e$. Main drivers are the energy sector, especially transport, and agriculture with further substantial emissions from the waste sector. The land use sector moved from being an emissions source with almost 2.5 $MtCO_2e$ in 1990 to being a net sink with -3.5 $MtCO_2e$ in 2009 (MINAET, 2009).

Costa Rica has developed a national climate change strategy (ENCC) in order to achieve a climate neutral economy by 2021 (MINAET, 2009). The ENCC comprises six strategic areas (mitigation, adaptation, measuring, capacity building, awareness raising and public education, funding), with the common objective of aligning policies with climate change as part of a long-term strategy for sustainable development. Only a number of policies have been implemented so far. Only these have been included in the current trend calculations and are described in Table 11.

Policy	Implications
Efficient boilers	Achievement of energy savings from renovation of all 600 operating boilers over a 5-year period
Efficient engines	Exchange of 50% of the 35,000 existing motors by more efficient equipment, leading to 4% electricity savings each
Energy efficient lamps in industry	Replacement of incandescent light bulbs leading to electricity savings of 10% for lighting in industry
Efficient air conditioning in industry	Installation of more efficient AC units for 50% of industry leading to 20% energy savings for air conditioning
ICE renewable sources expansion plan	Electricity generation from renewable sources of 92% until 2025 (up from 90%)
Power savings in industry	Training and technical assistance is projected to result in electricity savings of 6%
Promotion of carpooling	Promotion of carpooling leading to 12% of the working population participating
Solar heaters for industry	Installation of solar heaters in 40% of total heaters leading to 4.2% electricity savings
Vehicle restrictions for San José	Prohibiting the entry of vehicles in the capital city (San José) one day a week according to the vehicle's registration number leading to reduced fuel use

Table 11 - Most relevant policies included in current trend pathway for Costa Rica

4.8.4 Data sources and assumptions

Pledge

Historical and reference emissions were taken from Costa Rica's Second National Communication.

Current trend

The current trend projections are based on Costa Rica's National Economic, Environment and Development Study for Climate Change (NEEDS) and its Second National Communication (MINAET, INCAE, FUNDECOR, 2010; MINAET, 2009). Historical data is based on the Emissions Summary submitted to the UNFCCC.

The NEEDS project is an initiative of the Ministry of the Environment, Energy and Telecommunications (MINAET), promoted by the UNFCCC. The project was carried out by the INCAE Business School under a memorandum of understanding between UNFCCC and MINAET. It also benefited from technical support and coordination of the Fundación para el Desarrollo de la Cordillera Volcánica Central (FUNDECOR).

The project quantified a BAU scenario and a wide range of measures, of which only a number have been implemented. We identified the measures that were in fact implemented (MINAET, INCAE, FUNDECOR, 2010) and used the individual mitigation potential identified to estimate the current trend pathway.

Sources

MINAET, INCAE, FUNDECOR (2010). Proyecto NEEDS Opciones de Mitigación de Emisiones de Gases de Efecto Invernadero en Costa Rica: Hacia el Carbono Neutralidad en 2021. Ministerio de Ambiente, Energía y Telecomunicaciones de Costa Rica; INCAE Business School; Fundación para el Desarrollo de la Cordillera Volcánica Central.

MINAET (2009a). National climate change strategy Estrategia Nacional de Cambio Climático (ENCC) Costa Rica. Ministerio del Ambiente Energía y Telecomunicaciones de Costa Rica

MINAET (2009b). Segunda Comunicación Nacional a la Convención Marco de las Naciones Unidas sobre Cambio Climático, Costa Rica. Ministerio de Ambiente, Energía y Telecomunicaciones de Costa Rica; Instituto Meteorológico Nacional de Costa Rica

Republic of Costa Rica (2010). Costa Rica's pledge to the Copenhagen Accord. Compiled in: Compilation of information on nationally appropriate mitigation actions to be implemented by Parties not included in Annex I to the Convention, UNFCCC (2011)

4.9 Croatia

4.9.1 Assessment

Croatia's target for the second commitment period of the Kyoto Protocol is to reduce emissions by 20% compared to 1990 levels. With current policies in place it is unlikely to meet its pledge, see Figure 11. Current policies are expected to lead to a 12% increase over 1990 levels. Even accounting for LULUCF credits, which are estimated at 0.97 $MtCO_2e$, this would still represent an increase of around 9% relative to 1990 levels.

It remains to be seen how the inclusion of Croatia in the European Union will impact their target. Their target under an internal effort sharing decision will only cover the sectors and gases not included in the EU ETS. It is possible that this target would differ from the joint target. So far, there has been no decision in the EU in this respect.

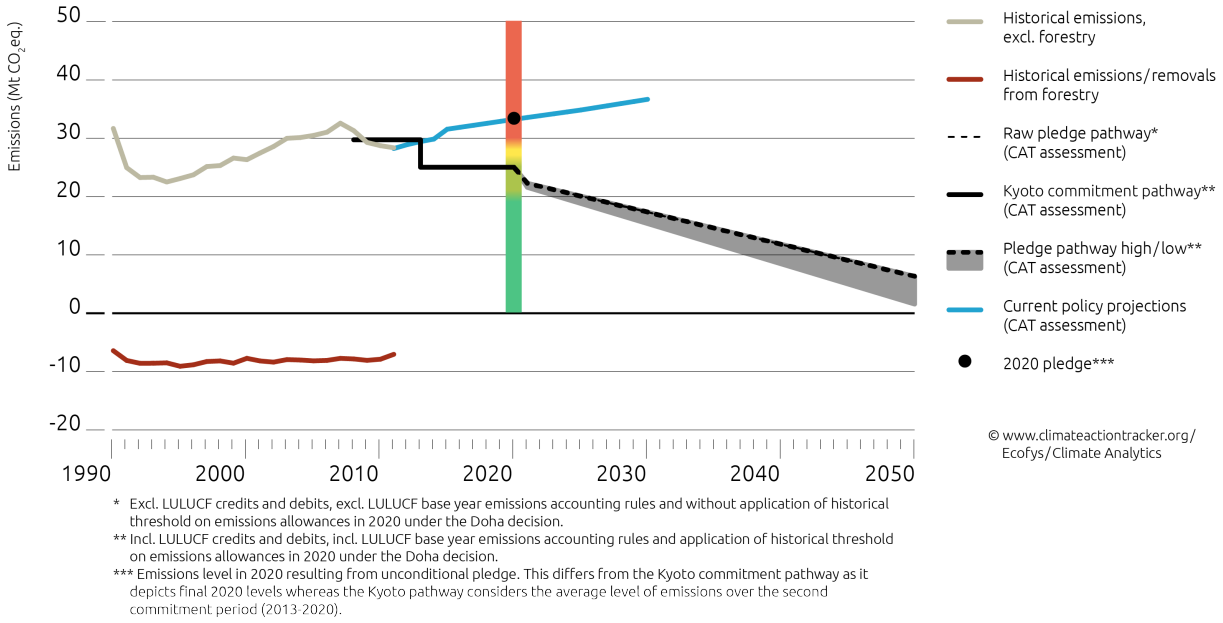


Figure 11 - Historic emissions, BAU, Copenhagen pledge and current emission trends in Croatia

4.9.2 Pledge description

In May 2012, Croatia submitted a provisional QELRO level range of 80 for the second commitment period of the Kyoto Protocol, aligning itself with Denmark and the European Commission. This means that Croatia's average yearly emissions during the period of 2013-2020 are proposed to be 80% of 1990 levels.

Croatia's Kyoto Protocol target for the first commitment period is -5% relative to base year (1990) and is equal to their original pledge under the Copenhagen Accord for 2020.

Croatia's inscription in Appendix 1 to the Copenhagen Accord states that its target is temporary, pending accession to the European Union, whereupon Croatia's target would be "… replaced by arrangement in line with and part of the European Union mitigation effort." (see the EU27 page for further information)

Kyoto Protocol

Member of KP CP1 (2008-2012)	yes
Member of KP CP2 (2013-2020)	yes
KP CP1 target (below base year)	-5%
KP CP2 target (below base year)	-20%

Convention

Copenhagen pledge	-5%
Reference for pledge	1990 emissions
Conditions (for higher pledge level)	
Developed countries commit to comparable efforts and developing countries contribute according to capabilities	

National goals

Long term goal(s)	80-95% by 2050 below 1990 emissions

4.9.3 Current trend description

Currently implemented policies in Croatia will lead to 35 $MtCO_2e$ in 2020 (excluding LULUCF), which would mean an increase of approximately 12% compared to 1990 levels. Main policies included in current trends are highlighted in Table 12.

Historically, Croatia saw a steep decline in emissions after 1990, reaching the lowest level in 1994 at 29% below 1990 levels. Since then, emissions have been steadily increasing until they reached 1990 levels again in 2007. The financial crisis resulted in a drop in emissions, like in many other countries. Although emission reduction policies are being put in place now, emissions are expected to start increasing again from 2012.

When Croatia joined the EU, it also joined the EU Emission Trading System (ETS), as well as now being subject to other existing legislation at European level, which will subsequently need to be implemented at national level. For the ETS, Croatia already selected 73 installations to participate and started implementation ahead of its membership to the EU, as they had already begun implementing an internal trading system in 2009.

In 2003, the Act on Environmental Protection and Energy Efficiency established the Environmental Protection and Energy Efficiency Fund, with the aim to finance preparation, implementation and development of programmes and projects in the field of environmental protection, energy efficiency and use of renewable energy. Operational since 2004, it raises revenues through charges on environmental polluters, which includes charges on the emission of nitrogen oxides, sulphur dioxide and carbon dioxide, charges on users of the environment, on environmental load by waste and special environmental charges on motor vehicles (Ministry of Environmental Protection, Physical Planning and Construction, 2010).

Policy	Implications
Renewable electricity promotion	Promoting the application of renewable energy sources in electricity generation, including through dedicated funds and loan programs
Cogeneration	Promoting the application of cogeneration
Energy efficiency in housing	Measures of energy efficiency upgrading in building construction
Energy use of waste	Reduction in fossil fuel consumption through utilization of biodegradable municipal wastes in district heating plants or landfill biogas
Efficiency of appliances	Energy efficiency labelling of household appliances
EU ETS	Coverage of 73 installations within the EU ETS from January 2013
HEP ESCO Energy Efficiency Programme	Promotion of energy services companies
National implementation of Ecodesign Directive	Establishing a framework for implementing the requirements from the EU Ecodesign Directive
Promoting energy efficiency	Promoting energy efficiency through implementation of the project "Promoting energy efficiency in Croatia"
Waste use in cement industry	Reduction in fossil fuel consumption through the use of biodegradable municipal waste in cement industry

Table 12 - Most relevant policies included in current trend for Croatia

4.9.4 Data sources and assumptions

Pledge

Targets for the second commitment period of the Kyoto Protocol were calculated from the most recent national inventory submissions (CRF 2013).

We calculated Croatia's LULUCF accounting quantities for 2020 for afforestation, reforestation and deforestation using the current Kyoto rules, and for forest management using a net-net approach, with a reference level based on 1990 levels.

Current trends

Greenhouse gas emission inventories are available from 1990 to 2011 in the CRF 2013 submitted to UNFCCC. Current trend projections are based on emission projections from Croatia's Fifth National Communication (Ministry of Environmental Protection, Physical Planning and Construction, 2010).

Both projections do not reflect the latest historic data. We therefore use historic data up to 2011 and then apply growth rates from the projections.

Sources

CRF (2013). UNFCCC AWG-KP Submissions 2013. Common Reporting Format.

Government of Croatia (2012a). Information by Parties included in Annex I listed in annex 1 to decision 1/CMP.7 on their quantified emission limitation or reduction objectives for the second commitment period under the Kyoto Protocol

Government of Croatia (2012b). Submission to the Ad-Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP): Information by Parties included in Annex I listed in annex 1 to decision 1/CMP.7 on their quantified emission limitation or reduction objectives for the second commitment period under the Kyoto Protocol, 30 April 2012

Government of Croatia (2011). Submission to the Ad-Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP): Forest management reference level

Government of Croatia (2010). Croatia's pledge to the Copenhagen Accord. Compiled in: Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention, UNFCCC (2011).

Government of Croatia (2009). Joint submission by Australia, Belarus, Canada, Croatia, the European Community and its Member States, Iceland, Japan, Kazakhstan, Liechtenstein, Monaco, New Zealand, Norway, Russian Federation, Switzerland, Ukraine Information relating to possible quantified emissions limitation and reduction objectives as submitted by Parties, Submission to the AWG-LCA and AWG-KP, 9 October 2009.

European Environment Agency (2012). Greenhouse gas emission trends and projections in Europe 2012. Copenhagen.

Ministry of Environmental Protection, Physical Planning and Construction (2010). Fifth National Communication of the Republic of Croatia under the United Nations Framework Convention on Climate Change (UNFCCC)

UNFCCC (2009). Report of the Review of the Initial report of Croatia

4.10 European Union (EU27)

4.10.1 Assessment

The EU has adopted a target of reducing average annual emissions within the second commitment period of the Kyoto Protocol by 20% compared to Kyoto base year emissions. Currently implemented policies put the EU on a good trajectory towards meeting this target, see Figure 12. In fact, projections indicate that no additional policies between now and 2020 would be required for the EU to meet their joint target. However, policies fall well short of bringing the EU on a trajectory towards meeting their 2050 objective of reducing emissions by 80-95% compared to 1990 levels.

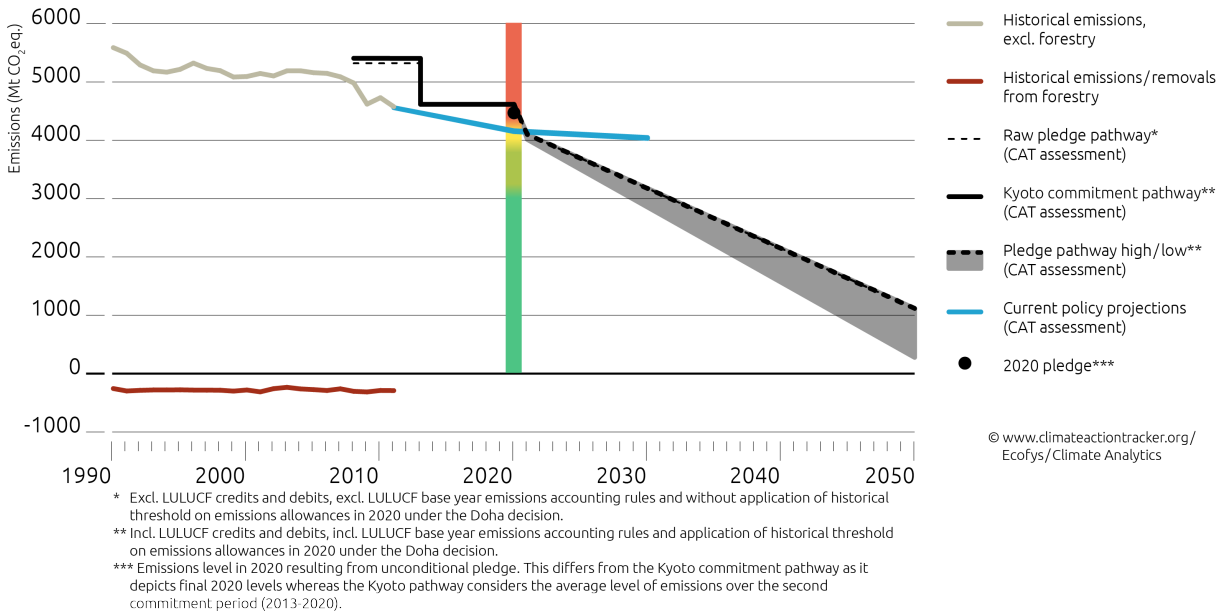


Figure 12 - Historic emissions, Copenhagen pledge, KP target and current emission trends in the EU27

4.10.2 Pledge description

Kyoto Protocol	
Member of KP CP1 (2008-2012)	yes
Member of KP CP2 (2013-2020)	yes
KP CP1 target (below base year)	-8%
KP CP2 target (below base year)	-20%
Convention	
Copenhagen pledge	-20%/-30%
Reference for pledge	1990 emissions
Conditions (for higher pledge level)	
Developed countries commit to comparable efforts and developing countries contribute according to capabilities	
National goals	
Long term goal(s)	80-95% by 2050 below 1990 emissions

The EU27 target for the second commitment period under the Kyoto Protocol is to reduce emissions by 20% below 1990 levels. In May 2012, the EU27 first submitted a provisional QELRO level of 80 for the second commitment period of the Kyoto Protocol, to be fulfilled jointly by the European Union and its Member States. This QELRO is also inscribed in the amendments agreed in Doha in December 2012. This means that EU27 joint average yearly emissions during the period of 2013-2020 are proposed to be 80% of 1990 levels.

The current target for the European Community (EU15) in the first commitment period under the Kyoto Protocol is set at a reduction of 8%. Through the expansion of the European Union the aggregate effective Kyoto Protocol target (2008-2012) for the EU27 is estimated to be -7.7% relative to 1990 emission levels.

Under the Copenhagen Accord the EU27 proposed to decrease emissions by -20 to -30% relative to 1990 by 2020 and by -80 to -95% below 1990 by 2050. The EU announced its target of -30% of 1990 emissions by 2020 as part of a global agreement post-2012 provided that other developed countries commit themselves to comparable efforts and developing countries contribute according to their capabilities.

EU clarified that its accounting rules for this post-2012 target are more stringent than the current rules under the Kyoto Protocol:

- A single 1990 base-year is used, not allowing for different base years for F-gases or Economies In Transition as under the Kyoto Protocol.
- It does not recognize surplus AAUs from the first commitment period of the Kyoto Protocol.
- Emissions from international aviation are included in the target and the legislation foresees the need to include international maritime emissions, if no progress is achieved to include these at the international level.
- Emissions and removals from LULUCF are at present not included in the achievement of the reduction target, but may be at a later stage given the legislation foresees already that accounting rules should ensure permanence and environmental integrity.

EU leaders endorsed the objective of reducing Europe's greenhouse gas emissions by 80-95% compared to 1990 levels as part of efforts by developed countries as a group to reduce their emissions by a similar degree (DG Climate 2013).

In addition, the EU supports proposals to remove emissions from natural disturbances and to count removals from harvested wood products. This has not been accounted for here, but could lead to higher credits (or lower debits). However, the inclusion of international aviation into the European emissions trading scheme is the first effort to regulate emissions from this sector globally. The impact of this on EU27's 2020 target was not quantitatively evaluated here.

4.10.3 Current trend description

The future projections of currently implemented policies continue the past downward trend, although with much lower reduction rates per year. Until 2020 emission are projected to decrease around 0.3% per year, after that by 0.1% per year until 2030. Emissions in 2020 are estimated between 4,150 $MtCO_2e$ and 4,165 $MtCO_2e$. In 2030 they are projected to be between 4,034 $MtCO_2e$ and 4,049 $MtCO_2e$.

Emissions in the EU27 have been on a decreasing trend since 1990. In 2011, emissions were 18.3% below 1990 levels. After a steep decline in 2009 due to the recession and a spike upward following the recovery in 2010, they dropped again in 2011.

Current trend projections include all major EU policies implemented, including the EU ETS, the Effort Sharing Directive and a wide range of other EU wide regulations influencing GHG emissions. It also includes the most important national policies. A list of the most important policies covered by the projections is provided in Table 13 below.

The most recent relevant policy development in the EU is the adoption of the Energy Efficiency Directive (EED) in October 2012 (European Union, 2012). The main features of the Directive are:

- Introduction of an indicative energy efficiency target for all Member States with the obligation to report this target to the Commission who will then review the overall adequacy.
- Obligation to renovate 3% of publicly owned and occupied buildings to minimum national energy performance standard and development of a strategy to promote renovation in the overall building stock.
- Obligation for public authorities to procure only high efficiency products, services and buildings subject to cost-effectiveness and other restrictions.
- Obligation of utilities to achieve energy savings of 1.5% per year in their customers' energy use until 2020.
- Mandatory energy audits for non-SME companies and support schemes to promote energy audits in SMEs and private households.
- Obligation to provide individual metering and billing based on actual consumption for electricity, gas, district heating/cooling and hot water for households "in so far as it is technically possible, financially reasonable and proportionate".
- Promotion of efficiency in heating and cooling including the obligation to carry out a comprehensive assessment of the potential for the application of high-efficiency cogeneration (CHP) and efficient district heating and cooling. This includes provide priority or guaranteed access to the grid of electricity from high-efficiency cogeneration.
- Obligation on energy network regulators to identify efficiency options and a time table for their implementation.
- Obligation to promote Energy Service Companies through provision of information, removal of barriers and other measures.

Based on the original impact assessment published in 2011 which analysed a number of different options proposed for the Directive we estimate effects to be between 82 and 97 $MtCO_2e$ by 2020 and assume that the effects then stay constant until 2030.

Policy	Implications
Ecodesign Framework Directive	The Directive sets energy performance standards for a wide range of products. As requirements and labelling concern only new products, the effect will be gradual (marginal in 2010; rather small in 2015 up to full effect by 2030).
Energy Efficiency Directive	Different elements of the Directive are expected to influence energy efficiency in different sectors.
EU ETS directive	The ETS puts a cap on emissions by covered installations. The cap was set to decrease annually by 1.74% until 2020. The ETS carbon price is modelled so that cumulative cap for GHGs is respected. The permissible total CDM amount over 2008-2020 is conservatively estimated at 1600 Mt. Banking of allowances is reflected The ETS cap is assumed to continue declining beyond 2020 as stipulated in legislation, however with an effective domestic emission decrease lower than the linear decrease rate of 1.74%)
GHG Effort Sharing Decision	National targets for non-ETS sectors are achieved in 2020, taking full account of the flexibility provisions such as transfers between Member States. After 2020, stability of the provided policy impulse but no strengthening of targets is assumed.
Recast of the EPBD	New building requirements are expected to positively affect thermal integrity of buildings and requirements for new buildings after 2020.

Table 13 - Most relevant policies included in current trends for the EU27

4.10.4 Data sources and assumptions

Pledge

The methodological clarifications related to the Copenhagen pledge mentioned above are important, since they lead to differences in effective emissions for the pledge under the Convention and for the Kyoto target. The most important element is the different starting point for emissions under the Kyoto Protocol and under the Convention. These differences explain why both the 20% decrease from 1990 by 2020 as pledged under the Convention and the Kyoto target to reduce average emissions of 20% below base year over the second commitment period arrive at almost the same emission levels by 2020. This is illustrated in Figure 13 below.

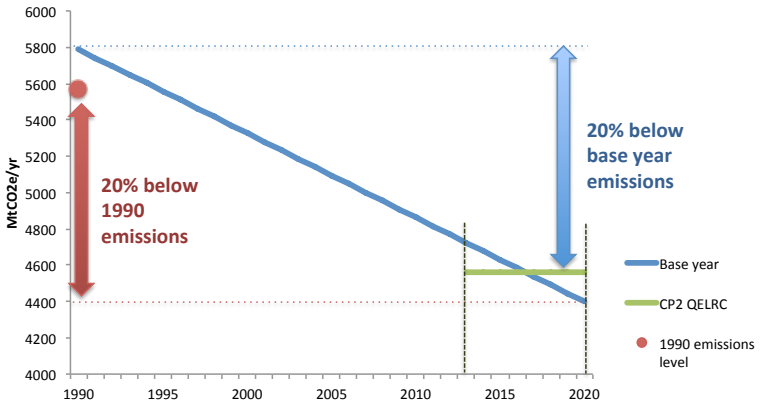


Figure 13 - Differences between Kyoto QELRC and Copenhagen pledge for the EU

We calculated EU's LULUCF accounting quantities for the period 2014-2020 for afforestation, reforestation and deforestation using the current Kyoto rules, and for forest management using a net-net approach with a projected reference level for 2014-2020. Some EU countries have included a background level for natural disturbances.

The EU provided historical data on forest management and afforestation, reforestation and deforestation data for many of its member states.

Where members did not submit data it was - wherever available - compiled using the time series data from the national inventories (CRF, 2013).

Current trends

The current trend projections are based on the EEA projections published in October 2012 (European Environment Agency, 2012). EEA projections for 2025 and 2030 are based on Member State projections where available. For the 2012 projections this was the case for 12 countries. The others projections were done using the relative trends from the Commissions scenarios based on the PRIMES and GAINS models.

The assumption is that the EU policies covered in the Energy Roadmap scenarios are covered in the respective projection scenarios (with existing / additional measures). The policies included in Table 13 are therefore the policies included in the EU Energy roadmap (European Commission, 2011a). We assume the existing policies scenarios are based on the 'Reference Scenario'. Neither the Energy Roadmap scenarios nor the EEA projections include estimates for the Energy Efficiency Directive as adopted. The effects were estimated based on the 2011 Impact Assessment (European Commission, 2011b).

From the different options quantified within the impact assessment, those that most closely match the finally decided measures within the Directive were identified with their respective impact. This was assessed with relation to expected overlap with other measures/policies included in the underlying policy scenario and with other measures within the package, and towards the expected effectiveness of measures. This assessment is reflected in a correction factor per measure. The adjusted minimum and maximum values are then added up to the overall effect. Original data and adjustments are summarized in Table 14.

Impact assessment (European Commission, 2011b)			Adjustments (own calculations based on impact assessment)			
No.	**Measure**	**Reductions 2020**	**Overlap / effectiveness**	**Correction factor**	**Min**	**Max**
		$MtCO_2e$			**$MtCO_2e$**	
A3	Indicative target	92.1 - 113.2			92.1	113.2
B3	Energy savings obligation 1.5%	43 - 47	Lag in implementation likely for many MS	20%	34.4	37.6
C2a	Obligatory renovation rate of 3% public buildings (cost optimal levels)	9.2	Given current economic situation in many MS an effective implementation of 50% of potential is assumed	50%	4.6	4.6
C3	EE in public procurement	12.8 - 25.7	Given current economic situation in many MS an effective implementation of 50% of potential is assumed	50%	6.4	12.85
C6	Voluntary measures on metering and billing*	3 - 4	Overlap with energy savings obligation. Limited effectiveness due to slow take up. Assumption 80% overlap	80%	0.6	0.7
C7	Mandatory energy audits for non-SME, support for SME and households	32 - 58	Overlap with ETS for non-SME	80%	6.4	11.6
C9	Mandatory promotion of ESCOs	no quantification				
D3	Mandatory use of CHP where feasible	35 - 55	Overlap with ETS	100%	0	0
D4	Mandatory conection and priority grid access for high efficiency CHP	included in D3				
D7	Energy efficiency obligation on energy network regulators	60	Part overlap with ETS, partly supporting ESCOs and energy services (assumption 50:50)	50%	30	30
					82	**97**

Table 14 - Assessment of Energy Efficiency Directive (EU27)

Note: First level measure A3 is not additional to second level measures B-D, but provides an alternative estimate

*Reductions for C6 are only provided in terms of energy savings, i.e. Mtoe. Assumption is that the same fuel mix applies as for the Energy Savings Obligation. The impact assessment assumes voluntary measures while the Directive puts an obligation "in so far as it is technically possible, financially reasonable and proportionate". We interpret this as having similar effects to voluntary measures.

Sources

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4.11 Iceland

4.11.1 Assessment

Iceland's QELRO for the second commitment period under the Kyoto Protocol is 80, leading to average annual emission reductions of 20% over the period (excl. LULUCF). With current policies in place, emissions in 2020 are expected to actually increase substantially between 25-92% relative to 1990 levels, see Figure 14. Even substantial credits from LULUCF are unlikely to be able to compensate for increasing levels of industrial emissions. The challenge for Iceland will be to retain and expand their high level of renewable energy use.

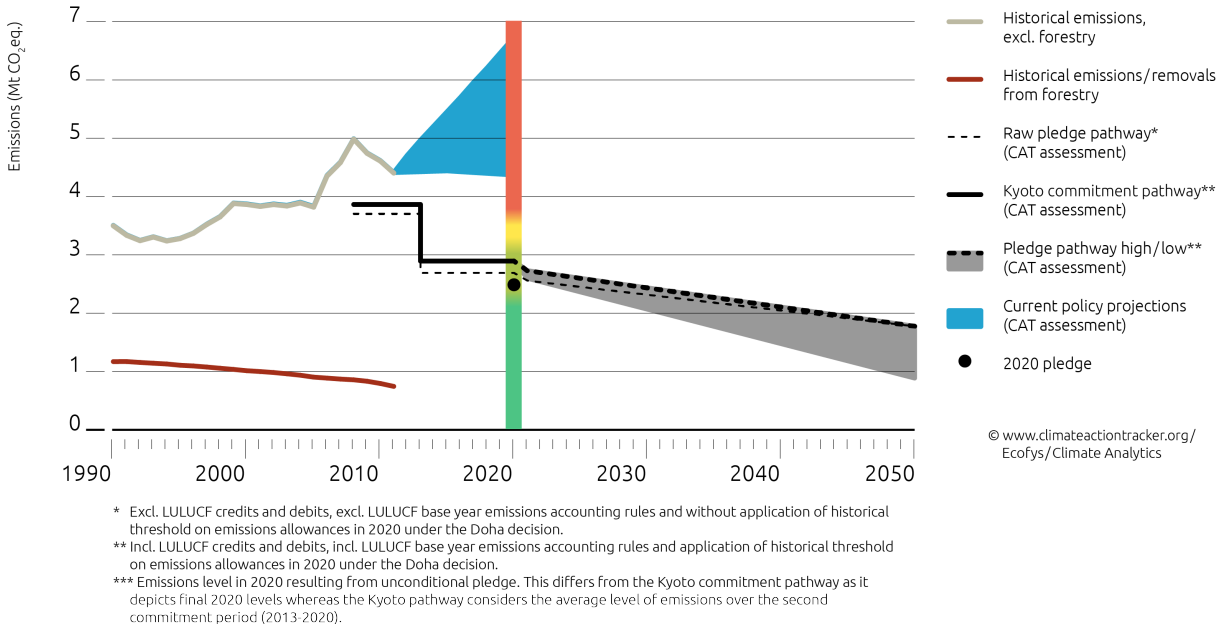

Figure 14 - Historic emissions, BAU, Copenhagen pledge and current emission trends in Iceland

4.11.2 Pledge description

In May 2012, Iceland submitted a QELRO level of 80 for the second commitment period of the Kyoto Protocol. This means that Iceland's average yearly emissions (excluding LULUCF) during the period of 2013-2020 would be between 20% of 1990 levels.

Iceland's Kyoto Protocol target for the first commitment period is +10% relative to 1990 emission levels.

In May 2009, Iceland proposed to decrease emissions by -15% relative to 1990 by 2020 and from -50 to -75% by 2050. In February 2010, Iceland announced that in a joint effort with the EU they would adhere to the -30% target of 1990 emissions by 2020 as part of a global agreement post-2012 provided that other developed countries commit themselves to comparable efforts and developing countries contribute according to their capabilities.

The -15% target is conditional on keeping the current Marrakesh Accords, in particular on LULUCF and Decision 14/CP.7, which allows Iceland a special exemption for single large projects to be excluded from the base year (Republic of Iceland, 2009a).

Kyoto Protocol

Member of KP CP1 (2008-2012)	yes
Member of KP CP2 (2013-2020)	yes
KP CP1 target (below base year)	+10%
KP CP2 target (below base year)	-20%

Convention

Copenhagen pledge	-15%/-30%
Reference for pledge	1990 emissions

Conditions (for higher pledge level)

-15%: target is conditional on keeping the current Marrakesh Accords in particular on LULUCF and Decision 14/CP.7

-30%: other developed countries commit themselves to comparable efforts and developing countries contribute according to their capabilities

National goals

Long term goal(s)	-50-75% by 2050 below 1990 emissions

4.11.3 Current trend description

With currently implemented policies, Iceland will actually increase its emissions within the range of 25-92% relative to 1990 levels by 2020, depending on the country's expected growth rate. This means the country is not on track to meet its target. Policies are estimated to lead to emissions levels (excl. LULUCF) of between 4.4 $MtCO_2e$ and 6.7 $MtCO_2e$ by 2020.

A significant increase in emissions already took place, between 1990 to 2007, mainly due to the expansion of heavy industry in Iceland; especially in the field of aluminium production. The economic crisis turned this trend around and there are very different expectations on how this would continue in the future. While the last National Communication, prepared in the middle of the economic crisis, took a rather conservative approach to future economic growth, more recent data expects a resurgence of the pre-crisis trend.

Nevertheless a number of policies are in place that address emissions from all sectors. Iceland's energy use is characterized by a strong dominance of renewable energy sources, which cover 80% of energy use and almost all of stationary energy. The challenge for the future will be to remain and enhance this level with future economic expansion.

Main instruments of climate policy are highlighted in Table 15, and include Iceland's participation in the EU ETS, its carbon tax on fossil fuels, and afforestation and re-vegetation activities.

Policy	Implications
Capture of methane in landfills	Reduce methane emissions
Carbon tax on fossil fuel use	Reduce fossil fuel use
EU ETS	Cap on industrial emissions since 2013
Exemption and reduction of excise tax on non- and low-polluting vehicles	Encourage buying of low-polluting vehicles
Limits on PFC emissions in permits for aluminium production	Encourage aluminium plants to cut PFC emissions
Oil charge tax	Make small diesel cars more competitive
Provision of land-based electricity to ships in harbours	Discourage burning of fuels by ship engines

Table 15 - Most relevant policies included in current trends for Iceland

4.11.4 Data sources and assumptions

Pledge

We calculated Iceland's LULUCF accounting quantities in 2020 for afforestation, reforestation and deforestation using the current Kyoto rules. Iceland has submitted new information on forest management reference levels using a net-net approach with a projected reference level for 2013-2020.

While Iceland elected to account for re-vegetation for the first commitment period, it has not provided any data for re-vegetation so that this has not been considered in the present analysis.

Current trends

The current trend projections were based on Iceland's Fifth National Communication on Climate Change 2010 (Ministry for the Environment, 2010) (lower bound) and EEA GHG trends and projections 2012 (EEA, 2012) (upper bound). Historic emissions were taken from the greenhouse gas emission inventories based on the CRF 2013.

Sources

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4.12 India

4.12.1 Assessment

India pledged to reduce the emission intensity of its GDP by 20 to 25% by 2020 in comparison to the 2005 level. The national estimation of India of the quantified target will be in line with current policies, although the BAU range is large and economic growth uncertain. This is illustrated in Figure 15.

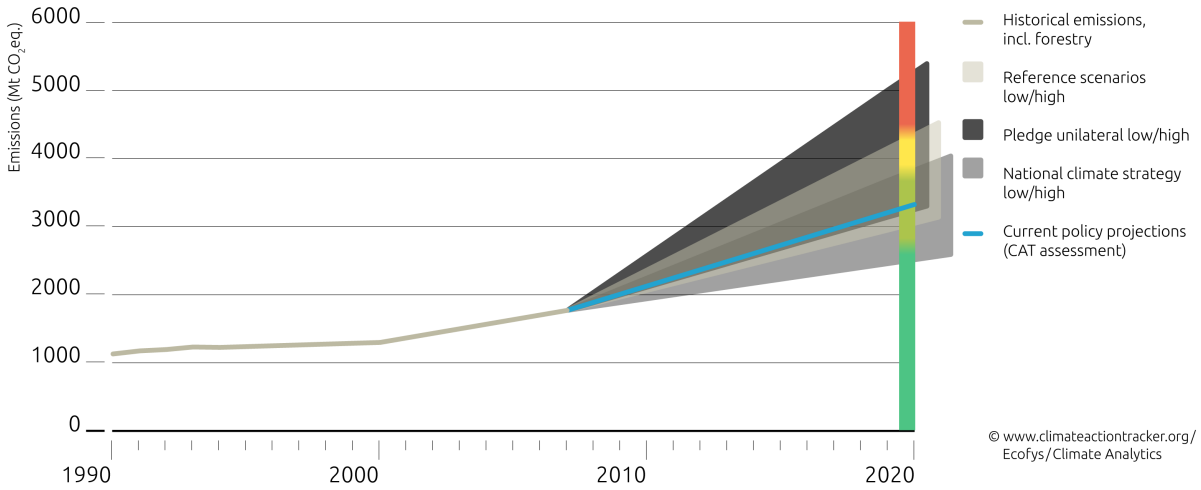

Figure 15 - Historic emissions, BAU, Copenhagen pledge and current emission trend in India

4.12.2 Pledge description

Convention	
Copenhagen pledge	Intensity: -20% / -25%
Reference for pledge	2005
Conditions	none
Long term goal(s)	none

India has pledged to reduce the emission intensity of its GDP by 20 to 25% by 2020 in comparison to the 2005 level. Emissions from the agriculture sector are not covered in this target. The target was proposed during the Copenhagen negotiations and submitted to the Copenhagen Accord on 30 January 2010. The quantification, based on different scientific literature, covers a wider range of between 3,254 and 5,280 $MtCO_2e$ in 2020, resulting from different assumptions and base years. India provided an official quantification of emissions as a result of its pledge, based on annual GDP growth projections of 8% and 9%. These projections lead to between 3,500 and 4,000 $MtCO_2e$ in 2020 (Planning Commission Government of India 2011), which is in the range of the values derived from scientific literature.

4.12.3 Current trend description

Currently implemented policies are projected to lead to an emission level of 3,308 $MtCO_2e$ in 2020 and 3,626 $MtCO_2e$ in 2030, including emissions from LULUCF according to our estimation. Main policies included in current

trends for India are highlighted in Table 16. Land use change constituted a sink in 2007 and reduced emissions from non-land use sectors by 9%. We assume this share will remain constant until 2020.

Total emissions have been growing steadily since 1990. The overall growth slowed down around the year 2000 as land use moved from being a small source of emissions in the first inventory year, 14 $MtCO_2e$ in 1994, to a large sink, with removals of 223 $MtCO_2e$ in 2000. This sink effect has since reduced somewhat; in the last available inventory land use represented removals of 175 $MtCO_2e$.

The Five Year Plans provide the basic direction for government activities and address all sectors and policy areas in India. Since last year, the government has been working on the implementation of the 12th Five Year Plan, which will also focus on climate change activities. However, since details are not clear yet, we focus the analysis on existing instruments that were implemented in the course of the 11th Five Year Plan.

On the federal level, India implemented two major renewable energy-related policies. The 'strategic plan for new and renewable energy' provides a broader framework while the 'solar mission' contains capacity targets for renewables by 2017 and 2022 (Planning Commission Government of India 2011). The renewable capacity targets from the solar mission for 2017 are 27.3 GW wind, 4 GW solar, 5 GW biomass and 5 GW other renewables, and for 2022 they are 38.5 GW wind, 20 GW solar, 7.3 GW biomass and 6.6 GW other renewables.

Achieving the targets depends on financial and structural support. This is expected to be partly provided by the state level feed-in schemes and renewable portfolio standards. Given that electricity demand is expected to further grow in future and the prevailing dominance of other energy carriers, such as coal, the total impact of these policies and targets is low compared to its potential.

Under the 'National Mission on Enhanced Energy Efficiency' India implemented the 'Perform, Achieve and Trade (PAT)' Mechanism. The scheme covers the largest industrial and power generation facilities, which in total cover more than 50% of fossil fuel use in India. The target is to achieve a 4% to 5% reduction of energy consumption of the participating facilities in 2015. Sixty percent of this is to come from the power sector and 40% from the industry sector. The effect after 2015 heavily depends on the rules governing the continuation of the scheme, which have yet to be decided.

In addition, biofuel legislation sets a target of 20% blending of ethanol and biodiesel in 2017.

Name of Policy	Implication
Energy Conservation Building Code	Reduction of electricity demand from air conditioning
National Solar Mission (20 GW from solar PV in 2022)	Impact on emission reduction and energy mix in 2020 high compared to other policy measure but low compared to its potential
National Mission on Enhanced Energy Efficiency (NMEEE) incl. PAT scheme	Effect on emission from industry and energy supply low, reduction depends on design and targets set after 2015
REN targets incl. tradable certificates and feed-in	Impact on emission reduction and energy mix in 2020, rural development
Support of biofuels in transport - Target of 20% blending of biofuels by 2017	Biofuels in transport, increase agricultural emissions

Table 16 - Most relevant policies included in current trends for India

4.12.4 Data sources and assumptions

Pledge

India has provided their own quantification in the Interim report of the Expert Group on Low Carbon Strategies for Inclusive Growth. In addition we derived a range by comparing various sources, including the Timer model, WEO 2009 data, McKinsey 2010, Stern 2010, TERI 2009 data and Moltmann et al. (2010) as compiled for den Elzen et al. (2010).

Current trends

The current trend projections are based on the World Energy Outlook 2012 Current Policy scenario projections for CO_2 only until 2030 (IEA 2012) and was combined with the US EPA non-CO_2 emission projections until 2030 (US EPA 2012). For historical data we used India's inventory data submitted to the UNFCCC (for 1994) as well as the 2nd national communication (Ministry of Environment and Forests 2012) that contained data for 2000 and 2007.

Sources

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4.13 Indonesia

4.13.1 Assessment

Indonesia pledged to reduce emissions by 26% below BAU unilaterally and by 41% with sufficient international support, see Figure 16. With current policies in place, it will likely not achieve the pledge, however the uncertainty of LULUCF emissions makes an evaluation difficult.

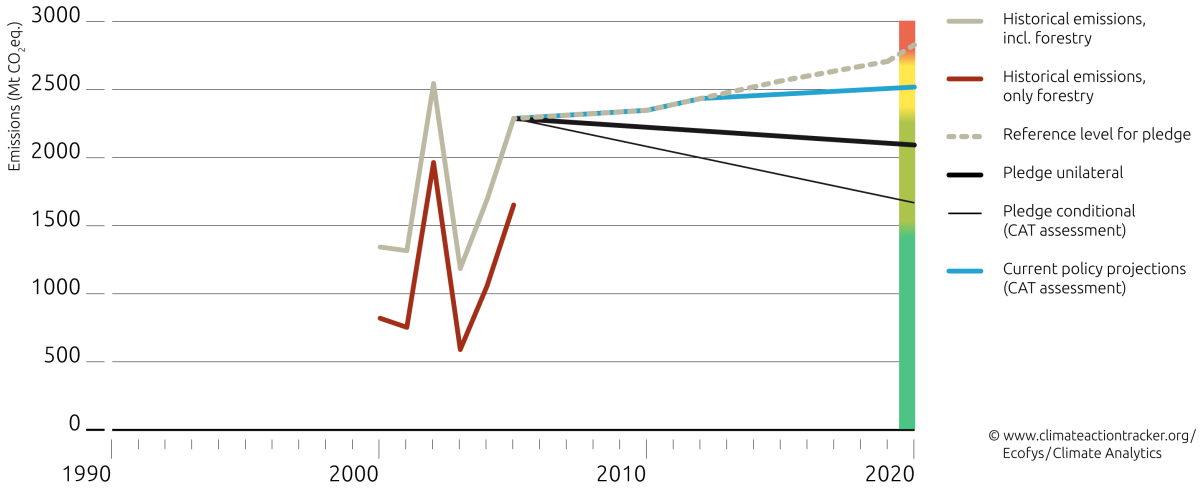

Figure 16 - Historic emissions, BAU, Copenhagen pledge and current emission trend in Indonesia

4.13.2 Pledge description

Indonesia proposed to cut emissions by 26% by 2020 from "business as usual" (BAU) levels. The target was proposed in September 2009 and submitted to the Copenhagen Accord on 30 January 2010. A large proportion of these reductions would come from reducing deforestation. In April 2011, Indonesia clarified that, in addition to its unilateral 26% target, it proposes a 41% reduction below BAU target based on supported Nationally Appropriate Mitigation Actions (NAMAs).

Convention	
Copenhagen pledge	-26% / -41%
Reference for pledge	BAU
Conditions (for higher pledge)	
Provision of adequate financial and technological support	
Long term goal(s)	none

4.13.3 Current trend description

Currently implemented policies are expected to decrease 2020 emissions by around 11% compared to BAU. Emission levels including LULUCF are expected to reach 2,519 $MtCO_2e$ in 2020, with 56% of these coming from the land use sector. Most relevant policies included in current trends for Indonesia are highlighted in Table 17.

The key policy is the Green Energy Policy, which sets up plans for future energy supply. This legislation covers renewable electricity generation, and also includes biofuel quotas, which may significantly reduce emissions in the transport sector, if sustainable production is guaranteed. To reduce emissions further via the Green Energy policy, an even stronger focus could be put on renewable energy, as in the current planning, the share of coal-fired power

plants will not decrease (Roelfsema et al., 2013). Another important sector for mitigation of GHG in Indonesia is LULUCF which is addressed under current legislation. However, emission reductions expected through current programmes are difficult to assess as the data uncertainty is high for this sector.

Name of Policy	Implications
Green Energy Policy	Little impact as coal-fired power plants are also supported
Biofuel quota, biofuel price subsidy & obligation to purchase biofuel for national oil company	Potentially high impact if biofuel production is sustainable
National Energy Policy and Energy Law, mainly for promotion of energy efficiency	Difficulties in implementation, little impact so far
Forest Law Enforcement, Governance and Trade (FLEGT) programme	May have significant impact on LULUCF emissions in combination with other efforts to ban illegal logging

Table 17 - Most relevant policies included in current trends for Indonesia

4.13.4 Data sources and assumptions

Pledge

We used data on historic emissions and projections from the 2nd national communication, submitted in January 2011 and updated in January 2012 (Ministry of Environment, 2010). The data includes emissions from peat fires. As values for emissions from peat fire vary significantly according to different studies named in the national communication, we used the average of all these studies for the years 2000 to 2005. Data for 1990 to 1994 is available in Indonesia's Initial National Communication, however the document states various issues related to lack of data and methodology, topics which have been significantly improved in the 2nd National Communication. We therefore do not show data for the first years.

Current trends

The evaluation of the FLEGT Programme is based on (Höhne et al. 2012). The impact of energy related emissions is based on data of the Indonesian Energy Outlook (Ministry of Energy and Mineral Resources of Republic of Indonesia, 2009).

Sources

Government of Indonesia(2010). Indonesia's pledge to the Copenhagen Accord. Compiled in: Compilation of information on nationally appropriate mitigation actions to be implemented by Parties not included in Annex I to the Convention, UNFCCC (2011)

Höhne et al. (2012). Greenhouse gas emission reduction proposals and national climate policies of major economies. PBL Netherlands Environmental Assessment Agency. Policy Brief. November.

Ministry of Energy and Mineral Resources of Republic of Indonesia (2009). Indonesia Energy Outlook

Ministry of Environment, Indonesia (2010). Indonesia Second National Communication Under the United Nations Framework Convention on Climate Change.

Roelfsema et al. (2013). Assessment of climate and energy policies of major emitting countries. PBL Netherlands Environmental Assessment Agency. Pub No. 1096.

UNFCCC (2011b). Information from the workshop on nationally appropriate mitigation actions submitted by developing country Parties, underlying assumptions, and any support needed for implementation of these actions, as requested by decision 1/CP.16, paragraph 51, held on 4 April 2011 in Bangkok Ministry of Environment (2010)

4.14 Japan

4.14.1 Assessment

Japan revised its 2020 pledge on 15 November 2013 and now aims to reduce emissions by 3.8% compared with fiscal year 2005 levels by 2020. fiscal year 2005 levels by 2020. The new 2020 pledge is equivalent to an increase of 3.1% above 1990 levels and represents a strong decrease in represents a strong decrease in ambition, see

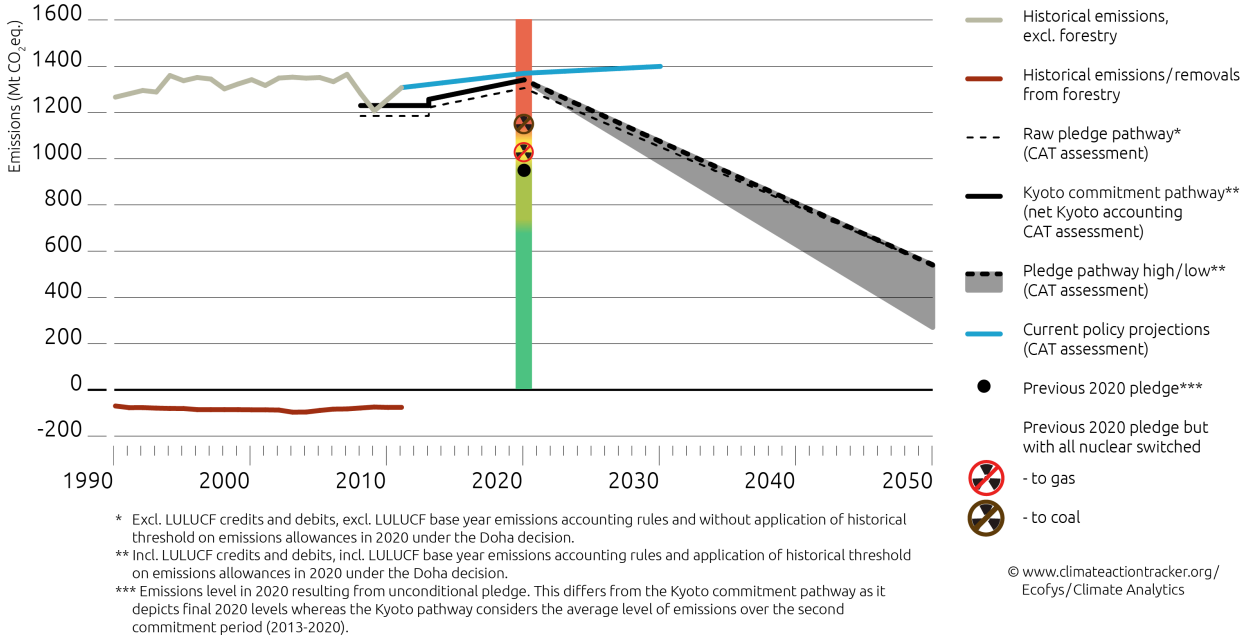

Figure 17.

Japan is not on track to meet the new pledge with currently implemented policies. The policy pathway exceeds the revised 2020 target by 64 $MtCO_2e$.

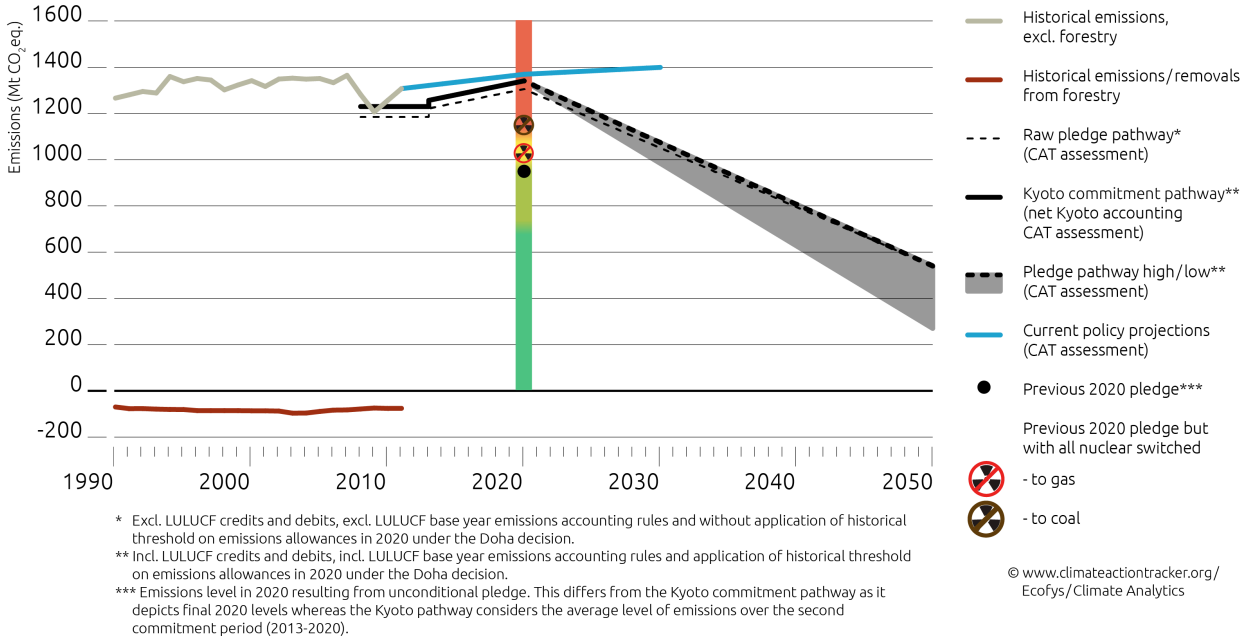

Figure 17 - Historic emissions, current and Copenhagen pledges, and current emission trends in Japan

4.14.2 Pledge description

Kyoto Protocol	
Member of KP CP1 (2008-2012)	yes
Member of KP CP2 (2013-2020)	no
KP CP1 target (below base year)	-6%
KP CP2 target (below base year)	n.a.
Convention	
Current 2020 pledge	**-3.8%**
Reference for current pledge	**FY 2005**
Copenhagen pledge	-25%
Reference for Copenhagen pledge	1990 emissions
Conditions (for higher pledge level)	no range
National goals	
Long term goal(s)	-60 to -80% by 2050 below 2005 emissions

In November 2013, Japan announced a new pledge to reduce emissions by 3.8% below fiscal year 2005 levels by 2020. This pledge will result in an emission level of 1,306 $MtCO_2e$ in 2020, which is equivalent to 3.1% above 1990 levels. We estimate that LULUCF accounting leads to a small credit. If these credits are applied additionally; the revised pledge will lead to an emission level of 1,341 $MtCO_2e$ in 2020.

Prior to the economic downturn in 2009, Japan's emissions had been fairly steady (1,300 – 1,370 $MtCO_2e$) since the mid-1990's. However, the economic downturn followed by the Fukushima disaster caused much greater fluctuations in emissions over the last 5 years.

For their original Copenhagen pledge, Japan communicated a target of a 25% emission reduction by 2020 compared with 1990 levels, which was premised on the establishment of a fair and effective international framework in which all major economies participate and on agreement by those economies on ambitious targets. Revision of the original pledge raises the 2020 target by 356 $MtCO_2e$, and increases the 2020 Emissions Gap (UNEP, 2013) by 3-4%. Our analysis indicates that the revision of the pledge cannot be fully explained by the removal of nuclear energy from the energy mix, but also represents a decreased lack of ambition (see below and CAT briefing on Japan 2013).

Japan's Kyoto target (2008-2012) is -6% relative to base year (1990) emission levels.

Decreased pledge a necessary response to reduction in contribution from nuclear energy?

In the IEA World Energy Outlook's Current policies scenario (IEA, 2013) nuclear energy would contribute 220 TWh to Japan's electricity supply. If all nuclear power in this scenario were to be replaced by coal-powered generation, an extra 197 $MtCO_2e$ would be emitted. This is equivalent to 15% of Japan's current emissions. As the policies scenario assumes current economic growth rates and no other mitigation, this value represents the upper end of emissions that can be expected from a total abandonment of nuclear power generation in Japan under current policies.

Even in a worst-case scenario in which nuclear was replaced entirely by coal, the expected increase represents only 55% of the increase in emissions from the original Copenhagen pledge to the new 2020 target. The remaining 45% must therefore represent a change in Japan's political will to reduce emissions.

If the shortfall in supply from nuclear were to be taken up by oil, gas, or renewables, instead of coal, the portion of the revision in target attributable to national circumstances would be much lower. If replaced by oil, the shut-down of nuclear production would represent 38% of the overall reduction in ambition, 23% in the case of gas, and 0% for a scenario where it is fully replaced by renewables.

One option under consideration by Japan to reach the original Copenhagen pledge was to increase nuclear capacity to 40% of total electricity generation. Assuming the same total electricity demand as in the WEO 2013 current policies scenario (IEA, 2013), Japan could only have achieved a maximum of 8% reduction below 1990 through this approach. If nuclear replaced anything other than coal-powered generation, the reduction would be weaker. The 40% nuclear scenario is insufficient to meet the Copenhagen pledge, and the additional 17% reduction below 1990 would have required energy efficiency improvements, additional changes to the fuel mix or the use of international units. Our analysis is in agreement with that done by the Japanese Ministry of the Environment presented in September 2012 that indicated a nuclear-free scenario would lead to a zero to 7% reduction below 1990 levels in 2020.

4.14.3 Current trend description

Currently implemented policies will lead to an emission level of 1,370 $MtCO_2e$ in 2020 and 1,400 $MtCO_2e$ in 2030, excluding LULUCF. Emissions from LULUCF contributed 6% in 2011. Assuming that the trend will stabilise in the future, the emissions level in 2020 will rise to 1,451 $MtCO_2e$ including LULUCF.

After the challenges associated with the 2011 earthquake, the Japanese government decided to review its energy policy to take into account a commitment to reduce Japan's reliance on nuclear energy. After a long debate a major piece of legislation "Innovate Strategy for Energy and environment" was released in September 2012. Japan continued to reassess its energy policy through 2013 under the newly elected government. This continued assessment resulted in the revised emissions pledge announced in November 2013, and considers a future in which there is no nuclear energy contribution.

The main focus of the September 2012 strategy is the long term phasing out of nuclear and fossil fuels by maximising green energy. One pillar is the achievement of the 16% share of electricity generation from renewables in 2020 that is supported by feed-in tariffs and general funding of distribution networks. The initial impact of this policy is small and will result in only 4 $MtCO_2e$ reductions in 2020, but the impact will increase to 44 $MtCO_2e$ reduction in 2030. The low impact in 2020 is due to the fact that there was already a high share of renewables in 2010 (10%), and an optimistic projection of increasing electricity demand until 2020 (IEA 2013).

Despite the long term transformation of the electricity supply sector, Japan had already introduced effective policies in the area of energy efficiency in transport, industry and buildings. The full list of quantified policies is shown in Table 18 below.

Name of Policy	Implications
Average fuel economy target for road freight	Innovation in car industry, reduction of fuel use and emission in transport
Decommissioning of units 1-4 of Fukushima Daiichi	Reduction of nuclear power in energy mix.
Energy efficiency benchmarking	Efficiency increase in industry, reduction of energy demand
Fiscal incentives for hybrid and electric vehicles;	Innovation in car industry, reduction of fuel use and emission in transport
Fuel economy target for PLDVs: 16.8 kilometres per	Innovation in car industry, reduction of fuel use and emission in transport
Innovative Strategy for Energy and the Environment	Long term transformation of the energy supply sector towards a fossil und nuclear free supply
Mandatory energy management for large business	Efficiency increase in industry, reduction of energy demand
Support for renewables generation	Development of innovative instruments and effective reduction of emission in energy supply.
Tax credits for investments in energy efficiency	Efficiency increase in industry, reduction of energy demand
Top-runner programme setting minimum energy standards in industry	Efficiency increase in industry, reduction of energy demand

Table 18 - Most relevant policies included in current trends for Japan

4.14.4 Data sources and assumptions

Pledge

Targets for 2020 were calculated from fiscal year 2005 according to Japan's Fifth National Communication to the UNFCCC (2010). We calculated Japan's LULUCF accounting quantities in 2020 for afforestation, reforestation and deforestation using the current Kyoto rules. For forest management, Japan's proposed reference level is zero. We also apply a cap on forest management (either 3% of the base year emissions or 15% of the activity whichever is less), since they want to continue with the current Kyoto Protocol rules for forest management.

Current trends

For the current trend analysis we used the WEO 2013 Current Policy scenario (IEA 2013) covering energy efficiency policies and CO_2 emissions. Those data were combined with non-energy data from US EPA (US EPA 2012) and Edgar (JRC/PBL 2012). The WEO did not cover the updated energy strategy which leads to higher REN targets than assumed in the WEO scenario. Therefore we additionally quantified the new targets assuming that the feed-in schemes are fully operating. The additional reduction was subtracted from WEO 2013 since we used the underlying data of WEO.

Sources

Climate Action Tracker Policy Brief (November, 2013) Japan: From frontrunner to laggard,

CRF (2013). UNFCCC AWG-KP Submissions 2013. Common Reporting Format.

Government of Japan (2011). Submission to the Ad-Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP): Forest management reference level

Government of Japan (2010a). Japan's pledge to the Copenhagen Accord. Compiled in: Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention, UNFCCC (2011).

Government of Japan (2010b). Japan's Fifth National Communication

Government of Japan (2009). Japan's view on the Annex of the conclusion of the AWG-KP7: Options and proposals on how to address definitions, modalities, rules and guidelines for the treatment of land use, land-use change and forestry (LULUCF), 27 April 2009, FCCC/KP/AWG/2009/MISC.11

IEA (2013). World Energy Outlook 2013, International Energy Agency. Paris.

JRC/PBL (2012) EDGAR version 4.2 FT2010. Joint Research Centre of the European Commission/PBL Netherlands Environmental Assessment Agency.

Prime Minister of Japan (2009). Prime Minister Yukio Hatamoto (2009) Statement by H.E. Yukio Hatoyama at the United Nations Summit on Climate Change, 22 September 2009.

USEPA (2012). Global Mitigation of Non-CO_2 Greenhouse Gases, Washington, D.C., USA.

4.15 Kazakhstan

4.15.1 Assessment

Kazakhstan has proposed average yearly emissions to be 90% of 1990 levels during the period of 2013-2020, subject to availability of carry-over surplus from the first commitment period and other conditions. Given the complex set of decisions at COP 18 in Doha it is unclear if the country will ratify this target. Its Copenhagen pledge is to reduce emissions by 15% below 1990 by 2020, see Figure 18.

Neither of the targets will be met with currently implemented policies. After hitting the floor in 1999 at 146 $MtCO_2e$ (60% below 1990 levels), emissions have been on a constant steep increase since and are projected to keep this trend until 2030.

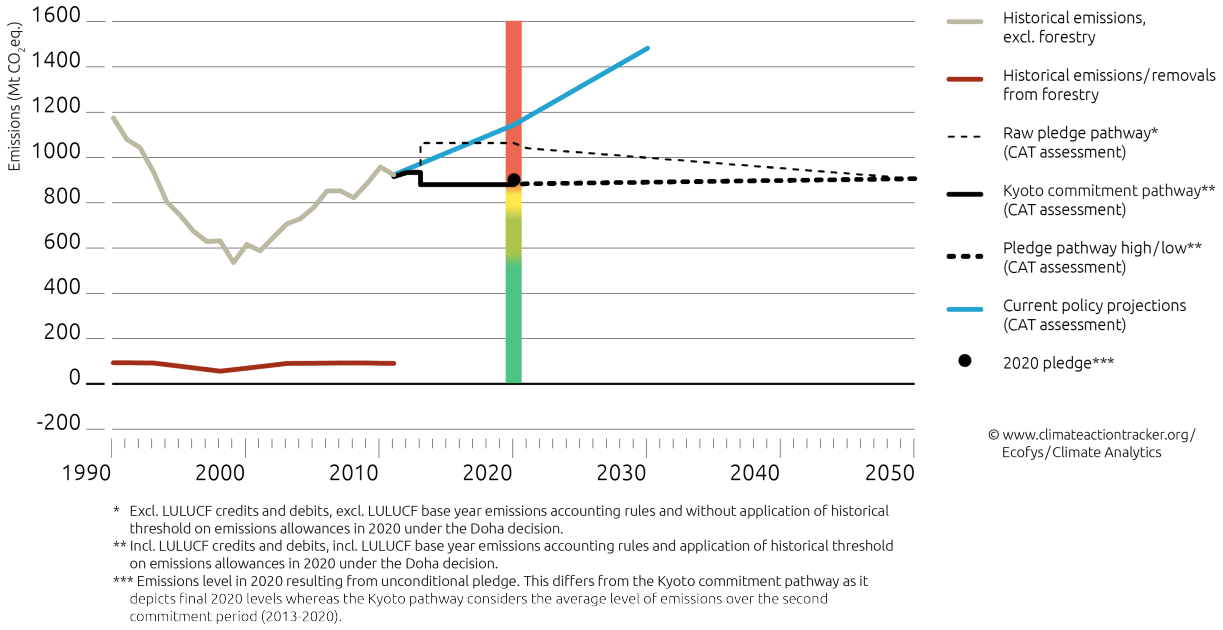

Figure 18 - Historic emissions, BAU, Copenhagen pledge and current emission trends in Kazakhstan

4.15.2 Pledge description

In November 2012, Kazakhstan submitted a provisional QELRO level of 90 for the second commitment period of the Kyoto Protocol. This means that Kazakhstan's average yearly emissions during the period of 2013-2020 are proposed to be 90% of 1990 levels. Kazakhstan's intention to undertake this QELRO is conditional to carry-over of full surplus from the first commitment period, environmental integrity of the Kyoto Protocol, access to mechanisms for both periods and on a mid-term 2013-2015 review to increase the level of ambition in terms of emissions reductions among others. It also requires the 2015 agreement to include participation of all parties with adequate commitments.

The Doha amendment limit targets for the second commitment period to the average historic emissions 2008-2010[13]. This affects Kazakhstan and leads to a Kyoto pathway almost 59 $MtCO_2e$/yr lower than the direct translation of their target for the period 2012-2020.

Kazakhstan has also sought to be included in Annex B of the Kyoto Protocol for the first commitment period. It proposed an amendment to Annex B of the Kyoto Protocol for the first commitment period and a target of 0% below 1992 emissions.

Under the Copenhagen Accord Kazakhstan proposed to reduce emissions to 15% below 1990 by 2020. Kazakhstan has also proposed a 2050 target of 25% based on 1992 levels.

Kyoto Protocol

Member of KP CP1 (2008-2012)	pending
Member of KP CP2 (2013-2020)	yes
KP CP1 target (below base year)	0%
KP CP2 target (below base year)	10%

Conditions

Carry-over of full surplus from the first commitment period, environmental integrity, access to mechanisms for both periods, mid-term 2013-2015 review to increase the level of ambition

Convention

Copenhagen pledge	-15%
Reference for pledge	1990 emissions

Conditions

2015 agreement to include participation of all Parties with adequate commitments.

National goals

Long term goal(s)	-25% by 2050 below 1992 emissions

4.15.3 Current trend description

Currently implemented policies are expected to increase GHG emissions (excl. LULUCF) in Kazakhstan to 348 $MtCO_2e$ by 2020 and 461 $MtCO_2e$ by 2030. This constitutes a 3% decrease in emissions by 2020 compared to 1990 levels, but an increase of almost 29% by 2030. Kazakhstan's main policies are highlighted in Table 19.

Historical emissions excluding LULUCF saw a steep decline after 1990, with the lowest levels being reached in 1999 at 146 $MtCO_2e$, only 41% of the 1990 level. After this, emissions have grown rapidly, with only a small impact from the financial crisis 2008/09. The energy and industry sectors are the main drivers of this growth.

In 2010, the 'Plan of the Republic of Kazakhstan on the Transition to Low-carbon Development till 2050' was published. The full implementation of this plan could allow the country to meet its international GHG emission reduction commitments, and improve energy safety and living standards.

The following priority areas of low-carbon development were specified in the Plan:

- Improvement of energy efficiency to reduce the expected level of energy consumption;
- Acceleration of renewable energy development (hydro, wind, biomass, waste, solar and geothermal);
- Regulation of national GHG emissions through the organization and functioning of the national market of quotas for GHG emissions;

[13] This is part of the Doha decisions and constitutes part of the amendments to the Kyoto Protocol. Amendments only come into effect once they are ratified by Parties.

- Population awareness raising on climate change

In May 2013, Kazakhstan adopted its Green Economy Strategy with the aim of further strengthening and diversifying its economy. Among other things, the Strategy envisages that by 2050 renewable and alternative energy sources will provide 50% of all energy produced in Kazakhstan. However, this strategy is still waiting for concrete measures of implementation.

Kazakhstan started their national ETS system with a pilot phase in 2013. The cap for the ETS in 2013 is 147 $MtCO_2e$ plus a 20.6 $MtCO_2e$ reserve. For the next phase, from 2014 to 2020, the cap will decrease linearly (Ecofys, 2013). There are still a number of open issues, such as MRV and modelling of the emissions quota and sectoral allocation, but a long-term goal is to make the ETS compatible with other trading systems, and specifically with the EU ETS.

Policy	Implications
Building regulations	Low impact as building regulations for new buildings, boilers, and heat meters not effectively enforced
Emissions trading system	Impact not yet quantifiable as regulation is not finalized

Table 19 - Most relevant policies included in current trend for Kazakhstan

4.15.4 Data sources and assumptions

Pledge

Targets for 2020 were calculated from the most recent national inventory submissions (CRF, 2013). The Kyoto pledge is calculated based on the official documentation provided by the UNFCCC based on Party submissions.

We calculated Kazakhstan's LULUCF accounting quantities in 2020 for afforestation, reforestation and deforestation using the current Kyoto rules. Forest management was calculated also with current Kyoto rules, with the cap set at 3% of base year or 15% of forest management, whichever is lower.

Current Trends

Historic data are based on most recent national inventory submissions (CRF, 2013). Projections are based on a report prepared in 2011 by NERA and Bloomberg for the EBRD "The Demand for Greenhouse Gas Emissions Reduction Investments: An Investors' Marginal Abatement Cost Curve for Kazakhstan (NERA Economic Consulting and Bloomberg New Energy Finance (BNEF), 2011). The 'Policy "Status Quo" Scenario' was used and adjusted to most recent historic data.

Sources

CRF (2013). UNFCCC AWG-KP Submissions 2013. Common Reporting Format.

Ecofys (2013). Mapping Carbon Pricing Initiatives. By order of the World Bank Institute (WBI).

Republic of Kazakhstan (2012a). Information by Parties included in Annex I listed in annex 1 to decision 1/CMP.7 on their quantified emission limitation or reduction objectives for the second commitment period under the Kyoto Protocol

Republic of Kazakhstan (2012b). Submission to the Ad-Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP): Information by Parties included in Annex I listed in annex 1 to decision 1/CMP.7 on their quantified emission limitation or reduction objectives for the second commitment period under the Kyoto Protocol, 2 May 2012

Republic of Kazahkstan (2010). Kazakhstan's pledge to the Copenhagen Accord. Compiled in: Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention, UNFCCC (2011).

Ministry of Environment Protection (2009). Kazakhstan's Second National Communication to the Conference of the Parties of the United Nations Framework Convention on Climate Change, Astana.

NERA Economic Consulting and Bloomberg New Energy Finance (BNEF) (2011). The Demand for Greenhouse Gas Emissions Reduction Investments: An Investors' Marginal Abatement Cost Curve for Kazakhstan, Prepared for EBRD, October 2011, London.

UNFCCC (2010). Compilation of pledges for emission reductions and related assumptions provided by Parties to date the associated emission reductions, page 11-12

4.16 Mexico

4.16.1 Assessment

Mexico pledged to reduce emissions by 30% below business as usual by 2020, conditional on international support. Mexico's progress in policy planning and institution building over the past years has been remarkable. However, more action is needed to meet the ambitious emissions reduction target by 2020.

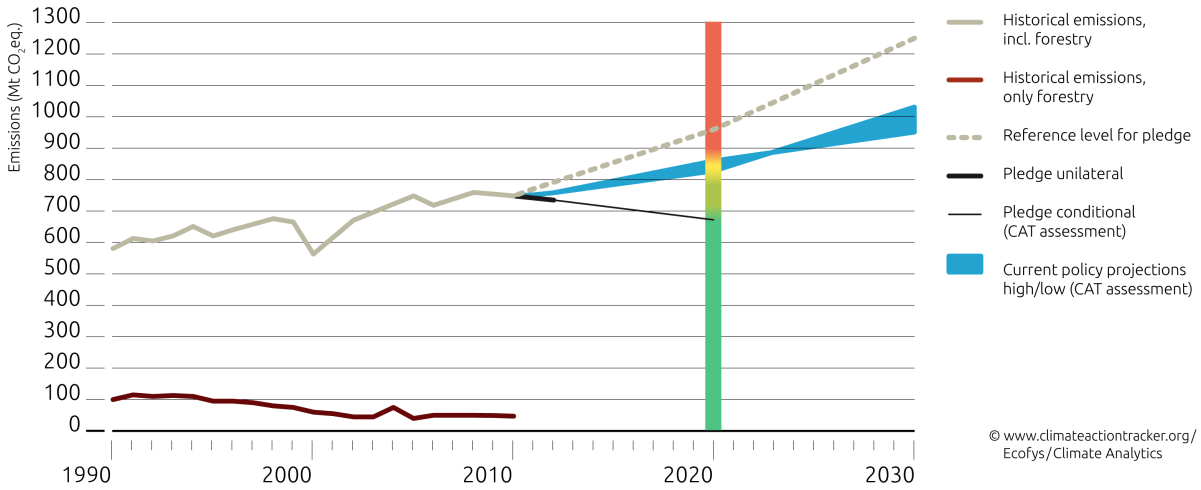

Figure 19 - Historic emissions, BAU, Copenhagen pledge and current emission trends in the Mexico

4.16.2 Pledge description

In its submission under the Copenhagen Accord, "Mexico aims at reducing its GHG emissions up to 30% with respect to the business as usual scenario by 2020, provided the provision of adequate financial and technological support from developed countries as part of a global agreement." President Felipe Calderón announced this target during the Copenhagen conference.

Convention	
Copenhagen pledge	-30%
Reference for pledge	BAU
Conditions	
Provision of adequate financial and technological support	
Long term goal(s)	-50% by 2050 below 2000 emissions

Mexico has a very detailed national plan up to 2012, which includes measures and their effects on emissions. Emission reductions up to 2012 as defined in the "Programa Especial de Cambio Climático 2008-2012" (PECC) (Special Programme on Climate Change) were a first unconditional step in national implementation. The plan was in line with an overall strategy to reduce emissions by 50% by 2050 compared to 2000 levels, which assumes moderate reductions in the early years and more ambitions reductions later.

With the General Law on Climate Change from 2012 and the National Climate Change Strategy published in June 2013, Mexico has confirmed these targets and made them binding on the national level, subject to international

support. The National Climate Change Strategy includes a new BAU scenario, which replaces the one from the PECC, to which the pledge previously referred. The new scenario is higher than before, so the emission level resulting from the pledge was corrected upwards to 672 $MtCO_2e$ in 2020, up from 618 $MtCO_2e$ under the previous projection.

4.16.3 Current trend description

According to our assessment, Mexico's current policies will lead to emissions of between 808 and 828 $MtCO_2e$ in 2020 and between 927 and 951 $MtCO_2e$ in 2030, including LULUCF. Main policies are listed in Table 20.

Historically, emissions have been increasing more or less steadily since 1990. The focus has changed over time from agriculture and LULUCF, which represented almost 35% of emissions in 1990, to representing less than 19% in 2010, while the share of energy-related emissions has increased substantially.

The most significant policy is Mexico's General Law on Climate Change, which establishes a well worked out system of translating the overarching targets into strategies and plans, and provides the institutional framework for successful implementation. In itself the law does not include concrete political instruments, so it is not possible to quantify future effects.

The National Strategy on Climate Change (NSCC) published in June 2013 implements one of the requirements of the General Law. The NSCC is designed towards a long-term strategic development, but only provides very general guidance. How this will be translated to concrete action remains to be seen. The new Special Program on Climate Change (PECC 2013-2018) is currently under development.

There are however promising activities in Mexico. These include efficiency programmes in the energy sector (especially co-generation), the support for renewable electricity and solar thermal heating, a green mortgage programme in the building sector and forest conservation and reforestation programmes. These programmes are included in the current policy scenario.

Name of Policy	Implications
General Law on Climate Change	Important framework, however no concrete policy instruments introduced, therefore no impact on emissions yet
Various sectoral programmes	Compare full country assessment in Höhne et al. (2012)

Table 20 - Most relevant policies included in current trends for Mexico

4.16.4 Data sources and assumptions

Pledge

With the 5th National Communication Mexico has provided a GHG inventory for all years between 1990 and 2010 (SEMARNAT, 2012) for the first time. The upper reference level is taken from the technical annex to Mexico's National Climate Change Strategy from 2013 (Government of Mexico, 2013).

Current trends

We show the previous BAU from the PECC. For the current trend scenarios, we apply growth rates from the policy scenario of the Climate Action Tracker's detailed country analysis from 2012 (Höhne et al. 2012) to historic emissions and as an alternative scenario use data from the 5th National Communication (SEMARNAT, 2012), assuming that the reductions achieved through the PECC in 2012 will remain stable until 2030.

Sources

Government of Mexico (2010). Mexico's pledge to the Copenhagen Accord. Compiled in: Compilation of information on nationally appropriate mitigation actions to be implemented by Parties not included in Annex I to the Convention, UNFCCC (2011)

Government of Mexico (2013). Estrategia Nacional de Cambio Climático. Visión 10-20-40. http://www.encc.gob.mx/documentos/estrategia-nacional-cambio-climatico.pdf

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SEMARNAT (2012). Quinta Comunicación Nacional ante la Conveción Marco de las Naciones Unidas sobre el Cambio Climatico. Secretaría de Medio Ambiente y Recursos Naturales. Mexico D.F.: SEMARNAT.

Secretaría de Medio Ambiente y Recursos Naturales (2009). Programa especial de cambio climático 2008-2012. Secretaría de Medio Ambiente y Recursos Naturales Mexico D.F.: SEMARNAT.

4.17 New Zealand

4.17.1 Assessment

New Zealand made an unconditional commitment to decrease emissions by 5% relative to 1990 emission levels by 2020. This announcement was made under the Convention and New Zealand has not put forward a QELRO under the Kyoto Protocol. With current policies and measures implemented, this target will not be achieved, see Figure 20. Current trends project an increase in emissions above 1990 levels of about 27-30% by 2020, remaining far above its target.

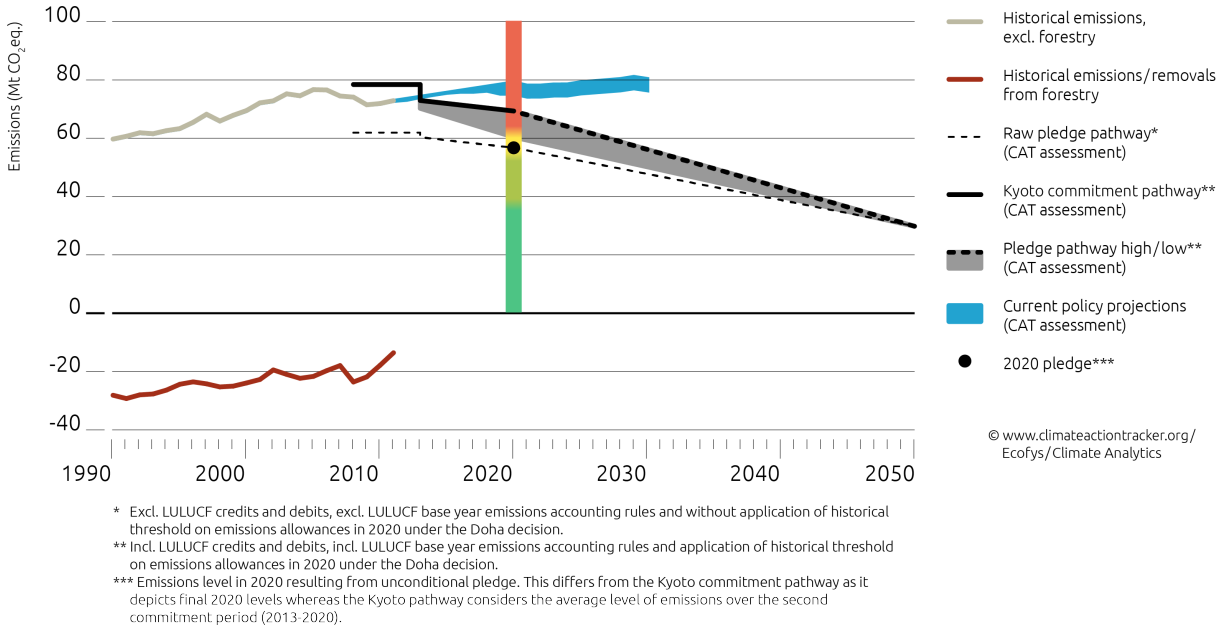

Figure 20 - Historic emissions, BAU, Copenhagen pledge and current emission trends in New Zealand

4.17.2 Pledge description

In August 2013, New Zealand announced an unconditional target of 5% below 1990 levels by 2020. This is complementing the conditional pledge of reducing emissions by 10 to 20% below 1990 levels by 2020, which was made under the Copenhagen Accord and which depends on a set of conditions, including a global temperature pathway of 2°C, that developed countries make comparable efforts and that developing countries take actions based on capabilities, effective LULUCF rules, and access to international carbon markets (Government of New Zealand, 2013).

New Zealand's Kyoto Protocol target for the first commitment period is a return to 1990 base year emissions (QELRO of 100%). Given large expected LULUCF credits of 16.5 $MtCO_2e$, the effective emissions resulting from this target are higher than 1990 emissions level.

New Zealand did not present a quantified economy-wide emission reduction commitment in the amended Annex B to the Kyoto Protocol for the period 2013-2020, but it remains a Party to the Kyoto Protocol. It has stated that it

plans to apply accounting rules governing the second commitment period and has expressed its 5% reduction target as being equivalent to a QELRO of 96.8, which means average yearly emissions during the period 2013-2020 are proposed to be 96.8% of 1990 levels (Government of New Zealand, 2013).

New Zealand supports proposals to remove emissions from natural disturbances and to count removals from harvested wood products, which has not been accounted for here. This could lead to higher credits (or lower debits). For 2050, the proposed target is a 50% reduction relative to 1990 emissions.

Kyoto Protocol

Member of KP CP1 (2008-2012)	yes
Member of KP CP2 (2013-2020)	no
KP CP1 target (below base year)	0%
KP CP2 target (below base year)	n.a.

Convention

Unconditional pledge	-5%
Conditional pledge	-10%/-20%
Reference for pledge	1990 emissions

Main conditions

a) Global agreement sets the world on a pathway to 2 °C, b) all parties making comparable or adequate efforts, c) an effective set of rules for LULUCF and d) full recourse to a broad and efficient international carbon market

National goals

Long term goal(s)	-50% by 2050 below 1990 emissions

4.17.3 Current trend description

With current policies total national emissions (excl. LULUCF) are projected to rise to 76-79 $MtCO_2e$ by 2020 and 76-80 $MtCO_2e$ by 2030. This represents an increase in emissions from 1990 of 27-30% in 2020 and 27-34% in 2030. If expected emissions from the forestry sector are taken into account, total national emissions will increase by another 1.3 $MtCO_2e$ by 2020. Net removals from forestry are expected to become a source in 2020 as relatively large areas of production forests planted in the 1990s are harvested.

According to new projections included in the Annual Report of the Ministry of Environment from October 2013, total emissions including forestry could even be significantly higher. However, these projections are not yet reviewed and data is not sufficiently detailed to allow for an individual assessment of emissions excluding LULUCF and emissions from LULUCF activities. We have therefore not used this in our current analysis.

New Zealand's main instrument to reduce greenhouse gas emissions is an Emissions Trading Scheme (Ministry for the Environment, 2009; Government of New Zealand, 2011b), see Table 21. The ETS entered into force in 2008 and operates differently to, for example, the European ETS. The system does not have a cap, and therefore does not regulate total emissions within a period.

Forestry was the first sector to enter the scheme (in 2008), followed by liquid fossil fuels, stationary energy and industrial processes in 2010, and waste and synthetic greenhouse gas sectors in 2013. The agriculture sector, responsible for around 50% of New Zealand's emissions, was due to enter the scheme in 2015, but at the moment this timeline is uncertain.

The Government issues a certain number of New Zealand Units (NZU) for free for industries exposed to international trade, fisheries and forestry. It is also possible for participants to acquire Kyoto Protocol emission units from abroad. For actors overshooting the issued permits there is a fixed price of $NZ25/$tCO_2e$.

During a transition phase that is not fixed in length the system obliges all emitters except from the forestry sector to surrender one emission unit for every two tonnes of emissions produced.

Policy	Implications
NZ ETS	Sectoral coverage was increased over the years, but agriculture, one of the sectors responsible for most of the emissions, is not yet covered and it is unclear when this will change. There are largely unlimited possibilities to deploy international units, which has been extensively used.

Table 21 - Most relevant policies included in current trends for New Zealand

An expert review report has questioned New Zealand's use of policy instruments to achieve its mitigation targets (UNFCCC, 2011). Despite considerable potential in several sectors, the review found that there is a lack of instruments to exploit it. The New Zealand Government has chosen the ETS as the main climate policy instrument, arguing that it ensures that reductions are cost-effective. The National Communication estimates a reduction of 12 $MtCO_2e$ by 2020, but refrains from providing detailed information about where and how these reductions will take place. The expert review team expressed "great concern" about whether New Zealand will be able to meet its targets by 2020 without a broader policy portfolio.

The Sustainability Council of New Zealand also comes to this conclusion that effects of existing policies are overrated, especially with respect to expected emissions reductions from coal fired power plants and from forestry. They come to the conclusion that 88% of the expected savings of 12 $MtCO_2e$ are highly uncertain (Sustainability Council of New Zealand, 2011).

The numbers used to calculate the current-policy-based trends are taken from the currently available policy scenario from the Ministry of the Environment. It has to be noted, however, that these projections could overestimate the mitigation effect of current policies.

A challenge for New Zealand on its way to meet the reduction targets is the growth in GDP, up 67% from 1990 to 2008. During this period there has been an increase of emissions in the energy sector by 46.8%, mainly due to transport growth and fossil fuel electricity generation (UNFCCC, 2011).

4.17.4 Data sources and assumptions

Pledge

Targets for 2020 were calculated from the most recent national inventory submissions (CRF, 2013).

We calculated New Zealand's LULUCF accounting quantities in 2020 for afforestation, reforestation and deforestation using the current Kyoto rules and for forest management using a net-net approach with a projected reference level for 2013-2020. New Zealand has included a level of natural disturbance in their reference level.

Current trends

The current trend projections are based on growth rates from New Zealand's Fifth National Communication (Ministry for the Environment, 2009) which were also presented in the Emissions Trading Scheme Review 2011 (Emissions Trading Scheme Review Panel, 2011) applied to the latest GHG inventory data (CRF, 2013).

Sources

CRF (2013). UNFCCC AWG-KP Submissions 2013. Common Reporting Format.

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Government of New Zealand (2013). Submission to the UNFCCC on Quantified Economy-wide emission targets for 2020

Government of New Zealand (2011a). Submission to the Ad-Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP): Forest management reference levels.

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Government of New Zealand (2010). New Zealand's pledge to the Copenhagen Accord Compiled in: Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention, UNFCCC (2011).

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UNFCCC (2011). Report of the in-depth review of the fifth national communication of New Zealand

4.18 Norway

4.18.1 Assessment

Norway's target under the Kyoto Protocol is to reduce average annual emissions by 16% from 1990 levels for the second commitment period. Under the Convention it pledged to reduce emissions by 30 to 40% relative to 1990 emission levels by 2020. Its 40% reduction target is conditional on global action. With currently implemented policies and measures it will not be able to meet its target, see Figure 21. The national policy is to cut approximately 2/3 of emissions at home and to buy offsets for the residual emissions. Current trends project an increase of around 10% above 1990 levels, reaching emissions of roughly 55 $MtCO_2e$ by 2020 and are thus far from achieving the targeted 27% domestic reduction.

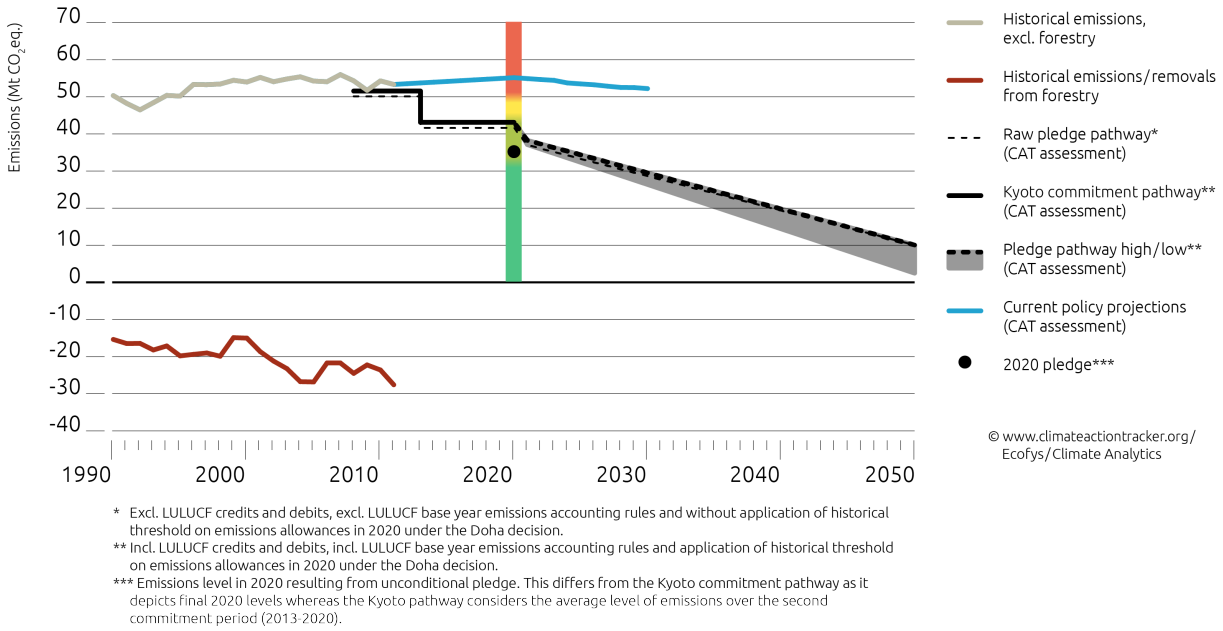

Figure 21 - Historic emissions, BAU, Copenhagen pledge and current emission trends in Norway

4.18.2 Pledge description

Norway's target for the second commitment period is defined by their QELRO of 84. This means average annual emissions for Norway from 2013-2020 would be 16% below 1990 levels.

Under the Convention Norway has proposed a 2020 commitment of -30 to -40% relative to 1990 emission levels and carbon neutrality by 2050. Norway's -40% target is conditional on a global and comprehensive agreement after 2012, with major emitting parties agreeing on reductions in line with achieving the 2 degrees Celsius target. Even if Norway is carbon neutral in 2050, this does not mean that industrial emissions are zero, illustrated by the pledge

pathway in Figure 21. This is because Norway is expected to have negative emissions from LULUCF which will compensate for remaining industrial emissions.

At the UNFCCC workshop in April 2011, Norway clarified that they aim to achieve their pledge as submitted to the Copenhagen Accord, including their estimate for LULUCF accounting at the time. If LULUCF accounting changes from the value estimated for the Copenhagen Accord, they will aim to offset this change by shifting their pledge, such that their pledge including LULUCF accounting stays the same.

Norway, with 30% of the land surface covered by forest, has substantial carbon sinks in their forests. The sink equals approximately half of Norway's annual emissions. The net uptake of CO_2 in 2020 is projected to decrease from 33 Mt/yr in 2010 to 24 Mt/yr, and then to stabilize at around 20 Mt/yr towards 2030 (Norwegian Ministry of Finance 2013).

Kyoto Protocol

Member of KP CP1 (2008-2012)	yes
Member of KP CP2 (2013-2020)	yes
KP CP1 target (below base year)	+1%
KP CP2 target (below base year)	-16%

Convention

Copenhagen pledge	-30%/-40%
Reference for pledge	1990 emissions

Conditions (for higher pledge level)

Global and comprehensive agreement after 2012, with major emitting Parties agreeing on reductions in line with achieving the 2 degrees Celsius target

National goals

Long term goal(s)	Carbon neutral by 2050

4.18.3 Current trend description

With currently implemented policies and measures, the latest projections for Norwegian national emissions are 55 $MtCO_2e$ in 2020 and 53 $MtCO_2e$ in 2030 (Norwegian Ministry of Finance, 2013 and CRF, 2013), which would be an increase of 10% and 6% respectively, compared to 1990. The effect of measures and policies adopted between 1990 and 2008 (including ETS) is estimated to yield a total reduction of about 16 $MtCO_2e$ in 2020. Nevertheless, this does not represent an absolute reduction since the population and economy is growing.

Apart from small dips in the early 90s and during the financial crisis, emissions in Norway have seen a slight but steady upward trend since 1990. The petroleum sector is the largest emitter in Norway, responsible for 26% of total emissions. Emissions from off-shore activities have increased by 80%, from 7 $MtCO_2e$ in 1990 to 14 $MtCO_2e$ in 2010, and are the main reason why Norway is not able to meet its pledge to reduce emissions nationally.

One reason for the projected development is the expected population growth and increased economic activity until 2020. Per capita national emissions (excluding petroleum off-shore activities) are expected to decrease 17% by 2020, as a result of mitigation measures. The petroleum sector contributes increasingly to emissions in the same period.

Policies and measures implemented since 1990 with the highest potential of reducing emissions are the CO_2 Tax, ETS and the Pollution Act. Other regulations are the Climate Change Agreement with the aluminium industry, and measures to reduce N_2O emissions from the production of nitric acid (Norwegian Ministry of the Environment, 2012).

Since 2008, Norway is part of the EU ETS.

The most conspicuous reductions have taken place in the petroleum sector, with annual reductions of 5 $MtCO_2$ due to the CO_2 tax and ETS (compared to BAU). Due to the CO_2 tax, Norway has separated and injected 1 $MtCO_2$ annually since 1996 at the Sleipner formation below the North Sea (Ministry of Petroleum and Energy, 2011).

Interesting particularities of the Norwegian situation:

- Norway has an extremely large renewable share (99% of electricity production), which makes emissions reduction in the energy sector difficult. Additional measures would imply shifting from fossil fuel use to renewable electricity.
- Petroleum production is entering a phase where the production fields are getting older and more energy intensive per unit produced, causing increased emissions even if production is stable.
- A support scheme for renewable electricity production was introduced in 2012 (green certificate system) and will provide 13 TWh new clean production by 2020. This could be used to phase out fossil energy use in building and transport, but can also be exported to neighbouring countries. A third alternative is to use the energy for industry purposes, for instance aluminium production.

It remains to be seen what the final utilisation of the new renewable electricity will be, as there are options with differing implications for Norway's emissions. Part of the additional renewable electricity could be used to cover increasing demand resulting from population growth; the demand is also dependent on the level of ambition of implemented energy conservation measures. Another option is to replace the entire Norwegian vehicle fleet with electric vehicles. This could use around 8-10 TWh and reduce emissions from fuels by 5 $MtCO_2$ (Zero, 2013). However, the official policy is aiming at a share of 5% electric vehicles by 2020. Since it is not clear what the additional renewable electricity would achieve, we have not included the resulting potential emission reductions.

Amendments to policy instruments implemented after 2007 are projected to provide a reduction in Norwegian emissions of up to 5 $MtCO_2e$ in 2020 (Norwegian Ministry of the Environment, 2012). The most significant reductions are listed in Table 22 below. Please note that these calculations are carried out on a very uncertain basis, and are therefore not included in our analysis. If verified these activities would contribute to bring Norway's emissions closer to its target.

Changes in energy use and electrification of off-shore installations are estimated to contribute a reduction of almost 2 $MtCO_2e$. New measures in private transport will also result in a 1 $MtCO_2e$ reduction.

Policy	Implications
Changes in energy use, electrification of platforms	Estimated reduction of 1.6 $MtCO_2e$ by 2020
Emission trading scheme (EU ETS)	Estimated reduction of 11 $MtCO_2e$ by 2020 (compared to BAU) (but also includes buying allowances abroad)
N_2O reduction due to new technology in fertilize production	Reductions of up to 1.3 $MtCO_2e$ by 2020
Policy changes for private transport	Reductions of 1 $MtCO_2e$ by 2020

Table 22 - Most relevant policies included in current trends for Norway

4.18.4 Data sources and assumptions

Pledge

Targets for 2020 were calculated from the most recent national inventory submissions (2013).

While Norway intends to become a carbon neutral nation, only part (two-thirds) of the cuts in total emissions by 2020 would be made domestically and would include their LULUCF sector, which is currently a large sink. We assume emissions excluding LULUCF decrease to 80-95% below 1990 by 2050.

Norway has stated that they will maintain 1990 as their historic reference level for forest management.

Current trends

The current trend projections are based on the white paper no. 12 (2012-2013) (Norwegian Ministry of Finance, 2013). Historical data is based on CRF 2013.

Sources

CRF (2013). UNFCCC AWG-KP Submissions 2013. Common Reporting Format.

Government of Norway (2012a) Information by Parties included in Annex I listed in annex 1 to decision 1/CMP.7 on their quantified emission limitation or reduction objectives for the second commitment period under the Kyoto Protocol

Government of Norway (2012b) Submission to the Ad-Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP): Information by Parties included in Annex I listed in annex 1 to decision 1/CMP.7 on their quantified emission limitation or reduction objectives for the second commitment period under the Kyoto Protocol, 8 May 2012

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Norwegian Ministry of Petroleum and Energy (2011). Fullskala CO_2-håndtering. Stortingsmelding Nr. 9 (2010-2011) (white paper)

Stoltenberg et al (2009) New policy platform for the red-green coalition Government Press release, Press release 7.10.2009, No.: 156/09

Zero (2013): Calculations on low-emission standards in vehicles by Benjamin Myklebust. Unpublished, available on request. Zero Emissions Resource Organisation, Oslo, Norway.

4.19 Russia

4.19.1 Assessment

Russia pledged to reduce emissions by 15% to 25% relative to 1990 emissions by 2020. This is rated Inadequate, since their commitments by 2020 are above expected BAU projections[14] which represent a development without additional measures after 2009 until 2020. According to our analysis, the currently implemented policies will lead to a 25% lower emission level in 2020 than the pledge level, as illustrated in Figure 23.

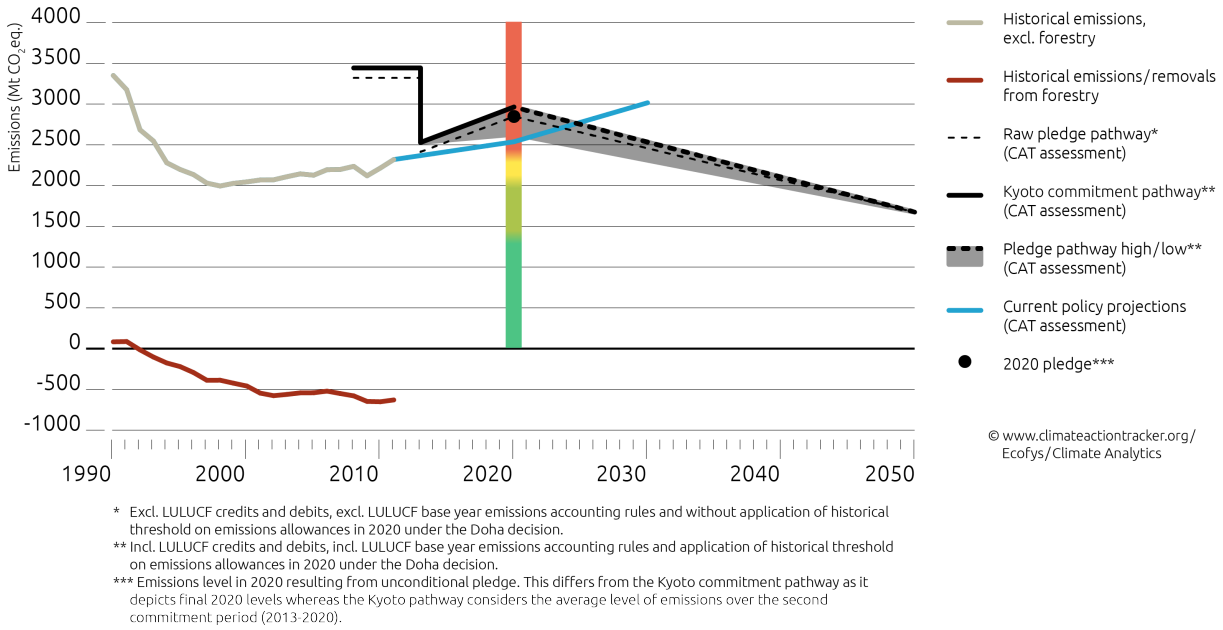

Figure 22 - Historic emissions and current emission trends in Russia

4.19.2 Pledge description

The Russian Federation pledged in the Copenhagen accord a reduction of 15 to 25% relative to 1990 emissions by 2020. Their commitments by 2020 are above BAU projections. LULUCF crediting based on presently available, but incomplete data provides a large increase to the allowed emission limits in 2020. Without LULUCF credits, even the 25% reduction target will leave Russia's emissions above the BAU range.

[14] BAU projections are mainly based on growth rates from the IEA's projections in the World Energy Outlook 2009. We use these to compare to the pledges, as they reflect policies in place before Copenhagen pledges were made, but not additional policies implemented since.

Russia's Kyoto target for the first commitment period is 0% relative to 1990 emission levels, which is also above BAU emissions and led to a surplus of 6 $MtCO_2e$ for the first commitment period under the Kyoto Protocol.

Kyoto Protocol

Member of KP CP1	yes
Member of KP CP2	no
KP CP1 target (below 1990)	0%
KP CP2 target (below 1990)	n.a.

Convention

Copenhagen pledge	-15%/-25%
Reference for pledge	1990 emissions

Conditions (for higher pledge level):

a) appropriate accounting of the potential of Russia's forestry sector,

b) the undertaking by all major emitters of legally binding obligations to reduce emissions

National goals

Long term goal(s)	50% by 2050 below 1990 levels

4.19.3 Current trend description

Currently implemented policies will lead to emissions of 2,539 $MtCO_2e$ (excluding LULUCF) in 2020 and 3,017 $MtCO_2e$ in 2030. This represents a decrease of emissions from 1990 levels of 24% in 2020 and 10% in 2030. Emissions from land use play an important part in Russia's inventory. If these were taken into account, emissions including LULUCF would be 27% lower, at 1,752 $MtCO_2e$ in 2020, assuming the same share of LULUCF as in 2011. Considering the uncertainties around the LULUCF accounting, the additional effect is questionable and depends on policy interventions in the future.

Emissions in Russia dropped after 1990, with a historic low of just below 2 $GtCO_2e$ in 1998 - down 40% from 1990 levels. Since then emissions have increased steadily, experiencing only a small impact from the financial crisis, and are expected to continue on the same trend until 2030.

Russia's climate policy environment has a clear focus towards energy production and demand. Current energy efficiency legislation sets targets for energy intensity (reduce energy intensity of GDP in 2020 by 40% from 2007 value) and provides a basic framework for reducing energy consumption. Most of the detailed policy measures in that policy area, like building codes and heat efficiency laws are outdated (before 2003). Main policies included in current trend calculations are listed in Table 23.

Policy support for introducing renewable technologies for electricity generation are compared to its potential low. The targets set by the State Policy of Energy Efficiency were already achieved in 2010 and therefore no additional reduction effect was quantified.

The most recent piece of legislation that will have a mitigation effect is a government decree to reduce flaring from natural gas production. This sets a 5% limit for gas flaring for the year 2012 and subsequent years with fines imposed if this threshold is exceeded or there is no measurement equipment in place.

Name of Policy	Implications
2009 Energy Efficiency legislation (Federal Law 261 F3) " On Saving Energy and increasing Energy Efficiency"	Small reduction effect compared to BAU, since energy use in general is still declining
Reduce Emissions from flaring - 5% limit for gas flaring for the year 2012	Reduction depends on future gas production that will depend on future growth.
State Policy of Energy Efficiency Increase through Use of Renewables for the Period up to 2020 (guidelines approved by Government Decree No. 1r)	No additional reduction effect, since the targets were already achieved in 2010

Table 23 - Most relevant policies included in current trends for Russia

4.19.4 Data sources and assumptions

Pledge

Targets for 2020 were calculated from the most recent national inventory submissions (CRF, 2013).

We calculated the Russian Federation's LULUCF accounting quantities in 2020 for afforestation, reforestation and deforestation using the current Kyoto rules. For forest management the reference level is the 1990 carbon budget.

Current trends

The current trend projections are based on the World Energy Outlook 2012 Current Policy scenario projections for CO_2 only until 2030, (IEA, 2012) the US EPA non-CO_2 (US EPA, 2012) emission projections until 2030, Edgar for non-CO_2 (JRC/PBL, 2012) and inventory data submitted to the UNFCCC until with the last historic data year being 2011 (CRF, 2013). The reduction from limiting flaring is based on projections for gas production of the BP energy outlook (BP, 2013), and IEA data for historical levels.

Sources

BP, (2013), BP energy outlook

CRF (2013). UNFCCC AWG-KP Submissions 2013. Common Reporting Format.

IEA (2012) World Energy Outlook 2012. International Energy Agency. Paris

JRC/PBL (2012) Edgar Version 4.2 FT2010. Joint Research Centre of the European Commission/PBL Netherlands Environmental Assessment Agency.

Russian Federation (2011). Submission to the Ad-Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP): Forest management reference level

Russian Federation (2010a). Pledge of the Russian Federation to the Copenhagen Accord. Compiled in: Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention, UNFCCC (2011).

Russian Federation (2010b). Submission to the Ad-Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP): Land Use, Land Use Change and Forestry

Russian Federation (2009a). Further elaboration of the options, elements and issues contained in annex IV to document FCCC/KP/AWG/2008/3 and annex III to document FCCC/KP/AWG/2008/5, including on which proposals could address cross-cutting issues, and how, 17 February 2009

Russian Federation (2009b). Submission to the Ad-Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP): Data on forest management , 27 November 2009

Russian Federation (2002). Third National Communication of the Russian Federation, Moscow, 2002.

USEPA (2012). Global Mitigation of Non-CO_2 Greenhouse Gases, Washington, D.C., USA.

4.20 South Africa

4.20.1 Assessment

South Africa proposes mitigation actions which will result in a deviation below the baseline emissions of 34% by 2020 and by 40% by 2025. A full assessment is not possible at this point. The range of the current trends scenario overlaps with the range of the projected BAU reference levels, see Figure 23. The additional reductions from currently implemented policies are marginal.

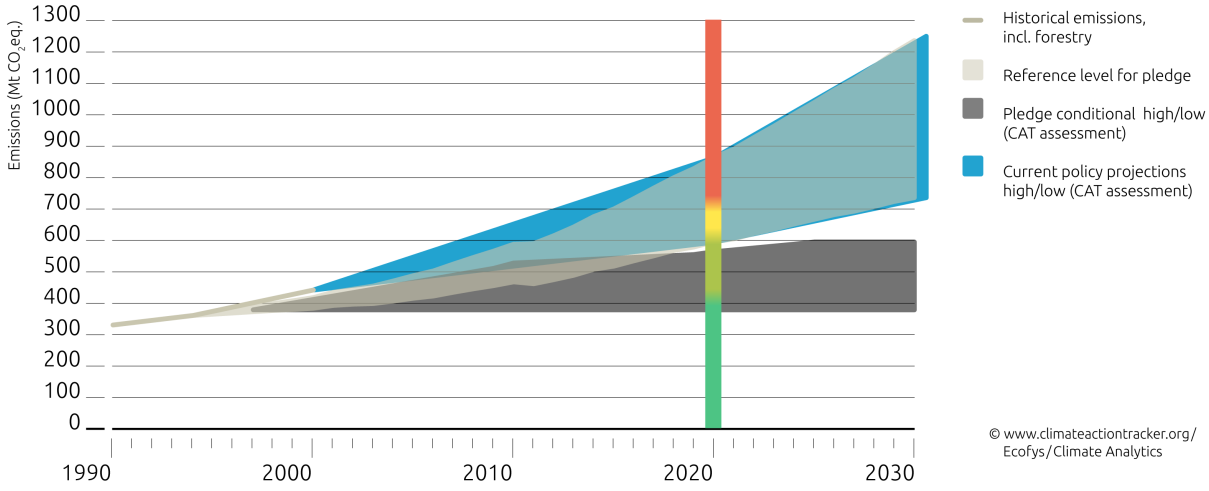

Figure 23 - Historic emissions, BAU, Copenhagen pledge and current emission trends in South Africa

4.20.2 Pledge description

South Africa pledged to undertake mitigation actions which will result in a deviation below the current emissions baseline of 34% by 2020, and by 42% by 2025. The target was proposed during the Copenhagen negotiations and submitted to the Copenhagen Accord on 29 January 2010.

Based on this, South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade and then decline in absolute terms thereafter. This characterizes a peak-plateau-decline (PPD) trajectory. This undertaking is conditional on a fair, ambitious and effective agreement in the international climate change negotiations under the Climate Change convention and the Kyoto Protocol and the provision of support from the international community.

In October 2011, South Africa provided an explanatory note with further details on their "business-as-usual" trajectory, and on the

Convention	
Copenhagen pledge	-34%by 2020
	-42% by 2025
Reference for pledge	BAU
Conditions	
A fair, ambitious and effective agreement under the Climate Change convention and the Kyoto Protocol and the provision of support from the international community.	
Long term goal(s)	40% below BAU in 2025
	Stabilization at this level
	Decrease after 2035

lower and upper limits of their PPD trajectories. The pathways start in 1994 and are consistent with data submitted in the 2nd National Communication for that year. In the year 2000, which is the most recent data point, historic data given in the National Communication is higher than the reference scenario. The quantification of expected pledge levels based on national BAU result in a range of 453 $MtCO_2e$ to 730 $MtCO_2e$ in 2020 including LULUCF.

4.20.3 Current trend description

Currently implemented policies have so far had little effect on the emission trend. Current policy-based projections are estimated to lead to an emission level of 596 to 864 $MtCO_2e$ in 2020 including LULUCF, which is equal to the range of BAUs. For 2030, the current trend analysis suggests a small reduction compared to BAUs, ranging from 736 to 1236 $MtCO_2e$ including LULUCF. Emissions from land use change reduced emissions by 20 $MtCO_2e$ in 2011 and are historically stable. Most relevant policies included in current trends for South Africa are listed in Table 24.

The large resulting range is mainly based on the range of BAUs that are used for this analysis, however it also highlights the very uncertain future development of South Africa.

Historically, South Africa's emissions have steadily increased throughout the time frame where data is available. South Africa's economy relies heavily on mining and heavy industry. Energy consumption in the industrial and buildings sectors relies largely on electricity as an energy source, which is produced with high carbon intensity using domestic coal. A large share of industrial-process emissions is due to coal use and a high share of transport fuels are domestically produced by coal-to-liquid processes. Overall it is estimated that 75% of South Africa's emissions result from coal use.

The effectiveness of South African climate policy is strongly influenced by barriers to implementation. For example, in 2009, South Africa implemented a promising feed-in-tariff, with rates for wind energy that were higher than those offered in Germany and those proposed in Ontario, Canada. However, the tariff has had no impact on renewable deployment so far.

The government has instead introduced in 2012 a bidding process to replace the feed-in scheme. The total capacity that should be funded by the bidding process is 3,725 MW in a timeframe of 20 years (2010 – 2030). In the first bidding round, 1,043 MW was approved and is currently under construction (Department of Energy (DOE) 2012).

The Integrated Resource Electricity Plan 2010 – 2030 sets a new installed renewable capacity target of 17.8 GW for 2030. But due of lack of supporting policies this target is not quantified further here.

The National Climate Change Response Paper identified key policy areas and packages (flagship programmes) that are planned for future implementation. It focuses mainly on adaption activities, but also addresses mitigation options such as the Energy Efficiency and Demand Management flagship programmes that will cover development and facilitation of an aggressive energy efficiency programme in industry.

Name of Policy	Implications
Integrated Resource Electricity Plan 2010 – 2030	No additional reduction expected
National Climate Change Response White Paper	No effect
Renewable Energy Independent Power Producer Programme (REIPPP)	Medium impact since the additional capacities will lead to 1% of electricity generation which is due to increasing electricity demand and the dependence on coal very low
Integrated Resource Electricity Plan 2010 – 2030	No additional reduction expected

Table 24 - Most relevant policies included in current trends for South Africa

4.20.4 Data sources and assumptions

Pledge

For historic emissions, we use the 2nd National Communication. For baseline projections and the pledge we use data provided by the South African government in their White Paper on Climate Change in 2011 (Department of Environmental Affairs, 2011)

Current trends

The current trend analysis is based on the national greenhouse gas inventory submitted to the UNFCCC (Department of Environmental Affairs (2011); projections for the BAU are based on national data. The assessment of the main policy is based on own assumptions and national data.

Sources

Department of Energy (DOE) (2012), New bidding process for Renewable Technologies . Republic of South Africa. Pretoria, DEA.

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DEA (2011a). Explanatory note: Defining South Africa's Peak, Plateau and Decline Greenhouse Gas Emission Trajectory. Department of Environmental Affairs. Republic of South Africa. Pretoria, DEA.

DEA (2011b). South Africa's Second National Communication under the United Nations Framework Convention on Climate Change Department of Environmental Affairs. Republic of South Africa. Pretoria, DEA.

DEAT (2007). Long Term Mitigation Scenarios. Strategic Options for South Africa. Department of Environmental Affairs and Tourism. Republic of South Africa. Pretoria, DEAT.

Republic of South Africa (2011). National Climate Change Response White Paper (5 December, 2012).

Republic of South Africa(2010). South Africa's pledge to the Copenhagen Accord. Compiled in: Compilation of information on nationally appropriate mitigation actions to be implemented by Parties not included in Annex I to the Convention, UNFCCC (2011)

4.21 South Korea

4.21.1 Assessment

South Korea pledged to reduce its emissions by 30% below reference emissions in 2020. With current policies South Korea is not expected to meet the pledge, even though the policy package provided is very innovative and exceptional for non-Annex I countries. This is illustrated in Figure 24 below.

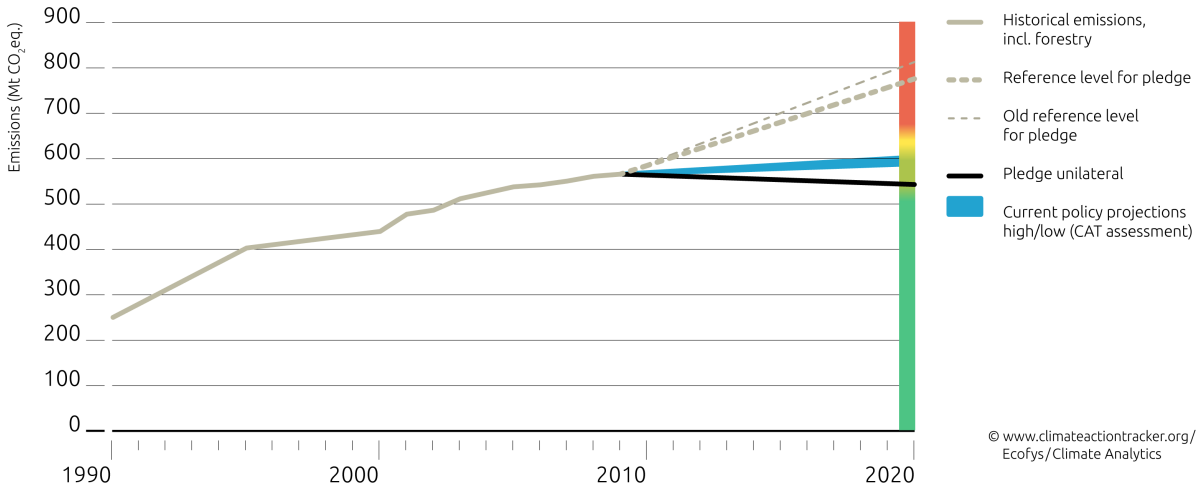


Figure 24 - Historic emissions, BAU, Copenhagen pledge and current emission trends in South Korea

4.21.2 Pledge description

Convention	
Copenhagen pledge	-30%
Reference for pledge	BAU
Conditions	none
National goals	
Long term goal(s)	none

South Korea has agreed to reduce its emissions by 30% below reference emissions in 2020. The target was proposed in November 2009 and submitted to the Copenhagen Accord on 25 January 2010.

In its 3rd National Communication (2012), South Korea lowered its BAU projections to 776 $MtCO_2e$ in 2020 from projections provided earlier of 813 $MtCO_2e$. It notes that "this recalculation does not change the 30% reduction goal rate". South Korea is the only country that increased the stringency of its pledge by correcting BAU emissions downwards. Under the new BAU projections the pledge would result in emissions of 543 $MtCO_2e$ in 2020.

4.21.3 Current trend description

Current implemented policies are expected to lead to emission levels of 589 to 603 $MtCO_2e$ in 2020 including emissions from LULUCF. The main policies included in the current trend for South Korea are highlighted in Table 25.

Emissions from land-use change reduced emissions by 20 $MtCO_2e$ in 2011 and had historically been stable at between -19 and -20 $MtCO_2e$.

South Korea's emissions have more than doubled between 1990 and 2010. Emissions steeply increased in the early 1990s. Growth then continued at a slower pace. Growth is currently continuing to slow. While South Korea's energy intensity has been slowly declining, it is still very high, and will foreseeably remain above the OECD average in the coming years. South Korea has a high share (31%) of nuclear energy.

South Korea successfully implemented its Green Growth Strategy, which provides a very comprehensive policy package targeting all policy areas including climate change. One of the key policies is the cap and trade scheme scheduled for 2015, which is already operating (under the name "Target Management System") to prepare companies for participation.

South Korea introduced the Target Management System (TMS) in 2012. Sixty percent of total emissions are currently covered under the TMS. The full implementation will start in 2015 and cover all installations in the industrial and power sectors with annual emissions higher than 25 $ktCO_2e$. The absolute emission cap of the ETS is expected to be in line with the pledge. However, it is not yet clear what percentage of total national emissions will be covered under the system. Since there are still uncertainties about the measuring, reporting and verification (MRV) of emissions, we assume that the target of the scheme will not be fully achieved, resulting in a reduction range between 105 and 120 $MtCO_2e$, based on the national BAU.

The Renewable Portfolio Standard (RPS) was introduced in 2012 and is replacing a previous feed-in scheme. The new standard is obliging suppliers to meet annual generation targets from renewable energy. They begin with 2% and increase up to 12% in 2022 (Kemco, 2013). Since South Korea has already started implementing REN technologies but is still dependent on coal, the reduction effect is low compared to its potential.

For the residential building sector, the government has set up a subsidy program that is targeting one million homes to be supplied by renewable sources such as geothermal, solar PV, small wind or thermal solar. Fifty percent of the costs for each household will be subsidised. So far, the annual increase rate of the scheme, as well as the supporting modalities, seem to be successful and therefore we assumed that the target will be reached.

Both the RPS and the million green homes measures are expected to reduce emissions by 25 $MtCO_2e$ in 2020.

Name of Policy	Implications
One million green homes	Will reduce electricity demand in 2020
Renewable Portfolio Standard (RPS)	Diversification of energy mix and impact on emission reduction in 2020
Target Management System" (TMS)	Energy efficiency improvement in all industrial sectors covered

Table 25 - Most relevant policies included in current trends for South Korea

4.21.4 Data sources and assumptions

Pledge

Historical emissions are taken from the national communication. Reference emissions were taken from the 3rd National Communication (Republic of Korea, 2012).

.Current trends

The current trend projections are based on its inventory data submitted to the UNFCCC (Republic of Korea, 2012) and calculation methods developed by the CAT team and as in Roelfsema et al. (2013). Bottom up quantification was done for the upcoming ETS system (UNFCCC 2012), the one million green homes (Kemco, 2013b) and the new renewable portfolio standard (Kemco, 2013b). For our analysis of the ETS, we assume coverage to be the same as for the TMS.

Sources

Kemco (2013a). Background information on Renewable Portfolio Standards (RPS)

Kemco (2013b) Background information on 1 million green homes

Republic of Korea (2012). South Korea's 3rd National Communication to the UNFCCC

Republic of Korea (2010). South Korea's pledge to the Copenhagen Accord. Compiled in: Compilation of information on nationally appropriate mitigation actions to be implemented by Parties not included in Annex I to the Convention, UNFCCC (2011)

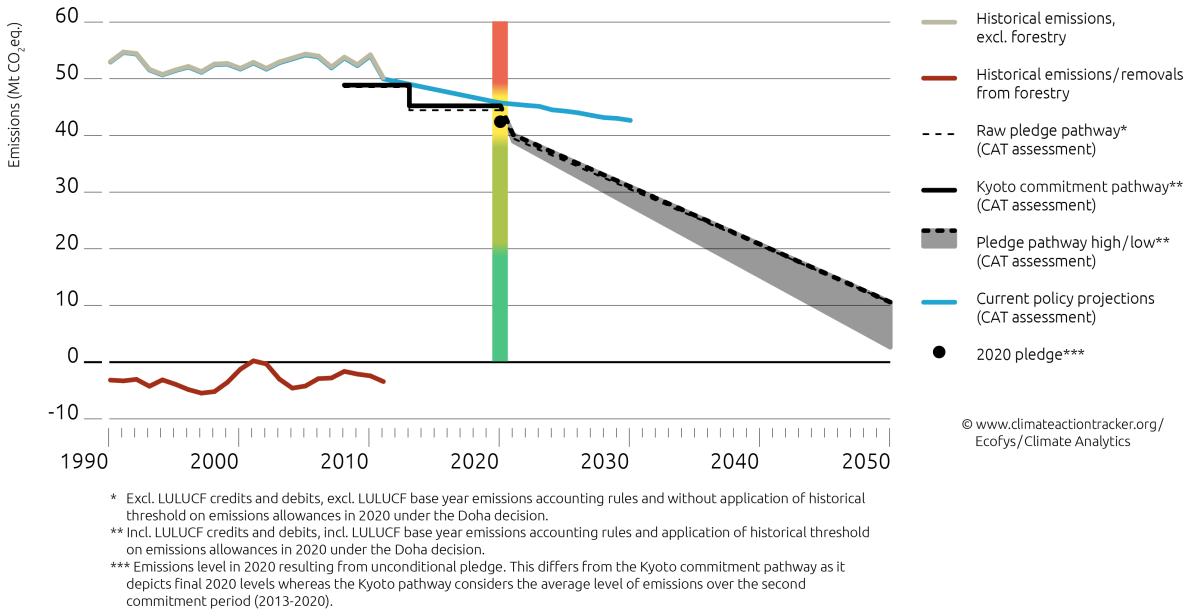
Roelfsema et al. (2013). Assessment of climate and energy policies of major emitting countries. PBL Netherlands Environmental Assessment Agency. Pub No. 1096.

UNFCCC (2012). Presentation about target management system

4.22 Switzerland

4.22.1 Assessment

Switzerland has made an unconditional commitment to decrease emissions by 20% relative to 1990 emissions. The national goal is to achieve this pledge domestically, without buying credits from abroad. With currently implemented policies and measures, it will not be able to meet this target, see Figure 25. Current trends project a decrease in emissions below 1990 levels of about 13.6% by 2020, leaving 5 $MtCO_2e$ to reach the pledge.



* Excl. LULUCF credits and debits, excl. LULUCF base year emissions accounting rules and without application of historical threshold on emissions allowances in 2020 under the Doha decision.
** Incl. LULUCF credits and debits, incl. LULUCF base year emissions accounting rules and application of historical threshold on emissions allowances in 2020 under the Doha decision.
*** Emissions level in 2020 resulting from unconditional pledge. This differs from the Kyoto commitment pathway as it depicts final 2020 levels whereas the Kyoto pathway considers the average level of emissions over the second commitment period (2013-2020).

Figure 25 - Historic emissions, BAU, Copenhagen pledge and current emission trends in Switzerland

4.22.2 Pledge description

Under the Kyoto Protocol, Switzerland submitted a QELRO level of 84.2 for the second commitment period, meaning that Switzerland's yearly emissions during the period of 2013-2020 are proposed to be 84.2% of 1990 levels.

Switzerland's current target in the first commitment period of the Kyoto Protocol is an 8% reduction.

Switzerland's preferred LULUCF option allows for a very small credit from accounting in 2020. LULUCF accounting was calculated based on Party-provided projections. If instead future emissions were to follow a historical mean, small debits could result. In addition, Switzerland supports proposals to remove emissions from natural disturbances and to count removals from harvested wood products. This has not been accounted for here, but could lead to higher credits (or lower debits).

Switzerland's commitment under the Convention for 2020 is to reduce emissions in the range of 20% to 30% relative to 1990 emissions. The -20% commitment is unconditional whilst the -30% is conditional on a global and comprehensive agreement. In such an agreement, other developed countries pledge comparable emission reductions, developing countries contribute according to their capabilities, and bunker fuels form part of global reduction objectives covered under a sectoral approach. Switzerland's Governmental processes on a 2050 target or goal are proceeding and not yet concluded, however, there are strong indications this will converge on a range of -80 to -95% from 1990 levels, as recently adopted by the European Union.

Kyoto Protocol

Member of KP CP1	yes
Member of KP CP2	yes
KP CP1 target (below 1990)	-8%
KP CP2 target (below 1990)	-15.8%

Convention

Copenhagen pledge	-20%/-30%
Reference for pledge	1990 emissions
Conditions (for higher pledge level)	
Global and comprehensive agreement, other developed countries take comparable emission reductions, developing countries contribute according to their capabilities, bunker fuels form part of global reduction objectives covered under a sectoral approach	

National goals

Long term goal(s)	-80-95% by 2050 (under discussion)

4.22.3 Current trend description

With currently implemented policies, Switzerland is expected to reach 45.7 $MtCO_2e$ emissions in 2020 (excluding LULUCF). This constitutes a decrease of 13.6% in relation to 1990 levels. Additional reductions are expected from the use of flexible mechanisms through the compensation requirements imposed on fossil transport fuels.

Historic emissions have fluctuated strongly without showing a clear trend. After a substantial drop in emissions in the early 1990s, emissions increased slightly, but with large annual variation. After a 3.3% increase in emissions between 2009 and 2010 in the recovery phase of the financial crisis, emissions dropped sharply by 7.5% in 2011.

The projection used in our analysis is mainly taken from the scenario “with additional measures” in the NC5. It includes the following measures: the continuation of the CO_2 levy, the building programme, a cap-and-trade system for energy-intensive companies, emission standards for new cars, a deposit on synthetic greenhouse gases, and the use of the flexible mechanisms to partially compensate for emissions from the transport sector.

The overall effect of policies and measures implemented since 1990 is estimated at around 10 $MtCO_2e$ by 2020. The largest reductions result from policies related to energy use and taxes. The main measures are outlined in Table 26 (FOEN, 2009, Energiestrategie 2050).

Policy	Implications
Building codes (MuKEn modules)	Energy efficiency standards for buildings
Building renovation programme	Subsidies with a total amount of CHF 300 million per year, funded by specifically allocated revenues from the CO_2 levy on heating fuels
CO_2 levy	Promotion of energy efficiency and less CO_2 intensive energy sources
Continuation of the CO_2 levy on heating fuels	CHF 36 per tonne CO_2 in 2013, possible increases in 2016 and 2019 up to a maximal amount of CHF 120 per tonne CO_2
Emissions trading system (ETS)	For energy-intensive companies with annual reduction of the emission cap by 1.74%
Federal and provincial building programmes	Refurbishment of buildings, promotion of renewable energy
Fossil fuel imports	Obligation for importers of fossil fuels to offset 5%-40% of CO_2-emissions by measures in the industry or the service sector.
Heavy vehicle fee (HVF) and supporting modal shift policies	Reduction of transalpine traffic, increased transport rates on rail
Ordinance on Air Pollution Control and incentive tax on VOC	Protection of the environment, reduction of air pollutant emissions
Requirements on devices and plants(Art. 8 Energy Act)	Increased energy efficiency
Requirements on fossil-fuel operated power plants (Art. 6 Energy Act)	Increased use of renewable energy sources
Tax incentives for low-emission vehicles and biofuels	Promotion of low-consumption vehicles

Table 26 - Most relevant policies included in current trends for Switzerland

4.22.4 Data sources and assumptions

Pledge

Targets for 2020 were calculated from the most recent national inventory submissions (2013) and based on the latest UNFCCC information on Convention pledges and Kyoto targets.

We calculated Switzerland's LULUCF accounting quantities in 2020 for afforestation, reforestation and deforestation using the current Kyoto rules and for forest management using a net-net approach with a projected reference level for 2013-2020. Switzerland has excluded emissions from extreme events in calculating their reference level.

Current Trends

Greenhouse gas emission inventories are available from 1990 to 2011 in the CRF 2013 submitted to UNFCCC. We use these historic values up to 2011 and then use growth rates based on Switzerland's Fifth National Communication under the UNFCCC, published in 2009.

Sources

CRF (2013). UNFCCC AWG-KP Submissions 2013. Common Reporting Format.

European Environmental Agency (2011). Survey of resource effiency policies in EEA member and cooperating countries. Country profile: Switzerland

Federal Office for the Environment (2009). Switzerland's Fifth National Communication under the UNFCCC, Bern.

Government of Switzerland (2012a) Information by Parties included in Annex I listed in annex 1 to decision 1/CMP.7 on their quantified emission limitation or reduction objectives for the second commitment period under the Kyoto Protocol

Government of Switzerland (2012b) Submission to the Ad-Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP): Information by Parties included in Annex I listed in annex 1 to decision 1/CMP.7 on their quantified emission limitation or reduction objectives for the second commitment period under the Kyoto Protocol, 4 May 2012

Government of Switzerland (2011) Switzerland's submission on reference levels as an accounting approach for forest management under the Kyoto Protocol

Government of Switzerland (2010a). Switzerland's pledge to the Copenhagen Accord. Compiled in: Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention, UNFCCC (2011).

Government of Switzerland (2010b). Forest Management reference level provided in presentation to Forest management accounting pre-sessional workshop on 30 July 2010

Government of Switzerland (2009a) Federal Act on the Reduction of CO_2 Emissions (CO_2 Act)

Government of Switzerland (2009b). Submission on Possible Options for Consideration Relating to Land-Use, Land-use Change and Forestry. 16 February 2009, FCCC/KP/AWG/2009/MISC.5

Switzerland (2009c) Joint submission by Australia, Belarus, Canada, Croatia, the European Community and its Member States, Iceland, Japan, Kazakhstan, Liechtenstein, Monaco, New Zealand, Norway, Russian Federation, Switzerland, Ukraine. Information relating to possible quantified emissions limitation and reduction objectives as submitted by Parties, Submission to the AWG-LCA ,,28 September to 9 October 2009

Ministerium für Umwelt, Transport, Energie und Kommunikation(2012): "Energiestrategie 2050: Erstes Massnahmenpaket."

4.23 Ukraine

4.23.1 Assessment

Ukraine pledged a target of a 20% emissions reduction by 2020 compared to 1990 levels. This target is rated as 'inadequate', since their commitments by 2020 are above business-as-usual projections. With current implemented policies Ukraine will meets its pledge, as illustrated in Figure 26.

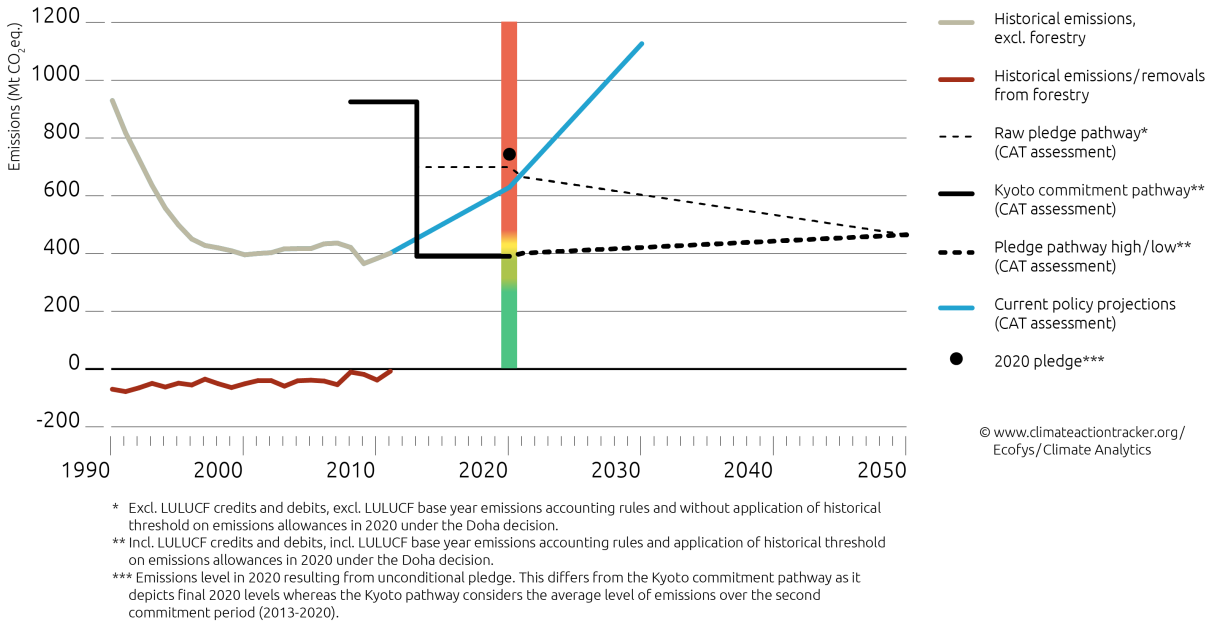


Figure 26 - Historic emissions, Copenhagen pledge and current emission trends in Ukraine

4.23.2 Pledge description

The Ukraine submitted a QELRO level of 76 for the second commitment period of the Kyoto Protocol. This represents a reduction of average annual emissions in the period of 2013 to 2020 of 16% below base year emissions. The target is conditional to full carry-over and no "cancellation or any limitation on use of this legitimately acquired sovereign property."

The Doha amendment limit targets for the second commitment period to the average historic emissions 2008-2010[15]. The Ukraine is the country most affected by this rule, which leads to a Kyoto pathway almost 310 $MtCO_2e/yr$ lower than the direct translation of their target for the period 2012-2020.

[15] This is part of the Doha decisions and constitutes part of the amendments to the Kyoto Protocol. Amendments only come into effect once they are ratified by Parties.

Ukraine's Kyoto target for the current commitment period is 0% below 1990.

The pledge under the Convention of a reduction of 20% below 1990 by 2020 is a conditional pledge based on agreed range of emission reductions for Annex I parties, Ukraine's status as an economy in transition, the flexible mechanisms, 1990 as base year and to be allowed to continue to carry over surplus AAUs (Article 3.13). Ukraine's internationally pledged emission level of 700 $MtCO_2e$ (20% below 1990 levels) for 2020 is on the upper limit of BAU emission projections (755 $MtCO_2e$ from the 5th National Communication).

4.23.3 Current trend description

Kyoto Protocol

Member of KP CP1 (2008-2012)	yes
Member of KP CP2 (2013-2020)	yes
KP CP1 target (below base year)	0%
KP CP2 target (below base year)	-14%
Condition on CP2 target	
Full carry over, no cancellation or limitation of use of units	

Convention

Copenhagen pledge	-20%
Reference for pledge	1990 emissions
Conditions	
Agreed range of emission reductions for Annex I Parties, status as an economy in transition, flexible mechanisms, 1990 as base year, use of to carry over surplus AAUs	

National goals

Long term goal(s)	-50% by 2050 compared to 1990 levels

Currently implemented policies are expected to lead to an emission level of 626 $MtCO_2e$ in 2020 and 1,127 $MtCO_2e$ in 2030 excluding LULUCF. Following the trend of LULUCF emissions in the last 10 years, we can expect no additional reduction from the sector in 2020. Main policies are listed in Table 27.

Between 1990 and 2000 emissions in the Ukraine dropped by 57% from 930 $MtCO_2e$ to 396 $MtCO_2e$. From 2001 to 2007 emissions started to increase again moderately to a level of 436 $MtCO_2e$ or 53% below 1990 , then dropped sharply again during the financial crisis in 2009. Since then emissions have increased by almost 5% annually.

In 2008, Ukraine introduced a feed-in-scheme with fixed prices, the so called "green" tariff for electricity. The green tariff also guarantees grid connectivity to all renewable power generated from the project. The feed-in tariffs are relatively high with 42 c€/kWh for solar PV and 11 c€/kWh on average for wind. In 2012, the tariffs have been updated and adjusted to the market levels. The amendment also included the introduction of obligatory "local content" rates expressed in percentage. The "local content" rate relates to a certain ratio of elements used in building renewable energy plants on the territory of Ukraine that must be manufactured in the country. This could be a barrier for implementation, since the additional burden to use local suppliers that might be more expensive could lead to decreased demand.

We expect that this updated regulation will lead to about 12% renewable electricity in 2020, taking into account implementation barriers. The share of renewable electricity was 7.5% in 2009, almost completely from hydro, which is also supported by the feed-in tariff from 2012 onward.

In the context of energy supply, Ukraine updated in 2013 its energy strategy until 2030. The strategy set new targets for different energy carriers such as electricity generation from renewable energy and nuclear. However, since there are no clear supporting policies discussed except the feed-in tariff, this strategy is not further quantified here.

The national policy scenario till 2020 of the last three National communications includes some energy efficiency measures and is line with the target (Government of Ukraine, 2009b).

Name of Policy	Implications
Green Tariff (Feed-in Tariff)	Reductions after 2020
Energy strategy for Ukraine until 2030	No reduction
Energy efficiency measures	Small reductions expected after 2020

Table 27 - Most relevant policies included in current trends for Ukraine

4.23.4 Data sources and assumptions

Pledge

Targets for 2020 were calculated from the most recent national inventory submissions (CRF 2013).

We calculated Ukraine's LULUCF accounting quantities for the first commitment period (2008-2012) for afforestation, reforestation and deforestation using the current Kyoto rules. The Ukraine has submitted information on their forest reference level which is equal to their 1990 forest management emissions and removals.

Current trends

The current policy scenarios is based on the national inventory submitted to UNFCCC for historical data, National Communication projections (Government of Ukraine, 2009) for the policy scenario till 2020 and calculations as prepared for Roelfsema et al. (2013) based on IEA energy balances (IEA 2012) for the effect of the feed-in scheme.

The national policy scenario was available, however, detailed information is not given. The feed-in scheme was updated in 2013 after publication of the policy scenario, so changes to this policy are not included in the policy scenario.

Sources

CRF (2013). UNFCCC AWG-KP Submissions 2013. Common Reporting Format.

IEA (2012). Energy balances. International Energy Agency. Paris.

Government of Ukraine (2011). Submission under the Ad-hoc working group on further commitments for Annex I Parties under Kyoto Protocol: Land Use, Land Use Change and Forestry

Government of Ukraine (2010). Ukraine's pledge to the Copenhagen Accord. Compiled in: Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention, UNFCCC (2011).

Government of Ukraine (2009a). Submissions by Parties, FCCC/KP/AWG/2009/MISC1/, contribution of Annex I Parties, individually or jointly, to the scale of emission reductions to be achieved by Annex I Parties in aggregate.

Government of Ukraine (2009b). 5th National Communication.

Roelfsema et al. (2013). Assessment of climate and energy policies of major emitting countries. PBL Netherlands Environmental Assessment Agency. Pub No. 1096.

4.24 United States

4.24.1 Assessment

The USA pledged to reduce emissions by -17% relative to 2005 emissions in 2020 (equivalent to -3% relative to 1990 levels). According to our analysis, the country will not achieve this pledge without additional policies, see Figure 27.

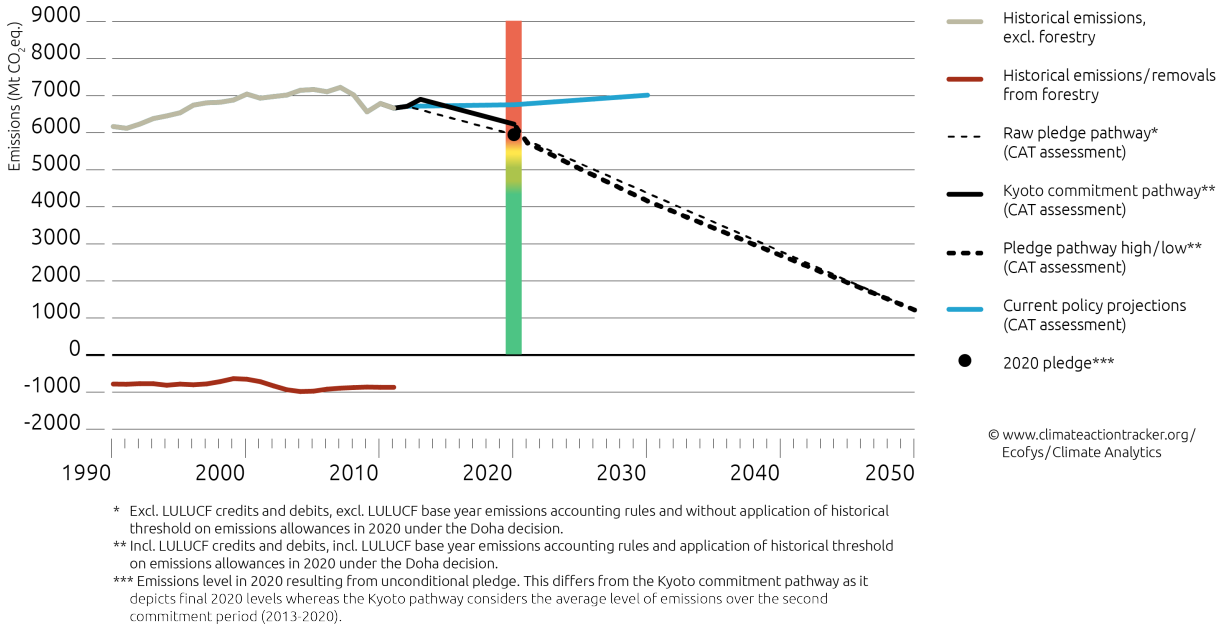


Figure 27 - Historic emissions, BAU, Copenhagen pledge and current emission trends in the USA

4.24.2 Pledge description

The United States is not a Party to the Kyoto Protocol. While a target of 7% reduction below 1990 was originally negotiated, it never ratified the Protocol and the target never came into force.

In the Copenhagen Accord, the USA announced reductions of 17% relative to 2005 levels. In absolute terms, this means a level of 6,235 $MtCO_2e$ in 2020 (excl. LULUCF). They also stated a long-term target of reducing emissions by 83% by 2050 (United States Department of State, 2010). At the UNFCCC workshop in April 2011, the USA reaffirmed the 17% reduction below 2005 in 2020 as an economy-wide target to be implemented through various national policy instruments. It stated that the target applies to all sectors according to the agreed IPCC guidelines for national greenhouse gas inventories. Forests will be accounted

Kyoto Protocol	
Member of KP CP1	no ratification
Member of KP CP2	no
KP CP1 target (below 1990)	n.a.
KP CP2 target (below 1990)	n.a.
Convention	
Copenhagen pledge	-17%
Reference for pledge	2005 emissions
Conditions (for higher pledge level)	no range
National goals	
Long term goal(s)	83% by 2050 below 2005 level

according to the broadest possible scope.

There is significant uncertainty surrounding the consequence of this target for reductions in industrial GHG emissions (all emissions excluding LULUCF) due to uncertainties in the LULUCF emission estimate. If the estimate based on official data reported in 2009 is used, this target would likely translate to a +3% increase relative to 1990 level industrial emissions, whereas the estimate based on data reported in 2010 would result in a likely -3% reduction from 1990 levels for industrial emissions. Estimates based on the CRF data reported in 2011 indicate that industrial emissions would be close to 1990 levels. The important issue is that these uncertainties arise from the same or very similar historical periods and differences are a result of technical revisions to data and methods. In addition, the USA mentioned that LULUCF adjustments may be made for natural disturbances and other factors, but details were left unclear.

4.24.3 Current trend description

With currently implemented policies, the USA is expected to achieve emission levels of approximately 6,760 $MtCO_2e$ in 2020 and slightly above 7,000 $MtCO_2e$ in 2030 (excl. LULUCF). It would not achieve its pledge, unless LULUCF accounting would add significant reductions. With additional measures as suggested by the Obama government in "The President's Climate Action Plan" (CAP) in June 2013 (Executive Office of the President 2013), the pledge could be achieved without LULUCF. Most relevant policies included in current trends for USA are listed in Table 28.

Historically emissions have been constantly increasing between 1990 and 2007. The financial crises from 2008 led to a drop in emissions. In 2010 emissions started to increase again, but 2011 saw a downward move resulting mainly from a strong shift to natural gas as an energy source.

In the USA, a variety of activities are taking place both on state and federal level and in all sectors. Nevertheless, a more comprehensive approach with adequate coverage and momentum could more substantially reduce emissions. One example for a current policy with a significant impact in terms of affecting the structure of a sector and reducing emissions in the long term is the second phase of standards for light duty vehicles starting in 2017. The 'New Source Performance Standard' limiting emission intensity of new constructed power plants, will have hardly any effect on future emissions, according to previous analysis by Ecofys and PBL (Roelfsema et al. 2013a) and the US Environmental Protection Agency's own impact analysis (United States Environmental Protection Agency 2011). The reason for this is that currently low gas prices already favour new natural gas over coal fired power plants.

Name of Policy	Implications
Light duty vehicle standard, phase II	Mainly long-term impact (after 2020)
New Source Performance Standard	Hardly any deviation from BAU due to low gas prices.
The President's Climate Action Plan	Targets set would lead to achieving the pledge, but no concrete legislation yet in place.

Table 28 - Most relevant policies included in current trends for USA

The USA's Draft 6th National Communication contains a scenario including activities from the CAP that complies with the pledge. Although some of the activities are already underway and are building upon past efforts, the doc-

ument indicates that the details of most actions are yet to be developed and speaks of the "potential scale of additional reductions" when presenting the emission scenario.

Activities planned in the CAP likely to significantly reduce emissions in the energy sector are (1) the target and supporting mechanisms of doubling renewable energy generation, and (2) the introduction of emission limits for existing coal fired power plants. Together, both policies support immediate emission reductions as well as a transformational change towards a more sustainable energy supply. Another important area in the CAP is energy efficiency in demand sectors, where it foresees for example energy efficiency standards for appliances and federal buildings, different financial incentives, and energy saving measures in federal agencies. In the non-energy area, the plan includes measures around methane emissions, controlling HFCs and in the LULUCF sector, which need further refinement to be evaluated.

A few points from the CAP already manifested in concrete activities in 2013. The process to permit RE installations on public land has been changed, making it less complicated to prioritise renewable energy (U.S. Department of the Interior 2013b). Also, the auctioning of renewable energy is an established process which can be accelerated or kept moving (see for example U.S. Department of the Interior 2013a).

The emission reductions from the activities in 2013 as well as planned activities are not yet included in our quantitative analysis, as these will depend on future decisions and actions. However, the framework being created at the moment is crucial to prepare for future actions and demonstrates that the US government is creating opportunities to push forward climate change policies.

4.24.4 Data sources and assumptions

Pledge

Targets for 2020 were calculated from the most recent national inventory submissions (CRF, 2013).

The US have announced that they prefer a comprehensive, land-based approach that takes advantage of the broadest scope of mitigation actions. For the post 2012 period (2013-2020), LULUCF accounting was calculated using a land-based approach, which assumes net-net accounting relative to 1990, using data from the national inventories (CRF, 2012).

Current trends

For the projections, we sum up energy related emission projections from EIA's Annual Energy Outlook 2013 (US Energy Information Agency, 2013), non-CO_2 emissions from the EPA's Global Non-CO_2 GHG Emissions: 1990-2030 (USEPA, 2006b), and non-energy related CO_2 emissions from EDGAR 4.2 (JRC/PBL, 2012).

Sources

CRF (2013). UNFCCC AWG-KP Submissions 2013. Common Reporting Format.

CRF (2012). UNFCCC AWG-KP Submissions 2012. Common Reporting Format.

Department of the Interior, 2013a. Historic Sale for Wind Energy Development Offshore Virginia Advances President's Climate Action Plan. Washington, D.C., USA.

Department of the Interior, 2013b. Land Management Rule Will Facilitate Renewable Energy Development on Public Lands. Washington, D.C., USA.

Energy Information Administration (2013). Annual Energy Outlook 2013. with projections to 2040. Washington, D.C., USA.

Environmental Protection Agency (2012). Global Mitigation of Non-CO_2 Greenhouse Gases, Washington, D.C., USA.

Environmental Protection Agency (2011). Regulatory Impact Analysis. Proposed New Source Performance Standards and Amendments to the National Emissions Standards for Hazardous Air Pollutants for the Oil and Natural Gas Industry. Washington, D.C., USA.

Executive Office of the President, U.S. (2013). The President's Climate Action Plan final Washington, D.C., USA.26 June, 2013.

JRC/PBL (2012). Edgar Version 4.2 FT2010. Joint Research Centre of the European Commission/PBL Netherlands Environmental Assessment Agency.

Roelfsema et al. (2013). Assessment of climate and energy policies of major emitting countries. PBL Netherlands Environmental Assessment Agency. Pub No. 1096.

United States Department of State (2010). Pledge of the USA to the Copenhagen Accord. Compiled in: Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention, UNFCCC (2011).

US Delegation (2011). USA's presentation at the UNFCCC workshop in Bangkok 4 April 2011. United States.

4.25 Other countries

For some of the countries, especially smaller countries, it was not possible to obtain data to be able to assess the current trend. These are Bhutan, Israel, Moldova, PNG, Maldives and Singapore. Together these countries represented emissions of 193 $MtCO_2e$ in 2010, representing 0.39% of global emissions (EDGAR, 2011). From a global point of view changes in trajectories for these countries are expected to have marginal effects.

For this analysis, we make the assumption that these countries continue on their BAU trajectories.