

LIDIA PUKA*

Not (yet) an Energy Revolution. India between Climate Change Mitigation and Development Imperatives

Indian decisions regarding the country's energy mix have global consequences. For this reason it is of paramount importance whether Indian declarations to take on climate change mitigation efforts could, indeed, mean a shift away from a fossil fuels-dominated energy mix and towards the deployment of renewable energy sources.

In the article "Winds of Change: India's Emerging Climate Strategy," Namrata Patodia Rastogi from the Pew Center on Global Climate Change argues that India's approach towards climate change has dramatically shifted in the span of a few years. The grounds for that being the development of the comprehensive domestic climate-change program and a new stance in international negotiations. The author also claims that in order to succeed India must make sure that an ambitious climate policy does not come at the expense of economic growth or development goals.

However, the thesis of a dramatic shift in Indian climate change policy is premature and highly disputable. This is not only because the obligations taken during international climate negotiations are not binding but also because the task of responding to the country's development imperatives (securing energy supplies for the population and alleviating energy poverty without locking-in high emissions) is tremendous, if at all feasible. Walking the talk about the proposed climate-change strategy would require an energy revolution in India. The aim of this paper, though, is not to provide India with solutions to the challenge of achieving the goal of climate-change mitigation. It's goal rather is to list the causes that will likely hinder the shift towards a low-carbon economy and it will show, therefore, that an Indian low-carbon energy revolution is not likely to appear any time soon.

* Analyst at the Polish Institute of International Affairs.

India's Energy Mix, Today and Tomorrow

India's energy mix is based predominantly on coal (about 36%), oil (25%), and biomass (about 29%). Energy sectors with lower greenhouse gas (GHG) emissions, such as natural gas (6%), renewables other than biomass (3%) and nuclear (1%) have just started being developed. Meanwhile, energy demand is predicted to increase sevenfold within two decades. This is true for almost every sector: household heating and cooking, transport and cement industry, iron and steel, petrochemicals, aluminium, pulp and paper.

The rising thirst for energy cannot be quenched by domestic resources. India already is a net importer of fossil fuels. Despite an increase in indigenous exploration and production by both national and private companies, the country's dependence on imported oil, gas and coal is rising. India has one of the world's largest proven reserves of coal (at 106 billion tonnes, it is estimated to provide the country 40 years worth of consumption). Nevertheless, because of the coal's low quality, insufficient capabilities to increase domestic production and lower costs for imported coal, India recently became the world's biggest net coal importer. According to the Ministry of Coal, "coal is India's energy choice of the future." What was for years a blessing for the country's development may soon pose a serious hindrance to the development of the renewable energy sector on a big scale.

Despite coal's strong position in the energy mix, India's primary energy usage *per capita* remains one of the lowest in the world. This is a result of the development of the low-energy-intensive services sector in India and from energy poverty. It is estimated that around 600 million people lack access to any form of commercial energy. However, should they become middle class consumers in the future, they will need energy to satisfy their needs. The task to bring electrification to the whole country is tremendous—not only in terms of acquiring energy sources but also because large investments in infrastructure are required. Energy infrastructure is scarce and investments in it are limited by budgetary constraints. To satisfy future energy needs with low-carbon solutions, India will need to decrease oil and coal consumption and increase the consumption of natural gas, develop its nuclear sector and deploy solutions that use its renewable energy potential in the form of hydro, solar and wind power. So far, despite vast solar-power resources, hydro power has remained the most popular renewable energy source other than biomass.

Policy Addressing Climate Change

In the comprehensive 2006 report "Integrated Energy Policy" by the government's Expert Committee of the Planning Commission, little attention was paid to environmental concerns. Neither did the report predict a shift in the position of India in climate-change negotiations. Instead, it underlined the country's priorities in alleviating energy poverty and securing energy supplies. It also outlined the problem of inconsistencies in the energy-related policies of the government. Better coordination of the actions among the Ministry of Coal, Petroleum and Natural Gas, the Ministry of New and Renewable Energy, the Ministry

of Power and the Department of Atomic Energy under the Office of the Prime Minister would result in a better investment climate.

According to the findings of the World Bank, India is vulnerable to the effects of climate change. Rising sea levels and melting glaciers in the Himalaya possibly could reduce agricultural production and have a severe impact on the population living near Indian coastal regions. Nevertheless, in domestic policies, climate-change challenges were addressed only occasionally, alongside energy or forestry policy. This changed in 2008 with the introduction of a National Action Plan on Climate Change (NAPCC). It covers a package of measures that address both adaptation and mitigation challenges and consists of eight national missions (solar, sustainable habitat, Himalayan ecosystem, water, energy efficiency, green India, sustainable agriculture and strategic knowledge about climate change). However, the introduction of the NAPCC has not changed India's argument in climate change forums. India first puts forward the principle of the common but differentiated responsibility of the developed countries vis-à-vis developing countries. According to this, the developed countries should bear the costs and responsibilities for mitigation actions. Second, India advocates that the comparison of the GHG emissions of the countries should be based on *per capita* measures, rather than total measures. The latter solution is championed by the industrialized countries.

India's flexible stance on taking responsibility for mitigation actions, as adopted during the UNFCCC COP meeting in Cancun in 2010, did not mean it had resigned from any of the previously mentioned arguments. The country will endeavour to reduce its GDP emissions intensity by 20%–25% by 2020 compared with the 2005 level. However, not only are emissions from the agriculture sector excluded from the calculations but also the actions are voluntary in nature and will not have a legally binding character.

Because taking on mitigation obligations in practice means the necessity to develop new energy sectors, the Indian government in 2010 raised the budget of the Ministry of New and Renewable Energy by 61%. It also dedicated \$1 billion to expand solar power infrastructure within the Nehru National Solar Mission programme. The government incentives included reduced duties on the development of wind power and geothermal energy generation. In addition, almost half of the state budget of 2010/11 has been allocated to infrastructure development, which is a precondition for creation of the energy market.

Nevertheless, it looks as if what one Indian policy addresses another hampers. Despite government subsidies for investments in renewable energy sources and an increase in these investments on a global scale, the rate of FDI in the renewable energy market in India decreased in 2010. The reasons for that were bureaucratic red tape, an underdeveloped infrastructure and lack of legal stability that resulted in differences in the entry conditions for companies to state markets. Moreover, much more investment is

needed to shift the Indian economy to a low-carbon path. This is the finding of a simulation held by the government group, The Energy and Resources Institute (TERI), in June 2009. In the report “India’s energy security: New opportunities for a sustainable future,” the differences between the point-of-reference energy scenario (business as usual) and the stringent mitigation scenario (which implies a shift in India’s climate-change negotiations) are tremendous. The shift in the climate-change policy of India would require energy savings of half the projected primary commercial energy demand in 2031, almost no change in the amount of fossil fuels imported, and the rapid deployment of solar power for power generation at the expense of coal. These would require “urgent and aggressive” government actions towards increasing energy efficiency and solar power generation.

Securing Supplies for Further Economic Growth

India’s emerging low-carbon strategy will be verified by actions that secure energy resources. The opportunities to substitute India’s fossil-fuels-dependent path of development with low-carbon solutions are hardly realistic. Today, the country’s rising energy needs are predominantly covered by imports. Import dependency ranges from low (10% of coal and 15% of the natural gas consumed) to high (70% of the oil consumed is imported).

The position of the coal sector in India is indisputable and is on the rise. Coal and peat power plants remain the main source of electricity production (69%) in a country that faces constant blackouts, and rising imports show that, indeed, coal remains India’s choice for energy. Although the production of coal is available to private entities, the public Coal India Limited (CIL) remains the major player in India (as well as the biggest mining company in the world). In parallel with the development of India’s policy towards climate change, CIL has acquired coal assets abroad: in Mozambique, Indonesia and Australia. At the governmental level, the Ministry of Coal cooperates with coal-producing countries. Bilateral Joint Working Groups on coal have been created between India and France, Germany, Russia, Canada, Australia and China, a Joint Commission set up with Poland and other forms of cooperation established with the UK, the U.S., the EU, South Africa, Kazakhstan, Belarus and Japan. Paradoxically, even the TERI report about the shift towards a sustainable energy mix recommends the “rapid, but optimal depletion of own-coal resources.” At the same time, the report sees the unsustainability of coal imports as a hindrance to the transition of the energy mix. Moreover, government subsidies to railways (the main means of transporting coal) hampers the economic feasibility of the development of other energy sectors, such as natural gas and renewables.

India’s high oil import dependence (mostly on Saudi Arabia, Kuwait, Iran, Iraq, the UAE and Nigeria) produces security concerns for a country with the world’s fastest growing automotive sector. The world’s fourth largest oil importer, India has tried to counterbalance the dependency, for example, by introducing storage capacities since 2004 that can provide

15 days of peak supplies. Nevertheless, no radical shift away from oil to a more sustainable energy source is visible. Instead, Indian companies tie economic bonds with these supplier countries by conducting exploration and production activities abroad. Oil and Natural Gas Corporation Limited (ONGC), which produces 81% of the domestic oil and 77% of domestic natural gas resources, and Oil India Limited have been searching for new market opportunities in Iran, Iraq and Nigeria.

The government seeks to explore and develop domestic oil and gas fields. Previously restrictive policies on private sector investment in the exploration of oil and gas fields have been eased in the New Exploration Licensing Policy. ONGC has put a halt to decreases in production by investing in the recovery of the fields and increasing their efficiency. To acquire the technology and enhance production, it also has cooperated with foreign companies (Petrobras, StatoilHydro, ENI, MOL, British Gas and Cairn Energy). India's largest private company, Reliance Industries Limited (RIL), participates in oil and gas investments deemed controversial from an ecological point of view. In February 2011, RIL announced a strategic partnership with BP for deep-water exploration. It also has engaged in shale-gas production in the U.S. through upstream joint ventures with Chevron and other U.S. companies (Corrizo and Pioneer).

Because of the predominance of the coal sector in power generation, the natural gas industry remained critically underdeveloped for years. As a result, the potential for sector development (i.e., from production in the gas fields on the East Coast, the new and marginal fields of the West Coast and coal-bed methane and underground coal gasification) depends on the development of gas infrastructure. Currently the biggest production activities are held in Rajasthan and the Krishna-Godavari basin.

The development of the gas sector, however, is further limited by geopolitical concerns related to India's reliance on imports. Its potential is significantly reduced by India's uneasy relations with Bangladesh, Myanmar and Pakistan. Exploration and gas production on the Indian continental shelf in the Bay of Bengal is conditional on the resolution of the maritime territorial disputes between India and Myanmar and Bangladesh. With Myanmar, the mutual distrust stems from India's support for political opposition figure Aung San Suu Kyi. Bangladesh could have given a boost to India's gas sector as a producing country (it is believed to have one trillion cubic metres of gas reserves, out of which it produces only 12 million cubic metres solely for domestic use). But on the contrary, together with Pakistan the two potential transit countries are, in fact, putting a halt to gas pipeline projects. Gas imports from Turkmenistan and Afghanistan, Qatar, Iran and even Myanmar have been debated for more than 20 years. Because of this, India has had to import gas through LNG shipments from more distant places: Qatar, Oman and Australia. These cause concerns, however, about the security of sea lanes and require increased investment in LNG infrastructure. A fourth LNG terminal is now under construction.

The path towards lower emissions also leads through the development of the country's nuclear energy programme. Starting in 2008 with the Civil Nuclear Agreement with the U.S., India also signed nuclear deals with France, Russia, the UK, Canada and, in April 2011, with Kazakhstan. However, the implementation in January 2011 of a civil nuclear liability law, which holds suppliers liable for any accident for up to 80 years after a plant's construction, may deter the investment plans of some companies (America's GE, Westinghouse and Bechtel, Russia's Rosatom, France's Areva and Japan's Toshiba, Hitachi and Mitsubishi). Also, the import of nuclear fuel and the transit and disposal of radioactive waste will remain a security concern for India.

Energy Poverty

Another reason why India will not quickly shift to low-carbon energy resources stems from the tremendous challenge of alleviating energy poverty. India's ambition to bring electricity to half its population by 2017 is indeed revolutionary. At the same time, the government sees that goal as one of the main challenges for energy security. This problem is characteristic for a developing country and has two dimensions. First, the alleviation of poverty as such is not possible without electricity. The lack of electricity means fewer opportunities for production, higher earnings or education. Given this fact, the solutions that will be deployed have to be as cheap as possible and most likely must use the most readily available resources. In the case of India, this means coal and biomass. Second, the goal is strictly linked to the security of supply for a population that is undergoing a transition from an agricultural economy to an industrial one in order to form a future middle-class. Usage of wood and waste is neither measured nor controlled and is extremely carbon-intensive. The ineffective use of biomass has a detrimental effect on health and the environment. It is estimated that this causes the deaths of 140,000 kitchen users per year. Moreover, the uncontrolled use of biomass has led to deforestation in the Himalayas.

So far, none of the developing countries have addressed the challenge of providing electricity with low-carbon solutions. The analysis and models of the economic consequences of the alleviation of energy poverty are lacking. The IEA has been trying to fill the gap. In its model, the agency used large-scale deployment of oil to answer energy needs. Nevertheless, it can be argued that India will try to avoid increasing its oil-import dependence. So far, policies aiming at the eradication of the problem of energy poverty have led to unexpected fiscal repercussions because of skyrocketing global oil prices. The government has repeatedly introduced direct subsidies for fuels used by the poorest Indians, such as kerosene. As a consequence, in the first stage the subsidies have significantly reduced the revenues of both India's national and private oil companies. Later on, the burden is shifted to the national budget. As indicated by the IEA findings, subsidies and the issuing of "oil bonds" have led to a doubling of the deficit and a decrease in investment reliability in India.

As a result, it is more likely that large-scale electrification projects in India might result in the large-scale deployment of coal consumption, following the South Korean and Chinese models. China has managed to provide electricity to 500 million people within a decade. Such a move would have serious consequences in terms of the price of coal and on Indian GHG emissions. Already, almost half of South-East Asian energy consumption is provided by coal.

The low-carbon solutions would need to come in the form of increased usage of gas and renewable energy sources. However, the solution also would need increased government coordination and investments in capital along with time-consuming research. It is more probable, however, that their deployment will come as a complimentary rather than a substantial energy source to coal. Nevertheless, the TERI public-private partnership project “Lighting a Billion Lives” targeted at displacing kerosene and paraffin lanterns with solar lighting devices to rural people should be noted. Not only has it brought solar panels to rural areas but it has provided additional workplaces for local entrepreneurs. TERI is now working on the Smart Mini-Grid System, which would enable electricity infrastructure development in rural India. If it proves successful, the system can be exported to other developing countries.

Bearing in mind the conflict of interests on the governmental level, the strong position of the dominant state-owned oil, gas and coal companies and the lack of coordination of government actions, India may need to deploy decentralized solutions to alleviate energy poverty in a sustainable way. An example of this comes from Bangladesh. The microcredit bank Grameen Shakti offers an affordable, home solar power system to the rural population and a low-cost biogas solution for cooking needs while asking each customer to plant five trees in their backyards. This combines electrification without the threat of increased fossil fuels usage and a reduction in GHG pollution.

Conclusions

The formulation of Indian climate-change policy is a step towards a lower carbon path. However, one swallow doesn’t make a summer. Despite its growing global ambitions, the country still faces the energy challenges of a developing country. The goals of achieving strong economic growth and alleviating energy poverty are interlinked with the aim to not “lock in” high emissions. The task is tremendous, unprecedented and often unrealistic.

With reference to the security of supplies to provide the fuel for economic growth, the investments are held predominantly by Indian national entities. In light of insufficient domestic production, the development of the transport sector poses a risk for increased oil import dependency unless petrol is substituted with natural gas. However, this is far from realistic as long as Indian relations with Bangladesh, Pakistan and Myanmar do not change.

At the same time, increased efforts by the government to investment and create incentives for the development of new markets—nuclear, renewables and gas—have largely failed. As long as the development of coal remains at the heart of the energy security of India, the country will not face a real energy revolution. The low efficiency of the sector, the CIL monopoly and railway subsidies need to be changed in order to allow a large-scale transition towards a low carbon economy.

This, however, is not likely to happen in the foreseeable future. Coal is an abundant domestic energy source and its use gives work to up to half a million people. Its position is thus indisputable. It also is likely that coal will play a central role in the alleviation of energy poverty. Current investments in renewable energy sources are not sufficient to address the problem of rising energy needs for half a billion people and are more likely to supplement rather than answer all of the country's energy needs. Also, bearing in mind the internal problems, it will be difficult to attract FDI unless legal and fiscal stability is introduced. Moreover, in the case of large-scale government investment, corruption can cause the investments to be “too big to succeed.”

Should India address climate-change problems, it will take much more effort than drafting a climate change strategy. The country needs to overcome serious internal and external hindrances so the reduction of GHG emissions does not come at the expense of the economic development or contribute to energy poverty. In this light, it is more appropriate to hope that mitigation efforts will not wither on the vine rather than to predict an energy revolution in India.