Climate shuffle

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Summary

National action on climate change mitigation appears to be joining the international climate negotiations in the new and ever popular "climate shuffle" dance. It involves maximum effort and motion while staying in the same spot…or even, in some cases, going backwards.

Recent emissions trends and estimates of the effects of those policies in place and proposed lead to a new estimate that warming is likely to approach 4°C by 2100, significantly above the warming that would result from full implementation of the pledges (3.3°C). The continuous global fossil-fuel intensive development of the past decade suggests that high warming levels of 4°C are more plausible than assuming full implementation of current pledges. Evidence is ever increasing that existing and planned policies are not sufficient for countries to meet these pledges.

Emissions on the rise…

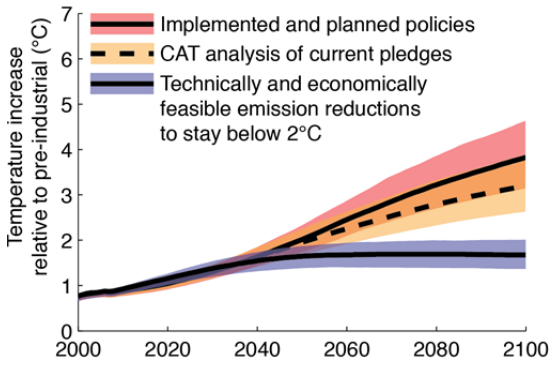
Our analysis shows that current emissions and policies - and future emission trends - are likely to lead to higher 21st century emission levels than previously projected. This, in turn, implies a higher level of warming by 2100.

Assuming current emissions trends, implemented and presently planned policies there is a 40% chance of warming exceeding 4°C by 2100 and a 10% chance of it exceeding 5°C in the same period, with a likely warming projected at 3.8°C by 2100. For this analysis, the Climate Action Tracker (CAT) has analysed many developments, both for individual countries and for sectors. We take into account the findings of several major recent publications (e.g. IEA's World Energy Outlook 2012 and UNEP's Emissions Gap Report 2012), which estimate the consequences of present and planned policy measures.

In earlier assessments the CAT has used projections of the effects of pledges, assuming that they would be fully implemented. This also includes pledged reductions to low levels by 2050 for some countries. Under this assumption a warming of 3.3°C above preindustrial levels by 2100 would result. It is becoming clear, however, that currently implemented policies are not sufficient to fully implement these pledges and that emissions are likely to be higher if no further policies are introduced. As a

consequence the warming projections above are based on projections that account for the effects of mitigation measures presently foreseen in recent IEA and UNEP Gap report assessments, which result in emissions significantly higher than the pledge case. This brings the emissions and warming close to the CAT Business as Usual (BAU) projections.

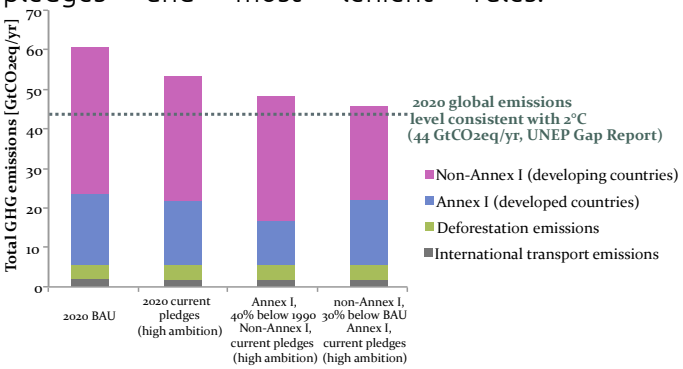
For the very long-term implications, we note that any scenario (such as the CAT projection) that leads to 3-4°C by 2100 is unlikely to stabilise at that level. Emissions scenarios leading to such warming would very likely lead to considerable further warming after 2100 as, for example, the response of the oceans needs centuries to "catch up" with 21st century emissions.



Global-mean temperature increase from implemented & planned policies without further action, compared to full implementation of currently pledged (future) emission reductions. The 2°C scenario is the lowest scenario published ahead of IPCC's Fifth Assessment Report. Shaded areas indicate carbon-cycle and climate-system uncertainties.

The emissions gap: where are we?

The gap between the sum of all countries' current pledges and what is needed for a path to keep global warming below 2˚C is around 8 billion tonnes of CO_2 equivalent if countries adopt their highest pledges and agree to strict rules - and 13 billion tonnes of CO2 equivalent if they adopt their weakest pledges and most lenient rules.



The UNEP Emissions Gap Report identified that global emissions would need to be at a level of no more than 44 GtCO2eq in 2020 to be in line with a 2°C pathway. The assumed land-use, land-use change and forestry emissions gap is around 3.5GtCO2eq, so the energy-related emissions by 2020 should be curbed to achieve levels of 40.5GtCO2eq.

If Annex 1 countries delivered the most ambitious end of the 25- 40% reductions, as suggested in the IPCC AR4 report, the gap could be narrowed by 5.6 $GtCO_2eq$. Although this would represent a considerable step towards closing the gap, it would still require non-Annex 1 countries to reduce energy emissions by 5.2 and 6.2 $GtCO_2eq$. This could be reduced by 1$GtCO_2$ by improving land use and reducing deforestation (Brazil, Indonesia).

According to a range of models for fair burden sharing, non-Annex 1 countries should, as a group, keep emissions 15-30% below baseline projections.

If non Annex 1 countries achieved 30% below baseline, and Annex 1 delivered on the most ambitious of their current pledges, the gap between what would be achieved and what is needed to keep warming below 2°C would be around 1.5 $GtCO_2eq$. This gap could be filled by Annex 1 achieving an average of 20% reductions below 1990 levels.

In summary, it is abundantly clear that both Annex 1 and non-Annex 1 need to do more.

In the following sections we take a look at recent activities of Governments at national and international level and assess how this impacts our overall assessment of the emissions gap and the ability of countries to achieve their pledges.

Small steps forward…

China and US agreement on HFCs can make a difference

China and the USA have just announced an agreement to tackle emissions of HFCs. Phasing out HFCs can have an impact of up to 0.3 $GtCO_2e$ in 2020. Future growth is likely to be significant, but with a wide range of uncertainty. Phasing the gases out would reduce long-term warming by 0.1°C to 0.5°C depending on projected growth for future use without a phase out.

If action is passed from the UNFCCC to the Montreal Protocol, safeguards would have to be in place to ensure that decisions are actually implemented.

The adverse experience with the "outsourcing" of international marine and aviation emissions to ICAO and IMO urges that a cautious approach to this is taken by UNFCCC Parties: a sunset clause that brings the issue back to the UNFCCC after a fixed time could be considered.

The recently announced agreement between China and the USA aims to tackle emissions of HFCs, most of which are potent greenhouse gases (AFP, 2013). HFCs are used, for example, in refrigerators, air conditioners and by industry as solvents and for foam blowing. HFCs with a strong effect on climate should be phased out and replaced by gases like CH_4, CO_2, ammonia etc., depending on the application and sector.

The risk from HFCs is foremost one of future emissions growth, rather than an immediate threat, such as from CO_2 emissions. Recent projections suggest that emissions of HFCs, currently about 1 $GtCO_2eq/a$ globally, could grow to 4-9 $GtCO_2eq/a$ by 2050, largely driven by demand in developing countries. Short-term reductions by 2020 could close the gap by up to 0.3 $GtCO_2eq/a$.

Projections of HFC emissions by 2050 amount to 8 to 18% of global present-day emissions. If HFC emissions were to reach such high levels by 2050, warming could be higher 0.5°C compared to a case of complete HFC phase out. For lower growth projections impact on warming would be around 0.1˚C on this timeframe.

HFCs are in the basket of gases considered under the UNFCCC and can be dealt with by strengthening reduction pledges. Indeed, they are a low hanging fruit in emission reductions. The US/China agreement proposes to tackle these gases instead under the Montreal Protocol for Ozone Depleting Substances, although it is currently not part of that Protocol's mandate.

The Montreal Protocol, given its experience with these classes of gases, might be an effective venue for action on HFCs. There remains a risk of the issue becoming deadlocked there, and caution needs to be exercised. In any case, options and provisions must be evaluated carefully, including those that lead to exemptions for certain countries, gases and sectors.

Emissions from aviation and maritime were initially controlled under the

UNFCCC, but were also transferred to the control of other bodies - ICAO and IMO in this case - and, as a result, have not yet been addressed.

Marshall Islands going renewables - leading by example in difficult times

Small Pacific Islands demonstrate how mitigation efforts, access to clean energy and development can go hand in hand - amidst devastating impacts of a severe drought.

The Marshall Islands (RMI) have recently been covered in the media for completely different reasons - both related to climate change. They have been calling out to the international community to address climate change. This call resonates strongly in the light of a severe drought the Islands are facing at the moment, causing a state of emergency affecting thousands of people.

But the small island state is not only calling for help. They are also demonstrating to the world that ambitious mitigation action is possible. Although emissions from the Marshall Islands are small, it "decided that it needed to take matters into its own hands"[1]. The Islands are now on a pathway to provide solar energy to all households in their outer Atoll Islands this year.

The Marshall Islands aim to provide 1500 households on their outer Atolls with solar home systems, funded by the European Commission under EDF10, representing 50% of total households in outer islands of RMI. This is implemented by the Secretariat of the Pacific Community through the North Pacific Renewable Energy & Energy Efficiency Project (North REP) that also includes other Pacific countries. The other half of households had solar energy. The project has already seen 496 solar systems installed with 500 more are planned for the coming months (Ministry of Resource & Development, 2013). Prior to North REP, other development partners had worked with the Ministry of Resources & Development (MRD) in providing SHS for the other 50% of total households in the outer islands of RMI.

The targeted households only previous access to energy services were car batteries, use of biomass and candles. So this fully renewable energy supply for the very dispersed and small communities allows the Marshall Islands to provide services not available before. In 2009 only 32% of the rural population were connected to the electricity grid (Secretariat of the Pacific Community, 2012).

The current drought on northern parts of the Marshall Islands is a dire expression of a problem that is common among island nations: the very limited capacity of fresh water supplies. Existing fresh water storage is threatened in two ways by climate change: insufficient replenishment, and penetration by salt water due to long-term sea-level rise and short-term ocean flooding events.

Current climate model projections show an ambiguous signal in precipitation changes for the Marshall Islands under continued global warming. However, local warming would likely be close to global-mean warming, giving a roughly 4°C structural rise in local temperatures by the end of this century under business-as-usual emissions of greenhouse gases. This would considerably exacerbate droughts like we observe today by accelerating evaporation.

[1] Quote from Minister Tony de Brum in a blog: http://www.trust.org/item/20130507183303-lsc8b/

Caribbean Community ramps up mitigation efforts

The group of countries from the Caribbean, among those calling for ambitious pledges, have done their homework - the region is heading for an integrated sustainable energy strategy.

As part of a new energy policy, the 15 member states of the Caribbean Community (CARICOM) recently announced renewable energy targets for the region. Their goal is to increase renewable energy contributions to total electricity generation in the Caribbean Community to 20% by 2017, 28% by 2022, and 47% by 2027.

The Caribbean Sustainable Energy Roadmap and Strategy (C-SERMS) set these targets, as part of its implementation of the CARICOM Energy Policy's sustainable energy section. Ministers agreed the policy in March.

A 20% contribution of renewable energy by 2020 is a substantial goal, given the current situation in the Caribbean. Between 1998 and 2007, renewable energy contributed ~9% of the total primary energy consumed in the region. However, increasing energy use is currently out-pacing the increase in available renewable energy.

The targets are also ambitious in a global context. By comparison, the combined EU target is a 20% renewables contribution by 2020, only two years later than CARICOM. Some EU member states have even lower targets for 2020, such as the UK (15%), Germany (18%) and the Netherlands (14%) while the EU is yet to set a long-term target (European Commission, 2013).

CARICOM's goals are in line with some of the more ambitious national targets, such as Mexico, which is aiming for 35% renewables by 2024 (General Law on Climate Change, 2012), South Australia for 33% by 2020, and Sweden for 49% in the same year.

The Caribbean states are likely to benefit from a decreased reliance on fossil-fuel imports, which currently constitutes ~90% of the regional energy supply (Loy, 2007). Energy prices in the Caribbean are some of the highest in the world (~0.35 US$/kW h) and reduced reliance on imports could help to lower these energy costs.

As with the Marshall Islands, these new targets are yet another demonstration of the ambition of vulnerable island states leading the way on energy use and responding to the threat of climate change.

A few steps to the side…

Addressing surplus under the Kyoto Protocol

Decisions in Doha of December 2012 limit the use of surplus allowances from previous commitment periods. This narrows the gap between 0.1 to 0.3 GtCO2e by 2020.

Background

During the first commitment period (CP1) of the Kyoto Protocol (KP), the European Union, Russia, and Ukraine had significantly more emission units issued than they needed to fulfil their pledges. One reason was the economic crisis; another is that some countries, especially Russia, the Ukraine and eastern member states of the EU, had allowances that significantly exceeded their expected emissions. The Kyoto protocol rules allowed countries to carry over these units into a second commitment period.

The countries that will participate in the second commitment period (CP2) hold

surplus units equal to 17% of their projected emissions for CP2. New rules on surplus units decided in Doha in December were aimed at reducing the impact of these surplus units. What we find, however, is that this goal will only be fulfilled if certain conditions are met or if the ambition is increased towards the maximum end of the Copenhagen pledges. More technical information and analysis is provided in the Annex.

The Doha decision on surplus

Under the Doha decision, some types of carry-over units can be fully traded and used within CP2 while the largest share is restricted in use and trade. The details of the decision are explained in the Annex.

The most important new rule regarding surplus is a cap of the emission allowances for CP2 at an historic level, as defined by the average emissions from 2008-2010. This aims to prevent the creation of new surplus units from (too) high commitments during CP2. This rule creates a strong incentive to strengthen commitments to match the historic level. It especially affects the Ukraine, Belarus, and Kazakhstan, which have commitments significantly above both historic levels and the CAT business as usual (BAU) projections.

Irrespective of the agreed rules, several parties to the KP (Australia, Norway, Switzerland, Liechtenstein, and Monaco) stated that they would not buy CP1 surplus Assigned Amount Units (AAUs). Japan joined the declaration, but is not part of CP2 and KP rules mean it cannot trade CP1 surplus AAUs. The EU stated that surplus AAUs cannot be used in CP2. However, this would change if the EU increases its target to its conditional 30% goal. It is not yet clear what the countries most affected by the cap will do: Ukraine, Belarus, and Kazakhstan have signalled that they have not yet decided if they will stick to their commitment now that the historical cap is in place.

The commitments parties made in Doha and the impact of the new surplus rules

The commitments undertaken for CP2 are weak. Our projections show that the commitments of all parties to CP2 as a group still allow for higher emissions than our BAU projections. Therefore, the surplus and the new rules governing its use on the actual allowed emissions have little influence. Despite this, the Doha decisions deliver slight emission reductions below BAU and therefore an improvement compared to the situation before Doha, which would have allowed all CP2 parties to stay at business as usual. This is an effect of the historical cap. This is, however, only true if the affected countries all participate in CP2.

If ambition were to be increased to the conditional pledges, surplus units would still allow parties to substantially deviate from their pledged emissions and emit at almost BAU level. The rules before Doha would have allowed emissions at BAU.

Impact on emission levels in 2020

The rules before Doha allowed for full use of surplus units. The impact on 2020 levels of those units would have been 200 $MtCO_2eq$ in the case of the Doha commitments and 1.3 $GtCO_2eq$ if ambition was increased to the conditional pledges during CP2. With the new rules in place these numbers are reduced to 100 $MtCO_2eq$ in the case of the Doha commitments and around 1 $GtCO_2eq$ in the case of increased ambition .[2]

In conclusion, the Doha decisions on surplus fail to effectively resolve the issue of surplus units under the KP and lead to only minor reductions in emissions compared to BAU. However, they introduce two interesting concepts

[2] LULUCF credits are already included in the calculation. The historical cap is also in place for the pre-Doha rules case to make the surplus use cases comparable.

that could serve as a prototype for future cap and trade systems: the cap on commitments at a historical level and the limitation on trade of surplus units. Unfortunately the positive effect of these instruments is overshadowed by the lack of regulation of domestic surplus use and the free use and trade of some types of units. Still the new surplus rules close the emissions gap by 100 $MtCO_2eq$. If the weak Doha commitments were strengthened to the conditional pledges the impact of the new surplus rules on the 2020 gap would be 250 $MtCO_2eq$.

Emerging emissions trading systems - impact or no impact?

While the EU has missed the opportunity to backload allowances from the EU ETS to give a positive short term signal for carbon investments, further countries are launching new emission trading schemes or taking their planning for future implementation significantly forward.

While the EU ETS is struggling with low carbon prices, the development of emission trading schemes has picked up speed globally and more countries are implementing, scheduling or considering this mechanism in order to control GHG emissions, as shown in Figure 1.

Some examples for emissions trading schemes implemented in 2012 and early 2013 are the Californian Cap&Trade, the Western Climate Initiative (WCI) (Québec and in the future California), Australia's Carbon Pricing Mechanism and the first pilot phase of the Kazakhstan ETS.

China has scheduled the start of several ETS regional pilots for this year and is also considering a national ETS (International Carbon Action Partnership 2013). The first province, Shenzhen, is announced to start trading in June 2013 (King 2013). South Korea is planning to implement its ETS in early 2015. Further countries currently considering carbon pricing schemes are Brazil, Mexico, Turkey, Ukraine, Japan and various Canadian states that might join the WCI (International Carbon Action Partnership 2013).

According to the World Bank report *"Mapping Carbon Pricing Initiatives from May 2013"* (Höhne et al. 2013a), countries with carbon pricing mechanisms implemented and scheduled currently cover roughly 20% of global emissions. Another 30% of greenhouse gases is emitted by big emerging economies, which are assessing opportunities of those mechanisms in their national policy making at the moment. Nevertheless, it is important to note that the schemes in none of the countries include all sectors and therefore cover only a share of total emissions. According to Höhne et al. the emissions actually covered by ETS or other carbon pricing implemented or scheduled amount to at least 7% of global emissions (Höhne et al. 2013a).

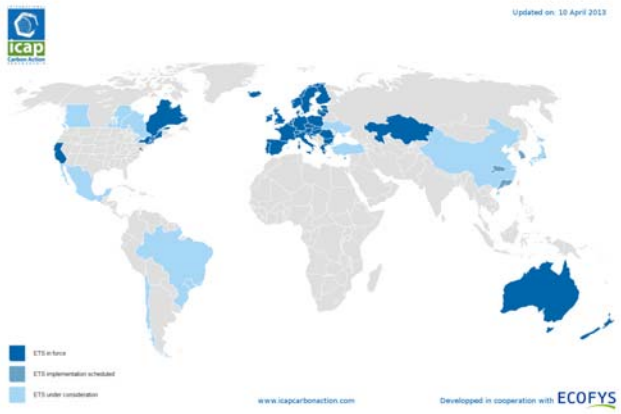


Figure 1: Overview of existing and emerging ETS around the world (International Carbon Action Partnership 2013)

Another positive development is that countries are beginning to establish links between each other's systems in order to increase their efficiency. Trading of

carbon credits will become possible between the EU and Australia, the EU and Switzerland and the member states of the WCI (Höhne et al. 2013a).

Emission trading schemes can be a preferred instrument because, in theory, they work according to "the polluter pays" - principle and distribute emission reductions in the most cost-efficient way. However, although coverage is large and linkages are emerging, **the new systems yet have to prove that their implementation will actually reduce emissions**.

To achieve this, the new systems have to make use of the lessons learned from established systems: ensuring stable prices by dynamic target-setting, floor and ceiling prices and preventing over-allocation of permits to ensure the long-term environmental integrity.

A current problem in the EU is a lack of demand for emission allowances. At the end of the year 2011, there were 1 billion surplus allowances in the EU ETS market. Low carbon prices barely incentivised investments to reduce emissions. This caused the EU Commission to come up with the proposal to postpone the auctioning of 900 million carbon allowances for 2013-2015 to the period 2018-2020, but this was rejected by the European Parliament.

The high number of surpluses has various negative implications. The imbalance of demand and supply creates a market situation with very low carbon prices. Low-carbon technologies are therefore less competitive, which especially affects the increase of renewable capacity. Equally, carbon-intensive coal has become more profitable in Europe again.

The instability of the carbon price creates a risk for low-carbon investments and thus increases insecurity among stakeholders and financing costs. Another danger is that member states could start implementing separate national instruments in order to create incentives which the EU ETS does not provide. This could cause a further fragmentation of climate policy making in the EU (European Commission 2012).

The suggestion to back-load a substantial amount of allowances would have led to a short term price increase and would probably have stabilised the European carbon market for a certain period. However, it would not have changed overall emission allowances by 2020 and thus not decreased the overall surplus.

Independently of the back-loading discussion, more structural changes are necessary to deal with the surplus in the mid and long run. Options could be to increase stringency of the EU's 2020 targets, to cancel parts of planned auctions, to limit carry-over of allowances beyond 2020 or to increase post-2020 ambition (Höhne et al. 2013b). New emissions trading schemes should consider setting sufficiently ambitious caps and allocation mechanisms from the outset - and allowing for opportunities to adapt the system when needed.

… and some steps backward

Japan pondering lower target while coal emissions are set to increase

Japan is pondering a revision of its pledge. This would likely lead to a change in the CAT rating from "sufficient" to "inadequate" and increase the emissions gap by between 209 and 299 $MtCO_2e/a$ in 2020.

Following the shutdown of most nuclear reactors after the March 2011 earthquake, Japan's national energy strategy - and consequently its GHG emissions targets - are now under review. A new energy strategy is to be decided before COP19, including new emissions reduction targets.

An analysis by the Japanese Ministry of Environment under the previous government suggested that new 2020 targets will range from 2-9% reduction from 1990 levels (The Energy and Environment Council, 2012). Domestic GHG reductions in the next decade will depend on Japan's economic growth and the proportion of nuclear power used in 2030 (0-30%). However, Japan still maintains an 80% reduction by 2050 as a national target (Ministry of the Environment, 2013).

Domestic mitigation targets in Japan are therefore uncertain, but are likely to be significantly less ambitious than the previous target of 25% reductions by 2020. **If the target is reduced, this would mean Japan would move from the CAT rating of "sufficient" to "inadequate" -** even for the upper range of the potential new target range of 2-9%. This would increase the emissions gap between 209 and 299 $MtCO_2e/a$ in 2020.

Currently, Japan's energy shortfall from offline nuclear stations is being met by LNG, oil and coal. Coal use in Japan is projected to increase further in 2013/2014 due to the low cost of coal compared with other fossil fuels. The top six utilities companies are anticipated to increase coal use by 25% in the next year (Reuters, 2012 and 2013).

Mitigation effort and planning in Japan has shifted to international emission reductions through, for example, Bilateral Offset Credit Mechanisms (BOCM) that aim to facilitate low-Carbon development and growth within developing countries. Japan has recently signed agreements with Mongolia, Ethiopia, and Bangladesh, and negotiations with Indonesia and Vietnam are underway. These agreements will help to facilitate low-carbon development in the developing world, but the UNFCCC doesn't currently recognised them.

Watch this space: Japan's new targets will be reported in the next CAT update.

What is the actual contribution of shale gas exploration to emission levels?

Significant negative impacts of shale gas overshadow the possible short term emission reductions. For example, the US exported almost 50% more coal in 2012 than in the previous year. Exports to Europe rose by 74%.

Over recent years, shale gas production in the United States has increased substantially. Increasingly, critical voices doubt the overall positive effect of the shale gas development on the environment in general, but also specifically on greenhouse gas emissions. In the US, despite possible short-term emission reductions because of the use of gas as a less carbon intensive energy carrier, the exploitation and the use of shale gas have significant negative impacts.

During the exploitation of the gas, fugitive emissions occur. Depending on the way they are treated during the exploitation of the wells, these can be substantial. Additionally, they are of high relevance to the climate because of their high global warming potential. Because there is no standard way of dealing with the fugitive emissions - and they are difficult to monitor, report and verify - it is unclear how high fugitive emissions from shale gas production actually are. There are a number of studies available, however there is no consensus on the results (Olivier et al. 2012).

Both coal production and imports have not changed much in the US, in spite of the decrease of coal consumption of the electricity sector. However, exports have:

in 2012, the US exported almost 50% more coal than in the previous year. Exports to Europe rose by 74% (EIA 2013). In Europe, high gas prices, the nuclear phase-out in some countries, and the low carbon prices under the EU-ETS have driven demand for cheap US coal. Coal mainly replaces natural gas imports. In the overall picture, the US shift away from coal therefore does not necessarily imply global emission reductions in the power sector.

Another problem is the lock-in to fossil fuel technology and a lower focus on a stronger capacity increase of renewable energy. Relying on natural gas to reduce emissions may – from a short-term view - reduce the need for renewable energy support. However, the mid to long-term cost-efficiency of renewable technologies, which also depend on economies of scale, is likely to suffer as a result. To limit greenhouse gas emissions to an acceptable level, renewable energy is indispensable. Not pushing it now will thus result in higher costs later on.

The effects of shale gas exploitation in the US are diverse and of different dimensions. The impacts do not depend on the supply in the US itself but also on circumstances in other parts of the world (e.g. if there was no demand for coal abroad, it could be that consumption would actually decrease globally). Little reliable data is available on fugitive emissions occurring during the production process. While uncertainty around the magnitude of changes in emissions implied through shale gas therefore is high, it is clear that there are negative effects which one has to consider carefully. It remains highly questionable whether the current developments will have a positive impact on global temperature levels.

Australia - uncertainty prevailing

Uncertainty over Australia's climate policy and GHG accounting sends negative signals over the sincerity of climate efforts.

A lot is happening these days in the land down under after a summer of extreme heat. Not much of this is inspiring confidence that Australia will manage to achieve ambitious mitigation nationally, or demonstrate leadership at the international level.

National review process could help raise ambition. A ray of hope is provided by the currently ongoing 'Caps and Targets Review' by the newly created Climate Change Authority.

The objective of this review is to regularly scrutinise Australia's emissions reduction targets as well as its progress towards achieving the medium and long-term goals. In the process of this review, stakeholders were invited to submit views before 30 May 2013 and the public will have another opportunity for comment on the draft recommendations in October. Final recommendations will go to the Government by 28 February 2014. This is timely to enable the Australian Government to use the opportunity to remove their conditionalities and move towards their most ambitious pledge under the negotiations of the ADP WS2.

National implementation threatened by repeal. The review process, however, is part of the legislative package known as the 'Clean Energy Future', that also includes the current carbon price and the ETS starting from 2015. The whole package of legislation is threatened by the multiple announcements from opposition leader Tony Abbot to repeal the package should he be elected in September. While this threat has been looming over the legislation from the start, the approaching elections and

recent reaffirmation of the intent are increasing uncertainty.

A repeal of the legislation could seriously undermine Australia's ability to actually meet their - still rated insufficient - target under the Convention, and inhibit the review process that could help raise the ambition of its international pledge.

Revision of land clearing laws in Queensland could impact emissions negatively. Proposed changes to the land clearing and water legislation in Queensland could put around 370 $MtCO_2e$ at risk (Taylor, 2013). Changes could result in clearing of previously protected areas, releasing emissions and preventing carbon uptake from high-value regrowth from bushland. Although the Queensland Government has different accounting rules for forests than agreed at the international level, the changes would also impact the national inventory of Australia and its ability to meet its pledge. Changes to the provisions on prosecution of illegal clearing could result in further emissions, although it is currently not possible to quantify the extent of this effect.

Canada - fugitive emissions from gas could be higher than reported

Canada's reported fugitive emissions could be substantially underestimated according to latest scientific findings. This could increase the emissions gap by 31-207 $MtCO_2eq/a$ in 2020 – 5-35% of their 1990 emissions.

In June 2012, the Province of British Columbia (B.C.) released its 'Greenhouse Gas Report 2010' with a detailed analysis of current sectoral emissions levels and trends. B.C. has committed to reducing greenhouse gas emissions by 33 per cent below 2007 levels by 2020. The total GHG emissions in 2010 were estimated at 62 MtCO2eq, which represents a reduction of 4% below 2007 levels (64.9 MtCO2eq).

Since the release of the BC report, concern has been raised as to what extent the accounting of fugitive emissions is in line with the latest best available knowledge: emissions may have been strongly under-estimated which could put B.C.'s ability to reach its GHG reduction target in question. Here, we present a quantitative analysis to evaluate these statements.

In the recent inventory report, methane fugitive emissions from oil and natural gas are estimated at 2.2 MtCO2eq for 2010, which represents a share of 0.45% of total gas production. Recent studies have reported that fugitive emissions from natural gas from the point of extraction to final destination lie within the range of 2 to 9% of total production (Tollefson, 2013, Alvarez et al, 2012, Pétron et al, 2012).

B.C.'s total gas production in 2010 was 35 billion m^3, so that, according to recent findings on the share of fugitive emissions, somewhere between 9-44 $MtCO_2eq$ of methane was released. Numbers reported in the B.C. inventory report are below even the low end of this range, pointing to an inadequate accounting methodology. More importantly, this suggests that current GHG emissions in British Columbia are 16-70% above the levels currently reported.

A close look at fugitive emissions at the national level reveals that Canada's national methodological approach may also be inadequate. Given the national production of approximately 189 billion m^3 of natural gas in 2011, the expected amount of methane released into the atmosphere should lie within 52 and 236 $MtCO_2eq$ according to the recent findings. The reported amount of fugitive natural gas emissions is, however, 24 $MtCO_2eq$, less than 50% of the low-end of the range.

How does this compare to other developed countries reporting emissions to the UNFCCC? The reported fugitive emissions from natural gas in 2011 for Russia and Germany are 297 and 5.5 MtCO2eq, both lying within the ranges defined by the reports on the share of fugitives (187-839 and 3-12 $MtCO_2eq$ respectively). Reported emissions on fugitives from the US are also below the low-end of their range by 20% (144 MtCO2 compared to the range of 180-808 $MtCO_2eq$). While accounting methodologies used in each country differ, the resulting emissions levels need to be evaluated against benchmarks that translate the latest knowledge. With Canada's recent withdrawal from the Kyoto Protocol, such methodological issues are unlikely to be resolved.

Consequences for Canada's national target

Canada's current GHG emission levels were 692 $MtCO_2eq$ in 2010, a decrease of 6% below 2005 (base year) levels. This suggests Canada is on its way to reach its 2020 target of 632 $MtCO_2eq$ (Canada's emissions trends report 2012).

Assuming that 2 to 9% of emissions from natural gas production are released into the atmosphere, 2005 emissions would be 40-275 $MtCO_2eq$ higher than reported. **This would translate into a 31-207 $MtCO_2eq$ higher target level by 2020, further increasing the emissions gap.**

ANNEX

Technical Details of the Doha Decision

Box: Unit types under the KP

AAU: Assigned Amount Unit. Emission allowance unit assigned to countries under the KP based on the QELRC

CER: Certified Emission Reduction: Units from the Clean Development Mechanism, where a KP party invests in emissions reduction in a developing country and can then use these reductions towards it KP target

ERU: Emission Reduction Unit. ERUs are units from Joint Implementation projects, where one party to the KP invests in clean development in another KP party. ERUs are created from AAUs, so they do not increase the total amount of units.

RMU: Removal Units. Units issued to KP parties for negative emissions from land use (e.g. forestry)

The Doha decision on surplus units under the Kyoto Protocol builds upon the existing rules addressing unit carry-over from CP1 to CP2. The amount of units that can be transferred remains unchanged: all surplus AAUs can be transferred, while ERUs and CERs can each be transferred up an amount equivalent to 2.5% of the parties initially issued emission allowances in CP1. RMUs cannot be carried over. CERs and ERUs are directly added to the CP2 assigned amount and are, therefore, usable like CP2 AAUs. Carry-over AAUs can be traded as well, but each party can only buy as many as 2% of its CP1 emission allowances. Selling CP2 AAUs and then using surplus CP1 AAUs to fill the gap is not possible.

Together with the decisions on CP1 surplus, a historical cap on commitments was introduced to prevent the creation of new surplus from high pledges (often referred to as "Hot Air"). This works as follows: if a party has a commitment (QELRC, Quantified Emission Limitation and Reduction Commitment) above the historical level, all initial emission allowances above the historic level will be cancelled. However, the threshold for use of CP1 surplus AAUs remains at the level of the emission allowances before the cap. The difference between the initial emission allowances and the historic level cannot be compensated by CP1 surplus AAUs. For example, the Ukraine would largely benefit from lowering its QELRC to the historic level and enabling the use of the large amount of CP1 surplus AAUs.

Analysis. The commitments made in Doha add up to yearly emissions allowances for all parties to CP2 together that are on average around 260Mt above BAU. However, after application of the historical cap, the remaining emission allowances are 180Mt CO2eq lower than BAU. This creates a demand for units of around 1.4Gt CO2eq.Two thirds of the expected demand could be fulfilled by surplus units, leaving only 500Mt of demand for other units. Including RMUs would lead to a complete saturation of the market leaving no demand for units from developing countries.

Uncertain impact from the economies in transition. More than half of the expected demand comes from parties affected by the new historical cap. As it is yet unclear if those parties will ratify their commitments and become part of CP2, the demand for surplus units could be even lower, possibly leading to a complete collapse of markets for all units valid in CP2. However, the emission levels would not be affected by Ukraine, Kazakhstan, and Belarus leaving the KP for CP2, as the cap is only effective if they are in CP2.

Limited impact of increasing ambition. The situation changes when considering an increase in ambition towards the conditional pledges. In this case, the EU will have a large demand for units and will also be able to use surplus units for compliance leading to a surplus use of 3.4Gt during CP2 for the EU alone. All CP2 parties together would consume around 4.8Gt of surplus leaving only a demand of 1Gt for other units like CERs, RMUs, and ERUs.

Therefore, the largest share of the 4.5Gt less of emissions allowances implied by the stricter targets would be compensated by surplus units, leaving a mere 250Mt impact of the increased ambition on 2020 levels[3], respectively 125Mt CO2eq impact on average emissions during CP2. Using RMUs and CERs, all parties will be able to stay at BAU even with increased ambition and probably still have very low prices for units due to low demand.

If the Ukraine, Belarus, and Kazakhstan decide to leave the KP this will, in contrast to the Doha commitments, increase emissions by around 400Mt during CP2 or 100Mt impact on 2020 levels. The reason is that they can emit at BAU in this case and the surplus they would have bought can be used by other parties.

Results. The restrictions on surplus use of the Doha outcome are not effective to reduce actual emissions because:

a) they allow for full use of CERs and ERUs which is sufficient to satisfy almost all demand in the case of the Doha pledges, and
b) the unlimited domestic use of CP1 AAUs allows the largest surplus holder, the EU, to fulfil all demand from moving to higher ambition domestically.

The main benefit from the Doha decisions is the cap of commitments at a historical level, leading to an impact on 2020 levels of 120Mt. However, adjusting QELRCs to the historic level would remove the impact of the cap.

In the case of increased ambition, the impact of the cap becomes more substantial (360Mt in 2020 or 180Mt on average) and is only partly neutralized by adapting the QELRCs. If the Ukraine, Belarus, and Kazakhstan decide to leave CP2, there are no emission reductions below BAU in the case of the Doha QLERCs and only 90Mt average emissions below BAU in the increased ambition case. All numbers are summarized in the tables below[4].

Total surplus use in CP2 in $MtCO_2eq$	**All CP2 parties, Article 3.7ter in place**	**All CP2 parties, Article 3.7ter in place, QELRCs adjusted to historic level**	**All CP2 parties, no Article 3.7ter**	**CP2 parties except Ukraine, Belarus, Kazakhstan.**
Doha	900	1,400	550 (+850)	600 (+800)
Conditional pledges	4,400	4,800	5,200 (+600)	4,400 (+600)

The values in parentheses are additional emissions by Ukraine, Belarus, and Kazakhstan, if there is no cap or they don't participate in CP2.

Average emissions in CP2 below BAU in $MtCO_2eq$ (2020 values in brackets)	**All CP2 parties, Article 3.7ter in place**	**All CP2 parties, Article 3.7ter in place, QELRCs adjusted to historic level**	**All CP2 parties, no Article 3.7ter**	**CP2 parties except Ukraine, Belarus, Kazakhstan.**
Doha	60 (120)	4 (8)	0	0
Conditional Pledges	180 (360)	130 (260)	0	90 (180)

[3] We assume that the use of surplus increases linearly during CP2. Assuming a constant use of surplus units would half the impact on 2020 levels.

[4] To make the surplus use in different cases directly comparable LULUCF units are not included here in contrast to the impact on the 2020 gap

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Background on the Climate Action Tracker

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

The Climate Action Tracker[5] reflects the latest status of the progress being made at international climate negotiations. The team that performed the analyses followed peer-reviewed scientific methods (see publications in Nature and other journals)[6] and significantly contributed to the UNEP Emissions Gap Report[7].

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

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

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[5] www.climateactiontracker.org

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

[7] www.unep.org/publications/ebooks/emissionsgapreport

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Climate Analytics

CLIMATE ANALYTICS is a non-profit organization based in Potsdam, Germany. It has been established to synthesize climate science and policy research that is relevant for international climate policy negotiations. It aims to provide scientific, policy and analytical support for Small Island States (SIDS) and the least developed country group (LDCs) negotiators, as well as non-governmental organisations and other stakeholders in the 'post-2012' negotiations. Furthermore, it assists in building in-house capacity within SIDS and LDCs.

www.climateanalytics.org

Potsdam Institute for Climate Impact Research (PIK)

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

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