

Cancun: Year One of the Post-Copenhagen Era

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While many were hoping for a broadening of commitments within the framework of the rules established by the Protocol, the agreement signed in Copenhagen, under pressure from the major emerging nations, broke with the spirit of Kyoto. It introduced a variable-geometry commitment system, determined in accordance with each country's targets, with no explicit link to the economic mechanisms enabling those targets to be reached. At the same time, it confirmed the principle of financial transfers to help with the introduction of climate change policies in developing countries, without specifying the terms and conditions.

Following the Copenhagen Accord, the commitments cover 80% of global emissions compared to the 25% covered by the Kyoto Protocol. In the absence of a uniform reporting and monitoring system, the precise scope of these commitments is uncertain; according to best estimates, however, it remains narrower than the recommendations of the Intergovernmental Panel on Climate Change (IPCC). In order to introduce genuine co-operative exchange, we still need to build an economic incentive system that extends the existing carbon pricing tools and makes it possible to release additional resources intended for developing countries. This requires a lot of work, as it involves a complete overhaul of a significant part of the governance applicable to international agreements on climate change. The December 2010 Cancun Conference is the first major meeting on the timetable.

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Synthesis:

Co-ordinating climate change policies on a worldwide basis is expected to solve a problem that is well known to economists, namely that of protecting a “common asset”, or climate stability in this instance. Protecting this asset implies a drastic reduction in total global greenhouse gas emissions. In the absence of an international agreement, it is in every country’s interest that this reduction effort should be borne by other countries. Conversely, if a group of countries commit themselves on a unilateral basis, their efforts can be offset in the long term by the behaviour of other countries that are not bound by any commitment.

The Kyoto Protocol attempted to introduce this type of collaborative mechanism through a co-ordinated system of caps on greenhouse gas emissions in industrialised countries. The scarcity of emission rights was meant to encourage the emergence of an international carbon price, giving countries an incentive to engage in a co-operative exchange and lowering the cost of emission reductions. The challenge of the Copenhagen Summit was to determine the rules for the post-Kyoto period between 2013 and 2020.

While many were hoping for a broadening of commitments within the framework of the rules established by the Protocol, the agreement signed in Copenhagen, under pressure from the major emerging nations, broke with the spirit of Kyoto. It introduced a variable-geometry commitment system, determined in accordance with each country's targets, with no explicit link to the economic mechanisms enabling those targets to be reached. At the same time, it confirmed the principle of financial transfers to help with the introduction of climate change policies in developing countries, without specifying the terms and conditions.

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Introduction

Reducing greenhouse gas (GHG) emissions touches on the age-old question of how to protect a somewhat unusual “common asset” (Hardin, 1968): climate stability. This asset is threatened by the accumulation of atmospheric greenhouse gas emissions, which needs to be reversed by a drastic reduction of those emissions. As long as free use of the atmosphere is the predominant model, the cost of reducing emissions will only be borne by those countries that choose to reduce them and these costs will be shared proportionately to their respective efforts. In contrast, the benefit of such actions is collectively shared and independent of each country's individual level of commitment. It is therefore in the interest of every country to minimise its own efforts and to “free ride” while its neighbours bear the greatest share of the burden.

The Kyoto Protocol introduced a global system for capping GHG emissions for developed countries for the period between 2008 and 2012, which was intended to make implementing a collaborative approach between countries easier. The scarcity created by countries' reduction commitments was meant to enable the emergence of an international price for carbon, which is intended to give financial incentives to countries to reduce their emissions. This incentive has been offered to developing countries, which are not constrained by commitments during the initial period, through the Clean Development Mechanism¹.

The challenge at Copenhagen was to determine the rules for the post-2012 period. Many were expecting the summit to broaden the guidelines put in place at Kyoto. However, the agreement signed in Copenhagen, under pressure from the major emerging nations, diverged significantly from the spirit of existing climate agreements. This divergence between expectations and what was achieved explains the confusion that reigned in the wake of the Copenhagen Summit, which was considered as a major failure by some and as a historic advancement by others. Nine months after such “heat of the moment” reactions, what should we think?

This article sets out to assess the Copenhagen Accord through a specific analysis of the statements issued between January and June 2010 by the various countries that were signatories to the United Nations Framework Convention on Climate Change (UNFCCC). In the first section, this article shows how Copenhagen represents a shifting of the centre of gravity in international climate negotiations. The second section offers an assessment of the “variable geometry” commitment system introduced by the Accord. The third section questions the conditions required to make Copenhagen successful. The concluding section looks at the prospects for the next stages of the negotiations, including those for the Cancun Conference, which will take place in December 2010.

¹ For an analysis of the economic mechanisms scheduled in the Kyoto Protocol, see Delbosch & De Perthuis, 2009.

1. From Kyoto to Copenhagen

1.1. *A post-2012 negotiation process that has been ongoing since 2007*

The adoption of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 reflected the growing awareness of the risks posed by climate change internationally. The Convention established an approach to negotiations that aimed to translate its principles into concrete emission reduction commitments and international co-ordination policy that made assistance between rich and poor countries easier. The Conference of the Parties, or COP, meets every year at a climate change summit, the most famous of which resulted in the adoption of the Kyoto Protocol in 1997. A GHG emissions reduction target was set for the first time. It was limited in time, as it involved average emissions for the period between 2008 and 2012. It was also limited in scope, as only the so-called developed countries listed in Annex I of the UNFCCC were committing to reduce their emissions by 5% compared with the 1990 level. Subsequent COPs then enabled the necessary rules for meeting those commitments to be defined more clearly.

Over time, however, the central debate gradually shifted from the issue of how to implement the Kyoto Protocol to defining post-2012 international climate change targets.

By drawing up the Bali Roadmap, the Bali COP of December 2007 introduced the post-2012 question into the negotiation process. Two main negotiation groups were awarded the mandate to prepare post-2012 climate guideline proposals for the Copenhagen Summit two years later. As part of that process, several thousand negotiators met between December 2007 and December 2009 under the umbrella of the United Nations. However, following long hours of negotiations, no draft compromise that fitted the pre-existing legal and institutional guidelines had been found at the time the Copenhagen Summit opened in December 2009.

Under such deadlocked circumstances, it was hard to imagine that Heads of State would sign a text perpetuating the spirit of the Kyoto Protocol by the end of the Summit. In the end, only one political agreement was reached: a text less than three pages long and christened the "Copenhagen Accord" was drawn up, reiterating the UNFCCC principles and supplementing them with new intentions, without, however, defining the tools that would be used, as the Kyoto Protocol had done.

This agreement was the result of meetings between representatives of the major emerging nations and the President of the United States. Europe and the other industrialised countries were not directly involved in the final negotiation process, but quickly rallied around the wording of the agreement. After a period of hesitation, most developing countries followed them. Unlike the Kyoto Protocol, the text was not adopted unanimously under the umbrella of the United Nations and therefore has no "legally enforceable" status. At the end of the Summit, the United Nations Assembly simply "acknowledged" the Accord, which, in diplomatic parlance, means that it did not formally adopt it.

1.2. *The contents of the Copenhagen Accord*

What is in the Copenhagen Accord exactly? As a political statement of principle, this very short text could almost have been signed on the first day of the Summit, at least regarding the commitments. It refers to the principles of the 1992 UNFCCC, while specifying one important

point: the ultimate average temperature increase stabilisation target should be +2°C, i.e. the level recommended by the Intergovernmental Panel on Climate Change (IPCC), which had previously only been adopted by the European Union².

The Copenhagen Accord does not provide specific quantified targets for the signatory countries. Those targets were meant to be specified in the appendices to the document, which were still blank at the time the Accord was published, once they had been filled in by each country in the first months of 2010. Most major countries indicated that, in practice, they would postpone the national commitments announced prior to or during the Summit. This “bottom-up” approach is deliberately intended to be non-binding from a legal standpoint, leaving the United States in sole charge of meeting its targets, which is what the major emitter countries want. The Copenhagen Accord reiterates the distinction between the developed countries in Annex I and the developing countries: in order to be a party to the Accord, the former must provide emission reduction commitments for 2020, while the latter must indicate the appropriate national measures (National Appropriate Mitigation Actions, or NAMA) that they intend to implement to reduce their emissions between now and 2020.

On the other hand, one of the stated aims of the Accord is to free up new sources of finance for climate change policies in developing countries: US\$ 30 billion between now and 2012 and US\$ 100 billion between now and 2020. The setting up of a Green Climate Fund is mentioned; however, in the absence of any indication on how that fund will operate, there is still no clarity whatsoever regarding the economic and financial tools that need to be put in place.

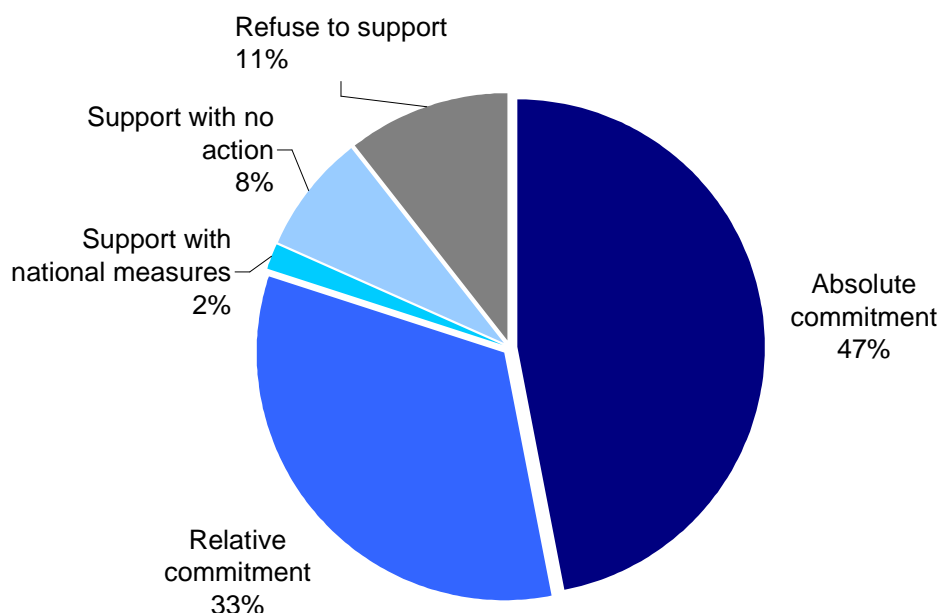
In June 2010, i.e. six months after the conference, 135 countries³ had confirmed their support for the Copenhagen Accord through an official letter delivered to the UNFCCC Secretariat. Those countries represent 70% of the signatory countries to the UNFCCC and 90% of 2005 global emissions. Although the Accord has majority support, that support cannot enforce a legally binding climate change agreement under the UNFCCC’s current operating rules, which require unanimity among the parties involved.

Figure 1 shows the different positions adopted by the UNFCCC signatory countries in relation to the Copenhagen Accord, according to their share of emissions in 2005. Some countries have committed to reducing their greenhouse gas emissions, on an absolute or relative basis. Others have supported the Accord and have either made a commitment (“Support with national measures”) or not (“Support with no national measures”) to take climate change measures without quantified emission reduction targets. Finally, some countries have either formally refused to be a party to the Accord or have not made their position known to the UNFCCC, and are grouped together in the “Refuse to support” category.

² Although the target features in the press release from the 2007 G8 Summit in Heiligendamm, it is only on a declarative basis.

³ Counting the European Union as 27 countries, even though the European Union negotiates on behalf of its 27 Member States in relation to climate change.

Figure 1 – Copenhagen Accord: support from countries in relation to their share of 2005 emissions



Note: emissions linked to land use, land use change and forestry (LULUCF) are not included. 40 countries have made absolute commitments and 14 have made relative commitments; 23 countries support the Accord and are committing to introducing national measures; 61 countries have stated their support for the Accord and 51 countries do not support it.

Source: National communications to the UNFCCC Secretariat as at June 14th 2010.

All Annex I countries, with the exception of Turkey and Ukraine⁴ (i.e. 13 countries plus the 27 European Union Member States), have registered their support for the Copenhagen Accord by submitting their unilateral emission reduction commitments to the UNFCCC Secretariat. The United States is included in this group and its return to the multilateral⁵ commitment system represents the first major breakthrough achieved by the conference. However, achieving its commitment remains dependent on approval by the US Congress.

2. A variable geometry commitment system

The Copenhagen Accord chose a different approach to that of the Kyoto Protocol, by suggesting “variable geometry” commitments depending on the country. In this section, we will attempt to explain the commitments announced by the various parties to the Copenhagen Accord and to compare them by converting them all to a consistent scale.

2.1. How do you make the commitments comparable?

The introduction of a “bottom-up” method to determine commitments immediately creates a comparability problem. Within Annex I countries, the main variables are the reference years

⁴ Turkey, which is included in Appendix I of the UNFCCC, did not commit to reducing its emissions within the framework of the Kyoto Protocol either. Ukraine's position is ambiguous, since it has declared an emission target for 2020, but has not formally signed up to the Accord.

⁵ The United States signed the Kyoto Protocol in 1997 but never ratified it due to the opposition from Congress to any climate change agreement that did not impose constraints on the major emerging nations, and then to opposition from President Bush. See Hight & Silva-Chavez, 2008.

selected, the way that carbon sequestration and release due to changes in land use is taken into account and finally, whether or not it is possible to carry over any remaining emission rights arising from the initial Kyoto Protocol commitment period.

Variations in the commitments delivered by the major emerging nations are potentially much more significant. Indeed, those commitments were all made in relative terms, either by focusing on a GDP carbon intensity target, in the case of China and India, or on an emission reduction percentage compared with a benchmark assumption, known as the “business as usual” (BAU) assumption⁶. This type of relative commitment is significantly more problematic to analyse, as you need to make assumptions about the economic environment as well as about the emissions trend in relation to economic growth.

The European Commission (2010) and the OECD (Dellink, Briner & Clapp, 2010), among others, carried out an assessment of the Copenhagen commitments by analysing the information delivered by Governments and then incorporating that information into more general models featuring emission and economic equilibrium assumptions. Their research converges towards a joint conclusion: even applying the most favourable assumptions, the emission trends obtained by consolidating those assumptions remain above those recommended by the IPCC for limiting the risk of a temperature increase of over 2°C. The second conclusion is that, depending on the interpretation given to governments’ statements, the end-results vary significantly.

In order to compare the Copenhagen commitments and assess their scope, we have put together business as usual forecasts for 2020 emissions in each country, assuming that the rate of increase in emissions does not change between 1990 and 2005 and between 2005 and 2020. Next, based on the information provided by countries, we have estimated the gap between those business as usual emissions and the targets announced in the Copenhagen Accord, inasmuch as we are able to piece them together based on the information available. The gap between the emissions calculated in this way and business as usual emissions is an indicator of the scale of each country’s ambitions, as well as the emission reduction efforts still required to meet their targets.

2.2. The commitments made by Annex I countries do not meet IPCC recommendations

The commitments made by Annex I countries and registered with the UNFCCC Secretariat are shown as absolute values. As a first approach⁷, therefore, all we need to do is add them together to obtain an overall view, which is shown in Table 1 (see details in Appendix 3).

If we limit ourselves to the minimum commitments made by the various countries, we get an overall 12% reduction in emissions by 2020 compared with 1990. Like Europe, which is prepared to raise its commitment from 20% to 30% in the event of a satisfactory international agreement being reached, some countries have indicated that they are ready to go further under certain conditions. If we add up the maximum commitments registered, we reach an emission reduction commitment of around 18% between now and 2020.

⁶ If the benchmark assumption is calculated by forecasting GDP on the one hand and a constant carbon intensity of GDP on the other, the reduction commitment in relation to this benchmark assumption can then be interpreted as a reduction in GDP carbon intensity.

⁷ For a detailed analysis of Appendix I countries’ commitments, see Levin & Bradley (2010).

Table 1 - Estimated emissions for Annex I countries based on commitments made in Copenhagen

1990 Emissions	2005 Emissions	2020 Emissions High Assumption	2020 Emissions Low Assumption
17,750	17,378	15,581	14,626
% change compared with 1990		-12%	-18%
% change compared with 2005		-10%	-16%
Gap (%) compared with the underlying assumption for 2020		-8%	-14%

Note: calculations were made based on the commitments registered with the UNFCCC and selecting only those emissions that were not generated by change of land use or forestry activities. Taking those emissions into account significantly alters the results for countries such as Canada and Australia.

**: Underlying assumption – identical rate of increase in emissions for the periods between 1990 and 2005 and between 2005 and 2020*

Source: authors' calculations based on UNFCCC and WRI data.

The emission reduction range obtained remains below what the IPCC is recommending, in order to reduce the risk of a temperature increase of over 2°C (-25% to -40% compared with 1990). The Copenhagen targets may also seem modest if we compare them with the Kyoto Protocol commitments, which were a collective 5% reduction in emissions between 1990 and 2008-2012. This is due to significant emission slippages in some countries like the United States (+16% in 2005 compared with 1990) and Canada (+27% in 2005 compared with 1990) compared with their Kyoto targets (-6% and -7% respectively compared with 1990). Both countries selected 2005 as a benchmark year in their post-2012 commitment proposals, which enables them to put forward a reduction target that is politically acceptable given the growth in their emissions between 1990 and 2005. Meanwhile Australia, where emissions were 39% higher in 2005 compared with 1990, selected 2000 as a benchmark year.

The commitments presented at Copenhagen therefore reflect an acceleration in emission reductions compared with the 1990-2005 trend. The changes of direction suggested in North America, Australia and Japan are significant and imply an effort that is identical, or even greater, than that made by other developed countries such as the European Union or even Russia, which has comfortable margins for increasing emissions.

The scope of these emission reduction targets nonetheless remains dependent on the terms and conditions for achieving them. Three areas require special monitoring:

- accounting for emissions sequestered in the biosphere or in the ground, which could drastically reduce the reduction constraints for some countries, depending on the procedures selected to calculate carbon sequestration by forests;
- potential extension of the validity of permits distributed to countries within the framework of the current phase of the Kyoto Protocol would also undermine the actual constraint on some countries such as Russia or Ukraine, which have substantial surpluses;
- accounting for emission reductions achieved in third party countries as a result of funding from developed countries, for example, within the framework of project-based mechanisms such as the Clean Development Mechanism. In fact, these emission reductions are likely to be counted twice, unless there is a specific rule specifying to which of the two countries they must be allocated, i.e. to the country providing the funding or to the country where the project is carried out. This type of rules, which were included in the Kyoto guidelines, must be specified for commitments made within the framework of the Copenhagen Accord.

The European Commission (2010) therefore believes that the emission reduction targets for Annex I countries could in reality be between -5% and -10% compared with 1990, if permit extensions were authorised and if certain forest-rich countries took advantage of the provisions of the Kyoto Protocol regarding emissions linked to change in land usage and to forestry in order to increase their emission rights.

Overall, developed countries have demonstrated their intention to maintain, or even increase their emission reduction efforts. A degree of uncertainty remains regarding the scope of those efforts. In the best case, they do not reach the levels recommended by the IPCC in order to limit the risk of a temperature rise of over 2°C, although that target is clearly specified in the Copenhagen Accord.

2.3. *Emerging nation commitments with an uncertain reach*

Emerging nations, which are not included in Annex I, have delivered commitments that are not expressed as absolute values but in relative terms. Most countries have done so in the form of a reduction compared with a benchmark assumption for their emissions, known as the BAU (Business as Usual) assumption. Meanwhile, India and China have committed to a 2020 GDP carbon intensity reduction target – i.e. a target for emissions as a ratio of GDP – compared with 2005, which is still relative.

This type of commitment makes the constraint less restrictive as short-term economic growth accelerates. For instance, the scope of the reduction announced by China is extremely sensitive to its economy's rate of growth: moving from an 8% to 9% annual growth rate increases China's emission rights by 1.6 billion tonnes of CO₂ by 2020, i.e. a level close to the total cap on industrial CO₂ emissions covered by the European Union Emission Trading System. This type of incentive is totally undesirable: the greater the economic wealth a country enjoys thanks to high growth, the more it will be in a position to allocate resources to actions to combat climate change. Moreover, in environmental terms, this kind of relative target is almost meaningless: it is the absolute volume of greenhouse gas emissions that accelerates climate change, not the carbon intensity of countries' GDP.

In order to estimate the impact of those commitments on emission volumes in emerging nations, we have attempted to translate these relative targets into absolute levels. The case of China and India is highlighted in the box showing how difficult this exercise is. For the other countries, we have recreated a benchmark assumption by forecasting 2020 GDP on the one hand and the carbon intensity of the GDP recorded in 2005 on the other. Two assumptions were selected for each country: a high assumption, based on strong economic growth, in line with the rates observed for the period between 1990 and 2005, combined with the lowest commitments made by countries when they provided a commitment range, and a low assumption based on lower economic growth combined with the high end of countries' commitment ranges. The results of our calculations are featured in Table 2. They should be considered as simple orders of magnitude, which are highly dependent on the procedures selected (see detailed results in Appendix 3).

Table 2 - Estimated emissions for emerging nations based on the commitments made in Copenhagen

1990 Emissions	2005 Emissions	2020 Emissions High Assumption	2020 Emissions Low Assumption
5,061	10,055	20,393	15,256
<i>% change compared with 1990</i>		+303%	+201%
<i>% change compared with 2005</i>		+103%	+52%
<i>Gap (%) compared with the underlying assumption for 2020</i>		-2.6%	-27.2%

Note: the emerging nations taken into consideration are South Africa, Brazil, China, South Korea, India, Indonesia and Mexico. Calculations were based on commitments submitted to the United Nations Secretariat, and include all greenhouse gas emissions except those relating to change of land use and forestry, with the exception of China and India, for which only CO₂ emissions have been taken into account, in order to reflect their commitments. Taking emissions linked to deforestation and change of land use into account significantly alters the results for countries like Brazil and Indonesia.

**: Underlying assumption = identical rate of increase in emissions for the periods between 1990 and 2005 and between 2005 and 2020*

Source: authors' calculations based on UNFCCC, WRI and IMF data.

The first impression is that emerging nations have comfortable margins for manoeuvre to increase their emissions, especially if growth proves strong. In the high assumption, the emissions forecast based on Copenhagen Accord commitments are even slightly higher than their underlying level. However, most of the simulations carried out show a deviation from the underlying forecast, possibly in excess of 20% by 2020 if we include all the most favourable factors associated with the low assumption.

The uncertainty surrounding emissions for the countries not included in Appendix I, combined with the commitment calculation methods, is compounded by the uncertainty surrounding calculation methods for national inventories. The aim of the international negotiations was therefore to ensure that the emission reductions that will be achieved are genuine.

The Copenhagen Accord is inconclusive in that respect. Only the actions taken by non-Annex I countries who benefit from international funding will need to be submitted to an international measurement and verification system, which will depend on the decisions taken by the United Nations at the COPs. Those actions will be entered in an *ad hoc* register specifying the technological, financial and organisational support that they received. In addition, the emerging nations have obtained the right to develop their own measurement and verification systems for their climate change policies⁸, in the name of respecting their national sovereignty. Unlike the unified system imposed on the Appendix I countries, those systems are not monitored by the UNFCCC Secretariat.

⁸ They must, however, deliver a report to the UNFCCC Secretariat, which includes a list of the measures implemented, as well as a national emission inventory every two years, the main guidelines of which will need to be defined within the international negotiation framework.

Box: China and India's 2020 commitment

China and India have committed to reducing the carbon intensity of their economy, in other words the ratio of emissions relative to GDP, between now and 2020 compared with 2005. To understand what we are talking about, the numerator and the denominator need to be strictly defined. However, given the present state of the information delivered to the UNFCCC Secretariat, both numbers are tainted by a high level of inaccuracy.

On the numerator side, India has announced that it is excluding emissions from agriculture, but has not explicitly stated how forests and non-CO₂ industrial emissions will be treated. China is talking about CO₂ and is making additional commitments on forests. We have chosen all CO₂ emissions for both countries, except emissions linked to changes in land use.

On the denominator side, the GDP indicator selected has not been specified. However, the GDP growth rate in volume terms, expressed in terms of purchasing power parity, is quite materially different from the rate calculated on the basis of current exchange rates (especially in China). We had actually selected GDP expressed in terms of purchasing power parity as the indicator.

GDP carbon intensity: historic trends

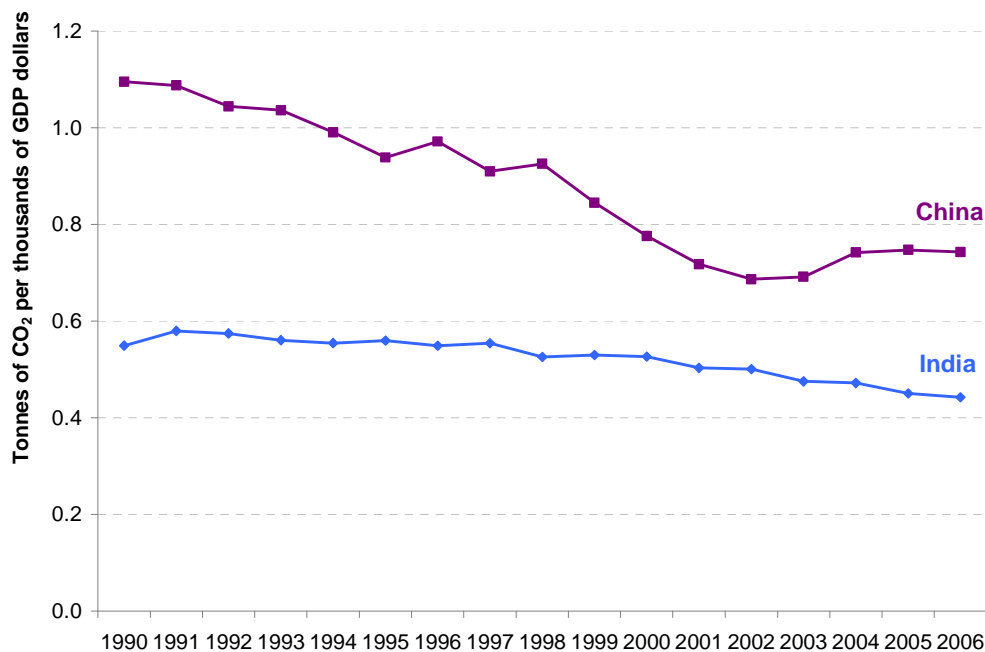
The commitments announced by India and China will be all the more important since the carbon intensity targets for 2020 are below their historic intensity reduction trend. In China, the ratio fell significantly between 1990 and 2002, and then rose slightly before stabilising at around 0.75 tonnes of CO₂ emitted for every US\$ 1,000 of GDP generated between 2004 and 2006. In India, the ratio fell quite regularly between 1990 and 2006, reaching 0.44 tCO₂ per US\$ 1,000 at the end of the period (see Figure 2).

The scope of India's commitments

India has committed to reducing the carbon intensity of its economy by between 20% and 25% by 2020 compared with 2005, i.e. a target range of between 0.34 and 0.35 tCO₂ per US\$ 1,000. This amounts to a decrease of between 1.5% and 1.9% per year, i.e. an additional effort, if we compare that decrease to its historic trend of -1.1% per year between 1990 and 2006. However, the IEA Reference Case assumption, which takes measures already in place into account, estimates that the carbon intensity of the Indian economy will be 0.28 tCO₂ per US\$ 1,000 in 2020. The commitments made by India would therefore not add any additional restrictions to the measures already taken.

Box: China and India's 2020 commitment (continued)

Figure 2 – The carbon intensity of the Chinese and Indian economies between 1990 and 2006



Sources: authors' calculations based on the WRI CAIT for CO₂ emissions excluding land use and forestry (LUCF), and on The Conference Board Total Economy Database for the GDP data in 2009 PPP terms.

The CO₂ emissions linked to those commitments depend directly on the growth rate for the economy. If that rate remains identical to the one recorded between 1990 and 2006, i.e. 6.5% over the coming decade, and if carbon intensity decreases at the same rate as between 1990 and 2006, CO₂ emissions will amount to almost 2,750 million tonnes in 2020, over twice their 2005 level.

If it respects its commitment to reduce carbon intensity by 20% by 2020, India ought to be emitting 2,539 million tonnes, or 2,412 million if it raises its target to -25%. However, if we use the estimated 2020 carbon intensity factor in the IEA benchmark assumption, CO₂ emissions would be limited to just over 2 billion tonnes in 2020 without any additional effort.

The scope of China's commitments

China has committed to reducing the carbon intensity of its GDP by between 40% and 45% by 2020 compared with 2005, i.e. an annual reduction of between 3.5% and 4.1%, which would result in a carbon intensity range of between 0.45 and 0.41 tCO₂ per US\$ 1,000 in 2020. China must therefore return to the sustainable decreasing carbon intensity trend that it had seen between 1990 and 2002 (-3.8% per year).

Let us first suppose that GDP growth remains at 9%, i.e. the average rate recorded for the period between 1990 and 2008. With a 2020 carbon reduction target of -40%, China would emit a maximum of 13.3 billion tonnes of CO₂ in 2020; with a more restrictive carbon intensity reduction target of -45%, emissions would not exceed 12.2 billion tonnes. Conversely, if the carbon intensity reduction rate remained the same as between 1990 and 2006, CO₂ emissions would reach 16 billion tonnes.

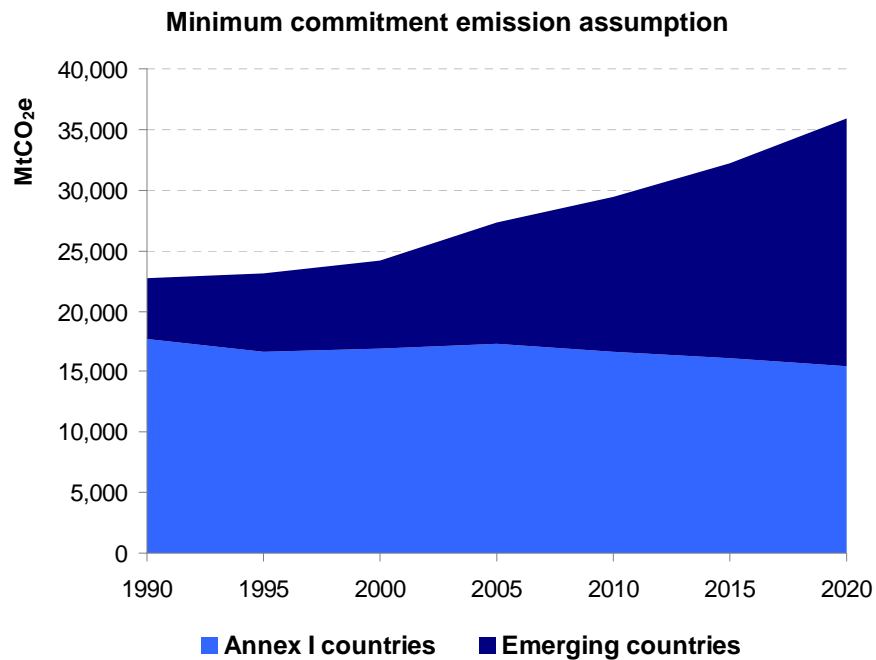
Box: China and India's 2020 commitment (continued)

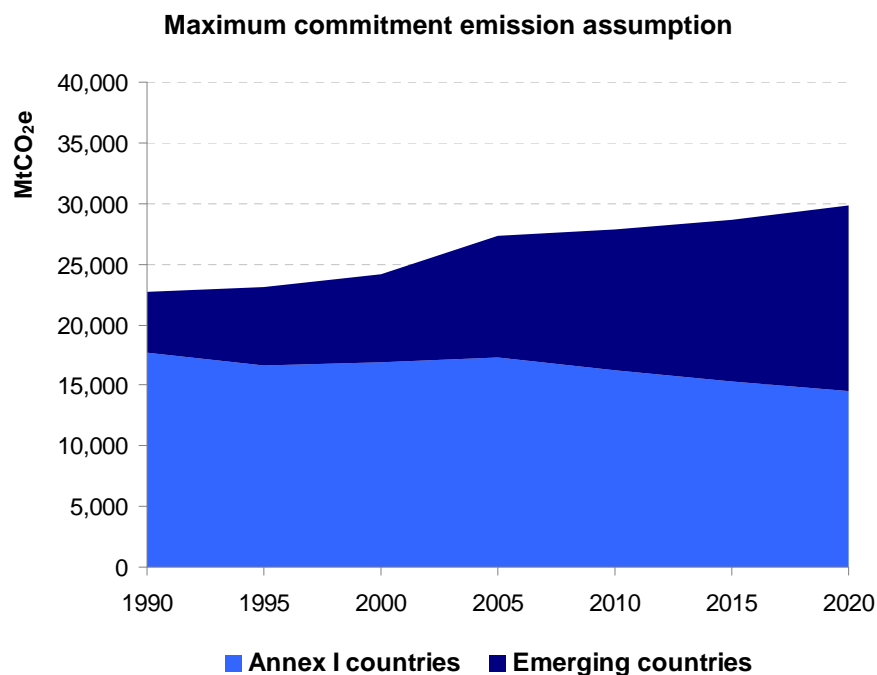
Let us now select a GDP growth rate of 8% over the same period. In this case, CO₂ emissions in 2020 should not exceed 11.7 billion tonnes for the least restrictive carbon intensity reduction target, or 10.7 billion tonnes for the most ambitious target. The IEA benchmark assumption is nonetheless forecasting a decrease in the carbon intensity of the Chinese economy that falls exactly between its two commitment targets: most of the measures to be taken either exist or have been planned and the additional effort to be made is limited.

2.4. Commitment review

By combining the simulation results obtained for emerging nations with the emission commitments of Appendix I countries, we arrive at a global emissions trend that dips slightly between 2005 and 2020, based on the most favourable assumptions, or resolutely continues to grow at the rate recorded since the early 2000s in the opposite case (see Figure 3).

Figure 3 – Forecast emissions for the countries that made a reduction commitment as part of the Copenhagen Accord





Note: All greenhouse gas emissions excluding deforestation and land use, except for China and India, for which only CO₂ (excluding land use and forestry) has been taken into account.

Source: the authors, based on UNFCCC, WRI and IMF data.

These emission forecasts confirm how desirable it would be for the Copenhagen Accord to encourage the implementation of early measures on the ground that go beyond the commitments that have already been made, in order to accelerate emission reductions effectively, including after 2020. Under what conditions can we imagine such a favourable assumption being triggered?

3. How do we go further in our commitments?

An analysis of the voluntary commitments made by countries as part of the Copenhagen Accord reveals aspirations that fall short of the IPCC recommendations. This section explores three ways that would make it easier to meet those commitments, or even to make faster progress towards emission reductions: putting in place a system of governance that enables the commitments made to be guaranteed in full, acknowledging the objective differences in countries' interests, which we need to overcome, and increasing the use of incentivising economic instruments linked to carbon pricing.

3.1. *Strengthening and unifying the measurement and verification system*

In order to set the commitments made in Copenhagen in stone, we need to have a consistent and reliable system for recording commitments and checking that they have been met. In the absence of such a system, it becomes hard to interpret the communications issued by governments, as shown in the second section of this article. The United Nations guidelines ought to be strengthened in this area and its role as a referee reconfirmed. This aspect of the governance for climate change agreements, which is sometimes viewed as a second-tier technical point, is actually highly political, as it is linked to issues of national sovereignty.

The ability of the United Nations system to manage the measurement and verification system is primarily based on the capabilities of the IPCC. Through its work on summarising and

disseminating the collective knowledge of the science of climate change, the IPCC allows the issuance of the standards that enable greenhouse gases to be measured in a consistent manner. It is thanks to a system of standards based on the scientific work done by the IPCC and validated by all the countries committed in the Kyoto Protocol that national inventories recording the greenhouse gases emitted by each country can be drawn up. Those inventories then serve as a basis for calculating the allowances to be surrendered by the Annex I countries. The standards selected for calculating emissions are also used to calculate the emission reductions that give rise to the allocation of carbon credits within the context of project mechanisms. The entire structure of the carbon economy therefore relies on the reliability and consistency of the standards selected by the UNFCCC based on the work of the IPCC. Strengthening that ability to issue standards for recording emissions and to enforce compliance with them, while limiting the inevitable wrangling by countries within the context of international negotiations, is essential.

Without such inventories, it is absolutely impossible to establish accurate quantified targets for each country beforehand, let alone to check to what degree they were met afterwards. This is why drawing up national inventories, which are taken every year and delivered to the UNFCCC Secretariat, is a rule that must be imposed rapidly on all countries that want to sign up to international climate change agreements. We are currently very far from that for non-Annex I countries: least developed countries have no such obligation; others are only required to produce a national inventory once, within three years following the entry into force of their participation to the Kyoto Protocol every five years. The Copenhagen Accord enabled a breakthrough in this area, by requesting national inventories from non-Annex I countries every two years, on the basis of guidelines adopted by the COP. It also contemplates the obligation of using international monitoring, reporting and verification (“MRV”) rules by non-Annex I countries for the actions they take that receive international funding. These international rules still need to be defined by the Conference of the Parties. The real challenge will be to build on existing standards, while limiting opportunities for inevitable haggling by countries during future negotiations.

The second pillar of the climate agreement monitoring framework is the infrastructure of the registers in which the emissions calculated on the basis of international standards are recorded, together with emission rights or carbon credits arising from the economic tools put in place. The current United Nations registration system enables the commitments made by the various countries as part of the Kyoto Protocol to be identified and the carbon credits and allowances delivered in respect of projects to be monitored, as well as double-counting to be specifically avoided: a carbon credit or allowance can only be used once to cover the emission of a tonne of greenhouse gas. The system is also an essential tool for enabling United Nations specialist bodies to guarantee that the emission reductions associated with projects and the corresponding credit allocations match up. The existence of a reliable and secure registration system is therefore a prerequisite both for monitoring countries’ commitments and for the reliability of economic instruments.

3.2. *Acknowledging the different situations of different country groups*

The complexity of the negotiations is due to the diversity of economies and emission sources, as well as to the political principles that guide different countries. In particular, countries’ commitments to reduce their emissions often conflict with their refusal to see their national sovereignty threatened, especially in terms of economic and social development. That concern is a trait of developing countries but also of developed countries such as the United States and Canada.

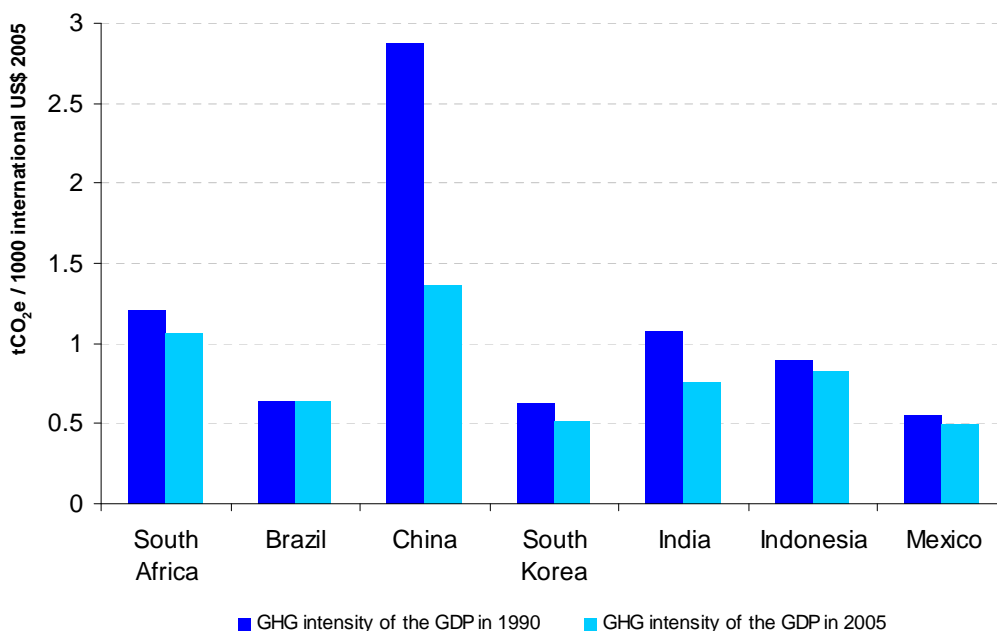
3.2.1 Developing countries: emerging nations, oil-producing nations and the other nations

The importance assumed by China and India within the environment of Copenhagen symbolically marked the shifting of the negotiations' centre of gravity. However, the developing countries group is not limited to those two countries by far. We can broadly distinguish three main groups of countries within the G77, which have different concerns⁹.

Among the developing countries, the emerging nations are the most visible in negotiations. India, China, Brazil, Indonesia, South Africa, Mexico and South Korea have become aware of the climate change issue, both in terms of the vulnerability of their territories and of an additional source of funding for their development. They are defending the current distinction between Annex I and non-Annex I countries, as they hope to benefit from funding and technology transfers due to that distinction, in exchange for their emission reduction commitments. Their communications to the UNFCCC Secretariat within the framework of the Copenhagen Accord, which underline the voluntary nature of their commitment and their full support for the principles of the 1992 UNFCCC, bear witness to that attitude.

The impact of the relative commitments they have made on the absolute emission volume will remain limited while their economic growth rate is strong. Besides, most of these countries have already reduced the carbon intensity of their economies since 1990 simply by using traditional fossil fuel resources in a more rational manner. One of the core challenges for the next stage of climate change negotiations is ensuring that these countries move from relative emission targets to absolute targets for their emission levels. It is intrinsically hard to envisage such a commitment in the short term: the ambiguous stance adopted by China, which blew hot and cold during the Copenhagen negotiations, really shows its intention of not having its hands tied too quickly.

Figure 4 – Greenhouse gas intensity of GDP in 1990 and 2005 for major emerging nations



Source: the authors, based on UNFCCC, WRI and IMF data. Emissions generated by deforestation, land use and change of land use were not taken into account.

⁹ See Vihma (2010) for a more in-depth description of the negotiating groups during the Copenhagen Summit.

The second clearly identifiable group in the negotiations was the oil-producing nations. This group showed itself reluctant to commit to emission reduction targets and several of its members, following the lead of Kuwait and Ecuador, were openly hostile to the Copenhagen Accord. In fact, it is in those countries' interest that carbon constraints in the form of emission caps do not become generalised in the coming years: by lowering the demand for fossil fuels, the generalisation of such constraints is likely to eat away little by little at their petroleum annuities (De Perthuis, 2010). The ALBA¹⁰ group of Latin American countries, which is headed by Bolivia and includes Venezuela and Ecuador, two countries with significant oil reserves, among others, showed itself to be highly critical of the Accord by requesting drastic emission reduction commitments from developed countries. This is why these countries make signing any agreement dependent on specific compensation, a claim that appears rather surreal in the case of the Arabian Gulf countries, which have abundant financial resources. The case of Russia should not be overlooked either: in theory, the country is included in Annex I and operates under the constraint of an absolute cap on its emissions in that respect. In reality, Russia is implementing a strategy aimed at extracting a financial value from the advantage that it has been given through using 1990 as a benchmark year, and through the potentially highly favourable calculation methods for forest emissions.

The group of least advanced countries is the largest in terms of numbers and includes a large number of African countries, among others. This group, which is very diverse, includes countries with very different positions, ranging from open hostility towards the Copenhagen Accord to strong support. It was not directly involved in the Copenhagen Accord negotiations and was reluctant to rally around it. The group mostly rallied around the financial promises that are included in the Accord. One of the crucial challenges for this group of countries is taking part in the governance of future financial instruments with the declared aim of generating additional resources for the collective combat against climate change and channelling them to the most vulnerable countries as a priority.

3.2.2 Developed countries: economic crisis, budgetary outlook and US hesitancy

The economic recession had two main effects on the position adopted by developed countries. In the short term, the recession altered the scale of the decision-makers' priorities, with targets for re-launching the economy and containing unemployment taking precedence over those for protecting the climate. This trend was accentuated by the fact that, by sharply reducing emissions, the economic crisis relaxed the constraints created by the current systems (mainly the Kyoto Protocol and the European CO₂ allowance system). The other medium-term effect was that cleaning up the public finances will squeeze budget resources on a long-term basis. Raising additional resources from public budgets for causes like climate change will be a real feat and we can trust in finance ministers' ability to recycle existing budgets while pretending to embark on new spending programmes.

This environment largely explains the United States' difficulty in making its Copenhagen commitments a reality, as well as the uncertainty over the additional decisions that other countries may make, especially the European Union.

President Obama adopted a very clear stance at Copenhagen: he stated that he could not go beyond a 17% reduction in emissions by 2020 compared with 2005. That number corresponds to the emission reduction commitment in the legislation debated by the US Congress,

¹⁰ *Alianza Bolivariana para los Pueblos de Nuestra América - Tratado de Comercio de los Pueblos*, (Bolivarian Alliance for the Peoples of Our America - Peoples' Commercial Treaty).

specifically the Waxman-Markey Bill, which was adopted in June 2009 by the House of Representatives, six months before the Copenhagen Summit. However, for that bill to become law, it must also be adopted by the US Senate, which legally ratifies any international treaty or agreement that commits the United States.

Straight after the Summit, we might have thought that the Copenhagen Accord would make the US Executive's task simpler by making the adoption of a draft legislation by the Senate easier. Eight months later, we are forced to observe that the expected breakthrough did not happen. In fact, the Senate delayed the examination of a bill on regulating greenhouse gas emissions indefinitely in July 2010; leaving the draft bill itself markedly slimmed down. President Obama nonetheless has some action-levers, especially in regulatory terms through the United States Environmental Protection Agency. However, the United States' return to international climate diplomacy is proving more tortuous than expected.

The United States' hesitancy, added to the difficulties experienced by other developed countries in adopting national climate legislation, is not likely to encourage Europe to aim for the top of its commitment range, namely a 30%, and no longer a 20%, reduction in its emissions between now and 2020. Economic assessments show that the economic recession has lowered the cost of meeting targets, which was actually demonstrated by the fall in the price of CO₂ allowances on the European market; the price has slipped from 25 euros per tonne before the recession to around 13 to 15 euros since. For some, and especially for the European Commissioner for Energy and Climate Policy, this new situation makes the unilateral move to a 30% reduction target by 2020 more acceptable and desirable, even if the Copenhagen Accord is a long way from meeting the criteria that the European Union initially required in order to do so. It is nonetheless unlikely that the Environment Ministers sitting on the European Environment Council, who also face increased unemployment and the problem of returning some countries in the euro zone to financial stability, will follow this path.

The underlying difficulty is that action against climate change is still considered as an additional expense that brings an environmental benefit, but not an economic one. However, using economic instruments wisely enables us to go beyond that view: introducing carbon pricing may stimulate investment and short-term growth¹¹ in some cases. Another important short-term point is that, in an environment where traditional public funds are rationed, carbon pricing generates new resources: a carbon tax creates tax receipts; a system for capping and trading CO₂ generates a carbon annuity that can be appropriated by public authorities through auctioning allowances. This is why the spread of economic instruments throughout the world would enable a broadening of the tax pool from which the new commitments made in Copenhagen can actually be financed.

3.2.3 Using existing economic instruments in a more ambitious way

The Copenhagen Accord remains very vague regarding economic instruments. The funding targets are sizeable, nonetheless: additional transfers between developed and developing countries are expected to reach US\$ 30 billion between now and 2012 (fast-start) and US\$ 100 billion per year between now and 2020. These transfers are intended to help developing countries to adapt to the expected impact of climate change, while refocusing their development on a low-carbon economy. The only new announcement in the Accord concerns the creation of a fund dedicated to managing that funding, the Copenhagen Green Climate Fund. The innovative market instruments put in place in the wake of the Kyoto Protocol are simply mentioned, without their relationship to the commitments expressed in the Copenhagen Accord

¹¹ See De Perthuis (2010), chapter VII, among others.

being explained. To go beyond the good intentions stage, the Copenhagen commitments must be implemented by redeploying the existing economic instruments in the field on a major scale.

CDM: switching to programmatic approaches based on the Copenhagen commitments

The clean development mechanism was created to encourage the funding of emission reduction projects in developing countries. In exchange for emission reductions, investors from Appendix I countries receive carbon credits that they can use for their own compliance purposes or trade freely, especially on the European carbon market. This system's first years of operation have demonstrated its advantages and drawbacks.

On the plus side, significant emission reductions of around two billion tonnes of greenhouse gases between now and 2012 have been obtained for projects that were not always expected. The initial projects in the early 2000s were mostly carried out in industrial sectors, before leaving more room for the renewable energy development projects that had been anticipated when the system was introduced. The mechanism has proved that it was capable of generating emission reductions at a lower cost, thanks to appeals to private investors, and of standardising transfers of technology and financial resources between developed and developing countries on a global scale. Since its launch, it has contributed to an investment of around US\$ 100 billion in developing countries.

On the flip side, the success of the CDM has not been universal. The major winners are the emerging nations, which have been able to put in place the administrative infrastructure required for the successful outcome of a large number of projects by guaranteeing a clear and low-risk regulatory framework for foreign investors. In contrast, the mechanism did not really work in less developed countries. Besides, agriculture and forests are hardly affected by these mechanisms, even though they are responsible for around one third of man-made emissions. Finally, the scope of the current mechanism is not capable of releasing the resources announced in the Copenhagen Accord: the US\$ 100 billion generated in one decade will have to be generated on an annual basis between now and 2020.

Change is therefore necessary. It is mainly appearing through the setting up of programmatic projects, which enable emission reductions to be no longer credited on the scale of each project, but on the scale of programmes that may group multiple basic actions together.

Second course of action: putting in place sectoral or national credit systems for emerging nations that manage to reduce their emissions further than the commitments made in the Copenhagen Accord. This plan is particularly discussed as an incentive to reduce deforestation within the framework of mechanisms known as REDD+, which reward countries that avoid deforestation. Emerging nations' relative commitments would therefore also amount to as many benchmark (baseline) assumptions, in relation to which additional emission reductions could attract exchangeable carbon credits. The scale of the project framework could change with such mechanisms and make a significant contribution to financing the promised transfers intended for developing countries.

These credits will nonetheless have to find buyers in order to provide a real incentive for developing projects. The Kyoto Protocol experience has demonstrated the limits of Governments' commitment to participating in a carbon asset exchange system, when their targets and their means to comply are the result of not very transparent political wrangling (Delbosch & De Perthuis, 2009). Hence the importance of recognising carbon credits within the major carbon markets by involving private companies that are regulated by the public authorities.

New development paths for carbon markets

By breaking with the spirit of Kyoto, the Copenhagen Accord introduces a new path to extend carbon pricing on a global basis, through the mutual acknowledgement of national or regional markets. In reality, this pricing is currently based on the European Union Emission Trading Scheme, which only puts a cap on around 4% of global emissions, but has provided a prototype that demonstrates the possibility of putting a multinational system in place to cap industrial CO₂ emissions and would be effective from an economic and political point of view¹². This system, which currently covers 30 countries with very different cultures and standards of living, must be able to fit directly or indirectly into a larger framework, in order to deliver results that are on a par with the global challenge. That framework depends on the choices made by countries that delivered emission reduction commitments in Copenhagen and that want to derive emission trading schemes from those commitments, in order to send an economic signal to their manufacturers and reduce the cost of meeting their commitments.

From this perspective, the first significant extension expected for global carbon pricing seemed to rely, up until mid-2010, on the success of the US Executive in implementing domestic legislation that reflects its Copenhagen commitments. As mentioned above, the complexity of Congress's negotiations is likely to delay the setting up of this federal US carbon market, which was initially scheduled for 2012 or 2013, by a few years. Failing which, the Environmental Protection Agency (EPA) is authorised to regulate greenhouse gas emissions through issuing standards as well as through potentially setting up an emission trading scheme.

Other governments have also announced that they are implementing emission trading schemes, namely New Zealand, Japan and South Korea. Those intentions remain fragile, as demonstrated by the failure of the Australian bill on setting up a carbon market in 2012. This fragility is further exacerbated by the difficult economic environment. The surprise might come from the major emerging nations. Several carbon market projects are actually being studied in China and India.

Uncertainty over the rate at which carbon pricing will be extended is damaging to the international market for emission reduction projects, where the absence of additional buyers for carbon credits amounts to a brake on the roll-out of greenhouse gas reduction projects. Voluntary markets or regional markets in the United States may undoubtedly represent additional demand factors, but in no way can their roll-out generate demand on a scale comparable with that of markets governed by national regulations.

4. Conclusion: Cancun and the next steps for climate negotiations

The Copenhagen Summit, which was neither an absolute failure nor a historic breakthrough, saw a shifting of the negotiations' centre of gravity, reflecting the change in the global balance of power. The first breakthrough of the Copenhagen Accord was to put the major emerging nations back at the heart of climate change negotiations by significantly broadening the share of greenhouse gas emissions subject to a reduction commitment made to the United Nations. A second breakthrough was to have made the international community acknowledge the 2°C mark as an average limit for global warming that must not be exceeded on a global basis.

The Copenhagen Accord has two main weaknesses: the vagueness of the variable-geometry commitments that were delivered by Governments, but are not part of a consistent and impartial

¹² See the assessment of the first operating period of the European carbon emission allowance trading system by Ellerman, Convery and De Perthuis (2010).

measurement and verification system, and the scarcity of economic and financial instruments included in the Accord. Both these weaknesses will not be remedied by reverting to a centralised and unified structure, of the kind that the Kyoto Protocol was aiming for. They will be overcome by the application of three action-levers:

First, strengthening the current United Nations system in terms of its capacity for measurement and verification is essential for guaranteeing the accuracy and consistency of the commitments made by the various countries. This is not only a technical issue, but also a political one, as it is linked to the issue of the national sovereignty of signatories to climate change agreements. The first challenge of the Cancun conference will be to provide an accurate and unambiguous picture of the Copenhagen commitments through strengthening the traditional role of the United Nations system in terms of recording and checking processes.

Second, the economic instruments which allow for carbon pricing should be strengthened and made consistent. The current framework – the European Union Emission Trading Scheme and the Kyoto Protocol project mechanisms – has demonstrated its potential, but need to be broadened to provide incentives that are on a par with the challenges. In the first instance, this implies internal policy decisions from other major emitter countries, which cap their industrial emissions, an issue on which Cancun will have almost no direct bearing. In contrast, communication between carbon markets through a unified system of project mechanisms is a major challenge: maintaining a homogenous certification process for project mechanisms under the aegis of the United Nations is highly desirable if we want to avoid fragmentation of the carbon markets, which would be the cause of economic waste. The second Cancun challenge is to clarify the future rules of these project mechanisms, particularly in the area of protection of tropical forests.

Third, a financial structure that gives some consistency to the financial promises announced in the Copenhagen Accord must be put in place. In an environment where public resources will be rationed on a long-term basis as a result of the economic crisis, this kind of structure will need to be co-ordinated with carbon pricing mechanisms, such as renovated project mechanisms, which enable the resources allocated to low-carbon investment in developing countries to be increased, and the use of allowance markets to generate economic transfers according to the choices made in terms of the initial allocation of emission rights and to broaden public resources thanks to the auctioning of emission permits. Given the delays that have arisen in the discussions, Cancun will undoubtedly not enable a breakthrough to be made on this third action-lever, which is the most decisive in the short term.

Incorporating these three action-levers into the next stages of the climate negotiations is an arduous task. The underlying reason is that there are still yawning gaps in global per capita wealth. Filling those gaps is a top priority. However, if developing countries catch up by going down paths that are identical to those previously followed by rich countries, the emission trends will quickly become unbearable. In order to protect the common “climate stability” asset, it is therefore necessary to move forward towards a co-operative system where all countries are encouraged to switch to a low-carbon economy. By getting all the major emitter countries on board, the Copenhagen Accord may represent a first step in that direction. The next steps depend less on the legal nature of future climate agreements, particularly their legally restrictive nature, than on the economic incentives that will be put in place.

As Hardin demonstrated in his seminal 1968 article, protecting a common asset requires that the community give up the free use of that asset. In climate change terms, this means switching to a broader greenhouse gas emissions pricing system.

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Appendix 1: National positions in relation to the Copenhagen Accord :

Absolute commitment	Jordan	Laos	Equatorial Guinea
Australia	Macedonia	Lebanon	Grenada
Belarus	Madagascar	Lesotho	Haiti
Canada	Maldives (*)	Malawi	Honduras
Croatia	Marshall Islands	Mali	Iran
European Union (27)	Mauritania	Maurice	Kuwait (**)
Iceland	Moldavia	Mozambique	Kirghizstan
Japan	Mongolia	Namibia	Liberia
Kazakhstan	Sierra Leone	Nepal	Libya
New Zealand	Togo	Nigeria	Malaysia
Norway	Support without action	North Korea	Myanmar
Russia	Afghanistan	Palau	Nauru (**)
Suisse	Albania	Panama	Nicaragua
Ukraine (***)	Algeria	Peru	Niger
United-states	Bahamas	Philippines	Niue
Relative commitment	Bangladesh	Rwanda	Oman
Brazil	Barbados	Samoa	Pakistan
China	Belize	Senegal	Paraguay
India	Bosnia-Herzegovina	Serbia	Qatar
Indonesia	Brunei	Swaziland	Salvador
Israel	Burkina Faso	Taiwan	Sao Tomé and Príncipe
Mexico	Burundi	Tanzania	Saudi Arabia
Morocco	Cambodia	Tonga	Seychelles
Papua-New Guinea	Cameroun	Trinidad and Tobago	Solomon Islands
Singapore	Cape Verde	Tunisia	Sri Lanka
South Africa	Central African Rep.	Uganda	St. Kitts and Nevis
South Korea	Chad	United Arab Emirates	St. Lucia
Support with national actions	Chile	Uruguay	St. Vincent
	Colombia	Vietnam	Sudan
Argentina	Comoros Islands	Zambia	Surinam
Armenia	Dem. Rep. of Congo	Refuse to join	Syria
Benin	Djibouti	Angola	Tajikistan
Bhutan (*)	Fiji	Antigua and Barbuda	Thailand
Botswana	Gambia	Azerbaijan	Turkey
Congo	Guatemala	Bahrain	Turkmenistan
Costa Rica	Guinea	Bolivia (**)	Uzbekistan
Eritrea	Guinea-Bissau	Cook Islands (**)	Vanuatu
Ethiopia	Guyana	Cuba (**)	Venezuela (**)
Gabon	Iraq	Dominica	Yemen
Georgia	Jamaica	Dominican Rep.	Zimbabwe
Ghana	Kenya	Egypt	
Ivory Coast	Kiribati	Ecuador	

(*) "Carbon neutrality" commitment by 2030 and by 2050. (**) Countries that have sent a letter of refusal to the UNFCCC Secretariat. (***) Ukraine did not formally become a party to the agreement but did announce 2020 commitment targets after the Copenhagen Summit.

Source: UNFCCC website (as of 14 June 2010).

Appendix 2: Commitments made by the main signatory countries to the Copenhagen Accord

	Country	2020 emission reduction target	Benchmark year
Appendix I	Australia	Between 5% and 15% (if there is an international agreement that includes the developing countries), or even 25% (if there is a target not to exceed 450 ppm of greenhouse gas in the atmosphere)	2000
	Belarus	5% to 10% with conditions	1990
	Canada	17%	2005
	United States	Around 17% (subject to Congress voting on the internal legislation)	2005
	Japan	25% (if there is a fair and ambitious international agreement that includes the main economies)	1990
	Norway	30% to 40% (if there is an international agreement aiming to limit the rise in temperature to 2°C)	1990
	New Zealand	Between 10% and 20%, if there is a full international agreement (aiming not to exceed a 2°C rise in temperature, comparable efforts from the other developed countries, adequate measures from developing countries, rules on LUCF, access to an efficient international carbon market)	1990
	Russia	15% to 25%, depending on the recognition of forests and the main emitters' commitment to reducing their emissions	1990
	European Union - 27	20% or 30% (if there are equivalent commitments from the other developed countries and an adequate contribution from developing countries)	1990
Emerging nations	South Africa	34% compared with the "business as usual" assumption	2020
	Brazil	Between 36 and 39% compared with the "business as usual" assumption	2020
	China	40% to 45% reduction in GDP CO ₂ intensity	2005
	South Korea	30% compared with the "business as usual" assumption	2020
	India	20% to 25% reduction in GDP greenhouse gas intensity (excluding agricultural emissions)	2005
	Indonesia	26%	?
	Mexico	30% compared with the "business as usual" assumption	2020

Source: UNFCCC website (as of 14 June 2010).

Appendix 3: Commitments from major emitters and difference compared with the underlying assumption

	Underlying emissions (mtCO ₂ e)			Copenhagen targets			
	1990	2005	2020	HIGH		LOW	
				mtCO ₂ e	Difference with underlying (%)	mtCO ₂ e	Difference with underlying (%)
United States	5,988	6,931	8,023	5,753	-28%	5,753	-28%
European Union - 27	5,374	5,049	4,744	4,299	-9%	3,762	-21%
Russia	2,932	1,947	1,293	2,492	93%	2,199	70%
Japan	1,194	1,356	1,540	895	-42%	895	-42%
Canada	582	739	938	614	-35%	614	-35%
Australia	403	559	775	478	-38%	377	-52%
Annex I total***	17,664	17,291	16,925	15,507	-8%	14,558	-14%
China*	2,316	5,592	13,506	12,702	-6 %	9,368	-31 %
India*	623	1,234	2,444	2,685	10 %	2,123	-13 %
Brazil**	690	1,012	1,484	1,705	15 %	1,215	-18 %
Mexico	459	643	901	811	-10 %	652	-28 %
South Korea	308	569	1,051	954	-9 %	717	-32 %
Indonesia	331	582	1,023	1,034	1 %	777	-24 %
Emerging nations total	5,061	10,055	20,945	20,393	-3 %	15,256	-27 %
Total	22,725	27,346	37,870	35,900	-5 %	29,814	-21 %

Notes: All greenhouse gas emissions excluding deforestation and land use, except for China and India (CO₂ only).

** CO₂ emissions, excluding deforestation and land use. ** Not including commitments for deforestation. *** Excluding Turkey.*

Endnote for readers: the underlying forecast assumes a constant growth rate for emissions over the periods between 1990 and 2005 and between 2005 and 2010. For the Appendix I countries, the Copenhagen targets are those included in the communications that countries have delivered to the UNFCCC Secretariat, as no credit in respect of the excess emission rights arising from the Kyoto period may be carried forward beyond 2012. For emerging nations, we have forecast 2020 emissions based on two economic growth assumptions. For China and India, we selected both carbon intensity targets announced by the countries. For the other emerging countries, we calculated a benchmark assumption by applying the carbon intensity of the economy, as calculated in 2005, to estimated 2020 GDP. A calculation introducing an underlying increase in that intensity results in more ambitious Copenhagen targets for the countries under consideration.

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Prix du quota de CO₂ et taxe carbone : quelques éléments de cadrage

par Christian de Perthuis et Anaïs Delbosc

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