Economic instruments and the 2015 Paris Climate Conference: the catalyst of carbon pricing

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POLICY BRIEF

As shown by the collective action for the protection of the ozone layer under the Montreal Protocol, the success of a multilateral agreement rests on three pillars: strong political commitment, an independent and rigorous monitoring system, and economic instruments that transmit the right incentives. For it to be a success, the 2015 Paris climate conference will need to make progress on each of these three pillars. The Climate Economics Chair has focussed its research efforts on the pillar of economic instruments .

- The Fifth Assessment Report of the IPCC states unequivocally that from 2020 all major emitters of greenhouse gas emissions must participate in the global effort to reduce emissions and limit average warming to no more than 2°C.
- In order to drastically curb emission trajectories, global carbon pricing should be rapidly introduced, so as to put pressure on governments to act cooperatively and to encourage economic actors to reduce emissions at the lowest cost.
- To encourage governments to reach a global agreement, a bonus-malus carbon pricing system, calculated on the basis of average emissions per capita, could be introduced at a rate of $7-9 per tonne of CO_2 equivalent from 2020.
- The most realistic way of introducing an international carbon price into the global economy is to lay the foundation, between 2015 and 2020, of a trans-continental carbon market, based on prototypes developed in Europe, China and the United States.
- The introduction of double carbon pricing would be subject to the principle of "common but differentiated responsibilities", aimed at reconciling joint action on climate change and the priority of access to development.

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The trajectories needed to reduce the risk of average warming to more than 2°C were quantified in the Fifth Assessment Report of the IPCC. They require that all major emitters of greenhouse gases participate in a collective emissions reduction effort from 2020. The challenge for the Paris climate conference in December 2015 will be to lay the foundations for a universal agreement committing all countries to this course of action.

As shown by the Montreal Protocol aimed at protecting the ozone layer, the success of a multilateral agreement rests on three pillars: strong political commitment, an independent and rigorous monitoring system, and economic instruments that transmit the right incentives. These conditions have so far not been combined within the Framework Convention of the United Nations Climate Change (UNFCCC). To contribute to a successful climate agreement at the Paris conference, progress will need to be made on each of these pillars. This means that governments must agree on ambitious commitments to reduce their emissions within the framework of a strengthened monitoring system. To this end, the right economic incentives must be established, pertaining both to governments and to economic actors. One way of implementing this would be to introduce double international pricing of greenhouse gas emissions by 2020.

- An international bonus-malus system, introduced at a rate of $7.5 per tonne of CO_2 equivalent, would lend credibility to the financial promise to transfer $100 billion to the least developed countries (LDCs) and would encourage them to join the common MRV (Monitoring, Reporting, Verification) system, without which no universal agreement can be constructed.

- The formation between 2015 and 2020 of a transcontinental carbon market on the basis of the systems existing in Europe, China and the United States would allow an international reference price for carbon to emerge. Such a price would be a benchmark enabling economic actors to incorporate into their costs the value placed on climate protection and commit themselves to energy transitions compatible with controlling climate risk.

The introduction of the double carbon price should be subject to the principle of "common but differentiated responsibilities" set out by the UNFCCC, but should distance itself from the binary interpretation of this principle that has prevailed to date. Using the criterion of average per capita emissions in the bonus-malus system would extend the funding effort targeted at LDCs beyond the group of Annex I countries. Moreover, the transcontinental carbon market should expand to other countries, under conditions that reconcile carbon pricing and priority access to development.

The challenge for the Paris climate conference in December 2015 is to lay the groundwork for an agreement committing countries to drastically reducing their greenhouse gas emissions from 2020. The trajectories required to limit the risk of more than 2°C average warming imply that all major emitters of greenhouse gas emissions participate in the collective emissions reduction effort from 2020. A condition for achieving this is to find a set of economic incentives that allow the strategic interests of governments and economic agents to be aligned, while thwarting the temptation to act as "free riders".

"The positive agenda": an invaluable undertaking, but one that cannot substitute for a global agreement among governments

The construction of a "positive agenda" involves creating synergies between stakeholders around the co-benefits generated by far-reaching action against greenhouse gas emissions: reducing local pollution, diversification of energy sources, improved food security, technical innovation, and so on. Of great value, such synergies can engender multiple innovations and decentralized or sectoral voluntary actions; they can give rise to intergovernmental initiatives around technology transfer and action pertaining to adaptation to climate change; and they can convince political leaders of the reality of the many collateral benefits of an ambitious climate strategy.

But a positive agenda must not replace the central agenda of the conference, namely to reach an agreement among the governments that ratified the UNFCCC in 1994 and advance in a coordinated way along the road to the decarbonisation of economies.

Future climate agreement on the basis of "common but differentiated responsibilities"

The principle of "common but differentiated responsibilities", enshrined in the UNFCCC, remains the indispensable basis for any multilateral agreement. In the one-legged Kyoto agreement, this principle was interpreted in a binary way, exempting emerging countries from any effort. Already questionable in the 1990s, this binary representation of the world has since become totally inappropriate: of the top ten emitters of CO_2 from energy production in 2011, accounting for 80% of global emissions, there were four emerging countries, four developed countries and two oil-producing countries (Table 1). In the Copenhagen and Cancun agreements, this principle took the form of a promise to transfer $100 billion a year from North to South, a promise that remains hypothetical in the absence of a consensus on the distribution of funding sources among donors and on the criteria for allocating funds among recipients.

To provide the Kyoto Protocol with a second leg and give substance to the promise of Copenhagen-Cancun, credible economic instruments need to be established. Doing so requires international carbon pricing, which could take two separate paths depending on whether it applies to governments or to economic actors.

Towards international bonus-malus carbon pricing

The experience of the Kyoto Protocol has shown the difficulty, if not the impossibility, of making an international carbon price emerge by means of an allowances trading system between state actors. Indeed, it is not the role of governments to engage in trading. To encourage governments to act in concert, it is essential to work toward a different system of carbon pricing that is both straightforward and transparent. A bonus-malus mechanism, which

simultaneously defines the price to pay for emissions above a certain threshold and the use that the money raised should be put to, seems appropriate. In such a system, any country exceeding the average level of emissions per capita would pay a specified amount on every tonne emitted above the threshold. Symmetrically, countries that emit less than this benchmark level would receive compensation calculated on the number of tonnes saved compared to the world average. By construction, this mechanism would balance from year to year and would benefit countries that manage to maintain or reduce their per capita emissions below the global average.

As with the introduction of a carbon tax at national level, there then arises the question of the rate used to calculate the bonus-malus. On the basis of cost-benefit or cost-effectiveness methods, climate economists make recommendations, within fairly wide ranges, of about 50 to 140 dollars per tonne of CO_2 equivalent in 2020. With the exception of Sweden, the low end of the range has not been attained in any of the countries that have introduced a domestic carbon price. It therefore seems preferable to apply the reality principle defended by tax experts, who advocate, during the introduction of a new tax, aiming for the widest possible base even if it means starting with a moderate rate.

According to simulations carried out by the Climate Economics Chair (Table 2 and Figure 1), a rate of $7 to $9 per tonne of CO_2 equivalent would release sufficient resources to transfer $100 billion a year to countries with low emissions per capita. The form of the transfers generated depends on the reference year and the chosen scope of emissions. A little over $60 billion would come from Western countries and Japan, and just under $20 billion would come from hydrocarbon-exporting countries (Russia and Saudi Arabia in particular) and some Asian countries (China and Korea in particular). Such a rate, well below those usually recommended by economists, could be adopted in 2020 to test the system, and could then be adjusted upward later subject to the willingness of governments to pay more for greenhouse gas emissions. The main obstacle to be surmounted in getting the system under way is to convince the governments of donor countries to pay their contribution, a sum that in fact is very modest compared to the size of their economies.

A bonus-malus system to help strengthen MRV (Monitoring, Reporting, Verification)

Twenty years after the entry into force of the UNFCCC, there is still no clear and consistent MRV for greenhouse gas emissions applying to all countries. The technical basis of such a system, through national inventories and the work of the IPCC on emission factors, is available and already covers the emissions of Annex I Parties to the Convention (developed countries and those in transition to a market economy). On the other hand, information on emissions from most other countries is still very sketchy. Thus there are political obstacles that need to be surmounted if all countries are to be incorporated into the system.

Setting up a system of financial transfers on the basis of a carbon contribution of $7-9 per tonne of CO_2 requires that such a harmonized system be first introduced. Indeed the volume of transfers to be made can only be known if emissions of all countries participating in the scheme are calculated and reviewed annually. There is thus a very strong incentive for the least developed countries, all of which have emission levels below the world average, to join the common MRV system.

The carbon pricing mechanism for nation states encourages them to extend the harmonized MRV system and gives consistency to the promise of financial transfers made at Copenhagen and Cancun. However, it does not directly send a signal to economic actors, whose decisions are at the origin of greenhouse gas emissions.

Building the foundations for a transcontinental carbon market from existing pilot schemes

The decarbonisation of economies involves an acceleration in energy transitions, which governments must promote by combining a variety of economic and regulatory instruments. Among these instruments, the carbon price plays a pivotal role. For economic actors, it internalizes the cost of CO_2 emissions and constitutes a turning point that could dramatically change behaviour. If this single price applies to all emissions, it drastically reduces the costs of decarbonisation. Conversely, energy transition scenarios constructed without a carbon price lead to much too much CO_2 being released into the atmosphere.

There are various conceivable ways of moving towards generalized pricing of CO_2 emissions worldwide. The most realistic is to build a common platform based on experience of allowances markets introduced in Europe, China and the United States, three geographical areas accounting for 56% of global energy CO_2 emissions (Table 3). These markets all operate on the basis of a cap-and-trade system, but as yet without the minimum coordination that could lead to their interconnection at some future point. An ambitious policy goal would thus be to lay the foundation between 2015 and 2020 for a unified transcontinental energy CO_2 market that would initially include at least the European Union, China and the United States, and would be open to all countries wishing to join. If political impetus were to be given in 2015, its technical implementation would be facilitated by the lessons learned from the experience of the pilot schemes already in place.

It would be necessary to agree first on the scope of the capped emissions at the launch of the system in 2020. This is an important political choice, because for the majority of emissions capped by the system, emissions reduction commitments would be shared among the countries participating in the scheme. The most ambitious policy would be to limit all energy-related CO_2 emissions. The minimum requirement would be to introduce the mechanism in the electricity sector alone. The fear of each participant taken in isolation is of too great a constraint being imposed in advance, even though the main virtue of the integration of markets is to reduce abatement costs. The main lesson learned from experience, however, is that the combination of lobbying and political timidity could lead to systems where the constraint level is insufficient to transmit an unequivocal price signal.

On a more technical level, it is first necessary to harmonize joint rules on compliance and MRV by creating coordinated guidance tools through a common system of registries. These conditions ensure the environmental integrity of the system. Secondly, it is essential to control the distributional effects arising from the introduction of the system, which will operate in three regions where fossil fuel prices are still far from harmonized and by favouring the allocation of allowances by auction instead of their free distribution. Finally, there will need to be a common governance procedure, which has the technical capacity and the necessary authority to ensure that the market clearly sends a CO_2 price signal that confers credibility on the emission targets specified under the climate agreement.

Integrating agriculture and forestry in order to consolidate the accomplishments of the last decade

While global energy CO_2 emissions increased during the last decade at a rate not seen since 1970, those related to agriculture and forestry stabilized, due to the slowdown of deforestation in Latin America. This latter result, achieved mainly through coercive methods facilitated by advances in satellite imagery, would be perpetuated by the establishment of

sustainable economic incentives guiding local communities, farmers and foresters towards forms of land use with low emissions and favourable to carbon storage.

The inclusion of agriculture and forestry in a future intercontinental energy CO_2 market would give rise to further problems that it would be sensible to avoid at the outset. The consolidation of achievements in the fight against deforestation involves developing economic incentives that would simultaneously augment carbon storage and protect biodiversity. Such incentives may well be transmitted through funds where the value of a tonne of CO_2 is known in advance. The same applies for agriculture, where a high proportion of the emissions associated with chemical fertilizers and the treatment of livestock waste could be minimized at a low or even negative cost per tonne of CO_2 avoided.

Economic instruments and governance for a climate agreement

One of the fundamental difficulties with regard to protecting the common good of climate stability is the absence of a supranational authority. It is for this reason that the introduction of economic instruments designed to give credibility to the commitments made by governments in future climate agreements requires appropriate governance.

The joint MRV system should be based on calculations and measurements validated by the IPCC, whose function is also to produce and develop the many standards required for the accounting of greenhouse gas emissions. Its deployment should be implemented through the UNFCCC's technical bodies, which will need, on an annual basis, to verify and consolidate national greenhouse gas inventories and the registries where reduction commitments will be registered. This process calls for larger resources as well as requiring more transparency and communication on the part of all stakeholders.

The management of financial transfers between countries resulting from climate bonus-malus systems should be the responsibility of an organization with appropriate financial expertise and sufficient authority from the standpoint of the states concerned. Such expertise is found in other multilateral institutions, such as the IMF and the World Bank, through which the mechanism could be secured. Regulation of a future intercontinental carbon market would need to be arranged among the governments that decide to enter the system. It would be best if such regulation were entrusted to an independent agency with the necessary expertise to ensure that the carbon price appearing in the market is in phase with the greenhouse gas emissions reduction trajectories aimed at in the commitments of the countries concerned.

Key dates in climate negotiations

1988 Creation of the Intergovernmental Panel on Climate Change (IPCC).

1992 Signing of the United Nations Framework Convention on Climate Change (UNFCCC), which came into force in March 1994 and has since been ratified by 195 parties.

1997 Signing of the Kyoto Protocol, at the 3rd Annual Conference of the Parties to the UNFCCC (COP-3), committing Annex B countries to reduce their average emissions for 2008-2012 by 5.3% compared to 1990.

2001 U.S. withdrawal from the Kyoto Protocol.

Jan. 2005 Launch of the European CO_2 emissions trading system.

Feb. 2005 Coming into force of the Kyoto Protocol after ratification by Russia.

Jan. 2009 Within the framework of the Regional Greenhouse Gas Initiative (RGGI), ten north-eastern U.S. states launch a CO_2 emissions trading system covering the electricity sector.

Dec. 2009 Copenhagen Conference (COP-15), leading to a political agreement in which emerging countries accept the principle of emissions reduction commitments in exchange for a promise of funding from high-income countries ($100 billion a year from 2020).

Dec. 2010 Cancun Conference (COP-16) at which the main elements of the Copenhagen agreement are incorporated into UNFCCC decisions.

2013-2015 The launch, within the framework of the 12th Chinese Five Year Plan, of seven experimental CO_2 emissions trading schemes in five municipalities and two provinces, with a view to a national scheme after 2015.

Dec. 2011 Durban Conference (COP-17) opens a new negotiating process with a view to a universal climate agreement starting in 2020, with the target date of December 2015.

Jan. 2013 Start of the Californian CO_2 emissions trading scheme.

Sept. 2014 Climate summit with heads of state at the United Nations headquarters in New York

Oct. 2014 Publication of the 5th IPCC report.

Dec. 2014 Lima Climate Conference (COP-20).

Dec. 2015 Paris Climate Conference (COP-21) with a view to a universal climate agreement from 2020.

Table 1 – Emissions by major countries (CO_2 from energy sources)

Principal emitters	1990	2011	
	Emissions (gigatonnes of CO_2)	Emissions (gigatonnes of CO_2)	Cumulative global emissions (%)
China	2.43	8.67	27.8
United States	4.86	5.31	44.8
EU-27	4.13	3.59	56.3
India	0.59	1.81	62.1
Russia	2.34	1.74	67.6
Japan	1.07	1.19	71.4
Korea	0.24	0.61	73.4
Iran	0.19	0.52	75.1
Canada	0.42	0.47	76.6
Mexico	0.29	0.45	78.0
South Africa	0.29	0.45	79.5
Saudi Arabia	0.14	0.44	80.9
Brazil	0.21	0.42	82.2
Indonesia	0.15	0.41	83.5

Source: International Energy Agency.

In table 1, CO_2 emissions from energy sources cover all atmospheric emissions associated with the production and consumption of fossil fuels, excluding those related to international transport. It is these emissions that have grown fastest since 1990.

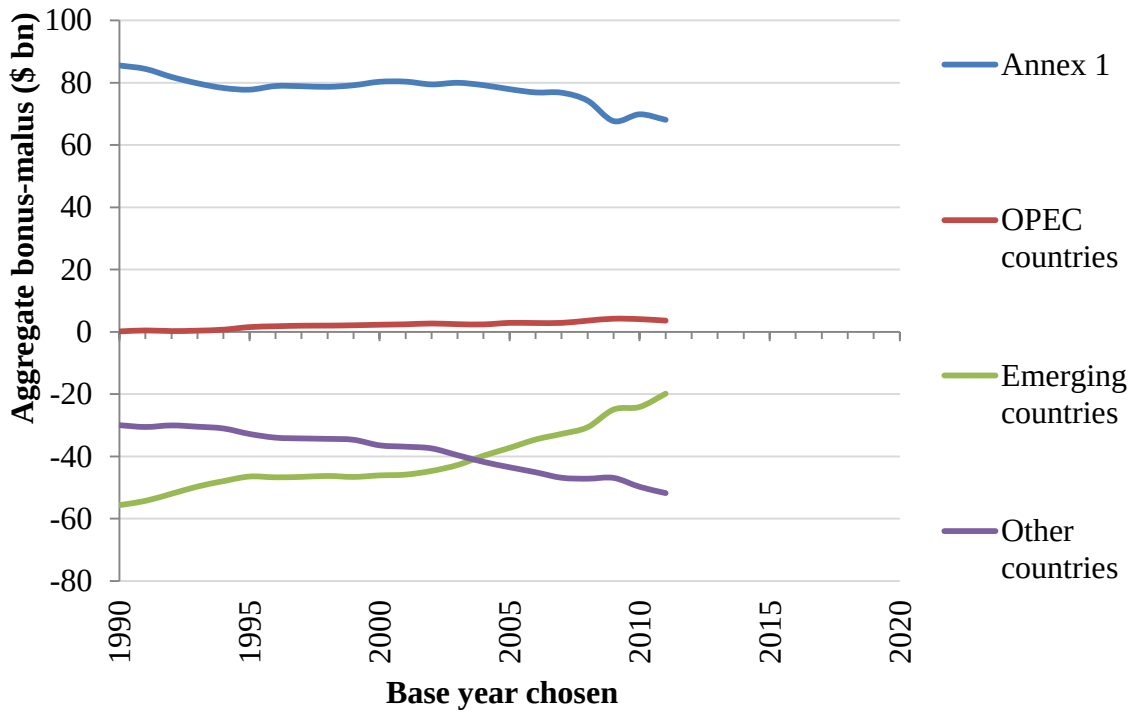
Table 2 – Distributional effects resulting from a bonus-malus system calculated on the basis of $7.5 per tonne CO_2 equivalent (2011 emissions)

	Total emissions ($MtCO_2$ eq.)	Population (million)	Emissions per capita (tCO_2 eq.)	Climate Bonus-Malus ($ million)
Contributors				
United States	6,550	312	21.0	34,428
China	10,553	1,344	7.9	15,742
Russia	2,374	143	16.6	11,064
European Union (UE 28)	4,541	503	9.0	10,325
Japan	1,307	128	10.2	3,776
Canada	716	34	20.9	3,752
Australia	563	22	25.2	3,172
South Korea	688	50	13.8	2,810
Saudi Arabia	533	28	19.2	2,687
Iran	716	75	9.5	1,809
Other contributors	4,495	399	11.3	14,889
Total contributors	*33,036*	*3,038*	*10.9*	*104,454*
World	**43,413**	**6,903**	**6.3**	**0**
Recipients				
India	2,486	1,221	2.0	-38,955
Bangladesh	129	153	0.8	-6,244
Pakistan	308	176	1.8	-5,997
Nigeria	325	164	2.0	-5,311
Indonesia	835	244	3.4	-5,241
Philippines	150	95	1.6	-3,362
Ethiopia	125	89	1.4	-3,282
Vietnam	274	88	3.1	-2,087
Dem. Rep. Congo	172	64	2.7	-1,727
Tanzania	73	46	1.6	-1,639
Other recipients	5,501	1,524	3.6	-30,609
Total recipients	*10,377*	*3,864*	*2.7*	*-104,454*

Source: Climate Economics Chair calculations, based on World Resources Institute data.

Table 2 simulates financial transfers caused by the introduction of a climate contribution of $7.5/t, based on countries with emissions higher than the world average per capita and redistributed to countries with below average emissions, in proportion to the emissions tonnage they have saved compared to the average. The calculations are based the emissions of all greenhouse gas emissions covered by the climate convention, excluding emissions from land use changes.

Figure 1 – Influence of the base year chosen on the bonus-malus by large groups of countries (1990-2011), calculated on the basis of $7.5/tCO2eq



Source: Climate Economics Chair calculations, based on World Resources Institute data.

Annex 1: Australia, Belarus, Canada, USA, EU-28, Iceland, Japan, Norway, New Zealand, Russia, Switzerland, Ukraine.

OPEC countries: Algeria, Angola, Saudi Arabia, Ecuador, United Arab Emirates, Iraq, Iran, Kuwait, Libya, Nigeria, Qatar, Venezuela.

Emerging countries: South Africa, Argentina, Brazil, China, South Korea, India, Mexico, Singapore, Turkey.

Table 3 – Comparison of emissions trading systems in Europe, the United States and China

	Europe	United States		China
System	European Union Emissions Trading Scheme (EU ETS)	California cap-and-trade	Regional Greenhouse Gas Initiative (RGGI)	Pilot emissions trading schemes *
Date created	2005	2013	2009	2013/2014
Geographical coverage	UE-28 *+ Iceland, Norway, Liechtenstein*	California *+ link with Quebec*	9 states *(Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, Vermont)*	7 Provinces/Municipalities *(Shenzhen, Shanghai, Beijing, Guangdong, Tianjin, Hubei, Chongqing)*
Sectoral coverage	Electricity, heating, industries, domestic aviation	Electricity, industry, transport	Electricity	Electricity, heating, industries (construction and transport)
Greenhouse gases covered	CO_2, N_2O, PFCs	6 GES + NF_3	CO_2	CO_2 (direct and indirect)
Proportion of emissions covered in the total for the area	45%	85% (2015)	28%	~33-60%
Emissions reduction target	-21% in 2020 compared to 2005	0% in 2020 compared to 1990	-16% in 2020 compared to 2014 (revised cap)	-17% to -21% in 2015 compared to 2010 (carbon intensity)
Average price 2014	~8 $/t$CO_2$	~12 tCO_2$	~5 $/t$CO_2$	~5-13 $/t$CO_2$

* There are significant variations in the scope and objectives depending on the pilot concerned. For more information, see the paper by Simon Quemin and Wen Wang, "Overview of climate change policies and development of emissions trading in China". Climate Economics Chair, Information and Debates Series No. 30, March 2014.

Source: European Commission, Climate Economics in Progress (2013).