A Southern Critique of the Globalist Assumptions About Technology Transfer in Climate Change Treaty Negotiations

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This article critically evaluates the process of technology transfer from developed to developing countries. It considers market-based policies contained in the United Nations Framework Convention on Climate Change, which are proposed as tools to promote the transfer of technologies that can abate greenhouse gas emissions contributing to climate change. It uses the case of India to exemplify the conditions that exist and issues that arise in a rapidly developing country that is a recipient of such investments. It contests the claim that such market-based strategies embodied in the present climate policy framework can facilitate the transfer of technologies that offer ecologically sustainable and socially equitable solutions for developing countries.

Keywords: *Kyoto Protocol, climate change, technology transfer, developed, developing, sustainability, equity*

The roots of the problem of climate change lie in the anthropogenic emissions of greenhouse gases (GHGs) due to the increasing use of fossil fuels. In the present "economic growth" paradigm, our rate of use of fossil fuels and the consequent rate of GHG emissions are much higher than the rate at which the environment can assimilate these wastes. GHGs typically have very long atmospheric lifetimes, and their effects are evident even centuries later (Intergovernmental Panel on Climate Change [IPCC], 1990). Because atmospheric GHG concentrations have shown an increasing trend for an extended period, some degree of climate change is already evident in terms of global temperature increases, rise in sea level, glacier retreats, and other impacts (IPCC, 2001).

The global policy initiative to address climate change is the Kyoto Protocol adopted at the third conference of parties to the United Nations Framework Convention on Climate Change (UNFCCC) in December 1997. The Kyoto Protocol calls for developed countries to reduce their GHG emissions by at least 5% below 1990 levels in the commitment period from 2008 to 2012. The developing countries have no such obligations as of now because their emission levels are very low and their historic emissions have not been responsible for the problem (United Nations, 1997).

Technology Transfer in Global Climate Change Policy

To make the GHG abatement process easier for developed nations, the Kyoto Protocol provides for three market-based mechanisms (or flexible mechanisms), namely, joint implementation, the clean development mechanism (CDM), and emissions trading. Joint implementation refers to projects that can be undertaken between developed countries to reduce GHG emissions. The CDM refers to project-based investments that developed countries can make in developing countries to reduce GHG emissions there and thus earn emission credits to apply toward their own emissions reduction obligations. Emissions trading is the mechanism by which a developed country may trade excess emission credits with another country having less of them (United Nations, 1997). It is

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under the CDM that developed nations are envisioned to transfer energy-efficient and environmentally friendly technologies to developing nations (IPCC, 2000). This supposedly would provide a cheaper means of achieving environmental compliance to developed countries whereas providing for economic development based on cleaner technology in developing nations.

Article 4.5 of the UNFCCC states that developed country parties and other developed parties shall "take all practicable steps to promote, facilitate, and finance, as appropriate, the transfer of or access to, environmentally sound technologies and know-how to other Parties, particularly developing country Parties to enable them to implement the provisions of the convention" (United Nations, 1992). The IPCC (2000), the global body of expert advisors to the UNFCCC, defined technology transfer as "a broad set of processes covering the flows of know-how, experience, and equipment for mitigating and adapting to climate change amongst different stakeholders such as governments, private sector enterprises, financial institutions, NGOs [nongovernmental organizations], and research/education institutions" (p. 15).

Technology transfer under the climate change policy framework is thus a multiple stakeholder process and likely to be affected by and have impacts on economic, social, cultural, institutional, and political factors, particularly in developing nations that are recipients of the new technologies (Saad, 2000). Private sector enterprises, especially multinational corporations (MNCs), will play an important role in this process. According to the IPCC, the most common method of technology transfer to developing countries appears to be through private sector investment, which has been on the increase especially for countries in East and South East Asia and Latin America (IPCC, 2000). Investments made by MNCs in developing nations are more often than not megadevelopment projects eventually contributing toward the growth of the urban industrial complex. This often gives rise to inequality and social stratification (Ayupan & Oliveros, 1994; Bazin, 1986; Onimode, 1988; Rajeswar, 2001). It would therefore be important to explore how environmental stewardship in conjunction with sustainability and equity might be advanced or impeded under a climate policy framework that calls for investment projects by developed countries in developing regions.

The Case of India

India is a typical example of a rapidly developing nation, with an economic growth rate of about 6.6% during the 1990s and a corresponding energy use growth rate of about 7% during the same period. More than half of the primary energy consumption is based on high-ash coal, and a majority of the power plants are coal fired. The industrial sector accounts for approximately 40% of the energy consumption and is responsible for about 67% of GHG emissions. The introduction of relatively more energy-efficient technologies has resulted in a gradual decoupling of energy use and economic growth, but on the whole, GHG emissions have rapidly increased by about 63% over the past decade. The per capita emissions, however, are only about a quarter of the world average and one twentieth of the U.S. rate (Shukla, 2002). This is largely because a majority of the population presently lacks access to reliable energy supplies. However, with increasing economic growth, the spread of the power grid, and rapid changes in lifestyle, energy-related GHG emissions are expected to increase almost threefold by 2020 under a business-as-usual scenario according to the findings of the Asia Least-Cost Greenhouse Gas Abatement Strategy project (Asian Development Bank, Global Environment Fund, & United Nations Development Program, 1998).

India's contribution to climate change is relatively small, but the country is highly vulnerable to its effects. This is because much of the country's economy is tied to its natural resource base, with a majority of the population living in rural areas. In addition, rapid industrialization and the spread of the urban industrial complex have caused unequal development. The infringement of the urban industrial complex on rural areas and rapid sprawl have greatly hampered traditional modes of sustenance, alienated traditional knowledge systems, caused large-scale rural urban migration, and affected associated environmental and social conflicts (Gadgil & Guha, 1992). Added to these already existing problems, climate change is expected to have significant impacts on water resources, forests, and agriculture. India's low-lying coastline is especially vulnerable—it is predicted that a 1-meter rise in sea level is likely to affect 5,763 square kilometers, effectively putting 7.1 million people at risk (Asthana, as cited in MOEF, 2002a).

Positions of the Indian Government and Industry

The government of India is keen to take advantage of the economic opportunity that manifests itself in technology transfer under the climate change policy framework, especially the CDM. In a press release issued just before accession to the Kyoto Protocol in August 2002, the government stated that it expects techno-economic benefits from the transfer of technology and foreign investments in renewable energy, energy generation, energy efficiency, and afforestation projects to help meet the nation's sustainable development priorities (MOEF, 2002b). These priorities mainly lie in further economic growth accompanied by improved human well-being in terms of alleviation of poverty and health, sanitation, education, and employment (MOEF, 2002c).

The Delhi Ministerial Declaration after the eighth session of the conference of parties to the Kyoto Protocol in October 2002 clearly puts forth economic development and access to energy-efficient technology as the primary advantage of CDM investments (United Nations, 2002). The energy and industrial sectors are therefore the primary targets for investment because this is where a significant potential exists for emissions reductions in India. MNCs, which have been the significant contributors to India's economic growth especially after economic liberalization, are likely to play a key role in this process of technology transfer.

The *Draft Climate Change Project Development Handbook* of the Confederation of Indian Industry (CII) has identified a GHG mitigation potential of about 61,000 MW in the energy-generation sector, of which about 35,000 MW have been identified within the realm of renewable energy. However, the book also states that only a very small portion of the renewable energy potential is likely to be realized in the near future. The full potential, although technically feasible and capable of reducing carbon emissions by about 60 million metric tons annually, will only be implemented over a period of several decades and will act to augment existing capacity rather than replace it (Hagler Bailly Services, 1999). The GHG emissions reduction projects feasible in the near future therefore typically lie within the realm of traditional fossil fuel technologies.

The Ministry of Non-Conventional Energy Sources (MNES) also estimates a renewable energy potential of about 45,000 MW from wind power alone, although at present only about 3,700 MW of the grid capacity are supplied by renewable energy. The government has recently endorsed six renewable energy projects under the CDM with the assistance of the Netherlands, but they are small in scale and account for about 90 MW of grid capacity (MOEF, 2002c). The aim of the government, however, is to achieve a 10% share of renewable energy in India's power-generation capacity by 2012 (MNES, 2002).

Sustainability and Equity in the Context of India

Sustainable development as interpreted by the decision makers and investors in the present context of globalization thus appears synonymous with sustainable economic growth along with some measures taken toward environmental stewardship, mostly end-of-the-pipe solutions. This attitude is not particular to India but is one that is endorsed by most nations. This is the main reason global GHG emissions have not been arrested despite our being clearly aware of the threat for decades.

When it comes to India, we have a rapidly developing country that had a late start in the development process due to British colonial rule in the past. This country's priority therefore clearly lies in catching up with the developed countries. This is becoming very evident in the urban complexes where lifestyles of individuals have gradually begun to resemble those of their counterparts in developed nations. The majority of the population in rural areas is still far from this transition (Reddy & Goldemberg, 1990). In this kind of unequal development, principles of sustainability and equity tend to be compromised.

Sustainability

Solutions to reducing GHG emissions by means of technology transfer under the climate change policy framework are thus sought within the fossil fuel regime with relatively little investment in renewable energy or other more sustainable options identified for the near term. This is because most people in India and in other developing countries do not have access to reliable energy services. This has created pressure to increase energy supplies to those who lack them and is traditionally interpreted as increasing consumption of commercial energy (Reddy & Goldemberg, 1990). Most of the investments identified are thus for increased efficiency, technology upgrades, or substitu-

tion of a greater carbon-intensive fuel source with a less carbon-intensive one. The CII has identified mitigation opportunities in coal washing to reduce ash content of coal, fuel switching from coal to liquefied natural gas in power plants, and installation of integrated gasification combined cycle (IGCC) coal combustion power plants—all within the fossil fuel framework. According to the CII, these opportunities would help the nation deal with the power supply shortages and meet the projected energy requirement of more than 110,000 MW of new capacity by 2010 (Hagler Bailly Services, 1999). Renewable energy options identified are only for the much longer term. The fossil fuel options are, however, basically short-term solutions that will lead to expansion of the electricity grid, spur economic growth, and further promote consumerist culture, which eventually means more GHG emissions from the country in the long run. The CII has also stated that despite investments in clean technology, there is unlikely to be a decrease in overall emissions in the near future. What is more likely to be achieved is a reduction in carbon intensity (Hagler Bailly Services, 1999).

Very few believe that under the current climate policy framework there could be a significant decrease in India's dependence on coal and thus a decrease in carbon emissions. Environmentalists have expressed concern about clean-coal technologies locking in a fossil fuel–based economy. There are increasing doubts about the possibility of meeting the Indian government's target of a 10% share of renewable energy in the country's energy mix by 2012. Industrialists are apprehensive about the bureaucracy involved in negotiating CDM projects, which could prove a barrier to their implementation. They have also expressed concern that the withdrawal of the United States from the Kyoto Protocol has brought down the price of carbon credits significantly, thus making CDM investments less financially lucrative. This situation has made it seem unlikely that technology transfer under the CDM program could finance a move toward cleaner energy in India, and coal is expected to continue to dominate the energy scene in the country (Whitehouse, 2003).

There is also concern that short-term projects aimed specifically at GHG emissions reduction that do not simultaneously strive to address social concerns could have very limited, project-specific impacts (Srivastava & Srikanth, 1999). This means that technology transfer bringing short-term impacts would be unable to simultaneously address deeper developmental issues in India. Such mitigation options as clean coal and fuel switching are unlikely to address issues of inequality in the distribution of social benefits of energy increases.

The developed countries, on the other hand, stand to gain from market-based mechanisms because they make the abatement of GHG emissions easier and cheaper for them (Agarwal & Narain, 1999). The option to invest in the transfer of energy-efficient technologies to developing countries like India is definitely more lucrative than any domestic investment. This way they can earn credits for abatement measures taken here while avoiding action at home (Agarwal & Narain, 1999). This could also, however, mean no net reduction in emissions if the effect of emissions abatement in developing countries is nullified by increasing emissions at home.

Equity

The developing countries are typically "dual societies" basically composed of "small islands of affluence in vast oceans of poverty" (Reddy & Goldemberg, 1990, p. 111). Lifestyles of the elites closely resemble their western counterparts in terms of energy use, whereas the poor struggle to find sufficient energy for basic survival (Reddy & Goldemberg, 1990). In such a situation, directing technology-transfer projects largely toward the further development of the industrial and power sectors would only exacerbate this dualism in developing societies.

The struggle to meet basic needs is sharply contrasted with increasing pressure from the developed nations, especially the United States (even though it has now pulled out of the Kyoto Protocol), who made their ratification conditional to establishment of binding emissions reduction commitments for developing nations, especially for rapidly growing countries such as India and China. For India, this would mean that it would be forced to "protect the global ecosystem at the cost of urgent national developmental tasks" (Reddy & Goldemberg, 1990, p. 116). This has therefore become a battle of "survival emissions" of the developing nations versus "luxury emissions" of the developed nations (Agarwal & Narain, 1995, p. 151).

At the same time, the United States finances substantial investments in carbon-intensive activities in developing countries. According to Baumert and Kete (2001), the U.S.-based Overseas Private Investment Corporation (OPIC) and Export-Import Bank of the U.S. (Ex-Im) made available loans and guarantees equal to U.S.$7.7 billion in energy-intensive sectors in

India and China between 1994 and 2001, with little or no investment in renewable energy technologies. On the other hand, the United States basically pulled out of the Kyoto Protocol because India and China do not have binding emissions reduction commitments. This inconsistency in policy toward India and China begs the question of the national aims of the United States.

The issue of equity also arises because cheaper projects are likely to be developed by foreign investors first. This means that once cheaper investment options in developing nations are exhausted, the developed countries are more likely to prefer investing at home (Agarwal & Narain, 1999). In this situation, India, which is bound to have responsibility for GHG emissions reduction in the future, will be left with the more expensive options. The CII has clearly stated that renewable energy projects are unlikely to make a big contribution in the near future and will only be realized over a period of decades due to economic considerations (Hagler Bailly Services, 1999). This means that India will likely be responsible for investments in the more expensive renewable energy projects in the future because cheaper options will be exhausted by then.

Foreign investments that do occur also are likely to be more in accordance with the circumstances of the investing country, and developmental needs of the recipient are more likely to be ignored (Byrne et al., 2000). Such projects will only act to further promote western-style consumerist culture, and associated issues will only magnify. This has been the experience with many MNC investments in the country in the past, leading to various conflicts between stakeholders, and therefore gives rise to skepticism about such investments under the climate policy framework that basically have the same agenda of promoting economic growth but with an environmental component.

Investment projects are also more likely to go to the relatively more advanced economies such as India and China rather than to the nations that are in much greater need of socioeconomic betterment, for instance those of South Africa (Agarwal & Narain, 1999). IPCC publications have shown that official development assistance as well as private sector investment have been biased toward the rapidly developing countries in South and East Asia, with very little investment in South Africa. It is only the NGOs that have invested more equitably, but their funds are very limited (IPCC, 2000).

The Role of the United States

The required reduction in emissions to stabilize GHG concentrations in the atmosphere according to the IPCC is 60% below 1990 levels (IPCC, 1990). The Kyoto Protocol, however, calls for a reduction of only 5% below 1990 levels. Economists have offered different emissions reduction targets on the basis of cost-benefit analyses. Nordhaus (1991) has calculated a required GHG emissions reduction of 11% below 1990 levels as appropriate. However, a reduction of either 5% or 11% in the face of the required 60% is grossly unsustainable, especially when GHG emissions from developed countries have constantly been on the increase, and they are nowhere near meeting their Kyoto targets.

The United States is the largest contributor, at 25% of total global emissions, and is expected to add 300 million tons of carbon by 2010. It is expected to remain the world's largest contributor to carbon emissions for years to come both on an annual and on a historical basis. At the same time, the U.S.-based OPIC and Ex-Im have long supported projects in the energy-intensive sectors in developing countries. Renewable energy investment by these entities in developing countries has been small. Thus, the United States not only has significant fossil fuel–based GHG emissions of its own but also contributes to GHG emissions increases in developing countries without providing any strong incentives for sustainable energy options (Baumert & Kete, 2001).

The U.S. Agency for International Development (USAID), an independent federal government body, has been a significant contributor to many of India's development-related projects for nearly 50 years. Lately, it has been involved in energy, environment, and GHG abatement-related projects in India with an aim to promote sustainable development (see http://www.usaid.gov/in/aboutusaid/about.htm). The reason for USAID's involvement in developing countries is an expected stream of economic and political benefits. It expects to foster development and reduce poverty in poor nations and in turn to create a market for U.S. goods and services (USAID, 1997). The *U.S.-India Cooperation on Global Climate Change: A Compendium of Activities* (USAID, 2002) lists a number of cooperative projects for GHG mitigation in energy, urban environment, transportation, and forestry sectors and for adaptation to climate change. Other fed-

eral institutions such as the U.S. Department of Energy and the U.S. Environmental Protection Agency also support many projects listed in this document (USAID, 2002).

The CII has identified a number of potential U.S. investors in India, such as the International Climate Change Project Fund (a cooperative venture between the U.S. Energy Association and the International Utility Efficiency Partnerships Inc.), International Utility Efficiency Partnerships (funded by the Edison Electric Institute of the United States), and the Oregon Climate Trust, to name a few, that will finance energy-efficiency projects for GHG emissions mitigation (CII, 2002). It has been claimed that the U.S. and Indian climate change policies have two things in common: "Neither wants to commit themselves to caps on GHG emissions and both have domestic lobbies keen to secure continued business for their large coal industries" (Whitehouse, 2003). USAID has already funded a pilot phase IGCC plant near Delhi, basically a clean-coal technology that environmentalists believe would simply increase dependence on coal (Whitehouse, 2003).

The participation of the United States in GHG abatement projects in developing countries raises important issues about the role of the United States under the climate policy framework. The question arises regarding whether U.S. investors would be entitled to emissions reduction credits for these projects when the United States is at present out of the Kyoto Protocol. These investors will be unable to use these credits unless the United States ratifies the protocol but could bank them for future use when the United States decides to comply. This means that they would benefit tremendously by means of having taken advantage of cheap emissions reduction opportunities during the early stages of the protocol's implementation even though their country was not a signatory then. The cost of GHG emissions reduction by means of domestic action for the United States could mean an investment of about U.S.$125 per ton of carbon, whereas the same amount of emissions reduction undertaken in a developing country would cost about U.S.$14 to U.S.$20 per ton of carbon, with the cheapest options lying in energy-efficiency improvements within the fossil fuel economy (Agarwal & Narain, 1999).

Global Implications

Although this article considers the case of India, some aspects may not differ greatly for technology transfer projects that occur between developed and developing countries for the abatement of climate change. The primary aim of the developing nations struggling to meet the basic needs of their citizens today will likely be "catching up" with the developed nations in terms of lifestyles and standards of living. This they hope to achieve by means of attracting greater and greater foreign investments, in the process compromising traditional knowledge systems and traditional livelihoods. At the same time, technology transfers from developed nations do little to address their own emissions or to encourage the development and dissemination of environmentally sound technology that is also sustainable and equitable.

Thus, it is possible that sustainability and equity may be compromised globally with investments made in the quickest and easiest emissions reduction options. Such efforts are likely to yield only temporary solutions that encourage further economic growth so that global emissions will, perhaps more slowly, stabilize at a level much higher than that required for environmental sustainability. The IPCC (1996) has already noted in its second assessment report that short-term measures such as energy efficiency/conservation are only likely to achieve half the required emissions reduction for climate stability.

This thus represents an attempt to manage the atmospheric commons on the part of humans for the sake of continued economic development. The atmosphere is basically treated as a commodity that can be traded between nations for the sake of sustained economic growth. Clearly, "economic effectiveness" gains the upper hand over "ecological effectiveness" and "social equity" (Agarwal & Narain, 1999; Byrne & Glover, 2000; Byrne, Wang, Lee, & Kim, 1998).

A Solution Beyond Kyoto

Given the above circumstances, it seems unlikely that the Kyoto Protocol in its present form will achieve significant reductions in GHG emissions, below 1990 levels. Reductions that might occur during the first commitment period from 2008 to 2012 will likely be too small to make an impact. Moreover, unresolved equity issues are only likely to continue to create conflicts during global negotiations.

Some scholars have therefore proposed modifications that are relatively more sustainable and equitable. The most prominent one among these is the allocation of emissions on a per capita basis rather than on a national basis (Agarwal & Narain, 1999; Byrne et al.,

1998). This more accurately reflects an individual's access to the earth's GHG-emitting resources or an individual's share of atmospheric space. On this basis, the per capita emissions for India were about 0.3 tC, whereas those of the world's biggest emitter, the United States, were 5.37 tC in 1996 (Agarwal & Narain, 1999). Byrne et al. (1998) have developed a sustainable per capita emissions allocation goal based on stabilization of global GHG emissions at approximately 60% below 1990 levels as suggested by the IPCC, which works out to 3.3 tons of carbon dioxide equivalent (tCO_2e). This would serve as a per capita global target toward achieving atmospheric stabilization. Most of the developed nations have per capita emissions much above this level, whereas those of most of the developing nations, including India, are much below this level (Byrne et al., 1998).

Under the present climate policy framework, it will however prove difficult to achieve stabilization of global CO_2 emissions at the proposed environmentally sustainable level of 3.3 tons CO_2 per capita. While emissions from the developed countries will likely increase (especially as a result of the U.S. withdrawal from the Kyoto Protocol), emissions from rapidly developing countries such as India will also possibly cross this level given that India and China together are expected to add about 570 million tons of carbon to the atmosphere by 2010 (Baumert & Kete, 2001). As long as the basis of the world economy rests on fossil fuels, emissions of GHGs from primary energy supply are likely to continue to increase even though increasing degree of end use energy efficiency is achieved. Emissions from a majority of developed nations are therefore on the increase even though they have achieved high degrees of end use efficiencies (Grubler & Nakicenovic, 1996; Nakicenovic, 1996). Transfer of such technologies to developing nations would therefore also result in an overall increase in emissions as they bring about lifestyle changes and increased demand for resources.

In this regard, there is a need to look beyond the present framework that eliminates solutions based entirely on a fossil fuel economy. The Kyoto Protocol is unlikely to achieve its objective of climate change mitigation unless it also includes in its mandate a transition to noncarbon energy sources. Otherwise, countries such as India and China with large coal reserves and growing economic needs would build more coal-based power plants, and any amount of efficiency improvements would be unable to prevent a further growth in GHG emissions (Agarwal & Narain, 1999). This would only give rise to the same type of development in the developing nations as exists in the developed countries. This kind of a globalist agenda would also result in the homogenization of culturally diverse societies in developing nations, creating more social conflicts in addition to increasing GHG emissions. According to Reddy and Goldemberg (1990), it is the energy services that are important for people's needs and not the energy itself, and the true indicator of development is really the extent of access to energy services.

Equal importance must therefore be given to investments in renewable energy projects between developed and developing nations, keeping in mind that such projects must address issues of livelihoods and access to reliable energy services. For India, it becomes important that technology transfer under the climate change policy framework address a significant proportion of renewable energy investments because they are unlikely to be achieved, although the potential is huge. India has a distinct advantage in that it already has a well-established base for the further development of renewable energy. It presently has one of the largest renewable programs in the world, is one of the five leading nations in wind power production, and has the world's largest deployment of solar systems (MOEF, 2002c). This would prove to be an ideal solution to providing reliable energy services and livelihood opportunities to its vast rural population.

Technology transfer that occurs in India under the climate policy framework should be a balanced mix of energy-efficiency/conservation/fuel-switching investments for existing infrastructure and renewable energy technologies for providing energy services to those who presently lack them. This would preclude the necessity to build new fossil fuel–based power plants and spread the power grid to meet energy demand. Such an initiative would be an effective tool in steering the country away from the emissions-intensive path of growth while providing for its developmental needs.

Conclusion

Technology transfer between developed and developing countries under the present framework of the Kyoto Protocol is unlikely to achieve the required reductions in GHG emissions for the stabilization of the climate system as long as the current ideology of sustained economic growth based on fossil fuels persists. In the case of India, neither foreign investors nor the country's own decision makers seem to be taking a

proactive stance and influencing decisions that would provide economic, environmental, and social benefits in the long term. Technology transfer under the climate change policy framework is mainly viewed as a quick opportunity for financial gain.

This attitude is likely to result in a compromise of the principles of sustainability and equity, leading to increasing environmental degradation and continued conflicts between rich and poor. The present framework fails to take into account the differences that exist between developed and developing nations. Investments made in developing countries under the market-based mechanisms of the Kyoto Protocol will only aid in firmly embedding these nations in the traditional developmental pattern. This kind of globalization based largely on a fossil fuel economy would make continued increases in GHG emissions inevitable.

To make the process of climate change mitigation ecologically sustainable and socially equitable, the Kyoto Protocol should mandate investments in renewable energy technologies in developed and developing countries that could meet energy needs without a sustained growth of the fossil fuel energy system. Such decentralized energy systems could be an ideal solution for the vast rural population of developing countries such as India that presently lack access to energy services. This would also contribute to poverty alleviation and associated issues by providing livelihood opportunities. This kind of a climate policy framework would promise to be more effective in addressing the developmental issues that India currently faces than the current market-based policies seeking to transfer "better" fossil fuel–based technologies.

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