PARTNERSHIP FOR MARKET READINESS (PMR)

Summary

__Expert Meeting: Modeling of Carbon Pricing Instruments__

The World Bank, Washington, DC

March 24-25, 2013

Comments and questions on this Summary should be directed to the PMR Secretariat (pmrsecretariat@worldbank.org).

For more information on the Partnership for Market Readiness, please visit the website: www.thepmr.org.

EXPERT MEETING: MODELING of CARBON PRICING INSTRUMENTS

The World Bank, Washington, DC

March 24-25, 2013

Draft Summary

1. Background:

A suite of approaches and instruments are needed to address climate change effectively. Several countries participating in the Partnership for Market Readiness (PMR, www.thepmr.org) are considering or exploring domestic carbon pricing options (e.g., domestic emissions trading scheme or carbon taxes)[1] as key means of moving to a low emissions development pathway and/or meeting their greenhouse (GHG) pledges. Decision on such instruments needs to be informed by a robust technical analysis that helps understand the implications and incidence of different policy options that can feed into each country's respective domestic policy debate on its low emissions development strategy, the potential role of carbon pricing instruments, and their design. This must also occur with other domestic policy considerations and goals. For some countries, such modeling-based analytical work constitutes the key part of the activities to be supported by the PMR.

The PMR Secretariat, in cooperation with partners at the World Bank, including the Climate Policy and Finance Department (CPF), the Development Economics Vice Presidency (DEC), the Energy Sector Management Assistance Program (ESMAP), the Poverty Reduction and Management Network (PREM), and the World Bank Institute (WBI), organized and hosted an Expert Meeting on the Modeling of Carbon Pricing Instruments at the World Bank in Washington DC on March 24-25, 2013.

The Expert Meeting brought together about 30 experts from 8 PMR Implementing Countries and 4 PMR Contributing Countries, as well as experts from other institutions and organizations. (The List of Participants is included in Annex I).

It sought to build on the October 2012 PMR workshop where the PMR Participants began exploring together the use of modeling tools to inform policy decision on carbon pricing instruments and the generated interest in pursuing the discussions and exchanges further, especially as a number of PMR Implementing Countries are planning to conduct modeling exercises to inform decisions on carbon pricing instruments and to examine implications of different potential designs,

---

[1] Carbon pricing instrument is hereby understood as those policies that regulate greenhouse gas emissions through price instruments such as a tax on carbon or an emissions trading system. This is sometimes referred to as "direct" carbon pricing. Other "indirect" pricing approaches such as reform of fossil-fuel subsidies, subsidies for renewable energy etc. were not the focus of the discussion.

2. Objectives:

The Expert Meeting was aimed primarily at experts within governments of both developed and developing countries, at the interface between modeling and policy, who may be responsible for planning/overseeing/commissioning modeling work and providing informed analyses of implications and incidence of carbon pricing options. Experts in policy modeling and assessment from World Bank, International Monetary Fund (IMF), and select research institutions were also invited.

The Expert Meeting was organized around the following objectives:

- Facilitate knowledge and experience sharing on modeling for carbon pricing instruments;
- Enable a community of practitioners that connects government experts and modelers within and across countries;
- Better understand and address questions and needs of World Bank client countries in this area; and
- Provide inputs towards the elaboration of a World Bank work program for providing systematic support to countries on modeling of carbon pricing instruments.

3. Organization/Format of the Expert Meeting:

The expert meeting was structured around a series of panel sessions where country representatives, policy experts and modelers can exchange on key carbon pricing modeling issues. Each session (about 90 min) was broadly structured with presentations on experience and challenges with carbon pricing modeling related to that topic followed by a moderated discussion among participants to facilitate dialogue, knowledge, and experience sharing in view to better understand questions and needs of countries that are starting to consider such issues and identify possible steps to address them.

4. Summary and highlights of Expert Meeting

Ms. Joelle Chassard (Manager, World Bank Carbon Finance Unit) welcomed participants; Ms. Martina Bosi and Mr. Carter Brandon (World Bank) co-chaired the Meeting. A copy of the Annotated Agenda is attached in Annex 2.

All presentations made during the Expert Meeting can be accessible from the PMR website: www.thepmr.org/events/eventlist/other-events/expert-meeting-modeling-carbon-pricing-instruments-april-2013

Setting the stage

This introductory session served to build a common language among participants on carbon pricing instruments and on modeling tools. **Mr. Ian Parry and Ms. Eliza Liz (IMF)** provided and overview of carbon pricing instruments. **Mr. Felix Matthes (Oeko Institut)** then gave a presentation on the landscape of modeling tools for the selection, design, and assessment of carbon pricing instruments.

Key messages from the session are summarized below:
- The choice of carbon pricing instruments (either Emissions Trading Systems [ETS] or carbon taxes) will depend on circumstances, possibilities, and constraints in each country. Whatever choice a country makes for its carbon-pricing instrument, what is important is getting the design details right. The importance of establishing a significant, credible, and rising price trajectory, and exploiting the fiscal dividend was highlighted.

- o Modeling of carbon pricing instrument is essential to enable policy makers to judge trade-offs and assess different scenarios/design options. It is important to use a set of complementary models and to use realistic assumptions.
- o To make good use of modeling capacity, it is important to target the policy questions and then select a model most suitable for this purpose
- o Different family of models help address different questions:
  - Macroeconomic and Computable General Equilibrium (CGE) models help understand interactions in the economy;
  - CGE models are useful to compare different cases: results are informative in terms of relative changes (but not absolute levels);
  - Econometric models are calibrated to reflect reality more closely (e.g., compared to assumption of general equilibrium), but they are more complex and very data intensive;
  - Bottom-up (sector and technology specific) models are used for simulation and optimization of specific technologies and/or sector-specific options.
- o Key challenges/issues/insights from modeling of carbon pricing instruments:
  - Modeling of ETS often done as if were a carbon tax and can thus overlook important features
  - Difficulty to reflect some key features of ETS or other policies, such as free allocation in ETS (or other compensation measures);
  - Transparency in modeling is one of the key issues;
  - Modeling of carbon pricing and other policies to assess interactions;
  - Armington elasticity is a key parameter to assess leakage that may be associated with carbon pricing instruments;
  - Recommendation for meta studies as an approach to ensure robustness of modeling results;
  - Need to take what is there: start with models that are used in the country and try to adjust them, bearing in mind limitations (instead of waiting for perfect model)

Foundation for a Work program on modeling of carbon pricing instruments

This session was essentially a round table to hear Participants describe their work and needs in area of modeling carbon-pricing instruments. To kick-off the discussion, **Ms. Beatriz Soares da Silva** (Ministry of Finance, Brazil) presented Brazil's plans for modeling work under the PMR; and **Mr. Zhang Yaxion** (China Information Center) presented an overview of the modeling work on ETS in China.

Information shared by representatives of PMR Implementing Countries during the round-table discussion is summarized in table below:

PMR Implementing Country	Main observations shared on modeling work, gaps and needs
Brazil	- Brazil will be conducting modeling work to provide input into policy discussions on considerations of a carbon pricing instrument (both ETS and Carbon tax are being examined). - Key issues Brazil is seeking to address: (i) understanding costs and impact of a carbon pricing instrument on the economy (including competitiveness); as well as (ii) distributional impacts (especially on households); and (iii) options and implications of revenue recycling.

	• `In addition, Brazil, is seeking to build modeling capacity within the government to enable ministry officials to better understand and communicate modeling results. • Brazil is starting with a macroeconomic assessment with a CGE model, as it reduces the need for installation-level data. This macroeconomic work will complement analysis conducted on sector marginal abatement costs with the World Bank MacTool.
Chile	• Chile has experience in (non-GHG) market mechanisms. It is useful to conduct analysis to understand impacts of regulations. For example, Chile is starting to look at how to introduce more competition in electricity sector. • In terms of modeling, Chile has developed an econometric model (with GDP exogenous). Now trying to internalize dynamic of GDP that will approach a CGE model. This work complements energy models, which will enable combining energy (physical aspects), and macro model (economic aspects). • Chile is also trying to build Marginal Abatement Costs (MAC) curves, but have some questions. • PMR support in Chile will be directed at modeling work, including building and improving data. For example, industry surveys are expected to be next steps.
China	• Some of the modeling work being conducted is to help regions/cities setting-up ETS pilots understand economic impact. National government now focusing their modeling work more on how to design and set-up national ETS scheme. • China has done analysis with the State Information Center General Equilibrium Model, which has different modules: (i) national; (ii) inter-regional; (iii) regional/provincial. Modules added for carbon tax and ETS. The model is based on 2007 China input-output data and covers 150 industries/commodities. • Key issues/modeling needs: challenge of modeling national ETS, involving cap setting and trajectory, sector coverage, allowance allocation and modeling of (i) price level and its impact; (ii) power generation sector (how ETS modeling with power sector model); and (iii) use of revenues. • Also need for impact studies: growth (mitigation cost) and structure change, industrialization pattern, regional effects/impacts. • Data is also a key issue.
Colombia	• Colombia is working on its Market Readiness Proposal (MRP); it plans to finalize it in the coming months. • In terms of carbon pricing, Congress recently passed a green tax reform asking the national government to assess efficiency of rate of taxes already in place and study feasibility of establishing new taxes for emissions, such as carbon taxes. With this development, the ministry of finance has asked the World Bank for support for the assessment of the impact of a carbon taxes.
Mexico	• Mexico has worked for several years on a baseline project and then developed MAC curves which are now being updated. • Working on CGE model. • Mexican government focusing efforts on NAMAs and targeted programs.
South Africa	• A policy decision has been made on implementation of carbon pricing. • A suite of models is used to look at different ways to implement a carbon tax.

	Important to have models that integrate energy planning with carbon tax • Current modeling priority: to enable better understanding of revenue recycling impacts to inform policy on how to do this effectively.
Thailand	• Thailand has conducted work on business-as-usual (BAU) baseline development with the Long-range Energy Alternatives Planning (LEAP) model. It has also worked with macroeconomic models (Computational General Equilibrium model to assess impact of greenhouse gas targets. • As a next step, Thailand seeks assessing impact of reducing greenhouse gas emissions via a market mechanism. • Thailand's MRP includes an energy efficiency-trading program (no decision has been taken yet if this would also involve GHG trading). This will require developing a model to understand the impact on industries that may participate in the program. Thailand's MRP also includes a proposal for a low-carbon city program that would generate credits. • Thailand interested in undertaking a simulation of the EE scheme.
Vietnam	• Vietnam is not yet ready for modeling of a carbon pricing instrument; government is currently preparing the Market Readiness Proposal involving design roadmaps for consideration and implementation of Market-based instruments (on which the government has not yet made a decision). • Possible next step: identify potential application of carbon tax and enhancing understanding of carbon pricing; identify technical assistance needs, such as learning about modeling of carbon pricing instruments and experience of other countries in this area.

Denmark shared with the group that the government's ambitious objective of 100% renewable energy by 2050 has implications for modeling, as it requires a different structure involving a hybrid model linking CGE and bottom-up models, as well as modeling energy services instead of energy flows.

In the **USA**, modeling is done by the US Environmental Protection Agency (EPA) and the Department of Energy (DOE) and its laboratories and covers a suite of different models and modeling approaches (both top down and bottom-up, such as with the MARKAL model). The focus of the modeling work has shifted from modeling economic instruments (such as cap-and-trade) to policies and standards.

The focus of modeling work within the **European Commission** (EC) is more on the longer term, consistent with climate change goals to conduct analysis of policies that should be in place by 2030. It was pointed out that the models focused on mid-to-long terms can be useful to obtain a perspective on pricing in emissions trading systems (ETS), but they are not adequate to examine daily trading behavior in an ETS. Modeling on carbon pricing instruments at the EC also involves dialogues with Member States on how to link the various country projections within one model.

The **World Bank** also made a presentation on its work relevant for modeling and analysis of carbon pricing instruments that can be built upon to support PMR Implementing Countries and other World Bank clients in their plans on modeling of carbon pricing instruments.

Building Scenarios to Assess Carbon pricing

This session provided a venue for experts to exchange views, experiences, and plans on considerations and challenges countries face in developing reference cases and carbon pricing scenarios. The context for the session was set by three presentations by [i] **Allen Fawcett** (Energy Modeling Forum) who highlighted issues and concepts relevant to baseline projections focusing on the experiences from US model comparison (EMF24) and Asia Modeling Exercise 2012, [ii] **Sixten Holm** (Danish Energy Agency) and **Iván Islas Cortés** (Instituto Nacional de Ecología y Cambio Climático, Mexico) whose talk compared Mexico's baseline projection from LEAP and POLES models, and [iii] **Erika Jorgensen** (World Bank) who shared insights from scenario building exercises with Poland and Macedonia using a suite of modeling tools.

Key messages emerging from the session are summarized below.

- Retrospective analyses show that baseline projections are highly uncertain and vary significantly depending on modelers' perception of how the world/countries might evolve.
- Major factors contributing to baseline uncertainty are, among other things: macro-economic conditions, sectoral composition, population dynamics, energy intensity, and carbon intensity. It is important to "decompose" baseline projections to understand the sources of uncertainty.
- Baseline setting is a complex and challenging task. Among the most critical issues are defining what the baseline consists of and what policies are to be included in the baseline.
- Model and baseline comparison exercises (such as those presented in this session) are crucial for understanding the divergence of projections and potentially achieving a convergence/agreement among them. However, the exercise should be built on a harmonized set of initial assumptions.
- Uncertainty is unavoidable and modelers should explore ways in which baselines are set with transparency, while moving away from deterministic analysis and enhancing effort on sensitivity/uncertainty analysis.
- It may be worth considering unexpected changes in analyzing baseline sensitivity.
- A suite of complementary modeling tools is needed for answering different policy and technical questions. For example, a bottom-up model is typically used to assess mitigation potential and cost-effectiveness of certain technology options, while a macro-economic framework may be adopted in tandem to estimate their economy-wide (GDP, competitiveness, employment, etc.) and distributional impacts.

Assessing Macro-economic and Sector-wide Impacts

This session focused on experiences and plans with computable general equilibrium (CGE) models and other macro-economic models to assess impacts of carbon pricing instruments on growth and investment, fiscal revenues, competitiveness, employment, as well as emissions. The discussion was led by three presentations by [i] **Allen Fawcett** (US Environmental Protection Agency) who shared insights from the analyses of proposed Federal climate bills in the USA, [ii] **Tom van Ierland** (European Commission) who demonstrated the use of modeling tools by EC to answer a range of policy questions in the context of EU's targets and EU-ETS, and [iii] **Chaiwat Muncharoen** (Thailand Greenhouse Gas Management Organization) whose presentation provided

perspective from Thailand with regards to its work-in-progress, modeling and data needs, and visions on modeling carbon pricing instruments.

Key messages from the session are summarized below.

- The session re-emphasized that there is no one single model that can address all questions and there is a need for different models to inform policy makers.
- In the case of analyzing US Federal climate bills, the US EPA adopted two CGE models (namely, ADAGE and IGEM) to assess the sources of emissions reduction, allowance price and its sensitivity, potential revenues, economic costs, and what the proposed bills could achieve climate-wise. Although the estimates from ADAGE and IGEM differ, the two models agree in qualitative terms.
- As for the EU experience, energy system model (PRIMES, plus GAINS) was used to assess sector roadmap (feasibility and investment requirement) towards achieving the 80 percent reduction target by 2050, as well as regional distribution and direct costs. On the other hand, two CGE models (GEM E3 and PAGE) and an econometric model (E3MG) were simulated to assess the impact across sectors, on employment and competitiveness.
- Countries (such as Thailand, China, Mexico, and Chile) also saw the need of a combination of approaches, and noted the importance of learning from the experiences of the US and EU examples. Nevertheless, there are still a number of gaps in data and modeling capacity in these countries, particularly in terms of preparation of Social Accounting Matrix, modification of CGE structure for specific simulation of carbon pricing scenarios, and establishing linkages between CGE and bottom-up models.
- It is important to note that modeling experts have so far captured ETS effects largely through modeling of carbon taxes or Marginal Abatement Cost (MAC) curve (as opposed to explicit modeling of trading of emission allowances). Questions remain as to whether or not it is technically feasible for existing tools like CGE to model ETS explicitly (in order to simulate specific design options, and not only revenue-recycling aspects), and whether other approaches should be considered.
- Issues related to linking/synchronizing the currently existing and future ETSs are plentiful and daunting. Appropriate methodology and modeling tools will be required to inform decision makers of its implications.

Session 6: Introduction to the Platform for Climate Smart Planning

Philippe Ambrosi and **Ana Bucher** (World Bank) presented the prototype of the Platform for Climate Smart Planning ('Platform') that was unveiled earlier in April, 2013 and answered questions on how this initiative could address the needs of different countries.

The Platform aims to facilitate access to well-trodden climate-smart planning toolkits and provide guidance on their use, as part of broader efforts to help developing countries create low emissions climate resilient development plans that are tailored to local needs, capacities, and challenges. A prototype of the Platform was launched at the second Annual Conference of the Green Growth Knowledge Platform in Paris on April 4, 2013 around a pilot a set of approximately 30 well-established and linked planning tools, methods, and approaches from 10 initial partners. The Platform can be accessed online at http://climatesmartplanning.org. The Platform's team is currently working towards broadening offering and partnerships with other institutions for tools, data,

and guidance with a view to launch an operational version of the Platform at COP-19 in Warsaw (Poland) in November 2013.

Session 7: Assessing Impacts on Industry

This session looked at experiences, challenges and plans with modeling impacts of carbon pricing instruments on productive sectors, including assessing competiveness effects, leakage, and response measures. Four presentations set the topic in perspective: **Martin Ross** (Duke University, US) discussed the analysis of two response measures to address competitiveness and leakage concerns (output-based free allocation and border carbon adjustment); **Tom van Ierland** (European Commission) talked of modeling of macro-economic impacts (GDP, output, employment) and competitiveness effects across sectors in the context of the EU Climate and Energy Package and different scenarios for international action; **Felix Matthes** (Oeko Institute, Germany) shared insights on modeling industrial competitiveness; and **Luis Gonzales** (Ministry of Finance, Chile) presented key policy questions, plans and next steps for carbon pricing instruments in Chile.

Highlights from the session include the following:

- Competitiveness effects result from direct costs from carbon constraint to companies, which is influenced by allocation rules, and indirect carbon cost passed by the power sector to companies, which vary greatly by sectors (and countries). To analyze them one must be equipped with a good understanding of modeling of power matrices and market characteristics, as well as of impacted sectors.
- Demand and trade elasticities are a key driver of models' output. Results are also dependent of the degree of granularity of models, with aggregate models overestimating losses and underestimating leakage. Finally, channels used to recycle carbon revenues (to companies and sectors, directly, or to the general budget, which can include redistribution to households) in the economy crucially matter for the overall economic outcome.
- Several good practices were discussed to make modeling exercises policy-relevant, i.e., improve micro-foundation of macro-models) and confront models with clear policy questions. They include transparency around key levers, sensitivity analyses, third party evaluation (by academia for instance) to audit and update data and parameterizations, and for a for model comparison, experience sharing, and associating policy makers to the exercises.

Session 8: Assessing Impacts on Households

This session focused on experiences, challenges, and plans with modeling distributional effects of carbon pricing instruments on households via income and compensation measures. Three speakers shared their experience: **Terry Dinan** (US Congressional Budget Office) discussed analyses of the distributional effects of a carbon tax (based on studies for the U.S.), through income (how carbon pricing affect returns from labor and capital), spending (how increase in prices of emissions-intensive goods affects consumption and affordability), and recycling; **Peter Janoska** (National Treasury, South Africa) discussed how a number of modeling studies have informed the design of a carbon tax in South Africa and which further modeling work is required to assess the impact of the country's upcoming carbon tax; and **Will Space** (Massachusetts Department of Environmental Protection) presented results of modeling analyses of the impact of a tightening of RGGI's cap on allowance and wholesale electricity prices, retail prices, and macro-economic variables.

Emerging messages from the session include:

- Carbon pricing affect households through many channels (income source, consumption patterns, location, and transitional effects). No measure of distributional effects captures them all. In addition, data requirements to conduct distributional impact assessment are significant.

- Most studies find a carbon tax in itself is somewhat regressive but ultimately distributional effects will depend on policy decision about recycling. Options such as tax credit/ cut, food, or heating assistance programs can help achieve multiple objectives but all involve trade-off between different considerations (e.g., benefits to lower-income households, administrative costs, incentives to work and invest, and incentives to cut emissions).

- A succession of studies (with different models and carbon pricing design) has indicated that recycling options have the potential to bring a positive dividend to the economy in South Africa, cutting emissions and fostering growth and poverty alleviation. South Africa's current carbon tax design includes two broad types of recycling options: a/ soft earmarking for energy efficiency and renewable energy support programs and b/ tax redeployment. Further modeling needs include a detailed analysis of the current carbon tax design on emissions, growth employment, structural shifts, and welfare and assessment of recycling options. Finally, beyond ex-ante analysis, there is a need to create a tool to be used on a regular basis to evaluate the impact of the policy and produces detailed scenario analysis.

- For RGGI, a very minimal net impact on residential, commercial and industrial electricity bills (less than 1%) is expected, in relation to low carbon prices (<$10 [2010] by 2020). There is no expected macro-economic impact and changes to RGGI are expected to generate an additional $2.2 billion ($2010) for reinvestment. These investments in energy efficiency and renewable energy save consumers money, create jobs and enhance energy security, and drive further emission reductions.

Session 9. From Modeling Outputs to Inputs into Policy Discussions

This session sought to initiate discussion on how to integrate and communicate insights from modeling and technical analysis into policy debates. **Bertrand Magné** (OECD Environment Directorate) shared insights from the OECD/IEA approach to low emissions development strategy, that draws on complementary (and increasingly integrated) modeling tools for policy-relevant analyses: OECD's top-down macroeconomic (ENV-Linkages model) and the IEA's bottom-up models (World Energy Model used for the IEA's World Energy Outlook; and the suite of models including TIMES for power optimization and MOMO for transport used for the IEA's Energy Technology Perspectives. He also highlighted OECD and IEA data and data sources for the modeling and discussed processes to engage stakeholders around modeling exercises. Finally, he highlighted IEA's Training and Capacity Building Program, designed to support non-member countries around a range of topics including energy system and scenario modeling, carbon policy and markets.

Some Participants were particularly interested in the availability of data and statistics collected by the OECD and IEA, which can input into models and/or be a check for domestic data. Participants also expressed interest in testing the models. Several participants noted that they were at the beginning of their modeling work and acknowledged the need to plan interactions with other ministries, experts outside government and stakeholders.

Building a workprogram together

In the wrap up session, the PMR Secretariat presented a list of ideas for workplan elements on the modeling of carbon pricing instruments that were noted during the expert meeting. Participants at the meeting complemented the list with further suggestions. A compilation, reflecting the different needs of different countries is included in the Table below. This information will help provide input to the development of the PMR's technical workprogram in collaboration with its World Bank partners that will provide value added and synergy to other existing modeling exercises.

Knowledge products and resources on technical issues	• **Mapping** of policy questions with modeling/analytical tools and data requirements. This could include compiling relevant references and update of what countries are doing, collecting information on their experiences with carbon pricing instruments
	• **Knowledge products** on key issues/topics (including case studies), such as
	(i) Modeling of **compensation measures** (including, for e.g., free allocation in the case of ETS) and **revenue recycling** options
	(ii) Modeling **of interactions** between policies and carbon pricing instruments
	(iii) Modeling of **competitiveness**
	(iv) Enhancing understanding of **limitations of economic modeling** in the socio-economic impact of carbon pricing policy. For e.g., how much detail could policy makers expect that modeling will reliably estimate? What are the lessons that PMR countries could learn from developed countries in terms of ex ante modeling vs. ex post experience?
	(v) **Combining different modeling** approaches/results, e.g.
	      o Integrating bottom-up technology information into top-down models
	      o Integrating electricity models (direct and indirect impacts)
	(vi) Looking at **non-GHG benefits** ("co-benefits" in broad sense) of carbon pricing instruments (modeling, estimation, messaging)
	(vii) **Data and assumptions for modeling**:
	      o Compilation of experience and identification of best practice with building a reliable database to conduct modeling.
	      o Distillation of experience with making data assumptions and effects on accuracy of modeling.
	      o Identification of the data assumptions/estimates that are needed (inevitable).
	      o Treatment of uncertainty and sensitivity analysis.
	• **Simulations** of trading programs (emissions and/or energy efficiency)

Technical meetings/trainings	• **Capacity building and knowledge exchange** on specific topics or tools, building on available (in countries) capacity and infrastructure could take different forms: o In-country (e.g., In-country training and support to develop a modeling system or platform; and/or support for developing « modeling tradition » in a country, including linking with modeling capacity in different government agencies and outside

	the government)
	o Regional trainings/workshops
	o International expert meetings and workshops
	o Cooperation with World Bank

Annex 1 – List of Participants

Expert Meeting on Modeling for Carbon Pricing Instruments

Washington, DC, United States - April 24-25, 2013

Country	Representatives	Department
Brazil	Ms. Beatriz Soares da Silva Ms. Silvia Palma Rojas	Ministry of Finance
Chile	Mr. Luis Gonzáles	Ministry of Finance
China	Mr. Zhang Yaxiong	China Information Center
Colombia	Ms. Sandra López Tovar Mr. Rodrigo Suescún	Ministry of the Environment and Sustainable Development Office of Executive Director of IBRD
Denmark	Mr. Sixten Holm	Danish Energy Agency
European Commission	Mr. Tom van Ierland	DG Climate Action
Mexico	Mr. Iván Islas Cortés	Instituto Nacional de Ecología y Cambio Climático
South Africa	Mr. Peter Janoska	National Treasury
Sweden	Ms. Charlotte Berg	National Institute of Economic Research (NIER)
United States	Ms. Alexia Kelly Ms. Terry Dinan Mr. Allen Fawcett	Department of State US Congressional Budget Office Environmental Protection Agency
Thailand	Mr. Chaiwat Muncharoen	Thailand Greenhouse Gas Management Organization
Vietnam	Ms. Doan Thi Xuan Huong Ms. Nguyễn Thị Hiền Thuận Mr. Nguyễn Văn Huy Mr. Phạm Nam Hưng Ms. Vũ Thị Ngọc Mai Mr. Phạm Sinh Thành	Ministry of Natural Resources and Environment Ministry of Finance Ministry of Industry and Trade

Experts	
International Monetary Fund (IMF)	Mr. Ian Parry;Ms. Eliza Lis
Organisation for Economic Co-operation and Development (OECD)	Mr. Bertrand Magné
Brookhaven National Laboratory (BNL)	Mr. Paul Friley
The Sustainable Transport and Emissions Services Company	Mr. John Rogers
Oeko Institut	Mr. Felix Matthes
American Enterprise Institute (AEI)	Ms. Aparna Mathur
Duke University	Mr. Martin Ross
Regional Greenhouse Gas Initiative	Mr. William Space

PMR Secretariat and World Bank	
Carbon Finance Unit	Ms. Joëlle Chassard
	Mr. Klaus Oppermann
	Mr. Hari Gadde
	Mr. Suphachol Suphachalasai
Climate Policy and Finance Department	Mr. Philippe Ambrosi
	Ms. Ana Bucher
Poverty Reduction and Management network (PREM)	Ms. Erika Jorgensen
Middle East and North Africa region (MENA)	Mr. Andrew Losos
Latin America and the Caribbean region (LAC)	Mr. Carter Brandon
	Mr. Chandra Shekhar Sinha
Development economics Vice Presidency (DEC)	Mr. Jon Strand
Eastern European and Central Asia region (ECA) South Asia Region (SAR)	Ms. Burcu Polat
	Mr. Keisuke Iyadomi
Sustainable Energy Department (SEG)	Ms. Wendy Hughes
ESMAP	Mr. Pierre Audinet
	Mr. Pedzi Makumbe

World Bank Institute	Mr. Pablo Benitez
	Mr. Marcos Castro
PMR Secretariat	
	Ms. Xueman Wang
	Ms. Martina Bosi
	Mr. Michael McCormick
	Mr. Adrien de Bassompierre
	Mr. Mitchell Delaney

pmr | PARTNERSHIP FOR MARKET READINESS

Annex 2 – Agenda

Expert Meeting on Modeling for Carbon Pricing Instruments

Washington, DC, United States - April 24-25, 2013

Day 1 (April 24)

1. Opening and Introduction *Co-Chairs: Ms. Martina Bosi and Mr. Carter Brandon (World Bank)*	
9:00	Registration: welcome coffee and badge pick-up
9:30	- Welcome – **Ms. Joëlle Chassard, Manager (Carbon Finance Unit, World Bank)** - Introductions - Tour de Table
2. Setting the Stage: Instruments and Modeling Tools	
This introductory session aims to build a common language among participants on carbon pricing instruments and on modeling tools.	
10:00	- Overview of Carbon Pricing Instruments — **Mr. Ian Parry and Ms. Eliza Lis (International Monetary Fund)** - Select, Design and Assess Carbon Pricing Instruments: the Landscape of Modeling Tools — **Mr. Felix Matthes (Oeko Institut)** - Q&A
10:45	**Coffee Break**
3. Foundation for a Work Program on Modeling of Carbon Pricing Instruments	
All participants are invited to briefly describe their work and needs in the area of modeling carbon pricing instruments (discussion to be initiated by representatives from Brazil and China). The session concludes with a brief introduction of relevant activities by World Bank partners.	
11:00	- Perspective on Plans for Modeling Work in Brazil – **Ms. Beatriz Soares da Silva (Ministry of Finance, Brazil)** - Perspective on Modeling Work on Emissions Trading in China – **Mr. Zhang Yaxiong (China Information Center)** **Round Table Discussion**: experiences and/or plans with modeling of carbon pricing instruments and identification of key needs and gaps — **All participants** Key questions: 1. What are the carbon pricing instruments being considered/planned in the participating countries? 2. What is their status (e.g., consideration, planning, design, implementation)? 3. What are the questions for which modeling is expected to help provide insights? 4. Are the existing modeling tools and datasets analysis-ready and available for/in the countries? What are the needs/expected needs?
12:15	- Overview of World Bank Activities in Modeling and Assessment of Climate Policy (research, technical assistance and knowledge management) – **(World Bank)** - Q&A
12:40	**Lunch**

	4. Building Scenarios to Assess Carbon Pricing Instruments
This session shall encourage an exchange of views, experiences and plans on considerations and challenges countries face in developing reference cases and carbon pricing scenarios	

14:00	- Model Inter-comparison to Understand Models Differences and Shortcomings and Handling of Uncertainties in Long-term Scenarios — Allen Fawcett **(Energy Modeling Forum)**
	- Mexico's National Baseline: A Comparison Exercise in Collaboration with Denmark – **Mr. Sixten Holm (Danish Energy Agency**), **Mr. Iván Islas Cortés (Instituto Nacional de Ecología y Cambio Climático, Mexico)**
	- Low Emissions Development Studies in Poland and Macedonia —**Ms. Erika Jorgensen (World Bank)**
	
	Round Table discussion — **All participants**
	Key Questions:
	  1. What are the key elements (e.g., variables, assumptions, approach, consultations) for building a reference case scenario that is credible among the stakeholders?
	  2. What are the key challenges for models to capture drivers of economic growth and emissions trajectories (as well as changes in trajectories)? How to manage data gaps?
	  3. How do we go about the uncertainties associated with a range of forward-looking input parameters in the models?

15:30	**Coffee Break**
	5. Assessing Macro-economic and Sector-wide Impacts
This session will focus on experiences and plans with computable general equilibrium models and other macro-economic models and sectoral models to assess impacts on, for example, growth and investment, fiscal revenues, competitiveness, employment, and emissions.	

15:45	- Insights and experience on analyses of proposed Federal climate bills in the USA — **Mr. Allen Fawcett (US Environmental Protection Agency)**
	- Insights and experience on analysis of EU-ETS – **Mr. Tom van Ierland (European Commission, DG Climate Action)**
	- Perspective from Thailand – **Mr. Chaiwat Muncharoen (Thailand Greenhouse Gas Management Organisation)**
	
	Round Table discussion — All participants
	
	Key Questions:
	
	  1. How applicable are these modeling tools to the questions/issues arising in countries? What are the limitations and what has to be done to customize the tools?
	  2. What models, if any, have already been used in countries to inform other policy decisions (e.g., macro/sector impacts of policies) that may also be applicable in context of carbon pricing instruments?
	  3. How to compare, interpret and reconcile results from different models?

17:15	**Coffee break**

6. Introduction to the Platform for Climate Smart Planning

The Platform for Climate Smart Planning ('Platform') aims to facilitate access to well-established climate smart planning tools, approaches and data developed worldwide and provide guidance on their use to support developing countries with plans for low emissions climate resilient growth. The Platform will include elements of crowd-sourcing from an active, participatory community for faster exchange, learning, and innovation. As the Platform matures, it will allow for the expansion of datasets (including their updating), for the integration of tools and data, for the enhancement of existing tools and the development of new ones. The team will present the prototype of the Platform that was just unveiled earlier in April and answer questions on how this initiative could address the needs of different countries.

17:30	- **Mr. Philippe Ambrosi and Ms. Ana Bucher (World Bank)** - Q & A
18:30	**End of Day 1 – Cocktail Reception**

Day 2 (April 25)

	7. Assessing Impacts on Industry
	This session will focus on experiences, challenges and plans with modeling impacts on sectors/industries, including competitiveness and related leakage issues, as well as compensation measures.

9:00	- Insights from Modeling on Sectors of the US Economy – **Mr. Martin Ross (Duke University)**
	- Insights from the EU-ETS – **Mr. Felix Mathes (Oeko Institute) and Tom van Ierland (European Commission, DG Climate Action)**
	- Perspective from Chile – **Mr. Luis Gonzáles (Ministry of Finance, Chile)**
	
	Round Table discussion — All participants
	
	Key Questions:
	
	    1. What are the issues and emerging evidence on the impacts of carbon pricing instruments on industry?
	    2. What are the designs/measures to address them?
	    3. What are the approaches, tools and data required for this analysis?

10:30	**Coffee break**
	8. Assessing Impacts on Households
	This session will focus on experiences, challenges and plans with modeling distributional impacts on households via income and compensation measures.

10:45	- Analysis of Distributional Consequences in US of Carbon Pricing Instruments – **Ms. Terry Dinan (US Congressional Budget Office)**
	- Perspective from South Africa on Compensation/Revenue Recycling Measures
	  Mr. Peter Janoska (National Treasury, South Africa)
	- Insights from modeling of impact of RGGI on households – **Mr. William Space (Regional Greenhouse Gas Initiative)**
	
	Round Table discussion — All participants
	Key Questions:
	
	    1. What are the issues and emerging evidence on the impacts of carbon pricing instruments on households?
	    2. What are the designs/measures to address them?
	    3. What are the approaches, tools and data required for this analysis?

12:15	**Lunch**
	9. From Modeling Outputs to Inputs into Policy Discussions
	This session will allow where participants to discuss and share experiences and plans on how to integrate and communicate insights from modeling and technical analysis into respective domestic policy debates on low emissions development strategies, the potential role of carbon pricing instruments, and their design.

13:30	- OECD modeling and contributions to policy discussions, **Mr. Bertrand Magne (OECD)**
	
	Round Table discussion — All participants
	Key Questions:
	    1. What are the issues, considerations, experiences with the results of modeling and technical exercises in informing policy debates/decisions?
	    2. Are there emerging lessons learned?

14:45	**Coffee break**

<table>
<tr><td colspan="2" align="center">**10. Building a Work Program Together**</td></tr>
</table>

Participants are invited to identify (i) needs; (ii) areas of possible cooperation, including to improve learning and sharing among countries; and (iii) ideas for next steps, as relevant.

15:00	**Round Table discussion — All participants** Key Questions: 1. What are the key questions the work program should aim to help answer? 2. What are the key elements (as well as themes) of the work program? 3. How do we build capacity sustainably and help maintain/update such tools for future use (as policies and questions evolve)? 4. How do we ensure synergies and complementarity with other relevant initiatives?
16:30	Wrap-up and closing remarks **(World Bank)**
16:45	**End of expert meeting**