International Climate Policy & Carbon Markets

N°04 September 2009

BI-MONTHLY REPORT

ALICE FAVERO E CATERINA CRUCIANI

International Climate Policy and Carbon Markets is a bi-monthly report aimed to provide a clear analysis of the worldwide evolution of the carbon market, and the international and domestic climate policies.

The report is drafted in four sections focused on i) international negotiations and national policies, ii) European and international energy policy, iii) flexible mechanisms and developing countries, and finally, iv) the valuation of the carbon price in the European and global market.

The information and data presented in each section are not only an update of recent events but also an extrapolation of the **quantitative implications** of recent events, based on a detailed analysis of academic papers and recently published reports (i.e. how will the carbon price be impacted by changes in the demand or supply side, etc). Every two months for each section we will briefly introduce and analyse the most important policies (proposed or applied) and actions. Each article will include boxes, figures and graphs in order to provide in-depth examinations and data exemplifications; all papers and reports used for the analysis will be cited in the final reference section.

CONTENTS

Less than 90 days before Copenhagen: the global finance blueprint proposed by European Commission

With less than 90 days before the U.N. climate conference in Copenhagen the **European Commission** (EC) has put the first meaningful proposal (*Stepping up international climate finance: A European blueprint for the Copenhagen deal*) on the table in the view of breaking the impasse of the coming negotiations.

Based on Commission's estimates global finance requirements for adaptation and mitigation actions in developing countries could reach roughly **€ 100 billion** per year by **2020**. In particular, the total net additional cost in the energy, industry, agriculture and forest sectors amounts to around **€ 94 billion** in 2020, while adaptation costs are extrapolated using data from the UNFCCC Secretariat which are around € 23 – 54 billion in 2030.

Of the overall amount, **domestic private** and **public finance** could deliver between **20-40%**, the **carbon market** up to around **40%**, and **international public finance** could contribute to cover the remainder.

Indeed, the Communication emphasises the key role of the **international carbon market** which, if designed properly, could potentially generate financial flows equal to **€ 38 billion** per year in 2020 (in a 30% reduction target scenario). So, thanks to such flows generated in the energy and industry sector, the remaining **net total additional costs** were estimated at **€ 56 billion** in all sectors, of which € 33 billion in the energy and industry sector (**Tab. 1**). However, this achievement requires the assumption that all profits from selling offset credits would be used to mitigate GHG emissions in developing countries.

TAB. 1 TOTAL ADDITIONAL COSTS 2020 (BILLION EURO, 2005 PRICES)

	2020	Net costs including carbon market flows
Mitigation	94	56
Energy and industry	71	33
Agriculture	5	5
Reducing emissions from deforestation and forest degradation REDD	18	18
Adaptation	10-24	
Total	104-118	
Financial flows carbon market	38	38

Source: EC(2009). Staff Working Document

The blueprint offers also a short-term evaluation between **2010–2012.** For this period a fast-start financing is required for adaptation, mitigation, research and capacity building in developing countries in the range of **€ 5 to 7 billion** per year (**Box 1**).

BOX 1 FINANCING SOURCES 2010-2012

1. CAPACITY BUILDING - **€ 1-2 billion**
   - setting-up GHG emission inventories and low-carbon growth plans by 2011
2. MITIGATION INCLUDING TECHNOLOGY DEPLOYMENT - **€ 1 billion**
   - Supporting the Global Energy Efficiency and Renewable Energy Fund Build (GEEREF)
   - Building capacity for domestic cap-and-trade systems
   - Reducing emissions from deforestation and forest degradation (REDD).
   - Supporting changes in agriculture
   - Supporting maintenance and restoration of carbon rich ecosystems
3. ADAPTATION - **€ 2-3 billion**
   - implementing priorities identifies in National Adaptation Programmes of Action
4. TECHNOLOGY RESEARCH, DEVELOPMENT AND DEMONSTRATION - **€ 1 billion**
   - contributing in driving transformational low-carbon, climate-friendly technologies
   - assisting key developing country partners on technology demonstration

Finally, regarding the **EU,** it should consider an immediate contribution of **€ 0.5 to 2.1 billion** per year, starting in **2010-2012**; while, between **2013** and **2020** the EU's share could rise from **€ 0.9 – 3.9 billion to € 2 – 15 billion**. This wide range is given by the different indicators used to determine how much of the burden each developed country should offer, measured by **GDP** or its **responsibility** for emissions. Depending on the weight of each factor, this would set the EU's contribution at somewhere between **10%** and **30%** of the total. For instance, the EU is keen to factor in responsibility for emissions, as this would lower its bill compared to a GDP-only calculation (**Tab. 2**).

TAB. 2 EXAMPLES OF CONTRIBUTION KEYS FOR SHARING GLOBAL FINANCIAL EFFORT

	GHG Emissions	GDP	GHG 75% GDP 25%	GHG 50% GDP 50%	GHG 25% GDP 75%	GHG 10% GDP 90%
EU-27	11.07%	32.55%	16.4%	21.8%	27.2%	30.4%
USA	14.46%	25.20%	17.2%	19.9%	22.6%	24.2%
Japan	2.97%	8.74%	4.4%	5.9%	7.3%	8.2%
Canada	1.75%	2.49%	1.9%	2.1%	2.3%	2.4%
Australia	1.22%	1.81%	1.4%	1.5%	1.7%	1.7%
China	15.80%	6.87%	13.6%	11.3%	9.1%	7.8%
Mexico	1.60%	1.93%	1.7%	1.8%	1.9%	1.9%
Brazil	5.26%	2.87%	4.7%	4.1%	3.5%	3.1%
Russia	4.44%	2.86%	4.0%	3.7%	3.3%	3.0%
India	3.99%	2.17%	3.5%	3.1%	2.6%	2.3%
South Korea	1.21%	1.65%	1.3%	1.4%	1.5%	1.6%
Indonesia	6.96%	0.92%	5.4%	3.9%	2.4%	1.5%
South Africa	0.94%	0.49%	0.8%	0.7%	0.6%	0.5%
Saudi Arabia	0.82%	0.83%	0.8%	0.8%	0.8%	0.8%
Turkey	0.91%	1.41%	1.0%	1.2%	1.3%	1.4%
Argentina	0.82%	0.58%	0.8%	0.7%	0.6%	0.6%
Total G-20	74.22%	93.47%				
Total LDCs	< 0.7%	<0.5%				

Source: EC(2009). Staff Working Document

Re-assessing adaptation costs

In *Assessing the costs of adaptation to climate change* a group of scholars of the IIED, Imperial College London, carefully review the United Nations Framework Convention on Climate Change (UNFCCC) estimates over **global adaptation costs** made in 2007. Although the authors of the six reports that contributed to the UNFCCC estimates already recognized that cost figures were probably under-estimated and that more in-depth studies were necessary, this IIED report investigates the **sources** and **reasons** of these discrepancies between assessed and probable costs (**Box 2**).

The report presents also a **sectoral review** of cost figures that updates the UNFCCC estimates, drawing suggestions for future work and improvements of the current state of the art which shows the potential increase in total adaptation costs up to 2030 (**Tab. 3**).

Box 2 Sources of under-estimation of adaptation costs

→ Limited information on future potential impacts

The lack of robust evidence on the scale of potential impacts and on the costs of adaptation caused the **exclusion from the adaptation estimates** of some sectors (**mining, manufacturing, energy, retailing and tourism)**. Even in sectors that were included in the report (**health**) some specific cost sources were excluded due to lack of specific case studies (health-related impacts of climate change in rich countries)

→ No making up for inadequate adaptation

Costs were computed applying a "climate mark-up" on investment costs in climate-sensitive sectors without taking into account that in many low- and middle-income countries current investment levels are far below what would be needed to effectively cope with climate change. This **adaptation deficit** need to be resolved before investment in adaptation is made effective

→ No clear figures on avoided impact or costs of residual damage

It is not clear how much damage will be avoided implementing the investments required in the UNFCCC analysis, nor what the distribution of costs will be across impacts and within impacts. No evaluation of **size of residual damage** after adaptation and its potential costs

→ Soft options and future profile of adaptation costs

Soft options only are considered for some sectors -human health- which are likely to need more costly **hard adaptation.** No information is provided on what adaptation needs will be after 2030-the horizon of the UNFCCC report-although this information will be crucial in defining a time frame for intervention.

Tab. 3 New adaptation cost estimates

Sectors	UNFCCC estimates	Sources of underestimations	New IIED cost estimates
Agriculture	$11.3-12.6 billions/year	Adaptation deficit → recovering it could cost up to $40-60 billions	$11.3-12.6 + $40-60 billions
Water	$11 billions/year	Transfer of water across countries, no adaptation to altered flood risk	Significant underestimation, more studies needed
Human health	$4-12 billions/year	Population grows but share of illness-related deaths remains constant	30-50% increase in costs
Coasts	$11 billions/year	Sea level rise (SLR) faster than foreseen, residual damage estimation ($1 billion/year) too optimistic	Overall costs could double depending on speed of SLR, residual damage costs t $2-3 billions/year
Infrastructures	$8-130 billions/year	Infrastructural deficit → removing could cost up $315 billions/year	Besides deficit, $16-63 billions/year
Ecosystems	$65-80 billions/year for protected areas	Exclusion of adaptation costs for non-protected areas ($290 billions/year)	$65-80 + $290 billions/year

Energy Efficiency for the "group of eight"

As climate change mitigation has risen up the policy agenda, and increasingly demanding targets and policy measures have been adopted, the need to well-understand energy efficiency policies is seen as a crucial component in the institutional approach. Since the oil shocks of the 1970s, G8 countries have promoted **energy efficiency improvements** across all sectors of their economies, but more can be done.

In particular, the International Energy Agency (IEA) in the report *Progress with Implementing Energy Efficiency Polices in the G8* underlined some **positive examples** of energy efficiency policy for seven specific area in G8 countries even if **no country** has realised the **full potential** for reduction up to 31st March 2009 (**Tab. 4**).

TAB. 4 STRENGTHS AND CHANLLENGES IN ENERGY EFFICIENCY POLICIES FOR G8 COUNTRIES

AREA	STRENGTHS AND INNOVATIONS	CHALLENGES AND IMPROVEMENT AREA
Cross sectoral	• **All countries**: have some degree of national energy efficiency strategy or action plan. • High-quality indicator analysis exists in most countries (especially Canada and UK)	• **improving** national energy efficiency strategies and action plans • Ensuring greater effort in enforcement, compliance and evaluation. • Expanding efforts in **financing**
Buildings	• **Germany**: strong building codes and promotion of passive energy houses • All countries: policies for existing buildings exist • All G8 except Russia: building certification is currently in place	• Establishing **stronger** energy efficiency requirements • supporting passive energy houses and zero energy buildings

Appliances	• All G8 except Russia:
	  • active minimum energy performance standards (MEPS) and associated labelling
	  • standby power requirements are either implemented or planned
	• **Russia**: planning MEPS and labelling schemes
		• Establishing policies to address the growing **television-related** energy demand
		• Developing measures to address home digital networks

Lighting	• All G8 except Russia: currently implementing policies to phase out incandescent lamps	• Supporting adoption of high-efficiency alternatives to fuel based lighting
Transport	• **Japan**: fuel efficiency standards are in place for heavy-duty vehicles • all G8 except Russia: planned policies aimed at rolling resistance of tyres • **EU member states**, **Japan** and **USA**: stringent fuel efficiency standards for light-duty vehicles exist • **USA** and **Canada**: measures to promote proper inflation of tyres • all G8 except Russia: Eco-Drive policies are active	• Ensuring implementation of planned policies. • Creating fuel efficiency standards for heavy duty vehicle
Industry	• Coverage of industry energy statistics is improving in **all countries** (particularly well developed in Canada)	• Establishing energy efficiency standards for electric motors • Paying more attention to **energy management policies** • Creating policies to **assist** small and medium-sized enterprises
Utilities	• **USA, UK, France, Italy**: innovative policies to create incentives for utilities to promote energy efficiency	• Devote more attention to providing incentives for utilities to promote energy efficiency

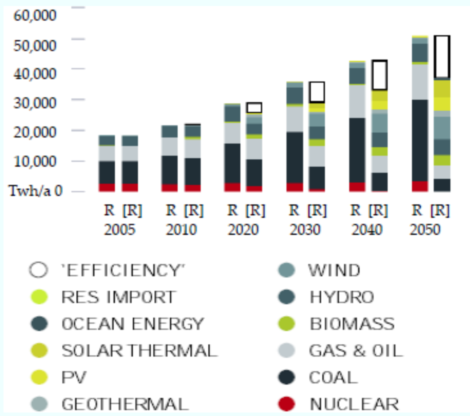
Is greener also better for jobs? A first comparative assessment of job potential

In a recent report commissioned by *Greenpeace International* to the *Institute for sustainable futures*, the very first comparative assessment of job potential of different energy scenarios was produced, showing impacts on number of employment associated with electricity production. The report uses as a reference (R) the energy projection produced by the IEA scenario in 2007, comparing it to the [R]evolution energy scenario [R] produced by Greenpeace and the European Renewable Energy Council (**Box 3**).

Employment levels are computed for both scenarios using a series of complementary data, such as installed electrical capacity, employment factors providing numbers of jobs per MW for each type of technology, regional job multipliers and other factors related to import and export of different types of energy. The methodology has not been calibrated using time series data for number of jobs, as quantitative data are not readily available for all sectors and the employment figures should be regarded only as indicative.

While in the **reference scenario** (R) energy employment slightly **decreases** over time, due to the contraction in coal-related jobs not fully compensated by the increase in gas-related jobs, the **[R]evolution scenario** shows a stable **increase** over the time horizon considered, mainly due to the expansion of the renewable energy sectors, despite a significant reduction in fossil fuel-related jobs to achieve the target (**Tab. 5**).

BOX 3 REFERENCE (R) AND [R]EVOLUTION [R] SCENARIOS



Source: Institute for Sustainable futures, 2009

The **[R]evolution energy scenario** sets a **50%** reduction target below 1990 emission levels by **2050**, achieved through **existing technologies**, such as energy efficiency, renewable energy and combined heat and power generation, gradually phasing out coal and nuclear.

TAB. 5 EMPLOYMENT POTENTIAL OF ENERGY SCENARIOS

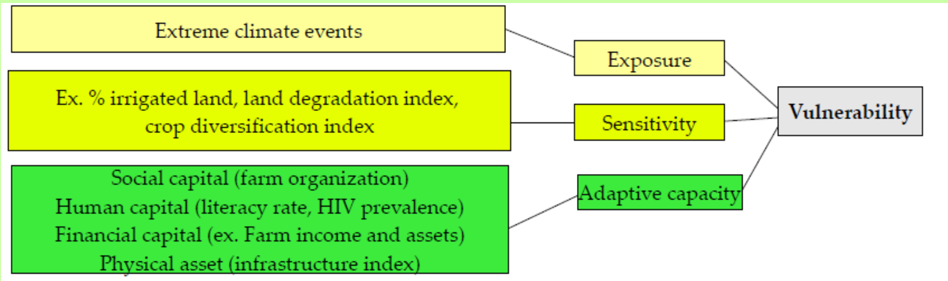
World jobs (millions)	Reference scenario (R)			[R]evolution scenario [R]			[R] % variations from (R)		
	2010	**2020**	**2030**	**2010**	**2020**	**2030**	**2010**	**2020**	**2030**
Coal	4.65	3.16	2.86	4.26	2.28	1.39	-8.39%	-27.85%	-51.4%
Gas	1.95	2.36	2.55	2.08	2.12	1.80	6.67%	-10.17%	-29.14%
Nuclear, oil, diesel	0.61	0.58	0.50	0.56	0.31	0.13	-8.2%	-49.55%	-74%
Renewable	1.88	2.41	2.71	2.38	5.03	6.90	26.6%	108.71%	154.61%
Energy supply jobs	9.1	8.5	8.6	9.3	9.7	10.2	2.2%	14.12%	18.6%
Energy efficiency jobs	0.0	0.0	0.0	0.1	0.7	1.1	10%	70%	110%
Total	**9.1**	**8.5**	**8.6**	**9.4**	**10.4**	**11.3**	**3.3%**	**22.35%**	**31.4%**

Flexible Mechanisms and Developing Countries

A vulnerability identification tool to drive South African climate change action

A report published at the end of August, *Mapping South African farming sector vulnerability to climate change and variability*, introduces an analytical tool to help policy-makers identify farming communities more vulnerable to climate change in South Africa, whose agricultural sector is at risk from climate change due to rainfalls reductions, with corn yields possibly decreasing by 30 percent by 2030. This vulnerability tool, developed by the International Food Policy Research Institute, is an aggregate index comprising a series of 19 indicators grouped into three main areas of (**i**) vulnerability-exposure, (**ii**) sensitivity and (**iii**) adaptive capacity, that tries to merge together **environmental** and **socio-economic** aspects of this climate-related issue (**Fig. 1**).

Fig. 1 An Aggregate index of vulnerability for South African farmers



Indicators are successively aggregated into the three main dimensions using weighted averages, this methodology is also used when producing the final vulnerability index from them, which opens a question of subjectivity of weights that represents one of the major limitations of this indicator approach. Nevertheless, this index is useful to identify trends and potential weakness and to inform policy choices. The **vulnerability index** has been used to assess the nine provinces of the country in order to identify the more vulnerable ones, showing that the most exposed provinces do not always overlap with the most endangered people. For instance, regions such as the Western Cape will be seriously exposed to climate change, but are characterized by a more adaptive profile. However, the extreme **heterogeneity** of the South African regions requires that more specific, local circumstances are taken into account when devising policy actions (**Box 4**).

Box 4 Policy suggestions to reduce Vulnerability

→ In **ALL** provinces: reduce pressure on natural resources, improve **environmental risk management**, and provide social safety nets for the poor.

→ In **HIGHLY vulnerable** provinces: promote **market participation**, especially among small-scale farmers, encourage the crop and job **diversification** to make people less dependent on agriculture; put in place social programs and increase spending on **health**, **education** and **welfare**

→ In **HIGHLY exposed** provinces: develop early warning systems for **extreme events**

→ In **RURAL** provinces: improve **infrastructural system**

Mexico and Argentina on the G20 top

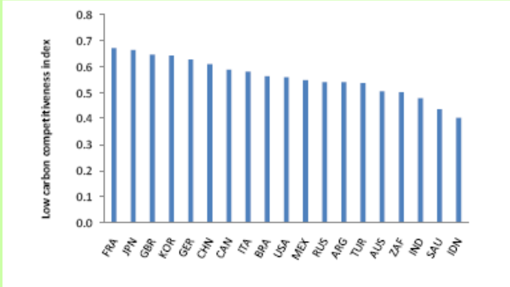
In the light of the September 24 meeting in **Pittsburgh** in which G20 leaders would discuss a way to finance the fight against climate change and the **Copenhagen** climate talks in December accelerating low carbon growth remains a key topic.

Despite most of the **G20** countries recently recognised the need to avoid dangerous global warming of 2°C above preindustrial levels most nations are short of the carbon productivity and competitiveness improvements necessary to stabilise global greenhouse gas concentrations. In particular, according to the report *G20 Low Carbon Competitiveness*, which assess the low carbon competitiveness of nineteen G20 countries, only **Mexico** and **Argentina** are currently improving carbon competitiveness fast enough to be on track to the 450 ppm scenario used (**Box 5**). Both these countries should experience continuing increases in carbon productivity, due to a combination of **carbon efficient growth** and **lower emission reduction targets** by virtue of being non-Annex I countries.

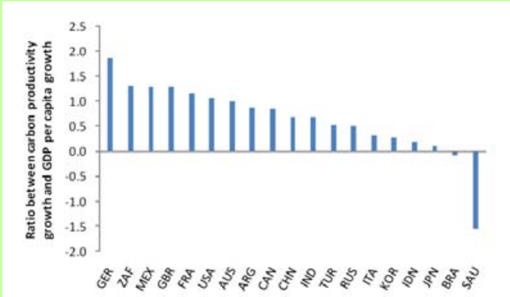
Focusing on other countries' performance, while **Germany** comes top of the **low carbon improvement index** other middle income countries records an improvement of their carbon productivity at a faster rate. In particular, **South Africa** and **Mexico** are second and third demonstrating an ability to both grow their economies and significantly increasing the amount of GDP obtained from each tonne of CO_2 emitted, as described in the report. By contrast, recent economic growth in **Saudi Arabia** has only been achieved through increasing the carbon intensity of its economy. Finally, **Japan** which is highly placed in the low carbon productivity index, has shown little ability to improve its carbon productivity over the period analysed.

BOX 5 INDEX USED IN THE REPORT IN ORDER TO ASSESS THE COUNTRIES' PROGRESS

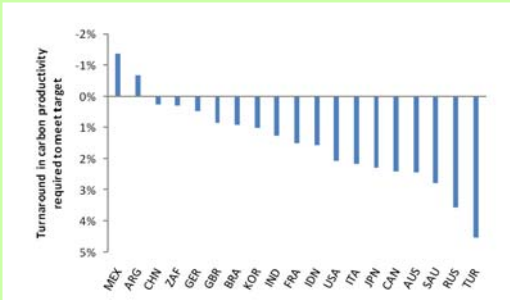
1. LOW CARBON COMPETITIVENESS INDEX: capacity of a country to generate economic prosperity to its residents and at the same time reducing GHG emissions based upon each country's current policy settings and indicators



2. LOW CARBON IMPROVEMENT INDEX: speed at which countries are shifting to a low carbon economy and improving their ability to be competitive.



3. LOW CARBON GAP INDEX: The scale of the challenge each country faces in meeting, by 2020, its share of the required carbon reductions for the IPCC 450 ppm CO_2-e scenario



Source: Climate Institute and EG3

THE CARBON PRICE

The structure of the analysis

This section is dedicated to the presentation of the most recent carbon price estimations both for the European carbon market, represented by the EU ETS (European Emission Trading Scheme) and for the International market. These evaluations are divided into two tables according to the time horizon. The first one includes the evaluations in the short term (within 2020) usually published by consultancies and focused on the EU ETS with estimations for the second phase (2008-2012) and for the third phase (2013-2020).

The **Table 6** presents the long-term estimations (after 2020) as calculated through economic models. For each evaluation collected we will define the source (AUTHORS) and the publication year (YEAR).

For both sub-sessions (short and long-term analysis) information will be provided on the **scenario** assumed in the models, which may be useful in order to understand the achieved results (assumptions on the policy, allowed use of flexible mechanisms, geographic area reference, etc)**,** and on the **variability** observed in the group of models analysed monthly, in particular in terms of **mean** and **variance** , showed at the bottom of the tables.

For what concerns **Tab. 6**, the stabilization scenario at **450** parts per million (ppm) of CO2 in the atmosphere will involve higher carbon prices compared to less ambitious stabilization scenarios such as the 550 ppm CO2. Taking into account that the present CO2 concentration is around 380 ppm, it is easy to understand that in order to keep the concentration under a certain level such as 450 ppm (this is the level needed in order to avoid a 2°C temperature increase by the end of the century according to many authoritative sources) a strict policy with a high CO2 price is required.

Finally, the **new average** and **variance** will be included in the last rows of each table below the average and the standard deviation of **previous estimations**, which are computed taking into account all estimations from previous reports, in order to reach an increasingly reliable price value.

For this number no new short term price scenario has been published; hence, we analyse only the long term estimations.

TAB. 6 ECONOMICS MODELS FOR THE LONG-TERM CARBON PRICE EVALUATION

MODEL	AUTHOR	YEAR	SCENARIO	CO2 PRICE ESTIMATION (€/TCO2) 2020	2030	2050	2100
WITCH	Bosetti et al.	2008	• global carbon market • 450 ppm CO2 stabilization scenario • borrowing not allowed • until 2030 the whole abatement effort is undertaken by High Income regions alone, while Low Income countries are allocated their baseline emissions. • Different allocation scheme: ▪ ***Equal Emissions per Capita*** (***EPC***): allowances are distributed among regions in proportion to their population, so that each individual is endowed with the same CO2 emission rights with (EPC_BNK) and without banking provision ▪ ***Sovereignty*** (***SOV***): allowances are distributed to each region according to their present share of total emissions with (SOV_BNK) and without banking provision ▪ ***Contraction and Convergence*** (***CC***): emission rights are first distributed according to the sovereignty rule then, greater weight is given to the equal emissions per capita allocation rule switching to a full application of it by 2100 with (**CC_BNK**) and without banking provision	***49.60*** 66.60 ***49.45*** 67.00 **49.65** 66.60	***108.30*** 120.70 ***108.75*** 131.80 **108.35** 120.20	***414.70*** 346.60 ***413.50*** 357.60 **414.00** 347.40	***1659.80*** 1661.10 ***1661.00*** 1587.80 **1664.45** 1667.40
MODEL	AUTHOR	YEAR	SCENARIO	CO2 PRICE ESTIMATION (€/TCO2) 2020	2030	2050	2100

RICE-2009	Nordhaus	2009	Three different scenario: 1. Optimal: Climate change policies maximize economic welfare with no participation or other constraints. The optimal path finds a cut in global emissions of 50% from 2005 in 100 years. Stabilization scenario higher than 550 ppm CO2 2. **Limit temperature to 2 °C**: The optimal policies are taken subject to a constraint that global temperature would not increase more than 2°C above the 1900 average. The path prescribes zero emissions at about 2080, stabilization scenario at 450 ppm CO2 3. *Optimization with limited participation*: a cost-beneficial policy such as 1 in which a timetable is placed for the participation: 2010 for developed countries, 2040 China and Latin America, 2050 India, Middle East and Other Asia countries, 2080 Africa Stabilization scenario higher than 550 ppm CO2	9.70 **15.75** *9.95*	18.90 **25.45** *13.40*	25.00 **69.35** *25.90*	78.15 **197.55** *78.60*
AVERAGE OF MODELS ANALYSED THIS MONTH Stabilization at **450** or 550 ppm				52.10 9.82	103.37 13.64	337.60 25.43	1442.73 78.37
STANDARD DEVIATION OF MODELS ANALYSED THIS MONTH Stabilization at **450** or 550 ppm				18.19 0.16	35.46 0.33	122.53 0.65	549.79 0.33
AVERAGE OF PREVIOUS ESTIMATION Stabilization at **450** or 550 ppm				**42.32** 18.20	**64.39** 23.71	**183.13** 43.35	**837.94** 119.00
STANDARD DEVIATION OF PREVIOUS ESTIMATION Stabilization at **450** or 550 ppm				**32.33** 9.25	**23.86** 11.24	**114.90** 26.36	**628.36** 98.79
NEW AVERAGE ESTIMATION Stabilization at **450** or 550 ppm				**44.03** 17.66	**72.18** 22.97	**214.94** 41.78	**1039.53** 108.84
NEW STANDARD DEVIATION Stabilization at **450** or 550 ppm				30.38 9.18	30.40 11.22	130.96 25.62	657.78 85.59

REFERENCES

Bosetti, Carraro and Massetti (2008). *Banking Permits: Economic Efficiency and Distributional Effects* at http://www.feem.it/NR/rdonlyres/85C1C1A7-3E52-4F38-9C30-B3F380D729CF/2493/108.pdf

Climate Institute and E3G (2009). *G20 Low Carbon Competitiveness* at http://www.climateinstitute.org.au/images/carboncompreport.pdf

European Commission (2009). *Staff Working Document accompanying the Communication Stepping up international climate finance: A European blueprint from the Copenhagen deal* at http://ec.europa.eu/environment/climat/pdf/future_action/sec_2009_1172.pdf

European Commission (2009). *Stepping up international climate finance: A European blueprint from the Copenhagen deal* at http://ec.europa.eu/environment/climat/pdf/future_action/com_2009_475.pdf

Grantham Institute for climate change, Imperial College (August 2009). *Assessing the costs of adaptation to climate change*, *A review of the UNFCCC and other recent estimates* at http://www.iied.org/pubs/pdfs/11501IIED.pdf

International Energy Agency (2009). *Progress with Implementing Energy Efficiency Polices in the G8* at http://www.iea.org/G8/docs/Efficiency_progress_g8july09.pdf

Institute for Sustainable Futures (2009). *Energy sector job to 2030: a global analysis* (for Greenpeace International) at http://www.greenpeace.org/international/assets/binaries/energy-sector-jobs-to-2030.pdf

International Food Policy Research Institute (August 2009). *Mapping South African farming sector vulnerability to climate change and variability* at http://www.ifpri.org/sites/default/files/publications/ifpridp00885.pdf

Nordhaus (2009). *Alternative Policies and Sea-Level Rise in the RICE-2009 Model* at http://cowles.econ.yale.edu/P/cd/d17a/d1716.pdf

For questions and comments please contact alice.favero@feem.it