

Khalilian, Setareh et al.

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Climate change and economic development

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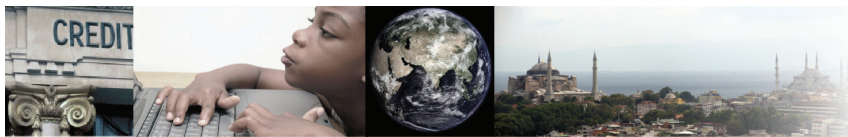
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The Global Environment

Climate Change and Economic Development

The Challenges

Climate change poses the serious challenge of carbon dioxide emission reduction. Emission control by developing countries is becoming a key for effective mitigation of climate change, as those countries now account for more than a half of global emissions and are still expanding their energy infrastructure.

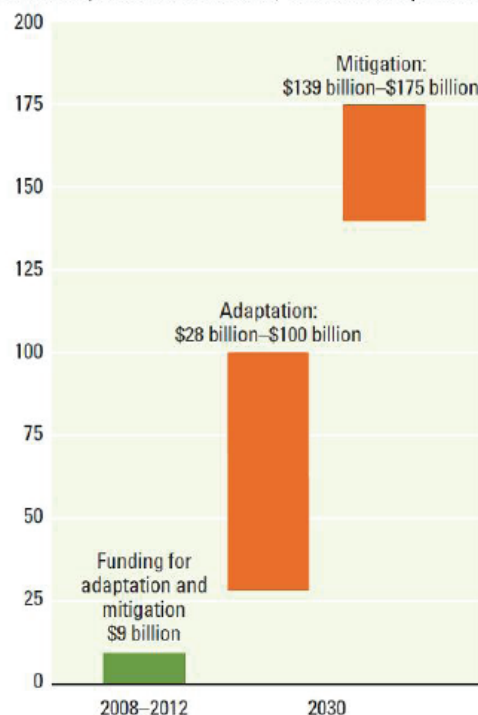


Substantial emission reduction in developing countries would require strong policy commitments and subsequent investments in a green economy. Some highly efficient, emission-saving production technologies could already be implemented without technical complexities. The challenge is therefore how to bring these technologies to countries that do not have the financial means to invest in them.

The successful implementation could generate a “triple dividend,” that is, energy saving, emission reduction and job creation. In this sense climate change can be seen as a chance for economic development in these countries. Meanwhile, climate experts indicate that the damages of climate change will fall disproportionately on developing countries and particularly on the poor, which are the most vulnerable and least able to adapt. Those damages could inhibit economic development. The World Bank estimates that developing countries will need US\$145–US\$175 billion for mitigation and US\$30–US\$100 billion for adaptation annually by the year 2030. However, the amount of international funding is currently US\$9 billion for both measures combined.

There are two areas in which we need international solutions. The first is how to promote implementation of efficient technologies in developing countries. The second one is how to finance the adaptation to climate change in developing countries. The first part can be solved not only on the political level, but to a high degree on a business level, particularly by multinational firms. How can we encourage the business sector in implementation of efficient technologies? What will be effective ways of public-private partnerships to achieve the goal? In order to solve the second part, there is a need for intensified communication between politics and development partners. How can we guarantee such communication given the multiplicity of institutions involving development assistance, which include bilateral aid organizations as well as multilateral ones such as UN institutions? Also, how should we

Annual incremental climate costs (2°C stabilization case) estimated by the World Bank (Source: World Bank, World Development Report 2010)





set priorities in the distribution of funds (e.g., finding a balance between financial support of climate change adaptation and conventional development aid, streamlining funding bodies for climate change adaptation and for other types of development assistance)? Meanwhile, should governments also establish new mechanisms to raise such funds, such as the allocation of revenues from auctioning emission permits and the introduction of a new global tax (e.g., a Tobin tax)?

Proposed Solutions

Setareh Khalilian

Kiel Institute for the World Economy

Linda Kleemann

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1. Urge multinationals to use clean technologies in all their worldwide business operations.

This could be done for example by WTO regulations urging multinationals to use the technology standards of their home country in all their international production sites and all daughter companies—thereby avoiding the transfer of environmentally damaging production to developing countries. Alternatively companies could be given emission credits for the transfer of clean technologies to developing countries, if a global emission cap and trade system could be set up.

2. Further the Kyoto Protocol mechanisms of CDM and JI. The Kyoto Protocol mechanisms should be developed further, but most importantly the process must be more effective than the Kyoto Protocol. The next global climate regime needs effective means of enforcement and sanctions against non-complying treaty members and against free-riders (non-members to the treaty) in the international community.

3. Bring about equitable burden sharing. A global transfer fund financed by developed countries should help developing countries acquire the technological capacities for climate change mitigation and be used as a vehicle for transfer of clean technologies from developed to developing countries. Oxfam has made a proposal on how adaptation to climate change should be funded: Nations should pay according to the amount of carbon dioxide emissions they produce per capita, coupled with their position on the human development index. On this basis, the US would supply more than 40% of the money and the European Union over 30%, with Japan, Canada, Australia and South Korea making up the balance.

4. Develop a global system of carbon pricing. This can be done through carbon taxes or through tradable permits, whereby other GHGs are converted into CO₂-equivalents. Currently, a wide variety of policy instruments are used to reduce GHG emissions: quantitative restrictions, biofuel targets, technological specifications, voluntary restraints, etc. Many of those instruments could be effectively replaced by carbon pricing systems that are compatible with each other internationally.

5. Introduce a Tobin tax/Robin Hood tax. The idea of a small 0.01% tax on all financial transactions is gaining a new wave of popularity. This tax could be used to finance mitigation and adaption on climate change, first of all in developing countries, but in the long run also world-wide.



6. Establish an international environmental organization. World governments should establish a strong international environmental organization with the power to oversee the interrelated issues of climate change mitigation and adaptation, trade liberalization, climate change induced migration, and equity issues between developed and developing countries. The organization would facilitate global cost-sharing for mitigation and adaption on climate change and would administer a global mitigation and adaption fund.

Eric Stark Maskin

Nobel Laureate; Professor, Institute for Advanced Study

Contingent climate-change treaties

We probably can not deal successfully with climate change without a strong international treaty limiting greenhouse gas emissions. But getting such a treaty is hard. One important reason is that reducing emissions is economically costly, but the costs of reduction are not publicly known. Thus, if a treaty negotiator proposes that country *A* reduce its carbon emissions by $x\%$, that country may well object—especially if it is a developing country—that to do so would be prohibitively expensive—and the negotiator would be hard pressed to prove the country wrong.

That is where a *contingent treaty* could help. Rather than specifying that developing country *A* should reduce by a specific amount, the treaty could offer country *A* a *menu* of choices, ranging from high reductions (with correspondingly high compensations, in the form of trade concessions or technology transfers) to low reductions (with low compensations). After signing the treaty, country *A* would then choose the option that best suited it. In fact, by making use of the mechanism design theory, one could design the treaty so that country *A* would choose the reduction level that it would have been assigned had reduction costs been publicly known in the first place.

Sanjit Bunker Roy

Founder, Barefoot College

The Barefoot Approach: Women Barefoot Solar Engineers of Africa

The Women Barefoot Solar Engineers of Africa aim to improve the lives of the rural poor living on less than US\$1 a day in remote inaccessible villages off the energy grids in the 21 least developed countries in Africa supplying their communities with clean, low cost, household lighting from solar energy.

Since 2005 more than 140 women from Africa, many of them grandmothers, almost all of them illiterate, have trained at the Barefoot College in India. In 6 months, these women learned how to fabricate, install and maintain solar-powered household lighting systems, and have become Barefoot Solar Engineers transforming the lives of over 2,000 families in the first self-sufficient and self-reliant, solar-electrified villages in Africa.

The Barefoot Approach has reached remote, poor, rural villages in 25 countries in Africa, Asia and Latin America. Illiterate rural mothers and grandmothers who have never left their villages before training in India have solar electrified their own villages.

A pressing need for affordable clean energy in developing countries

A rural family in Africa burns around 60 liters of kerosene a year to light their home. The average kerosene lamp in Africa spews a ton of CO₂ in less than 10 years. Solar lighting can replace kerosene and wood, and improve the health of the people and the environment.



Training illiterate & semi-literate grandmothers from Africa

The College believes the very poor have every right to control, manage and own the most sophisticated of technologies to improve their own lives. Just because they can not read and write, there is no reason that very poor women can not be water and solar engineers, designers, communicators, midwives, architects and rural social entrepreneurs.

Illiterate grandmothers have shown they are capable of fabricating, installing and maintaining solar lighting systems after six months of hands-on training, tutored by unschooled Indian women who have learned to train others in the skills they have acquired “learning by doing.”

More than 140 rural grandmothers have solar electrified 9,118 remote rural houses in 21 African countries. It is an extraordinary story because grandmothers are considered useless in rural African society and after their return they have become role models for their communities.

As a result of solar electrifying their communities, they have managed to save 30,000 liters of kerosene per month from polluting the atmosphere all over Africa.

Paper qualifications, literacy and even common language are not needed

For women who have rarely left their village, it requires undeniable courage and patience to leave their homes and families to come to India for 6 months. With time they adapt to new food, shelter and clothing.

The presence of so many nationalities creates a positive environment of cultural diversity, but initially raised concerns over language and communication. The need for expression has given birth to a unique “language” of gestures, signs and broken English cutting across all language barriers.

“Learning by doing” has long been the philosophy adopted by Barefoot College for training. Practical demonstrations, “hands-on” experience and regular repetition help trainees get familiar with terms, tools, equipments and components, used in the solar technology. With each passing day their level of hesitancy decreases and confidence and technical dexterity increases.

The program breaks a critical myth associated with solar technology and learning. It proves that “paper qualifications” are not required to become a solar engineer.

A proven model for self-sustaining community development

The Barefoot Approach was designed to demonstrate the first technically and financially self sufficient, solar electrified rural villages in Afghanistan, Bhutan and Africa.

The target constituency has been the rural poor families living on less than US\$1 per day in rural communities where the women spend hours fetching wood or kerosene, or rely on candles and flashlight batteries for lighting at very high costs. After food, the highest family expenditure is on lighting.

By training an illiterate rural grandmother to be a fully competent solar engineer there is no need for a urban, paper-qualified solar engineer and eliminates the dependency of rural communities on urban experts.

By getting the communities to pay every month for the use of the solar units (thus reaching the very poorest of the poor who can not afford to buy these systems even in installments), the financial commitment is assured for the purchase of replacement components and payment of the monthly salary of the woman solar engineer. This salary provides the incentive for the woman solar engineer to work and look after the units regularly or she will not receive her monthly salary.

Each household agrees to pay a fee between US\$5 to US\$10/month for the solar lighting, roughly what they used to spend on kerosene, candles and flashlight batteries.



A scalable solution for solar electrification across Africa

This Barefoot model for implementation of community-owned and managed systems has resulted in solar-electrification benefiting nearly 190,000 people in over 750 communities in 16 states in India and is being replicated in 24 other countries in Africa, Latin America and South Asia.

The Barefoot Approach leverages local community contribution and participation with public and private sector investment and financing. Working in partnership with the local community, the Barefoot Approach draws on a mix of resources including government and international funding agencies, private foundations, and corporate and individual sponsors to enable the appropriate investment for cost-effective and self-sustaining solutions for delivering solar power in poor, rural communities.

The Government of India is funding the air travel and training costs of the African women being trained by the Barefoot College in Tilonia.

Decentralizing and demystifying technology

Very ordinary people written off by society because they are labeled as poor, primitive and backward are doing extraordinary things that defy common expectations. What the Barefoot College has effectively demonstrated is how the combination of traditional knowledge (barefoot) and demystified modern skills can bring lasting impact and fundamental change when the tools are in the control and ownership of the rural poor.

All other initiatives providing solar-powered lighting in remote villages are implementing a top-down approach where the installation is done by a “paper-qualified” engineer coming from a city who has no idea how to work and communicate with poor communities. The experts’ belief in the technology is total. Their faith in the capacity and competence of the rural poor to fabricate, install and maintain the solar units totally absent.

The primary obstacles that are coming in the way of the demystified Barefoot Approach spreading faster all over the world is the “blinkered” mind of the paper-qualified expert and the limited vision to dream or take risks by the Literate Man and Woman in corridors of power.

It is beyond their comprehension and understanding to accept that an illiterate rural woman who has never been to school or college can be a Solar Engineer. They do not believe that sophisticated 21st century technology like solar should be or could be managed, controlled and owned by very poor rural women earning less than US\$1 a day.

It is by taking whole communities into confidence and making them take all the decisions that wastage can be minimized, urban migration reversed, pilferage and theft of solar panels in villages eliminated.

That is why a change in work style and mindset is required to provide clean, inexpensive, pollution-free light to the poor around the world.

Dato Lee Yee-Cheong

Chairman of the Governing Board, UNESCO Science, Technology and Innovation Centre for South-South Cooperation

In the GES 2010 Preview on this panel, the burden to ameliorate the adverse effects of climate change is placed on the developing world.

“Emission control by developing countries is becoming a key for effective mitigation of climate change, as those countries now account for more than a half of global emissions and are still expanding their energy infrastructure.”

I beg to differ!



The burden rests primarily on the developed world.

The world in the year 2000 (according to Professor John Holdren, then Harvard, now science advisor to US President Obama):

- World population >6.0 billion
- Rich (0.8 billion)
- Transitional (1.2 billion)
- Poor (4.0 billion)
- Criterion: GDP in US\$ per capita (PPP) (i)>16,000, (ii) 4000–16,000, (iii) <4,000 respectively

The rich have nine times the wealth, eight times the energy consumption and eight times carbon emission of the poor. According to UNDP Human Development Report 1998: 20% richest, 86% of world private consumption 20% poorest; miniscule 1.3% of world private consumption.

The developed world can not run away from the truth that the accumulation of carbon dioxide in the atmosphere has been due to their economic development through industrialization in the past century. We would admit that the developing world contributed to the process by their blood, sweat and tear; as well as depletion of their natural resources, including forests as colonies of the developed world. This includes China, India and Malaysia. It is Ironical that in emulating the development pathway of the developed world successfully, high income developing countries like China and India are now the “villains” in this climate change debate!

The developing world of poverty at dawn of 21st Century 1.3 billion people live in abject poverty, subsisting on a daily income of less than US\$1.00; 3.0 billion people have a daily income of less than US\$2.00; 800.0 million people suffer from food insecurity; 50.0 million people are HIV positive; 1.0 billion people suffer from water scarcity; and 2.0 billion people have no access to commercial energy.

World population will increase to 9.5 billion by 2050. Since the developed world's population is declining, all the increase will be in developing countries and principally in their urban centers. This will immensely aggravate the global sustainability challenge. The most critical priority for our World: Global poverty elimination, especially through job creation and wealth creation for the teeming number of aspiring youth of the developing world. Otherwise, environmental degradation, social instability, terrorism, spread of diseases etc. confront the world.

Yet the world is not all gloom and doom. There has been much betterment of the human condition in the second half of the 20th century, due largely to scientific, engineering and technological innovations in the developed world. According to Professor William Clark of Harvard:

- Life expectancy at birth up: 50→64 years
- Infant mortality down: 13%→6%
- Access to safe drinking water: <35%→65%
- Literacy rate up: <50%→70%
- GDP/cap (developing world only): US\$900→US\$2,900
- >3 billion people improve living standards

In our closely knit global economy, there is encouraging spread effects of beneficial development from the developed world to the developing world.

We must therefore get away from finger pointing and instead work together to confront the twin challenges of global poverty and climate change. For the developing world, their priority remains economic development. They need urgently to lift themselves out of poverty.



According to the UN Millennium Project Science, Technology and Innovation (STI) Task Force Report “Innovation: Applying Knowledge in Development” the two pre-requisites are:

- Basic infrastructure, i.e., roads, schools, water, sanitation, irrigation, clinics, telecommunications, energy, etc.
- Basic industries, namely small and medium enterprises (SMEs) for supply of goods and services to agricultural and mineral extraction industries as well as repair and maintenance of infrastructure.

Without the above pre-requisites, indigenous industries can not upscale, economy can not uplift and foreign direct investment (FDI) will not come. Hence, UN Millennium Project urge the developed world to invest in developing countries with necessary resources to enable the developing world achieve the Millennium Developing Goals (MDGs) by 2015. Donor aid to date has been ineffectual, subject to costly delays due to imposed conditionalities like governance, labor standards, human rights and now green technologies. Of course procurement of goods and services must also be from donor country.

Advocacy of basic infrastructure as pre-requisite for achieving the MDGs in developing countries has been my main contribution to the UN Millennium Project in general and the STI Task Force in particular. This was quite a battle, as from the nineties to the turn of this century, infrastructure was a dirty word in World Bank, other development banks and the donor community. This was due to the decades of failed massive investments in mega projects that were inappropriate for the developing world and beggared further the already debt-ridden countries. You may remember the damning World Bank report “World Report on Large Dams” that set back electric power development from a renewable source throughout the world with the exception of China. There is now almost universal recognition that Infrastructure is essential for economic development. However, inappropriate and unaffordable mega projects are again rearing their ugly head! Intense promotion by donor countries and development banks are in vogue in Africa:

- Ethiopian Gilgel-Gibe I, II and Gibe III 2000 MW hydro power projects feeding the region through thousands of Km of 500 KV DC electric power transmission;
- Pan East African electrified railway network;
- Pan African fibre-optics network;
- Solar power installations covering the Sahara desert to supply Europe via submarine power cables.

The glamour and temptation of mega projects also remain irresistible to political masters in developing countries. As a result, inadequate attention and insufficient resources are being allocated to small but widespread Infrastructure projects in rural and remote regions in developing countries. Without local physical and virtual connectivity, local economies are grid-locked. They can not effectively participate in regional and national economic development through trade and commerce, let alone transnational or global economy. Developing countries must make appropriate, accessible and affordable infrastructure their top economic development priority.

Developing countries must refocus infrastructure services at the local level, using local human resources to build, operate and maintain simple installations with maximum utilization of local materials. If such local infrastructures can be built all over the country, then the national government can in parallel build the next levels of infrastructure to interlink and interconnect these local installations.

Then and only then, the basis for integrating the national economy, trade and commerce will be available for competitive participation first in regional and global trade and global production chain.



Due to the unsuccessful donor driven development experience, I have found widespread despondency in Africa that the economic chasm between the developed world and African countries is too wide. I have been trying to wean Africans away from quantum leaps in development projects that will plunge their countries deeper into poverty. I have urged Africa to look instead to Asia Pacific and South East Asia where macroeconomic stability, self-reliance, hard work, thrift and investment in education have transformed the economic landscape in the short span of three decades. I am an ardent advocate of “Look East and Look South” for Africa to cooperate with high and middle income developing countries Malaysia, China, India, Brazil, Singapore and others in the economic development of Africa through south-south cooperation.

As an energy professional, I have been advocating that developing countries must focus on accessible and affordable energy, be it green, brown or black. Through my own network, I am assisting Kenya to examine seriously the procurement of second hand but appropriate and affordable coal-fired power plants from China. Such power plants are prematurely shut down due to China’s commitment on reduction of carbon emission. This initiative, if realized, will make energy accessible and affordable to fuel economic development in Kenya. Through my UNESCO International Science, Technology and Innovation Centre for South-South Co-operation (ISTIC), I am trying to get Brazil to be the sugarcane ethanol hub and Indonesia to be the palm diesel hub for G77 countries.

I would repeat that ultimately and urgently, the solution to climate change must rest in the hands of the developed countries. The argument “More energy consumption is necessary to assure prosperity in developed countries” is not valid. There are developed countries in Europe with low annual electricity consumption per capita and high human development indices. Human development index is a measure of the well being of a nation, being derived from factors like life expectancy, level of education, GDP per capita and the like.

For this to happen, the developed world must lead the world to practice sustainable consumption. However, sustainable consumption has seldom been on the global development agenda. It is not favored because it is perceived to threaten competitiveness and profitability. Whilst the unbridled consumption of the developed world is damaging in itself, lifestyles of affluent countries in Europe and North America have unfortunately become models for consumers in the more affluent developing countries.

If the global consumption of energy and materials were to become as intensive as that of the average American, worldwide usage would increase several fold and environmental damage would rise similarly. Quite apart from climate change consideration, this development path is unsustainable for our globe. To realize the culture of sustainable consumption, drastic changes in life-styles are necessary, especially in the developed world and in the higher income developing countries. There would need to be resolute political and societal will.

This will be very difficult in the prevailing climate of global advocacy of small government so as to let the market has a free rein. If private sector is left to maximize their bottom line, the world will suffer more “the tragedy of the common” like fishing the oceans to depletion and global warming by excessive carbon emission. I trust the current global financial tsunami that is triggered by excessive greed will make the world to value the indispensable role of government in assuring the “Asian values” of self-reliance, hard work, thrift and investment in education. Instead of striving to stay ahead in competitiveness, exhausting global resources in energy and materials, and endangering the very survival of our planet through global warming,

We must work urgently together to assure the quality of life rather than the quantity of living.