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FONDATION POUR LES ÉTUDES ET RECHERCHES SUR LE DÉVELOPPEMENT INTERNATIONAL

Working Paper 121 February 2015 Development Policies

Summary of the workshop on Climate mitigation policies in developing countries*

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Abstract

As background preparation for the 21st Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) in Paris in December 2015, the FERDI (Fondation pour les Etudes et Recherches sur le Développement International), in collaboration with CERDI (Centre for Studies and Research on International Development) from the University of Auvergne and IDDRI (Institute for Sustainable Development and International Relations), held a one-day workshop on the topic of current and future climate change policies with a special focus on challenges faced by developing countries which will be hardest hit by global warming.

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* The workshop was held on October 8 as a pre-conference to the 3rd International Conference: Environment and Natural Resources Management in Developing and Transition Economies (October 9-10 2014) organized by Johanna Choumert, Pascale Combes Motel and Sonia Schwartz (CERDI & University of Auvergne) and held in Clermont-Ferrand **http://enrmdte2014.sciencesconf.org/.**
The presentations and the interviews of the speakers can be found on the Ferdi's web site : **http://www.ferdi.fr/en/event/climate-policies-developing-countries** This summary sets the contributions in the broader context of the current negotiations on the successor to the Kyoto protocol.
This summary benefitted from inputs by Jaime de Melo. Gisèle Schmid and Jaime de Melo bear responsibility for any mis-interpretation of the proceedings.

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CETTE PUBLICATION A BÉNÉFICIÉ D'UNE AIDE DE L'ÉTAT FRANÇAIS GÉRÉE PAR L'ANR AU TITRE DU PROGRAMME «INVESTISSEMENTS D'AVENIR» PORTANT LA RÉFÉRENCE «ANR-10-LABX-14-01».

Agenda

Wednesday, October 8, 2014 - Amphithéâtre Teilhard de Chardin
63 boulevard François Mitterrand, 63000 Clermont-Ferrand

8:30 - 9:00	Welcome speeches
	Pascale Combes-Motel, Organizer, Professor at University of Auvergne - Cerdi
	Vianney Dequiedt, Director of Cerdi, University of Auvergne - Cerdi
	Jean-Louis Combes, Director of the Ecole d'Economie de Clermont-Fd, University of Auvergne - Cerdi
	Philippe Dulbecco, President of University of Auvergne
	Patrick Guillaumont, President of Ferdi (Introductory remarks)
9:00 - 10:45	**Climate mitigation policies in developing countries : an overview**
	Chair : *Jaime de Melo, Ferdi*
	Is green growth relevant for poor economies? - *Edward Barbier, University of Wyoming*
	Climate Change and Economic Development - *Michael Toman, The World Bank*
11:00 - 12:45	**Market-based mechanisms : CDM and REDD+**
	Chair : *Pascale Combes Motel, University of Auvergne - Cerdi*
	Is REDD+ a good idea impossible to implement? - *Arild Angelsen, Norwegian University of Life Sciences*
	Lessons from the CDM for the design of new mitigation policy instruments involving developing countries - *Axel Michaelowa, University of Zurich & Perspectives Gmbh*
2:15 - 4:00 pm	**Pricing carbon**
	Chair : *Alain Ayong le Kama - University of Paris X & EconomiX*
	Pricing Carbon in An emerging Economy:The road to Paris for Chile - *Juan-Pablo Montero, Department of Economics, Pontificia Universidad Católica de Chile*
	Economic instruments and the 2015 Paris Climate Conference: the catalyst of carbon pricing -*Christian de Perthuis, Université Paris Dauphine & Chaire d'Economie du Climat*
4:15 - 6:00 pm	**Bottom-up and other approaches: the way forward**
	Chair : *Sébastien Treyer – IDDRI*
	Cutting the Gordian Knot Economic Development and Climate Policy - *Dominique Bureau, Conseil Economique pour le Développement Durable – Ministère de l'Ecologie, du Développement Durable et de l'Energie*
	A "paradigm shift" in the climate affair - A monetary plan for upgrading climate finance and support a sustainable development. - *Jean-Charles Hourcade, Centre International de Recherche sur l'Environnement et le Développement*
6:00 - 6:15	Closing remarks

1. Background

This year in December, France will host the 21st COP to the UNFCCC in Paris. Expectations are high: the conference should ultimately conclude with Parties agreeing to a global new treaty that would curb emissions to avoid the dangerous consequences of climate change. The new treaty will enter into force in 2020, avoiding a gap after the end of the second phase of the Kyoto Protocol (2013-2020).

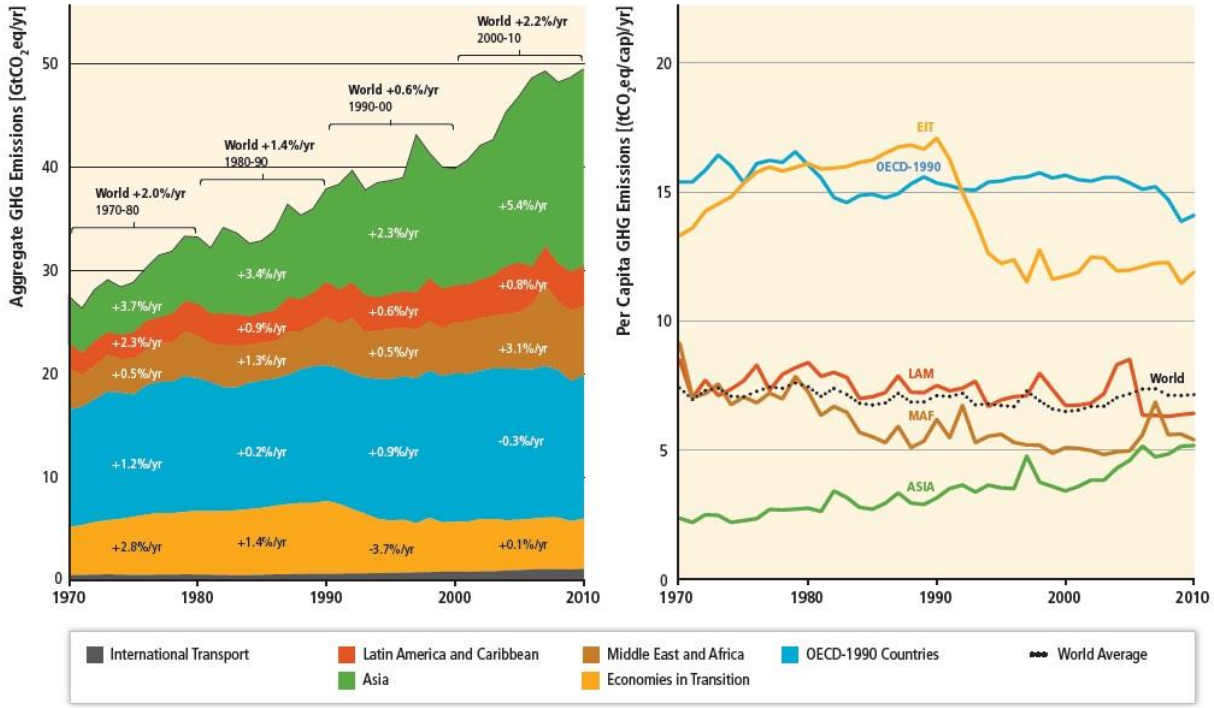

Figure 1 - Blanco G., R. Gerlagh, S. Suh, J. Barrett, H.C. de Coninck, C.F. Diaz Morejon, R. Mathur, N. Nakicenovic, A. Ofosu Ahenkora, J. Pan, H. Pathak, J. Rice, R. Richels, S.J. Smith, D.I. Stern, F.L. Toth, and P. Zhou, 2014: Drivers, Trends and Mitigation. In: *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Figure 5.2

Ban Ki-Moon, UN Secretary-General, organized a Climate Summit on 23 September in New York to build momentum on the path to the climate negotiations ahead, and ambitious action in the near-term. This meeting was the largest gathering of leaders for UN climate talks since the 2009 Copenhagen conference, which resulted in only a weak political statement and no legally binding commitments for reducing emissions.

During the Summit, leaders committed to finalise a meaningful, universal new agreement at COP-21 in Paris next year, and to arrive at the first draft of such an agreement at COP-20 in Lima, in December 2014. This is a paradigm shift in climate negotiations since the dual approach adopted in the Kyoto Protocol (Annex I and Non Annex I countries). Rapid growth in developing countries' greenhouse gas emissions (GHG) (Figure 1), led by China and India, has increasingly made clear

that any new architecture for a climate protocol will involve more active participation, and need for cooperation, by developing countries. On November 13, China and the US announced a joint plan to cut emissions, the US to double its current pollution mitigation efforts and China to have a peak in emissions in 2030 and to increase its non-fossil fuels in its energy mix to 20 percent by the same date.

Many developing countries have already pledged voluntary mitigation targets and actions. Their role will be pivotal for the success of global action against climate change: their carbon emissions are projected to vastly outpace those of OECD countries (EIA, 2013). They hold substantial carbon stocks in the form of forests. They also hold carbon stocks in their oil, gas and coal reserves, a great part of which ought to become "unburnable" (see e.g. IEA, 2012).

However, not all developing countries are at the same stage of development. For some low-income countries, issues, such as poverty alleviation, education and economic development, are more pressing than climate change. In his presentation, Dominique Bureau discussed whether economic development (or recovery) policies should be promoted first and climate mitigation policies, second.

Bureau shares Dani Rodrik's opinion that climate change and economic development should be addressed as a global problem of development. Climate negotiations should be articulated around development issues and have a common horizon, because climate change risk is a given in all development problems.

Bureau argued that, to integrate climate change risk into development objectives, politicians and the public need to be convinced that the cost of non-action is higher than the cost of action. Mitigation policies must be viewed as investments (such as infrastructure development policies) to reduce climate change risk, and the immediate return rate on these "investments" should justify early action.

Against this background, workshop presenters discussed several options for fostering mitigation in developing countries, including carbon pricing, incentive mechanisms, climate policies as part of a broader set of green growth policies, and other innovative schemes.

2. How much will it take to achieve the 2°C target?

Following the recommendations of the Intergovernmental Panel on Climate Change (IPCC), the target of holding any temperature increase to below 2 degrees Celsius (2°C) above preindustrial levels to prevent dangerous climate change was included in the final document at COP-15 in Copenhagen. Parties later agreed to this objective in Cancun in 2010. Despite this important step in climate negotiations, global mean surface temperatures have risen by 0.74°C ± 0.18°C over the last 100 years (1906–2005). In other words, since 1870, we have already used up two thirds of the total "carbon budget" to stay under a 2°C temperature increase.

Referring to IPCC's AR5 Working Group III report, Michael Toman showed in his presentation how difficult it would be to achieve the 2°C emissions path (430-480 ppm CO2eq, see Figure 2). It will require a complete energy transformation and unprecedented speed in cutting global emissions (up to 40-70% by 2050 and becoming negative by 2100). Achieving such drastic reductions will have real costs, especially for developing countries, and these costs will need to be weighted and managed. Lower-income countries are however still striving to meet basic needs and thus should not be expected to bear significant cost burdens for GHG mitigation. High income and rapidly growing upper-middle income countries should take the lead in the mitigation effort, if only because of their responsibility in emitting the lion's share of GHG emissions.

To achieve the energy transformation, a portfolio of technologies will need to be employed, ranging from energy efficiency and fuel switching, to renewables and carbon capture and storage (CCS) (Figure 3), Putting a price on carbon and using economic instruments will be crucial to motivate cost-reducing innovation in low-carbon technologies. However these will need to be complemented by other policies (regulatory standards, land use and trade policies, energy subsidy reforms, etc.).

Countries will need to achieve a radical shift in their political economy away from more risk-averse positions toward policies that create near-to-medium term costs to achieve any serious limit. Only moderate near-term actions appear to be feasible at present, given difficulties in stepping up international commitments, and political risk aversion.

Toman suggested to move away from economy-wide approaches towards coordinated GHG mitigation, and to put more emphasis on sectoral and technology-focused measures, rather than only concentrating on emission targets. Toman concluded by saying that what is needed is an adjusting process (a gradual approach) to ensure that the level of ambition of contributions over years can be increased. The success of such an approach will however depend on falling costs and follow-through on commitments.

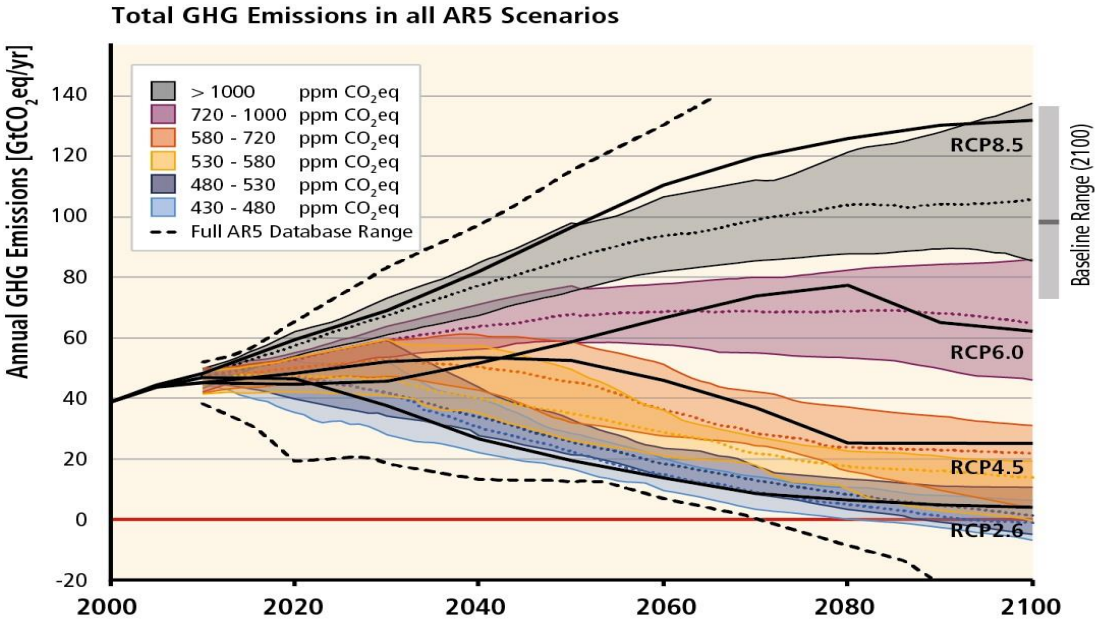

Figure 2 – Clarke L., K. Jiang, K. Akimoto, M. Babiker, G. Blanford, K. Fisher-Vanden, J.-C. Hourcade, V. Krey, E. Kriegler, A. Löschel, D. McCollum, S. Paltsev, S. Rose, P.R. Shukla, M. Tavoni, B. van der Zwaan, and D. van Vuuren, 2014: Assessing Transformation Pathways. In: *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Figure 6.7

Portfolio of technologies needed to achieve the 2°C target

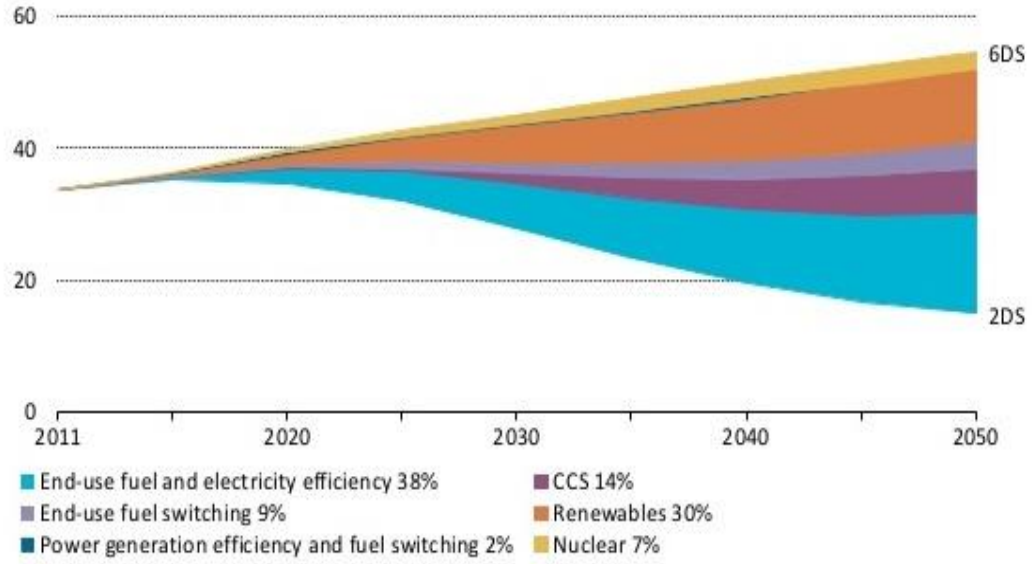

Figure 3 – Energy Technology Perspectives, IEA 2014

3. Mitigation options in developing countries

Several options were discussed at the workshop on how to engage broader participation from developing (except the low-income) countries to the global mitigation effort.

3.1 Climate policy as part of a green growth strategy for poverty alleviation

Edward B. Barbier gave a presentation questioning the relevance of green growth for poor economies. He discussed how climate policy in developing countries could benefit the poor within a broader set of green growth policies.

Barbier first provided a conceptual framework of a green economy and green growth. A green economy is one whose growth in income and employment is driven by investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services. He then discussed the key policy tradeoffs implied by green growth, by comparing the political difficulty of implementing green growth policies with the tradeoffs between local and immediate versus more global and long-term benefits. For example, the implementation of regulations on energy conservation is likely to be easier and imply fewer tradeoffs than the introduction of pricing policies on natural resources or the introduction of a global carbon tax.

He also compared growth to green growth, and recalled that any shift from growth to green growth will have distributional implications and that it will be important to identify those policies that will favour or hurt the poor, even if their overall impact is to increase economic output or welfare.

Barbier then questioned whether green growth is good for the poor. He argued that if green growth is to have relevance for developing economies, it must also be compatible with poverty alleviation. Many of the rural poor in developing countries – who are growing in number - are increasingly concentrated in "ecologically fragile" and remote areas. This particular structural feature impedes any transition to sustained economic growth – green or otherwise – for these countries.

Barbier followed up by discussing whether climate mitigation policies are good for the poor by distinguishing their direct from their indirect impact on the poor. Climate policies with direct impacts on poverty include payments for avoided deforestation that affect the livelihoods of the poor, improved air quality and health resulting from reduced GHG emissions and clean energy, and energy efficiency innovations that reduce poverty. Mitigation policies can also induce changes in the trade and economic growth of developing countries, thereby causing indirect impacts on the poor, via output markets (e.g. agricultural commodities, imported goods or consumption) or factor earnings (wages or land rents). These direct and indirect effects can be either positive or negative, and Barbier argued that there is a need for a more comprehensive approach to analyzing how

mitigation policies affect the poor in developing countries, especially regarding the assessment of the potential trade-offs between the positive and negative impacts on poverty alleviation.

Barbier continued by discussing whether green growth can be reconciled with the key structural features of natural resource use and poverty in most developing economies, which underlie two stylized facts.

The first is that many developing economies are resource-dependent and therefore rely heavily on the commercialization of a primary product sector. Resource dependency, measured as the share of primary product in merchandise exports, remains especially high (over 70%) in Sub-Saharan Africa and in the Middle East and North Africa. The main agents responsible for much of the resource exploitation and agricultural expansion in developing countries are commercially-oriented economic activities, such as plantation owners, large-scale farmers, ranchers, timber concerns, and mining operations, assisted by government policies. These activities rely on large-scale capital investments that often result in export-oriented extractive enclaves with little or no forward and backward linkages with the rest of the economy. As a result, many developing economies remain highly dependent on the exploitation of natural resources and are unable to diversify from primary production.

The second stylized fact is that many economies have a "residual" pool of rural poor located on abundant but marginal agricultural land and in remote areas.

Barbier and Hochard (2014) have estimated that, over 2000-2010, the rural population of developing countries living on less favored agricultural land (LFAL), less favored agricultural areas (LFAA) and remote less favored agricultural land (remote LFAL) has risen substantially, over 1% annually. In Sub-Saharan Africa, the growth is over 3%. Developed countries, over the same period, show a decline in these rates.

Moreover the poverty rate in countries with a share of rural population on remote LFAL higher than 10% is nearly double that of countries with a 0-3% share.

Although Barbier and Hochard do not find a direct relation between the spatial distribution of rural populations in developing countries on LFAL, LFAA and remote LFAL in 2000 and the change in the poverty rate from 2000-2012, they do find a significant indirect impact through lowering the poverty-reducing impact of income growth over the same period. Across a wide range of developing countries, as more rural people are located on remote and less-favoured agricultural land, the result is a substantial attenuation of the poverty-reducing impact of growth.

Structural transformation of developing economies – "green" or otherwise – is unlikely to benefit the rural poor on less favoured lands and in remote areas. Additional policies are required to address the two "stylized facts" associated with resource dependency and rural poverty. To try to overcome the problem of resource dependency, policies should follow the examples of successful and sustainable resource-based development by promoting three key factors:(i) resource-

enhancing technological change in primary production activities; (ii) strong forward and backward linkages between the resource-based primary production sector and the rest of the economy, and; (iii) substantial knowledge spillovers in primary production and across resource-based activities.

To reduce the rates of rural poverty, targeted policies for the rural poor on less favoured lands and in remote areas should be implemented. Barbier gave examples of policies that would help raise households' real wages and alleviate widespread rural poverty. These would include: targeting investments and policies to improve the livelihoods and productivity of traditional agriculture on marginal land; appropriate targeting of research, extension and agricultural development to improve the livelihoods of the poor; increase employment opportunities and reduce environmental degradation. Finally, Improving market integration for the rural poor through developing public services and infrastructure in remote and ecologically fragile regions is also an important aspect. This could take the form of extension services, roads, communications, protection of property, marketing services and other strategies to improve smallholder accessibility to larger markets.

Any policy strategy targeted at improving the livelihoods of the rural poor located in remote and fragile environments should be assessed against the alternative strategy of encouraging out-migration from these areas. Indeed, rural development is costly and out-migration may occur anyway and may be the less expensive option. Rarely are the two types of policy strategies, investment in poor rural areas and targeted outmigration, directly compared.

3.2. A carbon tax

Juan-Pablo Montero discussed the challenges of the implementation of a carbon pricing and cap-and-trade system in Chile.

In 2013, Chile had a population of 17 million, a GDP of 277 billion US$, equivalent to a GDP per capita of 19,100 US$ (PPP) (15,800 nominal). After a decline between 1999 and 2001, CO_2 emissions have been increasing very rapidly, reaching 80.1 Mt in 2011, a growth rate higher than in most industrialized countries, like the US and the EU, just behind India and China in the past decade.

In 2009, Chile pledged a voluntary target under the UNFCCC of reducing GHGs by 20% in 2020 using 2007 emissions as a baseline. This objective was internally "adopted" in May 2010. Besides using international mitigation mechanisms like the Clean Development Mechanism (CDM)[1], Montero emphasized that the implementation of a CO_2 tax on emissions is by far the most important policy to comply with the 20% reduction target.

In March 2014, as part of a much broader tax reform sent to Congress, Chile's newly elected president, Michelle Bachelet, proposed a tax of 5 US$/ton over CO_2 emissions from power plants of 50 MW and above, and other large facilities. The tax covers roughly 55% of total CO2 emissions and

[1] Chile is substantially involved in the CDM (139 projects as of 08.10.14) and is the 6th country receiving the most CERS (CDM credits).

was approved in September 2014. Despite its small estimated effect in terms of emission reductions and electricity price increases (10% and 2%, respectively, by 2030), Montero presented this tax as a crucial first step towards building the institutional capabilities Chile will require in the future as the country engages in more ambitious reduction goals, including the transition to a broader cap-and-trade system.

Chile's efforts are part of a broader movement of carbon tax and cap-and-trade initiatives around the world (Figure 4). Montero highlighted the remarkable example of China. China has a cap-an-trade programme in 7 provinces and cities covering 25% of the population, making it the second largest carbon market in the world after the EU ETS in 2013.

Mexico has also introduced a new carbon tax in the past year. These initiatives are a first step. However, Montero believes that the only way forward is for countries to establish quantity limits at the country level, to implement country-wide CO_2 cap-and-trade systems and to gradually prepare for a linking to international markets. He argued that it is better for countries to agree on quantity limits rather than on prices (taxes) because quantity limits are harder to undo and are easier to monitor. In the future, he thinks it will also be easier for countries to link their systems if they have quantity limits because they will directly know what they will be getting out of linking.

Montero explained that Chile has ample experience with markets of property rights for managing natural resources (particulates, water rights, fisheries). He however underscored that one of the main issues of creating a cap-and-trade system will be the distributional effect of rights. How should these be distributed? Grandfathered, auctioned? Who will keep the rent from allocating the rights? He concluded his presentation by giving some insights on his current research on introducing a carbon tax in the Chilean transport sector.

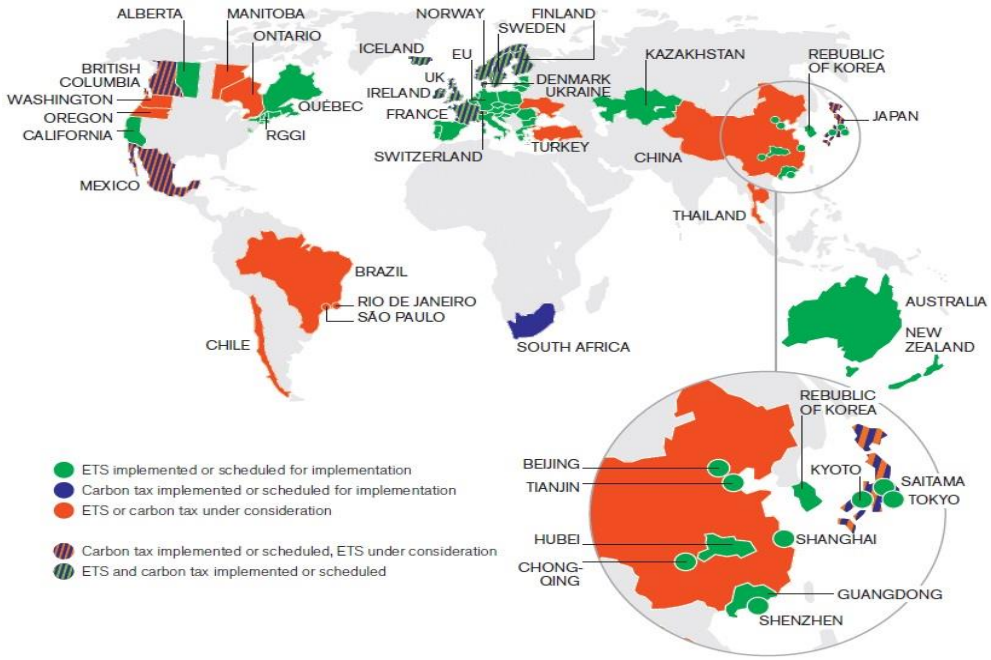

Figure 4 – Summary map of existing, emerging, and potential regional, national and sub-national carbon pricing instruments (ETS and tax). Source: World Bank 2014

3.3. A "bonus-malus" approach

Christian de Perthuis provided a new perspective on how economic instruments at the international level (carbon taxes, cap-and-trade) could help achieve a higher level of ambition in terms of abatement.

In the first part of his presentation, de Perthuis recalled the three components of an ambitious environmental agreement: strong commitments by all governments; an independent monitoring, reporting and verification (MRV) system, and; economic instruments. A successful example of an environmental agreement is the Protocol of Montreal on Substances that Deplete the Ozone Layer. This agreement has these three pillars.

Historically, the UNFCCC was based on the principle of Common But Differentiated Responsibility (CBDR). The first dimension of this principle is that all countries share the common responsibility of protecting the environment. The second dimension is that responsibilities in protecting the environment should be differentiated, based on socioeconomic differences and on the historical contribution to the global environmental problem.

This approach has shaped the "binary" interpretation of the Kyoto Protocol in terms of commitments (only Annex I countries have emission reduction objectives), in terms of monitoring (only Annex I countries must report on their emission reductions), and in terms of economic instruments (only Annex I countries can use flexibility mechanisms to comply with their emission targets). This binary interpretation of commitments, MRV and economic instruments explains why the Kyoto Protocol didn't work.

In Copenhagen, some progress was made in terms of commitments. For the first time, emerging countries announced voluntary pledges (relative targets). However, no real progress was made in terms of MRV in Non Annex I countries (except for forestry) and in terms of economic instruments (carbon pricing). One of the main achievements in Copenhagen was the promise of transferring $100 billion a year from industrialized to developing countries, starting in 2020. This announcement contributed to reinforce the binary interpretation of the CBDR, with no consensus on the distribution of funding among donors nor on the allocation of funds to recipients.

In the second part of his presentation, de Perthuis presented a new perspective on how international carbon pricing could be an important part of a future climate agreement to help accelerate the global mitigation effort.[2] The main issue raised by carbon pricing however is its distributional effects: a new value, the "carbon rent", is created. How to distribute it in the real economy?

International carbon pricing has a double function. For governments, it will help raise money and finance the promises made in Copenhagen. It should also incentivize governments to adopt a

[2] The view that carbon pricing would be an essential part of the mitigation effort was shared by most presenters of the workshop.

common MRV scheme and help avoid free-riding behaviour. For the private sector, international carbon pricing will help mobilize investments in low carbon systems by changing the relative price of energy and by creating a strong signal on the cost of emitting GHGs around the world (based on a "cost-efficiency" approach).

Introducing carbon pricing is not a technical issue, but a political issue. De Perthuis suggests a "bonus-malus" scheme, in which governments, who monitor their emissions in their national inventories and report to the UNFCCC, would pay a carbon tax ("malus") if their per capita emissions are above the world average. Payment would be based only on emissions that are above the world average. The tax rate calculated in order to raise $100 billion per year starting in 2020 would be 7-9 $/t. Using 2011 emission figures, the main donors would be the US, China, Russia and the EU.

The "bonus" part would be exactly the symmetry of the "malus ". Governments would have a right to receive transfers for the amount of per capita emissions that are below the global average. With 2011, figures, main recipients would be India, Bangladesh and Pakistan. However, as distributional effects of the " bonus-malus" scheme will depend on the choice of the year of reference, this will be a difficult aspect to negotiate.

If the political will exists for a "bonus-malus" scheme, it is yet to be determined how it would be implemented. A starting point would be to build on existing carbon markets, with the most prominent being the EU, the US and China. These schemes are based on "cap and trade" mechanisms covering the electricity sector and other emissions linked to energy and industry. There is currently no coordination and no feasible linkage between the schemes. To move forward, these schemes (that cover 56% of world emissions) would need to be linked, but there are technical issues (mutual recognition of allowances, harmonizing rules of MRV and compliance, common registries and market infrastructures, facilitating entry of new market participants, etc.) and political issues (scope of sectoral coverage, agreeing on a cap, allocation of permits and distributional impacts, incentives to attract new participants, avoiding "free riding" behaviours and governance of the overall market).

3.4. REDD+[3]

Arild Angelsen discussed the success and challenges of the REDD+ mechanism, a mechanism that has gained support through recent COP meetings. Basically, REDD is a framework through which developing countries are rewarded financially for any emissions reductions achieved associated with a decrease in the conversion of forests to alternate land uses (Parker et al., 2009).

Angelsen argued that REDD+ has been a success for three main reasons. First it is a good idea in that it sets monetary incentives for the conservation of forests at the national level (pay only for

[3] REDD+ stands for **R**educing **E**missions from **D**eforestation and forest **D**egradation and the "+" is related to the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries.

results). REDD+ has mobilized $5-6 billion of international funding, it has encouraged national REDD+ strategies and triggered subnational and local projects. In addition, it has generated substantial academic research. Second, it addresses a need – forests, as carbon stocks, play an essential role in contributing to stay on the 2°C emissions path. Finally, REDD+ plays an important political role in that it is sufficiently vague to accommodate several different views (from REDD+ countries, Annex I countries, NGOs and others).

In practice however, there are many challenges associated with implementing REDD+. These include institutional and technical challenges in creating a results-based system (a market), political economy challenges, and ideological challenges.

First, it is difficult to create a market for REDD, because several points need to be clarified before being able to do so. These include ownership and attribution of forest rights. A minimum requirement for defining REDD+ credits would also imply having institutions that are responsible for baseline definition, assessment of additionality as well as the definition of performance criteria and related measurement (design of a MRV framework). These requirements imply capacities and resources that many developing countries simply do not have.

Second, there are political economy challenges with REDD. Deforestation is increasingly driven by large, well-connected commercial actors. Is it politically acceptable to use development aid in the form of REDD to pay oil palm companies in Indonesia or farmers with >50 000 ha in Brazil to cut deforestation? Another challenge is to identify the "right" actors that REDD+ projects will target. REDD+ projects may be designed for specific local communities that have specific features (the worthy, the easiest, the most exciting), but are these communities also the responsible ones?

Third, REDD+ has faced implementation challenges associated with ideology. Criticisms of REDD include questions linked to leakage and permanence of emissions captured, local participation, additionality and measurement problems. Critics of market mechanisms question the morality of the concept of "Payment for Environmental Services" (PES) and the main idea of the « commodification » of forests. As REDD+ is results-based, it has also been criticized as a form of neo-colonialism.

Instead of focussing only on the PES aspect of the mechanism, Angelsen argued that REDD+ will likely be more successfully implemented if it is considered as a broad set of policies. In his view, REDD+ should be viewed as a political experiment on which we can improve, a necessary political experiment that we cannot afford to neglect if we still aim for a 2°C target.

Angelsen concluded by giving some future research paths for the analysis of REDD+, including further exploring the mechanisms of international processes, the problem of negotiating or cooperating with large actors at local and national levels, the effectiveness of national policies and of local interventions, the design of the mechanism (how imperfect can a mechanism be and still have an impact?). Finally, another field of research would be to investigate further the impact of monetary incentives on performance (i.e. avoiding deforestation).

3.5 The Clean Development Mechanism

Axel Michaelowa gave a presentation on the lessons from the Clean Development mechanism (CDM) for the design of new mitigation policy instruments involving developing countries.

Michaelowa first discussed the increasing irrelevance of keeping a distinction between Annex I and Non Annex I countries in the run-up to the Paris Agreement. Historically GHG emissions of many developing countries have been very low. However, between 1990 and 2010, GHG emissions per capita have risen in many countries still considered as « developing » under the UNFCCC negotiations and are above those of the U.S. The distinction between Annex I and Non Annex I countries is thus no longer justified, especially concerning the oil exporting countries. Despite these per-capita emission increases, some studies have shown that achieving a higher level of development, as measured by the Human Development Index, is potentially possible without increasing per capita emissions (e.g. Hong-Kong, Israel, Singapore).

The development path of many developing countries has favoured the emergence of an industrialized, middle class lifestyle, organized around a car-oriented urbanization and allowing the penetration of low energy-efficiency appliances. This development is associated with a rapid emissions take-off, as in the cases of China and Chile in the last decade and India, likely to follow the same trend in coming years.

Michaelowa asked whether countries could introduce policies before the take-off of emissions, by introducing urban planning (Singapore), energy efficient appliances or by imposing a low-carbon energy system (Brazil). In this context, he discussed the advantages and disadvantages of the CDM and argued that, despite its flaws, it has provided lessons for new market mechanisms and new policy concepts, such as Nationally Appropriate Mitigation Actions (NAMAs) and New Market Mechanisms.

In Michaelowa's opinion, the CDM, established under the Kyoto Protocol, is likely to continue in the future, because of its many successes compared to other mechanisms. First, since its inception in 2005, the CDM has resulted in over 10,000 projects, generating billions of Certified Emission Reductions (CERs). In contrast to International Emissions Trading, the CDM's main achievement is to have set clear incentives for the private sector to invest in developing countries, making it a credible mechanism with limited government interference. These elements determined the market mechanism's success.

However, the CDM has also suffered several flaws. For example, the CDM has not initially ensured additionnality of projects. The original idea was that CDM projects should be less profitable than the most attractive alternative and not be common practice. This would allow auditors to rule out business-as-usual projects. However a large share of projects (approximately one third) was found to be non- additional. With increased scrutiny by civil society, this share has been falling. This problem has seriously compromised the CDM's credibility and might have been avoided by making auditors liable for the additionality of projects.

Another problem was the quality of evaluation of auditors. Originally, it was thought that project auditors would perform project-specific evaluation tasks and that regulators would focus on system-specific rules. However, due to the low performance of auditors in regulators' eyes, between 2007 and 2010, regulators had to fill the gap and engage in project-specific checks.

Since 2010, a solution was found by hiring support staff to perform project checks together with clarified rules. The lesson learnt was that roles between regulators and auditors should be better clarified and that project evaluation should be separated from rule-setting.

An advantage of the CDM, however, is that it allows a wide range of project sizes, ranging from 5 to 10,000 $ktCO_2$ expected reductions per year. This flexibility in the CDM's structure has also allowed to introduce programmes, known as "Programmes of activities" (PoAs). A PoA is basically an umbrella of CDM projects. Projects can occur at different local, regional or national sites. In PoAs, there are two types of project participants : a PoA coordinator, who assumes the key role, and project developers. The exact number and timing of implementation of projects are not known at the time of submission, as several individual projects can be added into the program at later stages. Although this new concept was introduced late, the number of PoAs is rising, with close to 50% of PoAs taking place in the Asia and Pacific region and 32% in Africa.

Progress has also been made regarding the standardisation of the CDM registration procedure in view to reduce transaction costs and regulatory complexity. Examples include using default factors or pre-defined, conservative values instead of actual data, which proved to be a successful simplification without posing a risk for environmental integrity. The definition of "positive lists " to demonstrate additionality have been created and are now widely used. However the use of a performance standard approach on a highly aggregated level has not worked well. An alternative would be to use this approach on technology-specific levels, by introducing thresholds on technology penetration rates for specific technologies.

Based on the CDM's lessons, Michaelowa gave some recommendations on up-scaled mitigation mechanisms (NAMAs and new market mechanisms). They will need to have strong regulation and to ensure a highly transparent process with rapid regulatory learning. They will need baselines and MRV methodologies, they will have to provide monetary incentives directly accruing to private companies without regulatory interference. He also warned that increased difficulties may arise in determining additionality due to the scale of the mechanisms. Finally, these mechanisms will require independent and credible audits.

3.6 An innovative approach to upgrade climate finance and support sustainable development

Jean-Charles Hourcade presented an alternative "paradigm shift" in climate negotiations in the form of a monetary plan for upgrading climate finance and to support a sustainable development.

Hourcade believes that price signals (carbon taxes) alone will not be sufficient to reduce emissions because people will ultimately integrate the cost of carbon and pay the carbon price. Carbon trading will not incentivize agents to invest in low carbon technologies, unless the tax rate is very high (e.g. 200 USD/t). He argued that carbon pricing is needed, but what is necessary is finance, because new capital intensive investments in rapidly growing sectors (e.g. energy) could face a bankrupcty risk if they lack liquidities. He cited the example of Latecoere, a French aircraft company, based in Toulouse, who is at risk of being bought by foreigners because of a lack of treasury.

Finance is needed to dispel the apprehension of firms to invest in any new type of technology (energy, transportation, etc.), including in the climate change debate. In this context, Hourcade sketched a new mechanism to leverage finance[4]. This scheme has two objectives. First, it would inject liquidity into the economy to fund low-carbon investments, give a public guarantee to lower the risks of low-carbon investments and enhance the solvency of low-carbon entrepreneurs. Second, it would raise the attractiveness for the Banking System to fund low-carbon investments and make institutional investors interested in carbon-based financial products to attract savings. Ideally, this would trigger a wave of low-carbon investments in infrastructure, thereby revitalizing the industrial fabric in OECD countries and generating more inward-oriented growth in emerging economies

Ingredients of this mechanism include an anchor (a social value of avoided carbon emissions - SVC), voluntary commitments by governments and central banks, and an independent supervisory body.

The "game" would be as follows: governments would agree on an SVC and on a quantity of carbon assets they would need to guarantee every five years. Governments' commitments would be translated into carbon-based liquidity by central banks. Institutional investors or private banks could then obtain credit from the central banks to fund low-carbon projects. Investors would show how much carbon their project is estimated to reduce, multiply this amount by a price of carbon and would receive the corresponding credit in cash. They would then later reimburse the bank with the corresponding carbon credits (not in cash). Hourcade argued that this would be a way to lower investment risk in a very significant fashion. At the end of the process, central banks would accept the carbon certificates as repayments of the loan. This scheme is a form of money emission, backed by the creation of real wealth in the form of carbon emissions and in the form of real

[4] For more information, see http://www.centre-cired.fr/spip.php?article1787&lang=fr

infrastructures. Hourcade however acknowledged that the success of such a scheme will depend on the capacity of controlling the system.

Hourcade pursued that we should forget about binding targets and timetables. Instead, we need some form of commitment in the form of a mechanism or a procedure, but no binding commitment on the outcomes. For example, one could create a "club" of voluntary countries adhering to a common system that provides incentives for respecting announced emissions pledges and to narrow the gap between these pledges and a "2°C" trajectory. If a member does not commit to the principle or mechanism, it is excluded from the club and therefore from the benefits of the system supported by the club of voluntary countries.

Hourcade concluded by saying that any form of normative target could be used to organize a "pull-back" force (in the sense of drawing back GHG emissions). If countries don't respect the agreed scheme, they will need to pay more. Countries that are above their projected emission trajectory are forced to put a fixed amount of tonnes on the table to back the new investments (that will reduce the excess tons). For countries that have emissions below their projected emissions trajectory, the system should reward them with higher borrowing rights of the credit lines provided by the rich countries if they adopt tighter pledges and respect them. Hourcade recognized that this scheme is very complicated and is not a silver bullet, but he believes that it is a potential alternative to leverage climate finance within a banking framework.

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"Sur quoi la fondera-t-il l'économie du monde qu'il veut gouverner? Sera-ce sur le caprice de chaque particulier? Quelle confusion! Sera-ce sur la justice? Il l'ignore."

Pascal

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