OPTION: 13

three choices for 2013 and beyond in the face of climate change

WHITE PAPER

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US$1.375 trillion: Minimum annual cost to avoid dangerous human interference with the climate system.

(Source: IPCC Working Group III Fourth Assessment Report, based on annual global fossil fuel emissions of 27.5 Gt of carbon dioxide equivalents (CO_2-eq) in 2005 multiplied by US$50/t, which is the minimum price (applied from 2010-2030 on 100 per cent of GHG emissions) needed to stabilize atmospheric concentrations of CO_2-eq at around 450 ppm by 2100)

Abstract: On January 1, 2013, the first phase of the Kyoto Protocol will expire. In an effort to define what comes next, many proposals have been put forth. This paper distills these proposals into three options. In addition to doing nothing or little of substance, the two main choices for achieving deep reductions in global greenhouse gas (GHG) emissions are to reach global agreement on a series of absolute national GHG caps (associated with cap-and-trade); or to harmonize the price of carbon across jurisdictions at a singular value (a global carbon levy or tax), ideally derived from a single science-based global GHG target and adjusted annually to steer emissions levels accordingly. This paper argues that a global cap-and-trade system is unlikely to deliver the scale of GHG reductions necessary to prevent dangerous human interference with the climate system, because fast-industrializing nations such as China and India will not accept absolute caps (seen as a straightjacket on economic growth) within any sort of early time frame. This paper makes the case for a fresh approach that shifts the focus from a set of national GHG limits to a single GHG target tied to climate science, which is used to establish a harmonized global carbon price. Consistent with the polluter-pays principle, the harmonized global carbon pricing architecture would be administered locally at carbon bottlenecks—the key points where flows of carbon are most concentrated (trunk pipelines for gas, refineries for oil, railroad heads for coal, LNG terminals, cement, steel, aluminum, and GHG-intensive chemical plants). This third option offers the best chance of stabilizing the growth of global anthropogenic GHG emissions by no later than 2020, internalizing US$1 trillion of carbon costs per year and generating US$50-$100 billion per year of clean development flows from developed countries to the least developed and fast-industrializing world to invest in carbon sinks and adaptation.

Option13 is an international policy change and grassroots education campaign to help broker a post-2012 global agreement that broadens and builds on Kyoto, and works for both industrializing and developed nations.

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1 In February 2007, Option 13 set off in search of answers to the questions: What mechanism will lead to decarbonization on a sufficient scale to avoid dangerous human interference with the climate system? What mechanism will inspire and compel both China and the US (as proxies for the industrialized and industrializing world) to participate, and what are the plausible incentives and penalties to make this assertion credible? As part of this undertaking, Option 13 interviewed international policymakers from the G8+5 countries and conducted comprehensive research of pre-existing proposals for a global strategy on dealing with climate change post-2012. Forty-three substantive proposals were identified and then distilled into three options. Prior to the Sept. 24-25, 2007 UN High-Level Event on Climate Change, the working version of the Option 13 white paper was provided to the leading climate change policy leaders around the world, incorporating the best of their suggestions along the way. The Option 13 white paper was then hand-delivered to delegates at the UN event and to delegates at President Bush's Sept. 26-27, 2007 Meeting of Major Economies on Energy Security and Climate Change. The goal of the Option 13 effort is to galvanize international action to put in place for 2013 and beyond a global mechanism of sufficient scope to prevent dangerous anthropogenic interference with the climate system.

Most of the world believes that humans have played a role in climate change and must play a role reining it in. Regardless of the degree to which one blames the human race for climate change, the prospects for what we can do about it are limited to three[2] options:

Option 1: Do nothing. Or do nothing of substance (i.e., what is happening now with voluntary agreements and aspirational sector targets). With this approach, greenhouse gas emissions will continue to grow.[3]

Option 2: Absolute national GHG caps.[4] The prerequisite for the successful implementation of this approach is that all major emitting countries accept a firm national GHG limit at an early stage. Without that agreement, global GHG emissions will almost certainly continue to grow well past 2020.

Fast-industrializing nations such as China and India are unequivocal that they will not accept an absolute cap on their emissions within any sort of early time frame, which they see as a straightjacket on their economic growth and poverty eradication goals. This tension is grounded in the vast differences in circumstances between industrialized countries on one hand and the least developed and industrializing countries on the other. It is the industrialized countries that carry the brunt of historical responsibility (75 per cent) for the anthropogenic greenhouse gases in the atmosphere and that have the highest per-capita emissions rates. It is the industrialized countries that have the highest per-capita gross domestic product and ability to pay for new low-carbon infrastructure. And it is the industrialized countries that have reasonably reliable measurement systems of their GHG emissions in place which can be readily verified.

Given these differences in circumstance, only developed countries will be willing to agree to absolute national GHG caps within an immediate or early time frame. The Montreal Protocol to reduce ozone-depleting substances worked along this sequence, with developed countries acting first to replace halocarbons, and developing countries, with financial assistance, following suit. To date, the Montreal Protocol has led to a seven per cent absolute reduction from the highest peak in atmospheric concentrations of halocarbons. This success, however, will be difficult to repeat in the context of greenhouse gases, a pervasive substance in a more globalized economy.

The main reason is that uneven carbon pricing of a trillion dollar annual cost will lead to carbon leakage. Carbon leakage occurs when carbon-intensive industry relocates from jurisdictions with a high carbon price to ones with a low carbon price. Up until recently, the prospect of substantial carbon leakage had not been considered as a serious risk. The Synthesis Report of the IPCC Fourth Assessment Report shone new light on this by pointing to a modeled global carbon price of US$20-$80 per tonne of carbon dioxide equivalents (CO_2-eq) by 2030 to achieve stabilization at around 550 parts per million (ppm) CO_2-eq by 2100. The IPCC report found that stabilizing at 450 ppm will require a price of $50-$100/tCO_2-eq between 2010 and 2030. Even this price could be on the low side. (A November 2007 report from the Confederation of British Industry put the minimum marginal price needed to meet Britain's 2020 targets at £60-£90/tCO_2-eq.) The bottom of the range of the IPCC price consistent with stabilizing at below 450 ppm (US$50/t$CO_2$-eq) multiplied by global fossil fuel emissions of 27.5 gigatonnes of CO_2-eq in 2005 works out to more than US$1.375 trillion per year. When carbon costs this much, it has an impact on every industry, but disproportionately, the impact falls upon carbon-intensive industries or electricity-intensive industries that rely on carbon-intensive electricity. With the prospect of avoiding a $50/t$CO_2$-eq cost, mobile industries in the materials and manufacturing sector would face a compelling rationale to relocate existing and new production to low or no-price carbon jurisdictions. In the worst case, this would unleash pressures for environmental protectionism, a slippery slope that could lead down a path of trade anarchy.

The other drawback of an absolute cap-and-trade approach resulting in uneven carbon pricing is that many opportunities are missed for economically attractive low-carbon technology deployment where the most action is happening: fast-industrializing countries like China and India. Missing these opportunities for any significant length of time will make it almost impossible to avoid dangerous human interference with the climate system. Between now and 2030, the IPCC projects that two-thirds to three-quarters of the business-as-usual projected increase in energy CO_2 emissions will come from non-Annex I regions (mostly fast-industrializing countries). Without a price on carbon, China alone could be on track to be emitting twice the amount of total greenhouse gases as the US, EU, Japan and all other industrialized nations combined in as little as 25 years, according to the forecasts of the chief economist of the International Energy Agency.[5]

Given huge variations in national circumstances, it will be incredibly challenging to get agreement on a set of absolute GHG targets that would support a global GHG target consistent with achieving the ultimate objective of avoiding dangerous human interference with the climate system. This provides a strong case for a fresh approach that focuses on integrating the environmental cost of carbon as determined by a single science-based global GHG target.

Option 3: A harmonized global carbon price derived from a single science-based global long-term GHG target and annual milestones to mark the way. This would overcome the three main problems of a cap-and-trade system and would also provide an equitable approach based on the polluter-pays principle, while leaving room for developing countries to grow. The funds generated from

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2 Mandatory product standards are another potential mechanism, which can play a complementary role in establishing floors for minimum efficiencies; but product standards are less likely to spur innovation. A range of other complementary policies to bolster the effectiveness of carbon pricing is detailed by Joanna Lewis and Elliot Diringer in "Policy Based Commitments in a Post-2012 Climate Framework," Pew Center on Global Climate Change (Arlington), May 2007.

3 The SRES (non-mitigation) scenarios project an increase of baseline global GHG emissions by a range of 9.7 to 36.7 GtCO2-eq (25-90%) between 2000 and 2030.

4 A variety of national caps have been proposed, including ones premised on grandfathering, carbon intensity, historical responsibility, and contraction and convergence. Sectoral targets on a global level have also been proposed. Contraction and convergence based on per-capita emissions has an attractive logic from a fairness point of view but, if applied at the scale necessary to stabilize atmospheric concentrations under 450 ppm CO2-eq, would require much of the developed world to revert back to the Stone Age. While intensity targets and sectoral targets can result in even carbon pricing at a global level, they both have drawbacks. Intensity targets do not guarantee absolute emissions reductions and sectoral targets would provide ample opportunity for multinational companies to game (circumvent their commitments) through subsidiaries and transfer pricing. In the long term, if global equality was achieved, contraction and convergence could be consistent with even carbon pricing.

5 Jim Yardley and Andrew Revkin, "China Issues Plan on Global Warming, Rejecting Mandatory Caps on Greenhouse Gases," New York Times (New York), 5 June 2007.

the harmonized global carbon price would stay within each respective country, with the exception of a built-in annual $50-$100 billion transfer from industrialized countries to industrializing and the least developed countries for carbon sinks (forests, agricultural land use management, landfills, peatlands and managed forests) and adaptation. The annual transfer amount would be based on a levy of 5-10 per cent on the carbon charge or carbon-credit auction price.

With a single universal price on carbon, fast-industrializing countries would face a more predictable carbon pricing situation (which would rise as carbon emissions rose) versus the price volatility and economic straightjacket that an absolute cap entails. A harmonized global carbon price would avoid the carbon leakage that results from uneven carbon pricing, and also help seize the tremendous opportunities for deploying cleaner and more efficient low-carbon technologies in developing and fast-industrializing countries.

While a harmonized global carbon price addresses the main drawbacks of a cap-and-trade approach, it comes with its own risks.

A lot of work has been done to figure out how an absolute cap-and-trade mechanism could deal with GHGs, and shifting to a harmonized carbon pricing approach risks losing this work. It would be possible, however, to marry the absolute cap-and-trade approach with a harmonized carbon price in a manner that did not put unfair constraints on developing countries. For instance, if industrialized nations agreed to a 30 per cent absolute reduction by 2020, and used a carbon market with 100 per cent of permits auctioned, the market price for a tonne of carbon could be applied in the form of a carbon tax (a simple form of intensity pricing) levied by industrializing countries at their bottleneck points of carbon collection. There are also valuable lessons and mechanisms in the cap-and-trade body of work that could inform important elements of a harmonized global carbon pricing approach, including how to best allocate the annual $50-$100 billion transfers from industrialized countries to industrializing and the least developed countries for carbon sinks and adaptation.

There is also a big question mark on buy-in. Why would fast-industrializing countries that oppose an absolute cap agree to impose a harmonized carbon price on their economy? The main difference is that a carbon charge is a form of intensity pricing. In contrast to an absolute cap, it allows a country to grow without the risk of having to purchase carbon credits on the international market. Another motivation for the least developed and industrializing countries to opt into a harmonized global carbon pricing agreement is that it provides a potential source of government revenue without risking loss of international competitiveness in energy-intensive industries such as steel-making.[6]

On the carrot side, there is the $50-$100 billion built-in transfer of wealth from industrialized countries for carbon sinks and adaptation that industrializing and the least developed countries would gain access to if they opted into the system.

The least developed and industrializing countries could also be granted a cushion period of up to five years to implement the harmonized global carbon price, with minimal trade distortion and without creating substantial carbon leakage.

The stick for countries that relieve their industries of the internationally accepted cost of carbon comes in the form of incrementally severe penalties for noncompliance, leading up to countervailing duties on carbon-intensive imports. This stick,[7] openly mused about by President Sarkozy and called for in America's Climate Security Act (Lieberman-Warner), is also an option that could be applied in a cap-and-trade context to countries that did not impose a GHG cap on their industries. However, it would be much messier and subject to protectionist abuse in the absence of a single carbon price to serve as a clear reference point for compliance. Once a significant region adopts the principles of a harmonized global carbon price, there will be substantial motivation for large trading partners to do so as well.

Verifying GHG emissions presents challenges in any context. Administratively, the harmonized carbon price would be most easily levied at GHG-intensive materials facilities (cement, steel, aluminum, and chemicals) and the key bottlenecks in the fossil energy system (trunk pipelines for gas, refineries for oil, and railroad heads for coal). Almost all countries are now members of the International Monetary Fund (IMF). As such, their economic policies, including fiscal policies, are subject to detailed annual surveillance by the IMF staff. Under a harmonized global carbon pricing agreement, the IMF could be asked to pay special attention during these reviews to sources of revenue, and in particular to carbon levy revenues. Each country's revenue books would be open to inspection, and its finance officials available for questioning. Countries' fiscal systems would also be monitored to assure that the carbon levy was not nullified by changes in other fiscal instruments which indirectly favored CO_2-emitting activities. Furthermore, physical readings of the largest sources of emissions, such as power plants, could be taken (e.g. by satellite and by on-site inspection) as part of the compliance regime.

Another potential drawback of a harmonized global carbon price approach is that it provides less certainty about the volume of GHG emissions reductions that will be achieved. This is why any harmonized global pricing framework must be joined at the hip with a science-based global GHG target, with the price adjusted at regular intervals to stay on track with that target. Recall that according to the IPCC Fourth Assessment Report, modeling studies show global carbon prices rising to US$20-$80/tCO_2-eq by 2030 to achieve stabilization at around 550 ppm CO_2-eq by 2100 As the modeling process is highly uncertain, it would be necessary to review the carbon price at regular intervals (e.g., every two to three years) and adjust it accordingly to steer actual emissions levels and atmospheric concentrations toward the desired stabilization outcome. A likely effect of reviewing and adjusting the carbon price would be to create an expectation of a rising carbon price over time, which would significantly affect investments in future infrastructure.

A further potential risk of a harmonized global carbon pricing approach is that it could be labeled as a tax, and it is hard to raise taxes. This could be neutralized by making the carbon charge (or revenues derived from the carbon-permit auction) revenue neutral[8] through lock-step reductions of capital and income taxes, with provisions to offset the impacts of price increases for low-income people, or by

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6 Richard N. Cooper, "A Carbon Tax in China?" (Harvard University), 2004.

7 International trade law asserts that countries would be within their rights to apply a border transfer adjustment tax on imports of fossil fuels in a case where the domestic industry was subject to a domestic carbon levy. International trade law is not clear on the potential application of a countervailing duty on carbon-intensive manufactured products (such as cars), which would depend on the process (e.g., whether hydro power or coal power was employed), and would be more complex to administer and determine. (Taken from: Cosbey, Aaron and Tarasofsky, Richard. "Climate Change, Competitiveness and Trade." (Chatham House.) May, 2007.

8 Metcalf, Gilbert E. June 2007. "A Green Employment Tax Swap: Using a Carbon Tax to Finance Payroll Tax Relief." Tax Reform, Energy and the Environment. Washington, DC: Brookings Institution and World Resources Institute.

creating a carbon innovation fund kept separate from general revenues to deploy low-carbon technologies and invest in infrastructure. However, this would be the prerogative of each individual country.[9]

How to Determine the Harmonized Global Price for Carbon

In order to ensure that the harmonized global carbon price delivers the ultimate objective of avoiding dangerous human interference with the climate system, there are three pricing approaches:

The One-Step Approach

Get global agreement from a critical mass of countries on:

1. An absolute emissions cap for industrialized countries (e.g., 30 per cent reduction by 2020 from a 1990 base year or 40 per cent reduction by 2020 from a 2006 base year), applying the carbon price established in the industrialized world carbon market (100 per cent of permits auctioned to prevent trade distortion) on a simple intensity pricing basis (carbon tax) in developing countries. Milestone points would benchmark progress and ensure accountability along the way.

The Two-Step Approach

Get global agreement from a critical mass of countries on:

1. A long-term, science-based global GHG target (e.g., 50 per cent reduction by 2050 from a 1990 base year)
2. Annual target milestones with price adjustments at regular intervals to stay on track.

The Four-Step Approach

Get global agreement from a critical mass of countries on:

1. An acceptable temperature increase range (e.g., less than 2°C).
2. The corresponding maximum atmospheric concentration of carbon dioxide equivalent (e.g., 450 ppm provides about a 50 per cent likelihood of keeping temperature warming under 2°C).
3. The annual modeled rate[10] of absolute emissions growth, stabilization point and then decline needed to ensure that the concentration level is not exceeded (e.g., absolute growth at not more than 1 per cent per year from 2010 to 2020, stabilization by 2020, then 1-2 per cent per year global reduction in absolute emissions from 2020 to 2030).
4. The modeled price on large carbon bottlenecks expected to deliver those annual global absolute reductions of carbon dioxide equivalent emissions (e.g., US$[11]50/t$CO_2$-eq[12] phased in over five years and moving to $100/t$CO_2$-eq by 2030[13]. The IPCC identified $50/t50/t$CO_2$-eq from 2010 to 2030 as the minimum price required to achieve stabilization of atmospheric concentrations of CO_2-eq at 450 ppm. It could start with a levy of $15/t$CO_2$-eq at carbon bottlenecks and move incrementally higher with a clear timeline to $50/t$CO_2$-eq and beyond, adjusting the price along the way to steer actual GHG emissions to desired level).

Bottom line: The process to get to a global price for carbon will eventually have to be put in place if we are to efficiently manage and reduce carbon emissions. The choice is whether it happens in an orderly way or in a messy and complicated manner.

9 America's Climate Security Act (Lieberman-Warner), currently considered to be the federal carbon pricing bill most likely to become law, would distribute its carbon permit auction revenues as follows: 55 per cent to emission reductions, 20 per cent to help low-income people, 5 per cent to help affected workers, and 20 per cent for adaptation to climate change.

10 B. Mertz, O. R. Davidson, P. R. Bosch, R. Dave, L. A. Meyer, et al, "Climate Change 2007: Mitigation, Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change," IPCC, Cambridge University Press (Cambridge), 2007, pg. 23.

11 The currency should be a weighted basket of international currencies. $US is used in this instance as a proxy.

12 Roughly, this would add US 10-15 cents per litre to the cost of gasoline, and an additional 5 cents per kilowatt hour to the cost of traditional coal-fired electricity.

13 B. Mertz, O. R. Davidson, P. R. Bosch, R. Dave, L. A. Meyer, et al, "Climate Change 2007: Mitigation, Contribution of Working group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change," IPCC, Cambridge University Press (Cambridge), 2007, pg. 23.

Built-in Annual Annual US$50-$100 billion Transfer of Funds for Carbon Sinks and Adaptation

A harmonized global carbon pricing architecture would include a well-defined built-in annual $50-$100 billion transfer (based on 5-10 per cent of the carbon charge or auctioned carbon permits) from industrialized countries to industrializing and the least developed countries for carbon sinks (forests, agricultural land use management, landfills, peatlands, and managed forests) and adaptation.

Which mechanism is up to the task of preventing dangerous human interference with the climate system?

Absolute Cap-and-Trade

Pro	In theory, delivers certainty of GHG reductions.
Con	Fast-industrializing nations such as China and India will not accept a hard cap in any sort of early time frame.
Con	Uneven carbon pricing of a trillion dollar carbon cost will lead to carbon leakage, which would prompt environmental protectionism, a slippery slope that could jeopardize the multilateral trading system.
Con	Uneven carbon pricing misses opportunities for economically attractive low-carbon technology deployment in fast-industrializing countries like China and India.

Harmonized Global Carbon Price

Pro	Provides fast-industrializing countries with a more predictable carbon pricing situation and potential new source of revenue (which rises as carbon emissions rise) versus the price volatility and economic straightjacket that an absolute cap entails.
Pro	Provides clear reference price for compliance with a global climate regime, thus simplifying compliance and minimizing the scope for environmental protectionism.
Pro	Avoids carbon leakage that results from uneven carbon pricing, thus addressing the central competitive concern of the US.
Pro	By introducing meaningful carbon pricing within an early time frame, it helps seize the huge opportunities for deploying cleaner and more efficient low-carbon technologies in fast-industrializing and least developed countries.
Pro	Equitable approach based on the polluter-pays principle.
Pro	Built-in annual $50-$100 billion transfer (based on placing a 5-10 per cent levy on the carbon charge or auctioned carbon permits in industrialized countries) is made available to industrializing and the least developed countries for carbon sinks and adaptation.
Con	Shifting to a harmonized carbon pricing approach risks losing cap-and-trade work. Valuable lessons and mechanisms in this body of work will inform important elements of a harmonized global carbon pricing approach. The two could work in symbiosis, with a carbon price determined by a market derived from the absolute cap in industrializing countries, in turn setting the intensity price (carbon charge) levied by developing countries at their carbon bottlenecks.
Con	Compliance and enforcement question marks in developing countries. Intensity based pricing for developing countries does not hem in their growth—it just helps decouple it from rising carbon emissions. Also provides least developed and industrializing countries with: a potential source of government revenue without risking loss of international competitiveness; a $50-$100 billion built-in transfer carrot to use for carbon sinks and adaptation; and a five-year adjustment cushion to implement carbon pricing, while also allowing the developed world to build trust by proving itself first. Imposes incrementally severe penalties for noncompliance, leading to countervailing duties on carbon-intensive imports. Levied at administratively efficient GHG intensive materials facilities (cement, aluminum, steel, and chemicals) and the key bottlenecks in the fossil energy system (trunk pipelines for gas, refineries for oil, railroad heads for coal), and verified by IMF annual review.
Con	Provides less certainty about the volume of GHG emissions reductions that will be achieved. The price must be joined at the hip with a single global GHG emissions target (or an industrialized world absolute cap which, through a carbon market, establishes a harmonized global carbon price applied on an intensity pricing basis in developing countries), and regularly adjusted to stay on track with that target.
Con	Could be labeled a tax, and it is hard to raise taxes. This could be neutralized by making the carbon charge (or permit auction funds) revenue neutral through lock-step reductions of capital and income taxes, with provisions to offset the impacts of price increases for low-income people, and/or keeping the funds separate from general revenues and only available for dedicated decarbonization uses.