

Carbon Trading Ineffective in Curbing Greenhouse Gas Emissions

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Carbon credit trading is a market-based approach adopted by the United Nations to achieve environmental objectives. In 1992, over 150 countries and the European Economic Community adopted and signed the U.N. Framework Convention on Climate Change (UNFCCC) to stabilize greenhouse gas (GHG) concentrations in the atmosphere. Under the convention, parties included in Annex I, i.e., all countries belonging to the Organization for Economic Co-operation and Development (OECD) and economies in transition (EIT), committed themselves to returning individually or jointly to their 1990 levels of GHG gas emission by 2000. Emissions trading allows countries that are reducing GHG emissions below their emission cap to use or trade the excess reductions to offset emissions at another source inside or outside the country. Trading can occur at the intra-company, domestic, and international levels, based on a quota system with assigned amounts calculated from the emission reduction and limitation commitments under the Kyoto Protocol (see below and the [August 2010 newsletter article](#)).

The Fourth (2007) Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), the latest on the state of knowledge on climate change, shows that in 2004, Annex I countries accounted for 20% of the world's population, but contributed to 46% of global GHG emissions, while the remaining population in Non-Annex I countries was responsible for only 54% of emissions. When income per capita for each country is taken into consideration, the contrast between the region with the highest per capita GHG emissions (North America) and the lowest (Non-Annex I South Asia) is even more striking, as shown by Figure 1a. North America accounted for 5% of world population and 19.4% of emissions while South Asia, with 30.3% of the population, emitted only 13.1% of GHG.¹

Figure 1b shows a different picture, where GHG emissions per unit of gross domestic product expressed in terms of purchasing-power parity per person (GDP_{PPP}) is used: Annex I countries generated 57% of gross world product with a GHG production intensity of 0.68 kg CO_2 -eq (carbon equivalent or CE) for every US\$ GDP_{PPP} , compared to 1.06 kg CO_2 -eq/US\$ GDP_{PPP} for non-Annex I countries.¹ The term CO_2 -equivalent emission is defined as the amount of CO_2 emission that would cause the same radiative forcing as the emitted mixture of GHGs, all multiplied by their respective global warming potentials (GWPs) to take into account the different times they remain in the atmosphere.

As developing countries pursue industrialization, global energy use and GHG emissions will continue to grow. Under the Kyoto Protocol, Annex I countries must fulfill their obligations to reduce their anthropogenic GHG emissions (carbon dioxide CO_2 , methane CH_4 , nitrous oxide N_2O , hydrofluorocarbons HFCs, perfluorocarbons PFCs, and sulfur hexafluoride SF_6 released as a result of human activity) by an average of 5.2% below 1990 levels in the commitment period 2008–2012. The Kyoto Protocol came into force in February 2005 and will expire at the end of 2012.

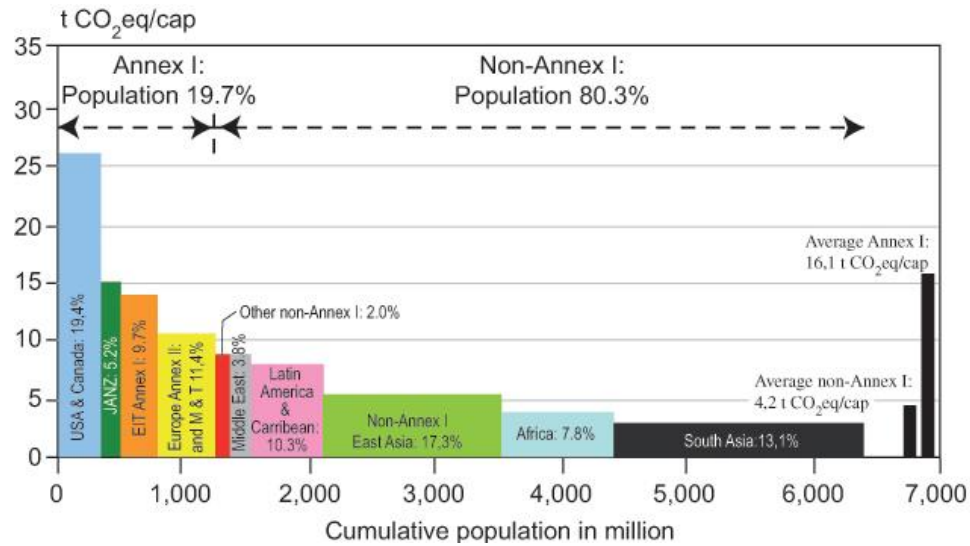


Figure 1a: Distribution of regional per capita GHG emissions (all Kyoto gases including those from land-use) over the population of different country groupings in 2004. The percentages in the bars indicate a region's share in global GHG emissions.

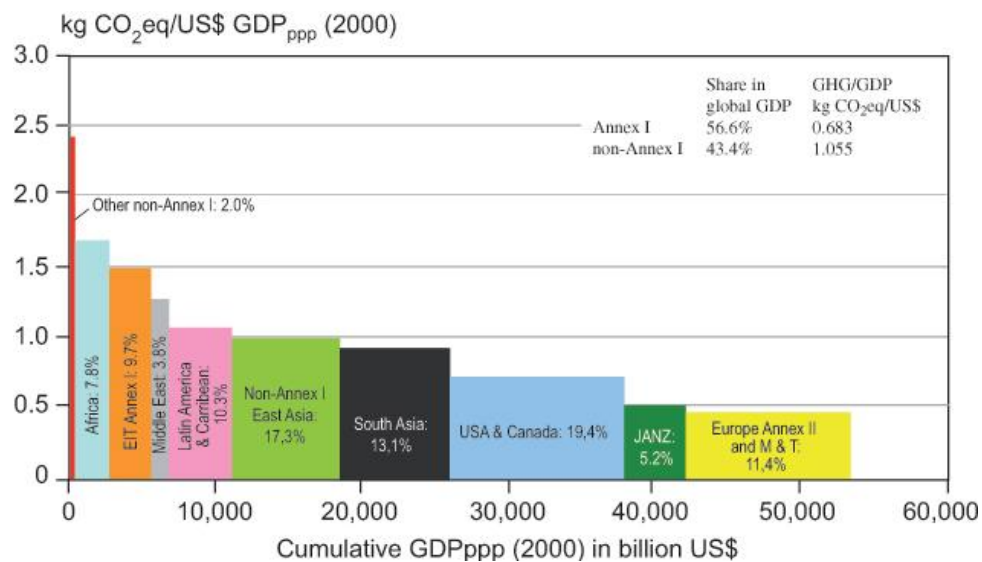


Figure 1b: Distribution of regional GHG emissions (all Kyoto gases including those from land-use) per US\$ of GDP_{ppp} over the GDP of different country groupings in 2004. The percentages in the bars indicate a region's share in global GHG emissions. The metric GDP_{ppp} (2000), defined as the gross domestic product expressed in terms of purchasing-power parity per person in 2000, is used for illustrative purposes only here.

Source: H-H. Rogner, D. Zhou, R. Bradley, P. Crabbé, O. Edenhofer, B. Hare, L. Kuijpers, M. Yamaguchi, "2007: Introduction," in *Climate Change 2007: Mitigation*, contribution of Working Group III to the *Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 106, Figures 1.4a and 1.4b (2007)
<http://www.ipcc.ch/graphics/ar4-wg3/jpg/fig-1-4.jpg>

By the end of 2009, a total of 187 countries and the European Commission had ratified the Protocol, with all but one (U.S.) of the 40 Annex I countries endorsing the agreement. While the U.S. is a party to the UNFCCC and was responsible for 36.1% of the 1990 emission levels of Annex I countries, it objected to the continued non-commitment of non-Annex I countries China and India, which have seen rapid industrialization with the associated GHG emissions. Earlier this year, China surpassed the U.S. as the world's top energy consumer and emitter of GHGs. For a non-signatory, the U.S. 7% GHG reduction objective set in 1997 is non-binding. Other objectives range from reductions of 8% by Switzerland, many Central and East European states, and the European Union (the EU will achieve its target by distributing differing reduction rates to its member states); and 6% by Canada, Hungary, Japan, and Poland. Russia, New Zealand, and Ukraine are to stabilize their emissions, while Norway may increase emissions by up to 1%, Australia by up to 8%, and Iceland 10%.² Emission reductions in Non-Annex I countries are voluntary.

Countries participating in the Kyoto Protocol can meet their reduction objectives through three Flexibility Mechanisms: Joint Implementation (JI, Article 6), Clean Development Mechanism (CDM, Article 12), and International Emissions Trading (IET).³ The first two are project-based mechanisms, where JI projects allow Annex I countries or companies from these countries to establish projects together to reduce emissions or enhance sinks. The CDM aims to (1) assist Non-Annex I countries, such as China, India, and Brazil, which do not have binding emission reduction commitments to achieve sustainable development and contribute to Kyoto reduction goals and (2) assist Annex I countries to comply with emission limitations and reduction commitments.

A carbon trading and offsetting scheme allows developed countries that are the main culprits for global warming to lay off their GHG emissions and meet climate targets by funding cuts and projects such as wind power and improved efficiency in developing nations. The most advanced Emissions Trading Scheme (ETS) is the one developed by the EU, which serves as a model for the carbon market in the U.S., Australia, and other countries. The ETS also has an international component as it involves cross-border trades and transactions between national allowance registries. A larger global system of IET is developed through emission credits generated by the project-based JI and CDM.

The international carbon market is very fragmented and complex, however. Although the basic unit of GHG emissions trading is always one metric ton of CO₂-equivalent (MTCE), the market itself uses a “patchwork of currencies” with limited convertibility and a wide range of prices.^{4,5} The EU carbon currency is the European Union Allowance (EUA), with a historical price range of €10–35, the highest per ton of CO₂. The Kyoto Protocol has seven different currencies, the most important of which are the Assigned Amount Units (AAUs), the Certified Emission Reductions (CERs), the Emissions Reduction Units (ERUs), and the Voluntary Emission Reductions (VERs):⁴

- Annex I countries with binding emission targets are assigned AAUs.
- Under CDM, Non-Annex I countries (e.g., China, India, Brazil, Korea, Singapore) can implement local emissions reduction projects and generate credits for purchase by Annex I countries (e.g., Germany, United Kingdom, Canada, France, Italy, Japan). Trading between these two categories of countries use credits in the form of CERs.
- Emissions trading between Annex I countries (e.g., Germany and Japan) under JI projects are in ERUs.

- VERs can be traded in most countries, including ones that do not participate in the Kyoto Protocol (e.g., Taiwan, U.S.).

In 2007, the CDM saw primary transactions worth US\$7.4 billion (€5.4 billion), with demand coming mainly from private sector entities in the EU, but also from E.U. governments and Japan.⁶ The average 2007 prices for CERs, ERUs, and VERs were \$16.30, \$12, and ~\$4 per credit, respectively.⁴ Carbon credit transactions amounted close to \$7 billion in 2008. Faced with unstable pricing in 2009 and 2010 as the global economy continued to freefall, Russia set a minimum price of €10 per ton of carbon offsets (ERUs) in August 2010.⁷ With a beginning prototype fund worth \$160 million from the U.N. 10 years ago, the current CDM projects run a whole family of funds worth \$2.7 billion,⁸ with a CER unit price of around \$8.55.

The World Bank reported in 2008 that the total, global carbon market grew from \$11 billion (€9 billion) in 2005 to \$31 billion (€24 billion) in 2006 and \$64 billion (€47 billion) in 2007.⁹ Unfortunately, judging from news in the last few years, while there is much trading, there is no noticeable reduction in GHG emissions worldwide.

Critics have called the EU's ETS flawed, if not downright fraudulent. A rich country can "cut" emissions without actually releasing fewer and smaller volumes of GHGs by paying a poor country to emit less than it would have otherwise.¹⁰ Some corporations are accused of treating lenient emissions trading as a huge opportunity to boost profits. Introduced in 2005, the ETS is a cap-and-trade system under which participants can buy and sell emissions allowances within a certain overall limit ("cap"). It covers 10,000 industrial installations, which are responsible for 40% of the EU's GHG emissions.¹¹ For the 2008–2012 phase, permits to pollute have been allotted to companies for free. After 2012, the European Commission has proposed full auctioning for the power sector and the gradual introduction of auctioning for the manufacturing sector, including the chemical industry, steel, and other energy-intensive industries.¹²

Across the Atlantic, carbon markets face plunging prices as the economy plummeted and is showing weak signs of recovery. Diminished industrial output led to decreased demand for power and carbon offsets. The Regional Greenhouse Gas Initiative (RGGI) in northeast U.S. auctions carbon dioxide allowances in a cap-and-trade system, which can be used to offset pollution during 2009–2011. The first auction (with only six participating states) in September 2008 attracted bids for more than four times the available allowances (12.57 million tons) and each ton of allowance fetched \$3.07. Since then, the number of potential bidders and ratio of bids-to-supply have decreased every quarter although there are now 10 participating states and the allowances offered have increased to over 45 million. By the eighth auction in June 2010, entities submitted bids to purchase just 1.3 times of available allowances (40.69 million), with the auction clearing price of \$1.88 barely above the minimum reserve price of \$1.86. Allowances were left unsold in the two most recent auctions, where just 75% and 57% of allowances offered were purchased. At the December 2010 auction, since the available allowances far exceeded the bidding volume, the clearing price was at the reserve price of \$1.86 for each of the 24.76 million allowances sold. The prices have fallen steadily since March 2009, the first auction in which all state utilities in the participating states had to partake: \$3.51 in March 2009, \$3.23 in June 2009, \$2.19 in September 2009, \$2.05 in December 2009, \$2.07 in March 2010, \$1.88 in June 2010, \$1.86 in September 2010, \$1.86 in December 2010.¹³

The RGGI also auctions future CO₂ allowances for the period 2012–2014, offering approximately 2.1 million allowances each quarter since March 2009. All of these future allowances were sold in the first three auctions at \$3.05, \$2.06, and \$1.87 each, respectively, but the December 2009 auction sold less than 74% of the offerings, at a reserve price of \$1.86 each.

The following two auctions recovered to 98% and 100% sale, but the price remained at \$1.86. Sales fell to 61% and 55% in September and December this year, at the \$1.86 minimum.¹³

The participants in RGGI are Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. Power plants in these states are required to hold enough allowances to cover emissions by 2012. A mid-sized utility generates several million tons of emissions per year, for example. The money collected from the auctions (\$777 million total so far) is spent primarily on ways to reduce energy use and to fund energy-efficient alternatives, but cash-strapped states such as New York and New Jersey have begun raiding the funds to help balance state budgets.¹⁴

Since the RGGI is the only government-mandated cap-and-trade program in North America, its performance does cast doubt on the future of similar incentives in the U.S., with the exception of California, which is targeting an RGGI-like initiative by 2015. Interest in carbon trading in the U.S. also dwindled when climate legislation failed to gain traction in the Senate earlier this year, after Congressional Democrats crafted and passed a comprehensive cap-and-trade bill in 2009. The federal government's inaction on limiting emissions also led to the shutdown of the Chicago Climate Exchange (members included DuPont, Motorola, I.B.M., and other major companies), the only national carbon cap-and-trade exchange in the U.S., in mid-November 2010.¹⁵ During a recent visit to Australia, Secretary of State Hillary Clinton emphasized that the demise of a cap-and-trade plan for curbing emissions in Congress does not mean an end to U.S. action on climate change. Without elaborating on the alternative carbon pricing strategies that could attract fresh congressional support, Clinton said that the Obama Administration is weighing different approaches to curbing GHGs.¹⁶

With the Kyoto Protocol expiring at the end of 2012, climate experts, environmentalists, and skeptics are already proposing new strategies to control emissions post-2012. The European Executive Commission is suggesting revisions to the ETS, with provisions to exclude offset credits from trifluoromethane (CHF₃, Freon 23, or HFC-23) and nitrous oxide credits from adipic acid production.¹⁷ The commission said that 80% of the disputed HFC credits and 60% of the N₂O credits came from China, and most of the rest came from India. The move seeks to restore credibility to the disputed system by banning the trading of bogus carbon credits from unscrupulous project developers, who deliberately overproduce the ozone-depleting refrigerant chlorodifluoromethane (CHClF₂, Freon 22, or HFC-22) to create potent GHG byproducts for destruction and ultimate profit.

Academics and officials of climate institutes are working on proposals that depart from the cap-and-trade model, focusing on making clean energy cheaper instead of raising the cost of dirty energy for carbon-intensive industries.¹⁸ Some countries (the island nation of Micronesia, the U.S., Mexico, and Canada) are also pushing to expand the scope of the Montreal Protocol (see [August 2010 newsletter article](#)), the treaty designed to phase out ozone-depleting chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs), to include the phasing out of HFCs, which have a minimal effect on the ozone layer but are potent GHGs. The tactic would be a novel use of the Montreal Protocol, which has carried out its work effectively and with little dispute or animosity for over 20 years, compared to the often chaotic, hostile, and unproductive negotiations conducted under the Kyoto Protocol.^{19,20}

On the eve of the 2010 U.N. meeting on climate change in Cancun, Mexico at the end of November, a sobering report released by the U.N. Environmental Program (UNEP) shows that emission cuts pledged by countries in a non-binding climate accord reached last year in Copenhagen, Denmark fall short of target.²¹ This was followed the next day by a report from the

U.N. World Meteorological Organization (WMO) that GHG levels in the atmosphere rose in 2009 by 1.6 parts per million (ppm), to a record level of 386.8 ppm, compared to a pre-industrial CO₂ average of 280 ppm. Furthermore, WMO said the global economic crisis that led to decreased manufacturing, construction, and energy consumption did not significantly affect overall GHG emissions.²²

Even if the voluntary pledges made in the Copenhagen Accord were fully met, it would still only be 60% of the emission cuts required to keep the global mean temperature from rising less than 2°C (3.6 F) above pre-industrial levels.²² After the failure at last year's conference to produce a climate agreement in Copenhagen, participants are not optimistic about the 194 nations reaching a consensus on a legally-binding treaty for reining-in global warming. This certainly would not be accomplished this year, but delegates hoped to focus on climate financial aid, deforestation, and other secondary issues to revive momentum towards a deal at next year's conference in South Africa or at the Earth Summit in Rio de Janeiro in 2012.

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