

CARBON TRADING*Swatanter Kumar****Abstract**

CO₂ emissions are a necessary part of growth and development and, simultaneously, the cause of global warming owing to the continued dependence on fossil fuels. The fair and equitable use of the global atmospheric commons imposes a common responsibility on all nations. However, an industrialized minority comprising of the developed nations has been shown to be overusing the earth's ability to cleanse the atmosphere of excess carbon and other greenhouse gases. The critical issue today, therefore, is reallocation of the carbon space available in the atmospheric commons between nations with varying current rates of emissions and growth on the basis of the key over-arching principle of "common but differentiated responsibilities." This paper attempts to discuss in brief the viability of carbon trading, often touted as a way of privatizing the public cost of carbon dioxide pollution, to aid such dynamic reallocation through the Clean Development Mechanism of the Kyoto Protocol.

I Introduction

IN A competitive economy, markets control the way resources available to society combine to produce goods and services that cater to human needs. While in most situations, the market economy works well to provide the socially optimal level of goods and services, in many other situations, such as the consumption of natural resources, it has led to excessive and unsustainable extraction. The reason they are not efficiently traded in a market economy is that natural resources do not fulfill two conditions crucial for a market outcome to be efficient: the good or service should be private rather than public and there should be no

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difference between the private and social costs of producing the goods or service.¹ Whereas the private benefits of exploitation of natural resources such as coal are valued through the market, social benefits are not valued in the market without some type of policy intervention. Historically, some of the most common initiatives to preserve natural resources have been regulatory or command-and-control instruments.² The current climate regulation regime, through voluntary and regulatory markets, seeks to harness market forces by encouraging individuals and entities to take actions that meet *both* their private interests and policy goals.

Carbon trading refers to trade in greenhouse gas (GHG) emission targets by countries or their companies, in order to fulfill commitments under environmental treaties such as the U.N. Framework Convention on Climate Change³ through the regulatory carbon market such as the European Union Emissions Trading System⁴ under the market framework of the Kyoto Protocol⁵ to the UNFCCC or even the voluntary carbon market⁶ under market frameworks such as the Chicago Climate Exchange.⁷

The objective of UNFCCC is “stabilization of greenhouse gas

1. G. Heal, *Nature and the Market Place: Capturing the Value of Ecostate Services* (Washington: Island Press, 2000).

2. Pagiola, S. *et al.*, *Selling Forest Environmental Services: Market-Based Mechanisms for Conservation and Development* (London: Eartscan, 2002).

3. United Nations Framework Convention on Climate Change (adopted 29 May 1992, entered into force 21 March 1994) 1771 UNTS 107 (hereinafter UNFCCC).

4. The European Union Emissions Trading System (hereinafter EU ETS), which came into effect on 1 Jan. 2005, is the first regulatory commercial market for certified emission reductions. The EU has voluntarily imposed stricter commitments than those under Kyoto, namely reduction of GHG emissions to at least 20 per cent below 1990 levels by 2020. Other regulatory carbon markets include Norway's Emissions Trading System and the US' Regional Greenhouse Gas Initiative.

5. Kyoto Protocol to the United Nations Framework Convention on Climate Change (adopted on 10 December 1997, came into force 16 Feb. 2005) 37 ILM 22 (hereinafter Kyoto Protocol).

6. Even standards have been developed such as the Climate Community and Biodiversity Alliance standards, to certify voluntary carbon projects in the retail market, available at <[www.climatestandards.org/ index.html](http://www.climatestandards.org/index.html)>.

7. Market participants in the Chicago Climate Exchange established in 2003 (hereinafter CCX) includes major corporations and financial institutions with activities in 16 countries and covers 700 million metric tons CO₂ - equal to roughly one-third the size of the EU ETS. The commodity traded on CCX is the Carbon Financial Instrument® (CFI®) contract, which represents 100 metric tons of CO₂ equivalent.



concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.”⁸ To strengthen the developed country commitments under the convention, the parties to the UNFCCC adopted the Kyoto Protocol, by which they agreed to “Quantified Emission Limitations or Reduction Commitments.” These reduction commitments seek to reduce net greenhouse gas emissions below 1990 levels by 5.2 per cent over the period 2008-12⁹ and are expressed as levels of allowed emissions or “assigned amounts.” The Clean Development Mechanism set up under Article 12 of the Protocol aims to reduce the presence of greenhouse gases in the atmosphere through the achievement of two objectives:¹⁰ (1) promoting sustainable development in developing countries and (2) financially assisting industrialized countries by enabling them to more cheaply comply with their emissions reductions commitments. The industrialized North can thus escape the obligation to reduce at home by investing in special, UN-approved ‘greenhouse gas or carbon-saving’ projects abroad. On the other hand, the CDM creates the flows of wealth and technology for the developing nations so that they can reduce their growing environmental impact without sacrificing their economic development.

Such carbon-saving projects fall into two categories: (i) Clean Development Mechanism (CDM) projects are carried out in the South, in countries not subject to the emissions ‘cap’ on industrialized nations and generate certified emission reductions (CERs) (ii) Joint Implementation (JI) projects are similar, but set up in other industrialized countries such as Eastern Europe and they generate emission reduction units (ERUs).¹¹ The CDM, thus, allows developing countries to develop in an environmentally sustainable way with new, clean technologies, while allowing industrialized countries to transition their highly polluting industries in an economically efficient manner. As achievement of the first objective is largely dependent on investment by industrialized countries under the CDM, active participation by both groups is essential to reducing greenhouse gas emissions.

8. Art. 2, the UNFCCC.

9. Art. 3, the Kyoto Protocol.

10. Art. 2(2), the Kyoto Protocol.

11. Each CER or ERU is equal to one ton of CO₂. Transfers and acquisitions of these units are tracked and recorded through the registry systems under the Kyoto Protocol. - An international transaction log ensures secure transfer of emission reduction units between countries.



In India, Gujarat was the first state to sign a memorandum of understanding with the World Bank in 2007. Under this agreement, Gujarat launched a campaign to reduce carbon emissions from the state. In return, the World Bank agreed to provide financial incentives to the state. This MoU will go a long way in ensuring that new industries in the state will abide by the global pollution standards. According to the Ministry of Environment and Forests, Government of India, companies in India have already earned \$ 7.9 million through carbon credit trading, despite the recent economic melt-down. India has been predicted to “move quickly” in the future to capture a large part of the carbon credit market due to its relatively low abatement and transaction costs.¹² However, environmental groups are raising concerns about the legitimacy of carbon credit practices and verification problems in the credit certification process. In this context, this paper would discuss whether carbon trading is a viable long-term solution to the problem of climate change or is it a temporary market fix whereby pollution is ‘optimized’ through trading?

II Examining the viability of carbon emissions trading

Origin

The pollution-trading mechanism that forms the core of the Kyoto Protocol was essentially “made in the USA” as it was proposed by North American economists in the 1960s, put into practice in US markets for lead, nitrogen oxide, sulphur dioxide and other pollutants beginning in the 1970s and 1980s and successfully pressed on the United Nations Organization by the US government, advised by lobbies of American economists, NGOs and business in the 1990s.

Under the US Clean Air Act Amendments of 1990, a national sulphur dioxide trading programme was set up to save power plants money as well as to encourage states to use emissions trading in the effort to control acid rain and reduce urban smog. It is interesting to note that in 2003, the US programme was expected to cut sulphur dioxide emissions by only about 35 per cent by its 20th anniversary in 2010.¹³ In contrast,

12. Chicago Climate Exchange, available at www.indiamicrofinance.com/wp-content/uploads/2009/.../carbon-credits.pdf.

13. Curtis A. Moore, ‘Marketing Failure: The Experience with Air Pollution Trading in the United States’, Sacramento, CA, Health and Clean Air Newsletter, 3 Feb. 2004, p. 2, available at <<http://www.innovations.harvard.edu/showdoc.html?id=483>>



Germany cut power plant emissions by 90 per cent from the first proposal in 1982 to completion of its programme in 1998, *without trading*.¹⁴ The viability of pollution trading schemes *vis-à-vis* development of sustainable types of technology is dealt with in more detail below (in “Downside to carbon trading”).

Today, the lucrative carbon market appears to be sustained by the theory that the market would ‘help society find and move along the least-cost pollution reduction supply curve.’ Even as global GDP declined by 0.6 per cent in 2009, and at a more perilous rate of 3.2 per cent in industrialized economies, the carbon market demonstrated resilience. The total value of the market grew 6 per cent to US\$ 144 billion (• 103 billion) by year’s end with 8.7 billion ton of CO₂ traded.¹⁵

Tading under the CDM of the Kyoto Protocol

The very basis of emissions trading, according to former World Bank chief economist Sir Nicholas Stern, is assigning property rights to emitters, and then allowing these to be traded.¹⁶ Property rights are central to the idea of “privatizing” the natural resource so that an exchange can be made between the supplier of the goods or service and those who demand it.¹⁷ Price Waterhouse Coopers, in an analysis of the tax implications of the EU ETS, has observed that ‘trade in CO₂ emissions is equated with the transfer of similar rights such as copyrights, patents, licensing rights and commercial and industrial trademarks’.¹⁸

There are two kinds of carbon trading. The first is emissions trading. The second is trading in project-based credits. Often, the two categories are put together in hybrid trading systems. In the former, the buyer purchases emission allowances created and allocated (or auctioned) by regulators under cap-and-trade regimes, such as Assigned Amount Units (AAUs) under the Kyoto Protocol, or European Union Allowances

14. L. Lohmann, *Carbon Trading- A Critical Conversation on Climate Change, Privatization and Power, Development Dialogue*, no. 48, p. 109 (Sep., 2006).

15. Kossoy and Ambrosi, *State and Trends of the Carbon Market 1* (Environment Department, World Bank, Washington D.C., May, 2010).

16. Nicholas Stern, ‘What is the Economics of Climate Change?’, *Stern Review on the Economics of Climate Change* (London, 31 Jan. 2006).

17. See, generally, R. Coase, “The Problem of Social Cost”, 3 *J. Law and Eco.* 1-44 (1960).

18. United States Department of Energy, ‘Energy Information Administration, Analysis of S. 139, the Climate Stewardship Act of 2003: Highlights and Summary’, Washington, p. 6.

(EUAs) under the EU ETS. Carbon cap-and-trade regimes currently permit the import of credits from project-based transactions for compliance purposes. Once project-based credits are issued and are finally delivered, then they are fundamentally the same as allowances. Unlike allowances, however, project-based credits are compliance assets that need to be “created” through process that has certain risks inherent with it (regulation, project development performance for instance) and involve significantly higher transaction costs.

There are six different GHGs for which the Kyoto Protocol sets limits on emissions: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆).¹⁹ As these GHGs vary in potency and lifespan, they do not represent the same threat to the environment and thus are not equivalent in emissions reduction benefits. For example, just one ton of HFC-23 emitted in the environment is equivalent to the effect on global warming caused by 11,700 tons of CO₂ i.e. 11,700 CERs are earned for the reduction of one ton of HFC-23. So the elimination of one ton of HFC-23 would be prioritized and given greater compensation in the CDM market.²⁰ This ensures that projects targeting the most potent greenhouse gases receive priority.

Fortunately, it is fairly inexpensive to eliminate the harm from HFCs such as HFC-23. Hence, not only have many annex I industries opted to voluntarily capture and destroy them in their own domestic regimes but non-annex I countries also prioritize the reduction of HFC-23s through the CDM. As market theory would predict, the low cost of capture and destruction of HFCs compared to substantial CERs revenues per ton eliminated have led, for instance HFC-23, decomposition projects to become highly profitable and attractive ventures in the CDM market.

Thus, as a market mechanism, it may be said that the CDM has been successful in achieving its second objective, *viz.* producing the lowest-cost emission reduction while its progress in promoting its first objective, *i.e.* sustainable development has been questionable.²¹ It appears that the social

19. The Kyoto Protocol, annex A.

20. M. Wara, *Measuring the Clean Development Mechanism's Performance and Potential*, 55 *UCLA L. Rev.* 1759 at 1782 (2008).

21. But it must be acknowledged that the CDM may be an efficient tool for promoting sustainable development in countries like India and China and aiding in discouraging the development of large, high-carbon emitting factories and industry. As these two countries, hosts to the largest number of CDM projects, establish new infrastructure and industry, they could potentially become the world's greatest GHG



benefits emerging from the second objective cannot be monetized and, therefore, they have played a limited role in directing investments. This has been aggravated by inaccurate valuation of credits²² and the problem of leakage.²³

The evidence, however, suggests that even the CDM market incentives may not result in an overall reduction of GHGs in the atmosphere.²⁴ In addition, as the potential supply of cheap credits is significant, especially in Asia, the development implications may be indirectly negative in terms of lowering the price of CO₂ further making it less likely that renewable energy projects with high investment costs will be economically viable under the current market-mechanism. This is but one instance of the problems associated with the CDM.

Downside to carbon trading

According to the critics of carbon-trading, keeping fossil fuels in the ground, *i.e.* the need to find ways of leaving coal, oil and gas in the ground, and encouraging movements that already have this objective, has to be the default, mainstream approach to tackling climate change.²⁵ This

emitters. Thus, simultaneously, they are also in the best position to adopt the low-carbon technology subsidized by the CDM and greatly reduce emissions in their countries and globally.

22. Since CERs are awarded based on the amount of emissions reduced below the baseline, which defines the GHG emissions that would have occurred in the absence of a CDM project, project producers have a huge incentive to overestimate the baseline and, thus, increase the amount of potential revenues generated. See, generally, Pearson *et al.*, "Project-Based Mechanisms: Methodological Approaches for Measuring and Monitoring Carbon Credits" in Streck *et al.* (eds), *Climate Change and Forests: Emerging Policy and Market Opportunities* 135-47 (Concept Publishing Company, New Delhi, 2009).

23. Leakage occurs when emissions that would have occurred anyway in a project without a CDM subsidy instead occur outside of it, in another area of the same activity or a different non-subsidized activity. For a different view, see, generally, Steffen Kallbekken, "Why the CDM Will Reduce Carbon Leakage", 7 *Climate Policy* 197 (2007).

24. Rather, the market incentives to engage in the capture and destruction of HFC-23s are so strong that it has actually encouraged certain countries to develop more HCFC-22 facilities, which produce HFC-23 as a byproduct. These facilities then register CDM projects to destroy the resulting HFC-23s and gain large profits to subsidize their products. In fact, a developing world producer of HCFC-22 can earn nearly twice as much from its CDM subsidy than it can make from the sale of its primary product. See Wara, *supra* note 20 at 1784.

25. Lohmann, *supra* note 14.

is because carbon trading, crudely put, turns the earth's carbon-cycling capacity into property to be bought or sold in a global market.²⁶ 'Carbon-saving' projects could actually license the removal and burning of all the remaining fossil fuel still underground as they hold great short-term appeal for business and governments.

In the US-German example mentioned above, the bias towards cheaper reductions in the US pollution trading scheme has been unfriendly to more interesting, radical and sustainable types of technological innovation that require long-term, broad-ranging efforts. By lowering rather than raising the cost of obeying pollution laws, US emitters of sulphur dioxide have taken advantage of differences among technologies that exist for a particular purpose rather than invest/stimulate development of more effective technologies,²⁷ *i.e.* they improve current state-of-the-art technology rather than lead to a new state of the art.

Yet another consideration in a market-based mechanism is equity. It would be ideal if the Indian philosophy of "*vasudhaiva kutumbakam*", meaning the whole universe is one family, were to dominate global efforts to protect the global commons.²⁸ The CDM has been criticized for inadequate geographic distribution of its projects and exclusively benefiting the largest developing countries.²⁹ Further, not only do many

26. See the Durban Declaration on Carbon Trading, May 24, 2007, available at <www.durbanclimatejustice.org/durban-declaration/english.html>.

27. A study of the same at the Goldman School of Public Policy at the University of California, Berkeley concludes thus: "[T]he weight of evidence of the history of innovation in SO₂ control technology does not support the superiority of the 1990 Clean Air Act (CAA)... as an inducement for environmental technological innovation, as compared with the effects of traditional environmental policy approaches.... In addition, traditional environmental policy instruments had supported innovation in alternative technologies, such as dry flue-gas desulphurisation (FGD) and sorbent injection systems, which the 1990 CAA provided a *disincentive* for, as they were not as cost-effective in meeting its provisions as low-sulphur coal combined with limited wet FGD application. See Taylor *et al.*, "Regulation as the Mother of Invention: The Case of SO₂ Control", 27 *Law and Policy* 348-78 (2005).

28. See, generally, Nobel Lecture by R.K. Pachauri in Oslo, Norway on 10th Dec., 2007, available at http://nobelprize.org/nobel_prizes/peace/laureates/2007/ipcc-lecture_en.html

29. Of the 1,581 projects currently registered in the CDM, over 70 per cent are located in Asia and the Pacific. In fact, almost 60 per cent of the world's CDM projects are located in just two countries, China and India. See UNFCCC, CDM: Registration by Host Party, available at <<http://cdm.unfccc.int/Statistics/Registration/NumOfRegisteredProjByHostPartiesPieChart.html>>.

of the poorest lack property rights or are unable to retain access or control over them, but also transaction costs will exclude the poor from participating in emerging economic opportunities.³⁰

Opponents of the carbon trade advocate sweeping public works programmes which could help reorganize industrialized societies' infrastructure away from fossil fuel dependency besides revamp of transport systems, decentralization of electricity networks to make them more efficient, reliable, secure and receptive to solar, wind and micro-hydro power and promoting community-based planning for lower-carbon lifestyles, support for local movements protecting land, forests and smallholder agriculture, promotion of public debate and exchange on climate change. Phasing out of subsidies for fossil fuel exploration, extraction, refining, transport and use is another structural shift that can be made through collective decision-making.³¹

III A look at post-2012 alternatives

The Bali Action Plan³² adopted in 2007 aimed at reaching an “agreed outcome” on long-term cooperative action on climate change and concluding negotiations on the post-2012 period in Copenhagen in 2009. However, the conference in Copenhagen failed to deliver a legally binding

30. For project-based evidence that exclusion of the poor is a significant factor for which regulatory measures may be required to ensure equitable access to markets, see Grieg-Gran, Porrás and Wunder, “How Can Market Mechanisms for Forest Environmental Sciences Help the Poor? Preliminary lessons from Latin America”, 33(9) *World Development* 1511-1527 (2005).

31. Point Carbon, “Sweden Aims to Ban Fossil Fuel Subsidies”, 19 June 2006; *Swedish Parliamentary Committee Calls for EU Ban on Fossil Fuel*, 2 June 2006, available at <<http://www.pointcarbon.com>>. See, generally, Norman Myers *et al.*, *Perverse Subsidies: Tax Dollars Undercutting Our Economies and Environments Alike* (International Institute for Sustainable Development, Winnipeg, 1998); see *infra* note 42.

32. The Bali Action Plan contemplates two negotiating tracks: (i) The Ad-hoc Working Group on Further Commitments for Annex 1 Parties under the Kyoto Protocol (AWG-KP) focused on further commitments for the 37 developed countries already bearing reduction commitments under the Kyoto Protocol. This track, which would lead to a second commitment period under the Kyoto Protocol, is not favoured by the developed countries which want the developing countries also to take up responsibility; (ii) The Ad-hoc Working Group on Long-Term Co-operative Action (AWG-LCA) is the negotiating track under the UNFCCC which opens possibilities to renegotiate some issues in the Kyoto Protocol. It would also be possible to include new parties such as the United States or China, and let them agree with a binding reduction commitment.

framework for GHG emission reductions in the post-2012 period. The Copenhagen Accord³³ installed something akin to a second commitment period, running from 2013 to 2020. Though it acknowledged the need to combat climate change through collective action and was signed by the United States, China, India, Brazil, South Africa, and many other major parties, it was never formally adopted by consensus. The lack of trust amongst developing countries that industrialized countries will honour their commitments or take the lead in the new climate agreement has even been characterized as the 'post-Kyoto stress disorder.'³⁴ A range of form options exists for a new legal instrument in the post-2012 period and the choice between them will likely be dictated by political and strategic considerations of States.³⁵

Many proposals for a post-2012 regime, addressing GHG mitigation and adaptation to climate change have been made in academic and policy literature. Most of them may be divided into two basic groups, *i.e.* non-target based approaches and quantified emission reduction targets with emission trading (based on the Kyoto Protocol architecture). Non-target based approaches include technology development and transfer, sectoral agreements, policy based approaches,³⁶ equity and development, or financial measures. Sectoral agreements refer to a method for encouraging reductions in emissions in internationally competitive sectors such as steel, cement and electricity by encouraging deployment of low carbon technologies in these sectors in all countries. This would move the international process towards a level playing field for carbon.

The question whether demand would exist for CERs under the CDM after 2012 depends on whether a binding emissions reduction target-based global agreement is reached by 2012. If it is, then the developed country parties 34 commit themselves to binding emission

33. Copenhagen Accord, Dec. 18, 2009, FCCC/CP/2009/L.7, available at <<http://unfccc.int/resource/docs/2009/cop15/eng/107.pdf>>.

34. L. Rajamani, "Addressing the 'Post-Kyoto' Stress Disorder", 58(4) *ICLQ*, 803 (Oct., 2009).

35. For a detailed analysis of different legal options that States may explore, see Rajamani, *ibid*. She argues that the level of ambition is closely linked with the legal form chosen, which follows function.

36. For instance, the Climate Change Levy imposed on all industrial and public sector users, under s. 30 of the UK Finance Act, 2000, is a tax upon energy usage and is, therefore, levied upon users, as opposed to a carbon tax, which would be levied on the supply of fuel.

reduction targets and it is highly likely that it will take over the CDM mechanism or leave it to exist in the Kyoto Protocol, linking the one with the other. But a more realistic scenario suggests that no binding emission reduction targets may be agreed upon internationally. This translates, in principle, to a zero demand for offset credits and the CERs produced after December, 2012 would not have any or little value. But as the Copenhagen Accord recognizes the scientific view that global increases in temperature should be kept below 2°C to 'prevent dangerous anthropogenic interference with the climate system,' there is (at least) political pressure to comply with their pledges, potentially leading to a demand for offset credits. On the other hand, and of far more significance is the states' power to unilaterally bind themselves to emission reduction targets which is likely to give current and future investors a kind of legal certainty. For instance, in the EU, both the Revised Emission Trading Directive³⁷ and the Decision on Effort Sharing setting reduction standards for the non-EU ETS sector to reduce any negative impact on the EU's competitiveness,³⁸ presuppose the existence of CDM and JI projects and CERs and ERUs after 2012.

It may be appropriate to note that current emissions goals (and future goals, if a "Kyoto-style" target-based approach is adopted) are largely based on climate sensitivity predictions. Climate sensitivity is the key technical variable describing sensitivity of temperature to increased GHG levels. According to the IPCC, the most probable range for climate sensitivity has remained between 2.2 degree Celsius and 4.5 degree Celsius of warming³⁹- even very high outcomes like 7 and 10 degrees have not

37. Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community, *Official Journal of the European Union* L140/63, available at <<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0063:0087:en:PDF>>.

38. Decision No. 406/2009/EC of the European Parliament and of the Council of 23 Apr. 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020, *Official Journal of the European Union* L140/136, available at <<http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0136:0148:EN:PDF>>.

39. Intergovernmental Panel on Climate Change, *Climate Change 2007: Synthesis Report, Summary for Policymakers 20* (2007), available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

been ruled out.⁴⁰ This is important to the layman who asks himself: How hot will it get? Will we bake and flood the planet beyond repair or will we just have hotter summers? It is even more important to the policy maker because given such uncertainty emission-cap agreements are dangerous. It has taken quite a bit of political will and capital to lock governments of the world into the Kyoto goal of emissions below 1990 levels by 2012. But even in a perfectly planned post-2012 alternative, we do not know if the contemplated emission-cap would ultimately lead to a dangerous temperature increase of 2.5 degree Celsius or an apocalyptic 7 degree Celsius. So uncertain climate sensitivity could make unworkable a treaty made after years of diplomacy, negotiation and behavioral change. This means that in contrast to the traditional accord to reduce carbon emissions by a certain amount by a specific date, politicians have to be more open to uncertainty in rise of CO₂ levels and, consequently, there must be sufficient flexibility in any post-2012 alternative to allow goals to be adjusted, upwards or downwards, as new scientific evidence becomes available.

Functionalist logic also suggests that treaty generated legal commitments (which may emanate from hard law or soft law instruments) and principled expectations (which are created by seriously negotiated international instruments of operational significance but based on ethical considerations rather than strictly legal ones) are likely to be better received than and even equally effective as treaty obligations.⁴¹

IV Conclusion

The carbon market has been a prominent part of the response to climate change. Unfortunately, the incentives created by the market mechanism envisaged in the CDM have produced strategic behavior that has eroded the ability of the CDM to work as an effective tool for meeting the goals of the Convention. If the attainment of sustainable development is to be more than an aspirational goal and if the CDM is to continue being a tool under a subsequent commitment period of the

40. Gerard S. Roe & Marcia B. Baker, "Why is Climate Sensitivity So Unpredictable?", 318 *Science* 629 (2007); see also James Hansen *et al.*, "Target Atmospheric CO₂: Where Should Humanity Aim?" 2 *Open Atmospheric Sci. J.* 217-31 (2008), available at [http://www.bentham-open.org/pages/content.php? TOASCJ/2008/00000002/00000001/217TOASCJ.SGM](http://www.bentham-open.org/pages/content.php?TOASCJ/2008/00000002/00000001/217TOASCJ.SGM)

41. *Supra* note 34 at 810.



Kyoto Protocol, or until a new agreement is negotiated, an understanding of whether, and if yes, how the CDM can be improved to function effectively is necessary.

The climate crisis, however, requires the fastest technology, the most radical cuts and the most sustainable and environmentally desirable results. Focusing all attention on emissions reductions comes at the expense of the creation of innovative, new technology that prevents future emissions and advances sustainable development. Hence, emissions' trading can only be a temporary measure as non-carbon based fuels will initially fail to be efficient in comparison to fossil fuels as the former technology would be deprived of economies of scale, synergies and political and cultural entrenchment which technology based on fossil fuels enjoys. Petrol-fuelled cars, coal-fired electricity generation, and oil-based air travel are all sunset technologies that must be phased out soon.⁴² Thus, it must be recognized that continuance of emissions trading runs the very real risk of encouraging fossil-fuel dependence and delaying progress in dealing with global warming.

42. It is unfortunate that the World Bank has rejected the recommendation of its own Extractive Industries Review which calls for the phasing out of World Bank financing for coal, oil and gas extraction. See World Bank Group Management Response, *Striking a Better Balance: The World Bank Group and Extractive Industries: The Final Report of the Extractive Industries Review* 41 (Sept. 17, 2004) <<http://siteresources.worldbank.org/INTOGMC/Resources/finaleirmanagementresponse.pdf>> last accessed on 28.02.2011. There appears to be no change in its position today. See "The World Bank Group in Extractives Industries - 2010" *Annual Review* (January, 2011), available at <http://www.bicusa.org/en/Article.12330.aspx>