Opinion

The legacy of the Kyoto Protocol: a view from the policy world

Bert Metz*

The Kyoto Protocol (KP) has played an important role in putting climate change action firmly on the political agenda and to deliver real reductions in industrialized countries' Greenhouse Gas (GHG) emissions. It also led to widespread action in developing countries through the Clean Development Mechanism (CDM), although real emission reductions were much smaller than how they appear on paper. Policies to promote low emission technologies have been applied widely. Financial support to developing countries from public and private sources has grown to about US$100 billion/year. In 30–40% of CDM projects, foreign technology was used and the investment in renewable energy in developing countries rose to US$ 70 billion/year in 2011, with some Chinese and Indian manufacturers belonging to the top global suppliers. An extensive administrative machinery of reporting of emissions and other data, review, and enforcement has been built. And awareness of climate change, its impacts, and how to tackle it has grown enormously. However, as results from the past are not a guarantee for the future, the prospects for the KP look bleak. Geopolitical developments led to rejection by emerging economies to adopt the KP model of legally binding emission reductions, which triggered reluctance by major industrialized countries to continue this model. With the persistent rejection of the USA of the KP model, it seems a different approach will be needed. This could for instance be a system based on commitments that are only binding under national law or a system based on coordination of policies and measures across countries, which would 'wake up' an unused article of the KP.

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INTRODUCTION

The Kyoto Protocol (KP) has been in force since 2005 and enjoys almost universal membership (189 states and the EU). The USA never joined and Canada withdrew in December 2011. Its first commitment period lasted till the end of 2012, so it is appropriate to ask the question what it has delivered. The Protocol specified that agreement on its second commitment period should be reached before the start of the commitment period in 2008. That did not happen, nor did the hoped for agreement on extending the KP in Copenhagen, December 2009. In Durban, in December 2011, it was decided to embark on a second commitment period, albeit with a reduced number of developed countries. In Doha, in December 2012, the specifics of the emission reduction commitments, which industrialized countries would participate, the accounting methods to be used and the length of the commitment period were settled. At the same time, it was agreed to negotiate a new legally binding regime for all countries by 2015, to be effective after 2020. So this raises the question what the future of the KP will be.

*Correspondence to: bert.metz@europeanclimate.org
European Climate Foundation, The Hauge, The Netherlands

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WHAT HAS THE KYOTO PROTOCOL DELIVERED?

The KP is the first international agreement on climate change that contains specific legally binding targets

for industrialized countries' emission reductions, so called flexibility mechanisms to allow for achieving those reductions at the lowest possible costs, as well as a reporting, verification, and enforcement system to promote compliance. Through the Clean Development Mechanism (CDM) , one of the flexibility tools, developing countries are given incentives to look for emission reduction projects, engaging them in the global effort of combating climate change, while they have no obligations to reduce emissions. Other provisions in the KP stipulate support from industrialized countries to developing countries on financing climate action and on supporting the transfer of clean technologies to them. The question is if these objectives have been met and, more generally, what policies have been introduced in countries and how much the awareness about the urgency to tackle climate change has been raised.

EMISSION REDUCTIONS IN DEVELOPED COUNTRIES

Will industrialized countries as a group achieve their target of reducing greenhouse gas emissions by 5.2% below 1990 on average over the 2008–2012 period? No final data about emissions over the 2008–2012 commitment period are yet available, but emission levels in 2010 of all Kyoto Parties together were about 20% below the base year or about 10 $GtCO_2e$[1] (Figure 1). Projected emission levels in the period 2008–2012, the actual period over which commitments were made, based on country reporting as of 2008, show a reduction of 20–22%.[2] These projections also show that with the use of credits from the Kyoto flexibility mechanisms almost all individual countries are likely to meet their target. The reductions are partly the result of policy action, but are significantly influenced by the economic modernization in the former Soviet Union and Eastern European countries and the economic recession of 2008–2009.

Global emissions however increased from about 38 $GtCO_2e$ in 1990 to about 50 $GtCO_2e$ in 2010,[3] because developing countries increased their emissions as a result of spectacular economic growth. The fact that the USA stayed out of the KP only had a minor impact: their emissions increased 10% between 1990 and 2010, equivalent to an increase of about 0.7 $GtCO_2eq$. This global increase till 2012 was deliberately accepted in the design of the KP (although underestimated at the time), in line with the 'polluter pays' principle and the need to deal with equity concerns on the side of developing countries. The expectation was that in subsequent periods all countries would strengthen their actions to bring global emissions down.

Countries of the former Soviet Union and Eastern European countries are seriously overachieving their emission targets, because the expected increase of emissions after their economic recovery did not happen as a result of changes in their economic structure and modernization of their industries. Collectively they were at around 36% below their 1990 level in 2008.[2]

EMISSION REDUCTIONS IN DEVELOPING COUNTRIES

The CDM of the KP, which allows developing countries to 'sell' reductions obtained from specific projects to industrialized countries and which is aiming at supporting sustainable development in the 'selling' developing country, has been a big success. As of July 1, 2012, a total of about 10,000 CDM projects had been proposed, about 8300 of those still actively pursued.[4]

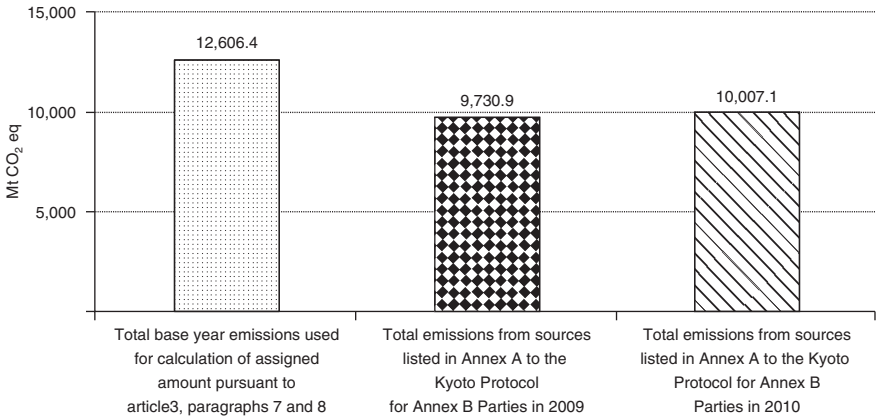

FIGURE 1 | Emission levels of Kyoto Protocol Annex-B Parties in 2009 and 2010 (excluding land-use change emissions), compared with the base year. (Reprinted with permission from Ref 1. Copyright 2012 UNFCCC).

About half of these (4296 projects) have been registered by the CDM Executive Board and for 1620 projects Certified Emission Reductions (CERs) were issued. In total they represent a reduction of about 0.22 $GtCO_2eq$ per year in the period 2008–2012 and about 0.9 $GtCO_2eq$ per year from 2013 to 2020. Given their relatively low price, it is likely that Annex-I countries will buy most of the CERs originating from the CDM to meet their obligations. To put things in perspective: the 0.22 $GtCO_2eq$/year is about 50 % of the total emission reduction (compared to the base year) that Kyoto Annex-I countries are supposed to achieve. In other words, domestic emission reductions in these countries will be only half of what they would have been without the CDM, if indeed all available CERs were bought.[5]

According to the CDM rules emission reductions from CDM should be 100% additional. There is even a specific requirement to demonstrate that additionality in applying for an approval of a CDM project. But how is the real situation? This depends on what is considered to be the business as usual (or baseline) development. A number of hydropower projects have been approved under the CDM, many of which were already under development before the CDM came into being, while hydropower has been commercially attractive in many places for a long time.[6]

Another interesting case is the destruction of HFC-23 from HCFC-22 production facilities. It is technically feasible to destroy HFC-23 in off-gas by using incinerators. The cost of this destruction, including investment and operating costs, is less than 0.20 US$ per tonne of CO_2eq destroyed.[7] A number of HCFC-22 plants in the world have installed these devices. It is thus very hard to argue that this cannot be seen as 'state of the art'. Nevertheless, HFC-23 destruction at existing plants in, e.g., China, India, and Korea was approved as a CDM project. Worse is that the CERs from these projects were sold at market prices of up to US$ 15–20 per tonne of CO_2eq avoided, meaning a gigantic profit was made.

Really worrisome is the CDM situation in China. Basically all new investments in hydropower, wind energy, and natural gas fired power plants are co-funded through the sale of CERs. Also the building of more efficient (so called 'supercritical') coal fired power plants has now been accepted as eligible for CDM.[8] This means that almost anything China is doing to reduce its dependency on coal (which it is now also importing), reduce air pollution, and to improve efficiency of power plants is now done with financial support through the CDM.[9] In other words, the assumption is that nothing of this would have been done in the absence of the CDM. That is hard to believe, as many of these installations have been built before without CDM funding and self-interest of China makes most of these projects completely viable. This is a serious blow to the additionality of the CDM.

OTHER ACHIEVEMENTS

Policies have been implemented in all economic sectors across a wide range of countries that lower emission intensity of energy supply, energy use, transport, buildings, industrial processes, agriculture, and forestry. These policies were introduced partly to achieve KP emission reduction targets or develop CDM projects, partly because of other economic reasons.[10–12]

Financial support to developing countries for reducing emissions, investments in low carbon technology or adapting to climate change have grown substantially over the 2000–2010 period. Total public and private financial flows (grants, loans, equity, guarantees) for these purposes are now estimated at about 360 billion US$/year.[13] This does include most domestic investment in developing countries by, e.g., national investment banks,[14] but is not all additional compared to previously committed financial flows.

Transfer of clean/low carbon technology to developing countries, another key element of the KP, has increased, but is hard to measure. Estimates from CDM experience up to 2010 indicate that on average in about 30–40% of CDM projects technology came from developed countries,[15] with a range of 13–82% depending on the project type. Another indicator is investment in clean energy. It grew globally from 34 billion US$ in 2004 to about 260 billion US$ in 2011, about 70 billion out of that in developing countries.[16,17] On clean energy Chinese and in some technologies Indian companies are already global players that have acquired or developed state of the art technology for export.

The KP has built an extensive machinery for reporting of emissions, review of those national reports, keeping a registry of national emissions accounts in relation to international emissions trading and CDM transactions and for promoting and enforcing compliance.[18] Although this administrative machinery is an essential achievement that provides good insights in implementation, the weakness is that developing countries only have much weaker obligations on reporting, etc. under the UNFCCC. It must also be concluded, that the compliance and enforcement provisions have no teeth, as for instance Canada has publicly stated for years it did not intend to comply with its KP obligations without

any consequence and even formally withdrew from the KP in December 2011.

Awareness about climate change and opportunities to solve it has increased dramatically since the agreement on the KP in 1997. In parallel, the lobbying efforts of private companies to weaken implementation of KP obligations (or even to tackle the problem outside the KP as in the USA) have grown and a privately financed 'climate change denial industry' has emerged.[19,20]

In summary, the KP generated significant action to curb climate change. In the long battle to limit the impacts of climate change to manageable proportions the first 5 years of KP implementation are only a modest start. But, as the Chinese saying goes 'A journey of a 1000 miles begins with a single step'.[21] Without the KP we would have been in a much worse situation.

WHAT WILL BE THE FUTURE OF THE KYOTO PROTOCOL?

KP Will Become Meaningless

Although the KP has delivered significant results, as described above, its future looks pretty bleak. The Protocol itself stipulated that agreement on a second commitment period should be reached before the start of the 1st commitment period in 2008. That did not happen. The Bali Action Plan, agreed in 2007, mandated completion of negotiations by December 2009 in Copenhagen. That meeting failed to deliver as well and produced a set of voluntary pledges for emission reductions by 2020.[22,23] The Cancun Meeting in 2010 failed again and only at Durban in December 2011[24] a face-saving decision was taken to establish a second commitment period, but just for a subset of the original KP Annex-B countries, as no developing country accepted to be part of the new Annex B and, as a result, Japan and Russia (plus Canada that formally withdrew from the KP and the USA that still refused to be associated with it) made clear not to join this second commitment period. Finally, in Doha, in December 2012, also New Zealand refrained from joining the second commitment period, and the reduction commitments for 2013–2020 were set at unambitious levels.[25] To make things worse, Ukraine, Kazakhstan, and Belarus are threatening to withdraw from the second commitment period in light of decisions taken to limit somewhat the use of surplus emissions allowances (these surpluses weaken the ambition levels further).[26] And those that joined (mainly the EU) committed only to the low end of their pledges (for the EU the already legally established 20% reduction by 2020 versus 1990), which as the UNEP Emissions Gap Report[3] showed, will be totally insufficient to keep global temperature increase below 2 degrees. As a result the KP second commitment period will add very little to what would have happened anyway, except for preserving the KP machinery in a 'mothball state'.

The Durban decision to complete negotiations on a new legally binding global agreement for all Parties by 2015 for the period after 2020 is a jump into the unknown: will this succeed while negotiations to establish a binding treaty for the period till 2020 failed? One important element of the decision was to abandon the Annex B versus non-Annex B country grouping of the KP that provided an excuse for countries not to join the Annex-B group of countries with legally binding commitments. However, big developing countries made it extensively clear after Durban that they do not want to be treated in the same way as developed countries, but expect to be asked less, according to the principle of 'common but differentiated responsibilities' of the UNFCCC.[27] And although specific provisions were made in the Durban decision to discuss the possible strengthening of the actions before 2020, there are no signs that countries are willing to strengthen their pledges for the period till 2020, which is absolutely crucial for meeting the 2°C target[3] that was unanimously agreed in Cancun as being the maximum tolerable warming, even specifying that 1.5°C would be preferable.[28]

A Different System Looks Impossible in the Short Term

It seems that countries are keeping each other prisoner in the current gridlocked situation. Developing countries, in particular the large emitter emerging economies, strongly reject legally binding targets for themselves, meaning they are rejecting to join the KP second commitment period Annex-B group, while insisting that developed countries do continue with the KP. The main argument used is the lack of delivering commitments by developed countries. The real reason seems to be the refusal to enter into internationally binding commitments, because of the fear this will undermine economic growth and development (which is not very different from the position of the USA actually). The USA, Canada, Japan, Russia, and New Zealand flatly refuse to join the KP under those circumstances (or at all in the case of the USA), while the EU has invested so much in the KP that it does not want it to disappear. This leads to an ineffective KP (see above) and impossibility to move to a different system, such as one based on voluntary pledges or purely nationally binding commitments,

but with strong review and coordination provisions.[29] It means we are *de facto* stuck with a system of voluntary pledges and national commitments made in Copenhagen, but without the necessary machinery to make this as effective as possible.[30] This paralyses action to bring global emissions down in the period till 2020. This does not mean that a legally binding system is not preferable. It has been demonstrated convincingly[31] that such a system is the most effective in controlling emissions. But a second best system is much better than what we have now.

Since there will be a *de facto* pledge based system till 2020 anyway, it makes sense to try and strengthen that system with a series of specific decisions on review, coordination, and other issues. The so-called second track of the negotiations under the Ad-Hoc Group on the Durban Platform,[32] aiming at strengthening the ambition level of action before 2020, provides the framework for such decisions.

Strengthen the Review System

The UNFCCC Durban decisions[32]contain the guidelines for an enhanced system of reporting and review, differentiated between developed and developing countries. The main improvements concern developing countries: a 2-year reporting cycle, connected to a regular system of International Consultation and Analysis. This is a big step forward compared to current obligations, but still is not enough to create a transparent system of reviewing performance of all major emitters that would encourage countries to strengthen their ambition. Immediate implementation and further improvements of the system are thus needed.

Policy Coordination

A forgotten article of the KP, article 2.4 that creates the possibility to take coordinated policies and measures,[18] might play a useful role in the future. It is obvious that coordinated action of countries in establishing feed-in tariffs to promote renewable energy, fuel efficiency standards for cars and trucks, energy efficiency standards for appliances, emission trading systems, emission standards for fossil fuel fired power plants and industrial processes, etc. would make it easier to overcome competitiveness concerns and would deliver large emission reductions globally.[33] Committing to taking such coordinated policies and measures very likely is politically easier than accepting a legally binding cap in emissions covering the whole economy. At a practical level, a collective UNFCCC effort in analyzing the possibilities for such coordination and in exploring interest of countries would create very useful learning opportunities for countries in how to design and implement effective policies. There are already very good examples of effective implementation of many different policies, also in developing countries.[3]

Change to Consumption-Based Emission Accounting

A weakness of the current UNFCCC/KP system is that emission control is based on accounting of production emissions. This masks the (major) contributions of emissions associated with imported products, particularly in developed countries. For OECD countries consumption-based accounting would lead to about 30% higher and for G77 countries to 23% lower emissions.[34] The current system provides no incentive for importing countries to consider those associated emissions and actually encourages the shift of production facilities to other countries, which often increases global emissions. The choice made to use production-based emission accounting is understandable in light of the technical complexities of a consumption-based accounting system.[35] However, technical capabilities have improved[36] and it would be feasible now to make the shift. Most high emitting emerging economies would probably be in favor, because they are large exporters and would thus not be judged on their export based emissions. Having consumption-based emission ceilings would force countries to put pressure on exporting countries to lower emissions.

A New Paradigm

It has been accepted widely that keeping climate change within tolerable limits will require a transition to a green, low emissions, climate resilient economy worldwide, and that such a transition is technically and economically feasible.[37] There is also a wide array of convincing arguments that a transition to a green economy is necessary in order to avoid major negative impacts on the economy worldwide from scarcity of natural resources, loss of biodiversity, insufficient food production, water scarcity, and climate change.[38] Although some attention has been given in the Cancun and Durban decisions to low-carbon growth, the UNFCCC and KP are in fact creating barriers to such a transition due to the strict focus on climate change, distracting the attention from green policies that are good for the economy. At national level in many countries interest is increasing strongly in green growth strategies. They have the potential of revitalizing political action that is needed to tackle the serious risks of climate change. With a critical mass of countries believing in a green economy as the way to secure

their future well-being a whole new global dynamic would emerge, freeing the way to collectively dealing with climate change. Steps could be taken over the coming years, nationally and internationally, to firmly establish inclusive green growth plans as the basis for countries to shape their policies.[39]

CONCLUSION

The KP definitely has left its marks on the last 15 years of action to combat climate change. It contributed clearly to the 20% reduction of developed KP country emissions in 2010 compared with 1990. The rise in global emissions over that same period—part of the KP design—was higher than expected owing to strong economic growth in developing countries, even when the CDM led to massive awareness raising and identification of emission reduction opportunities in those countries. It also led to widespread implementation of climate policies, strong increase in financial support, and some improvement of the diffusion of clean technologies to developing countries. A strong machinery of data collection, reporting, and review has been another achievement of the KP.

The KP however does not seem to be fit for the future. The CDM is not delivering enough reductions in developing countries. Worse, the interest in broadening the group of countries to take on binding emission reduction obligations and in deepening those reductions, is waning, making it unlikely the KP will be effective in the period 2013–2020. At the same time, countries are holding each other prisoner in not moving to a different system of less binding commitments with strong review mechanisms.

However, opportunities still exist to build on KP elements in tackling climate change more effectively. Using its provisions for coordination of policies across countries is something that can be done within the current framework, which can help to get more ambitious action before 2020. On the other hand, a clear lesson from the KP is that under current circumstances its global governance model is not the most effective to get to meaningful global action quickly. So in a new agreement much more reliance on a strengthened reporting and review system, coordination of policies across countries, and changing to a consumption-based emission accounting system would make sense. More importantly, embracing a green growth paradigm to reconcile development and climate change concerns and integrating climate change actions into green growth plans are promising approaches to get a more constructive and effective global arrangement in place.

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