After Copenhagen and before Cancun

India on the Way to a Global Agreement on Energy and Climate Policies

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- In the run-up to the Cancun Climate Change Summit, India is holding firm to its position not to accept internationally binding emission targets for fear that they may impede development prospects.
- However, with its great dependency on the rural agricultural sector, India is one of the most vulnerable societies to climate change and thus has a strong self-interest in a successful continuation of international climate negotiations.
- In its domestic politics, India is pushing climate-friendly policies with regard to resource use and energy efficiency in order to secure the energy demands of its growing population. Moreover, it is seeking to become a leader in the renewable energy sector, especially regarding solar power generation.

Dialogue on Globalization

India is in a peculiar position with respect to climate change. On the one hand, it is one of the world's most rapidly developing economies and heavily dependent on a cheap and plentiful availability of fossil fuels. On the other hand, with its vast and growing population and still predominantly agricultural society, it is intensely vulnerable to the threats of climate change. In international negotiations, India has so far played a role that is somewhat less active than the importance of the issue for the country might suggest. In its domestic politics, however, climate change has gained in importance over the last years – especially with the National Action Plan on Climate Change. India is looking for opportunities to reduce its resource consumption in ways that support rather than hinder its growth trajectory in the medium term.

Renewable energy technologies are a key component of this strategy. They help close the energy deficit and can bring electricity to remote areas. Some technologies, such as wind power or small hydropower, are already near grid-parity and very well developed. Solar power, on the other hand, while still being costly, offers an attractive long-term solution to the energy predicament of this exceptionally sunny country. India is in the process of establishing a fixed quota for renewable energy power in its grid electricity mix. Depending on the state, it may vary from less than 5 per cent to over 10% per cent. This would be a significant increase from the 3.5 per cent of renewable energy power in India's grid electricity in 2006.

India's Climate Policy

India's Official Position on Climate Change

In international climate change negotiations, India holds firm to the tenet of a common, but differentiated responsibility for the global climate. In effect, that means that India will not accept any internationally agreed upon, legally binding caps on its carbon emissions. It claims that such a limitation would be unjust (given India's low historical and per capita emissions) and would reduce the speed at which it can develop its economy and lift its poor out of poverty.

In the aftermath of the 2009 Climate Conference in Copenhagen, India has faced criticism for its lack of engagement and initiative. The chief negotiator, Syam Saran, a veteran of climate talks, has stuck to a purely defensive, non-committal line of argument. At the same time, Jairam Ramesh, the Minister for Environment and Forests and a political heavyweight in the Congress Party, has sought to offer a more cooperative picture of India as a negotiator. However, even he does not expect a binding treaty in Mexico this December at the Cancun Climate Change Summit: »I think, frankly, Cancun is headed nowhere, because the financial commitments made by the developed countries at Copenhagen have not been fulfilled and are unlikely to be fulfilled in any substantial measure,« he stated in an interview in September 2010. At the same time, India is giving a signal by hosting the International Renewable Energy Conference at Delhi (DIREC) in October 2010. The outcome of the conclave is supposed to serve as input for the Cancun Summit. »We'll feed everything that is going to come out of DIREC to the Cancun processes on climate change,« said Ms Gauri Singh, Joint Secretary in the Ministry of New and Renewable Energy (MNRE), in a recent interview.

At Copenhagen, India was a member of the »BASIC« group of countries (Brazil, South Africa, India and China), which have committed to act jointly in international climate negotiations. The group believes that the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol – both of which currently place hard emission reduction targets only on the developed countries – should remain the cornerstone of future climate negotiations, and rejects internationally enforced limits on its own emissions. In Indian media, there has been much criticism of India's alliance with China. While India and China's interests converge when it comes to forestalling emissions targets for developing countries, they also diverge significantly: China is far more developed than India and is the world's largest emitter of CO_2. China's emissions limit India's carbon space and increase the dangers posed by climate change.

Irrespective of its position in international negotiations, India has unilaterally declared that its per capita greenhouse gas (GHG) emissions will not be permitted to exceed those of industrialised countries.[1] Currently,

1. Public Diplomacy Division, Ministry of External Affairs, The Road to Copenhagen: India's Position on Climate Change Issues, Government of India. http://pmindia.nic.in/Climate%20Change_16.03.09.pdf.

India's emissions are around 1.4 tons of CO_2 per person per year. The global per capita average is 4.2 tons (with most industrialised countries emitting 10-20 tons per person per year). Nevertheless, because of its large population, India already contributes around 4 per cent of all global emissions. India has also committed itself to reducing the emission intensity of its gross domestic product (GDP) – that is, the emissions per unit of output – by 20-25 per cent compared to the 2005 level, by 2020.[2]

At first sight, these do not seem to be substantial commitments. India has a vast population, a large portion of which hardly produces any CO_2 emissions. It may take a long time until it will have to curb emissions in order to stay below those of industrialised countries on a per capita basis. Also, a reduction of emission intensity of GDP by 20-25 per cent over a period of 15 years is very much in tune with the expected efficiency gains due to technological advancement.

The commitments are relevant, however, as they show the direction in which India is willing to go. The per capita cap is the first statement of a binding nature from India. It reflects a profound sense of justice, but accepts that non-Indian developments may have an effect on India's emissions scenario: if industrialised countries are able to reduce emissions significantly, and as India's emissions will rise, the two may meet sooner than expected. The commitment to a less carbon intensive economy shows that India is very much interested in solutions that are both climate friendly and resource efficient.

The main Indian arguments and considerations relating to climate change can be summarised as follows:

1. India's emissions will rise. Relatively low-cost fossil fuels will continue to play a key role in its economic development. As it develops, absolute carbon emissions will likely increase, even as the relative carbon intensity decreases. Recent economic growth in India has been driven largely by the service sector, which is less carbon intensive than the manufacturing sector. Politically, there is a widespread consensus that a significant expansion of the manufacturing sector is the only way to create a vast number of new jobs. These are needed to accommodate a growing population that is migrating away from traditional agriculture in search of economic opportunity. Industrialisation is seen as a right that cannot be denied to the country. However, the international community is free to supply India with state-of-the art technology to mitigate the carbon effects of industrialisation. The cost differential between »standard« and low-carbon technology (for instance carbon capture and storage, CCS) will have to be borne by developed countries. There are, however, win-win technologies that further India's growth while keeping emissions in check. These are found, for instance, in the field of energy efficiency. Here, India is willing to invest itself.

2. India is committed to keeping the global temperature rise below two degrees Celsius. That goal limits the overall carbon space available to mankind, and India requires as much of this carbon space as possible. Over the past 200 years, the industrialised countries have used up most of their share of the carbon space already. Many Indians draw a sharp distinction between India's »development emissions«, needed for bringing India's population to a minimum standard of living, and the »lifestyle emissions« of developed nations, arising from more luxurious activities.

3. Irrespective of global emissions negotiations, there are hard resource constraints as to the size of a fossil-fuel-powered economy that India is ultimately able to build.[3] There are also adverse geopolitical implications of a high dependency on imported fossil fuels. At the same time, India can leapfrog to modern, efficient and less polluting technologies in some sectors (e.g., in decentralised electricity generation). Moreover, the field of clean technologies offers an enormous global business opportunity, and India wants to be at the forefront of this emerging industry. These considerations relating to a long-term national interest in low-carbon technologies are often sidelined in India as discussions focus on global carbon justice.

2. Ministry of Environment and Forests, Annual Report 2009-2010, p. 271. http://moef.gov.in/report/ report.html.

3. In a recent estimate, India's carbon emissions will peak at around 4.5 billion tons of CO_2 at any time merely based on the limited availability of fossil fuels. According to the authors, India could safely agree to cap its emissions at that level, which would represent 3 tons per capita. See: R. Gupta, H. Shankar, and S. Joshi, Development, Energy and Climate Security, *Seminar* (February 2010): pp. 30-34.

4. India will be the world's most populous country by the early 2030s.[4] With its widespread poverty and its great dependency on the rural agricultural sector, which is already suffering from reduced water availability, it is one of the most vulnerable societies to climate change. India will have to face significant adaptation costs. In how far these will be borne by industrialised countries, rather than by India itself, will depend on the success of a future climate change policy framework. India thus has a strong interest in a successful continuation of international climate negotiations. So far, however, it has not shown signs of being willing to significantly change its position on what a just deal should look like in favour of getting a deal at all.

This background of economic growth, development needs and climate change provides the context for discussions of India's climate policies. On that basis, India has developed low-carbon growth strategies, the most visible being the National Action Plan on Climate Change (NAPCC). Launched in June 2008, the NAPCC promotes development goals while addressing climate change mitigation and adaptation. The plan identifies eight core »national missions« running through 2017. Ministries were directed to submit detailed implementation plans to the Prime Minister's Council on Climate Change by December 2008.

Climate Change and Power Supply in India

In the power sector, India faces the problem of a large power deficit and many un-electrified households. Getting sufficient and affordable power to India's consumers is the highest priority. Against this, climate considerations take a secondary role. In 2009, the power deficit was 10.1 per cent (equivalent to 12 GW) and the peak load deficit reached 12.7 per cent; 35.5 per cent of the population did not have access to electricity at all. This is a predominantly rural problem (where only 52.5% of households are electrified). Urban areas have a much higher electrification rate (93.1%).

The demand for electricity is growing at a rapid pace: the economy is growing, lifestyles are becoming more power-intensive and the electrification of the population is progressing. To meet this demand, India will have to triple its capacity from around 150 GW in 2009 to more than 450 GW by 2017. That requires an expansion of the generation-capacity based on all available fuels: thermal (coal, gas and diesel), large hydropower, nuclear and renewable sources (wind, solar, biomass and small hydropower).[5] To reach this goal, the rate at which new capacity is added to the grid has to be increased significantly. This can only be achieved through an active participation of the private sector. Transmission and distribution (T&D) also needs to be improved. Although there have been reductions of T&D losses from 40 per cent (national average) in 2005 to 30 per cent in 2009, there is still a wide margin for improvements.[6]

From a climate change perspective, therefore, energy efficiency is the »low-hanging fruit«. It is also a win-win situation for India as well as the climate. Renewable energies play a different role: they are needed to supplement the electricity mix, to provide power to off-grid consumers and for captive power generation for industries. They also play a crucial strategic role. In the long term, especially solar energy is a key hope for India's energy supply. Renewable energy is also recognised as an important industry of the future, one in which India wants to be competitive.

Renewable Energy in India

India has created one of the most vibrant renewable energy markets in the world. The country has taken a leadership role in the deployment of wind power and small hydropower. It is now seeking to do the same with solar power. By March 2010, the total installed renewable energy capacity was 17,277 MW, of which about two-thirds originated from wind turbines. Since 2005, the industry has seen a year-on-year growth rate of more than 24 per cent. The planning commission estimates that by 2022, a total of 74 GW will be installed, mainly driven by new wind and solar power plants.

4. United Nations, World Population Prospects: The 2006 Revision, 2007.

5. The current power mix of grid-connected plants by MW of installed capacity in India is: coal (52.8%), large hydro (>25 MW, 23.1%), gas (10.7%), renewable energy (wind, small hydro, solar, biomass, 9.7%), nuclear (2.9%), diesel (0.8%). See: Nrel, Bridge to India Pvt. Ltd. GTZ, IRADe, REN21, Indian Renewable Energy Status Report: Background Report for DIREC 2010, October 2010.

6. The international standard of T&D losses is below 10 per cent.

The main long-term drivers for the development of renewable energy in India are:

- the persisting energy deficit and high growth in energy demand
- falling costs in renewable energy technologies
- rising costs of fossil fuels
- the need to develop decentralised supply solutions
- the abundant availability of renewable resources
- ambitious government schemes and incentives
- a growing domestic business community active in all technologies, along all value chains

Global climate considerations play only a subordinate role in the development of renewable energies in India. On the demand side, a key driver of growth can be the Renewable Purchase Obligations (RPOs). In the course of the last two years, the power regulatory commissions of 16 Indian states have specified RPOs for the utilities active in their states. The size of the RPO depends on the availability of renewable resources in the state. Tamil Nadu, for instance, which currently has the largest installed renewable energy capacity (mainly wind power), had an RPO of 10 per cent in the financial year 2008-2009, and is estimated to rise to 14 per cent in 2010-2011. A state like Delhi, on the other hand, which has few resources, only has an RPO of 1 per cent.

Wind Power

India has a strong wind market with consistently high growth rates, a long track record and most technologies locally available. In 2009, the country was ranked fifth in the world regarding the installed capacity (11,807 MW). During the current 11th Five-Year Plan (2008-2012), 9,000 MW in capacity additions are targeted. In the first two years, 3,847 MW have been achieved. The overall onshore potential of wind power in India is estimated to be 48.5 GW. India's offshore wind potential so far remains largely untapped, as does the market of repowering existing wind projects.

Generation costs are approaching competitiveness in sections of the Indian power market, such as captive power generation. With the company Suzlon, India has a global industry champion that has access to international markets and technologies, has acquired the German turbine manufacturer REpower and runs an innovation centre in the Netherlands. The wind power market has a high market concentration, dominated by vertically integrated companies. The five largest (Suzlon, Enercon, RBB Energy, NEPC and Vestas) contribute as much as 80 per cent to overall turbine production. However, a number of new companies have entered the market, thereby increasing the competitive pressure in the industry.

To increase the share of wind power in the grid, incentives now focus on actual electricity generation rather than on installed capacities. Next to the RPOs, these include especially a new generation-based incentive (GBI) of 0.5 Indian rupees (0.01 euro cents) per kWh for a period of 10 years. This scheme is capped at support for 4 GW overall until 2012 and at 6.2 million rupees (100,000 euros) per MW of each project. A project developer will be able to choose between the GBI and the depreciation incentive.

Solar Power

Although solar power has so far played an almost non-existent role in the Indian energy mix (with an installed power capacity of just over 15.2 MWp at the end of June 2010), the market is set to grow significantly in the next years, driven mainly by the ambitious National Solar Mission (NSM).

Encouraging the spread of solar power generation – both concentrated solar power (CSP) and photovoltaic (PV) – and aiming for grid-parity by 2022 (currently at around 5 rupees or 0.08 euro cents) and parity with coal power generation by 2030 (currently at around 1 rupee or 0.02 euro cents), is in many ways the closest India is currently coming to a comprehensive, long-term energy supply strategy. On average, the country has 300 sunny days per year and receives an average hourly radiation of 200 MW/km^2. The India Energy Portal estimates that if 10 per cent of the land were used for harnessing solar energy, the installed capacity would be at 8,000 GW or around 50 times the current installed capacity. Solar power could therefore easily cover India's long-term power demand. It has to be cost-competitive, however. Currently, solar power generation in India costs around 13 rupees (0.22 euro cents) per kWh, or over six times as much as power from coal.

The main instrument to make solar power a technology of choice in India is the NSM. It targets an installation of 20 GWp of grid-connected and 2 GWp of off-grid solar power by 2022. In the first of a total of three phases, from 2010 to 2013, the government aims to set up 1,000 MWp grid-connected power plants, encouraging the more developed PV technology as well as CSP equally with 500 MWp each. In addition, 200 MWp of off-grid and 100 MWp of tail-end and other small-grid solar power plants are to be installed.

In order to achieve the targets, the NSM provides attractive feed-in tariffs, a single-window application process, a quota for solar energy in RPOs as well as soft loans and capital subsidies for off-grid applications. The mission also encourages research and manufacturing of components.

For the financial year 2010-2011, the government offered a feed-in tariff of 17.91 rupees (0.30 euro cents) per kWh for PV projects and 15.3 rupees (0.26 euro cents) for CSP. Power Purchase Agreements would be valid for 25 years. At current cost levels, the government estimates that the tariff will allow investors an internal rate of return of about 16-17 per cent after taxes. At the application deadline for 2010-2011, on 18 September 2010, more than 400 project developers put forward bids for the 650 MWp on offer (of this only 150 MWp were for PV). The maximum size for a CSP bid was 100 MW and for a PV bid 5 MW. Given the oversubscription of the first rounds, the government will award contracts based on competitive bidding to those projects developers that can offer the lowest tariff (i.e., below the advertised tariffs).

Biomass Power

Traditional biomass is a major source of household energy in India, comprising about 40 per cent of non-commercial energy sources. India's rural households predominantly use cow dung and wood as fuel for cooking and water heating. Due to concerns of food safety and water shortages, the use of biomass for large-scale power generation focuses on using waste biomass.
Solid biomass-based power generation is well established in India. It has been used especially by the sugar industry for captive generation of heat and power (co-generation) for over 20 years. The opening-up of the Indian electricity market in 2003 has given these companies the opportunity to also sell electricity to the grid. This has led to new dynamics in the market. The government supports commercial biomass power projects with capital or interest subsidies. In March 2010, there was an installed capacity of 866 MW of biomass power from agro residues, 1,334 MW from bagasse-based cogeneration and 65 MW from municipal waste.[7]

Biogas has so far been used mostly for small, off-grid applications, mostly on the household level, but there is a trend towards large-scale applications. There are about 4 million family-size biogas plants installed in the country. The MNRE estimates that the annual biogas generation potential (based on available cattle manure) is about 17,340 million m^3, which could support the installation of up to about 12 million family-size biogas plants.[8]

Small Hydropower

Small hydropower is a well-established technology offering investors projects with a low risk and potentially very attractive return. The technology currently has the lowest generation cost among renewable energies in India. With an installed capacity of 2,735 MW in March of 2010 and a total estimated potential of around 15 GW, it can contribute to the national power supply and play a significant role in the electrification of rural areas.

Until the end of the 1990s, the market was dominated mainly by state-owned enterprises and today, most plants are still operated by state power utilities. However, due to new incentive schemes, the number of private companies entering the market has been steadily increasing. In December 2009, they had a share of 39 per cent of total installed capacity. The Indian states provide support for the modernisation and renovation of existing plants as well as subsidies for new plants, favourable loans and long-term feed-in tariffs. The MNRE currently focuses on improving the reliability and average utilisation of facilities.

7. The MNRE estimates that the surplus biomass resources potentially available for power generation could support roughly 25 GW of installed capacity and that there is a potential of about 15 GW for cogeneration in various industries including sugar mills, breweries, textile mills, distilleries, fertiliser plants, pulp and paper mills, and rice mills.

8. N.H. Ravindranath, and P. Balachandra, Sustainable Bioenergy for India: Technical, Economic and Policy Analysis, *Energy* 34:8 (2009): pp. 1003-1013.

New Technologies

There are currently no commercial geothermal power plants in India. However, the last year has seen an increasing interest from the MNRE as well as from Indian (e.g., Tata Power, NTPC, NHPC) and international (e.g., Verkis, Mannvit, PanaX Geothermal) private sector companies in the possibility of harnessing this source. The overall potential for geothermal energy in India has been estimated at 10 GW. Neither ocean energy (which is still in the pilot and demonstration phase) nor tidal and wave technologies (already implemented commercially) have so far been tested in India.

Conclusion

In developing its climate change stance and its renewable energy policies, India is not primarily concerned with mitigating international climate change. Firstly, India seeks to reduce obstacles to its development path – whether these are climate change adaptation costs or the availability of carbon space. Secondly, India seeks to help satisfy its vast energy demand.

In international climate change negotiations, India is currently playing a »game of chicken« with the developed economies: through its tough stance, it may either be able to broker a global carbon deal that continues to put the burden of climate change exclusively on the shoulders of developed countries, or it may contribute to a failure of the entire UNFCCC process. That would be a disaster for India, which is currently one of the prime beneficiaries of the Clean Development Mechanism process and potentially one of the largest victims of climate change. A more nuanced, imaginative and dynamic negotiating position would be advisable for India. One crucial reason why this is not forthcoming is, quite simply, a lack of manpower. The administration is simply putting too few brains behind its climate strategy.

In its renewable energy policy, India has been quite successful: there is a thriving market and renewable energy contributes significantly to on- and off-grid power supply. By consciously capping the amount of trial-and-error-policies, the government has managed to remedy mistakes and control the spending on incentive schemes. The risk of such an approach is that it may create uncertainty and hesitation with investors. India, however, is a sufficiently attractive strategic market and investors have been willing to take the bet – as the current interest in the NSM shows.

However, setting up 20 GW of grid-connected solar power in the next years, or even 1,000 MW by 2013, may be imprudent. Today, solar power is still the most expensive commercial renewable energy. India can hardly afford to construct a PV plant in Rajasthan's Desert, for example, and then transmit the electricity through a grid with losses nearing 30 per cent for it to be used ultimately for the luxury of powering old ACs in badly insulated buildings. It makes sense for India to attempt to become a leader in this technology in the long term. However, like China, it can do this though manufacturing and research rather than through developing its own installations. Richer nations can bring down the global costs for solar power by setting up plants. India could join the fold at a later stage.

In the meantime, India has a great opportunity to become the global market leader in decentralised energy solutions. These could be based on various renewable energy technologies. A stronger shift in focus and funds from grid-connected to off-grid applications would be a wise move.

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Bridge to India is an environmental strategy consultancy with an entrepreneurial approach based in New Delhi. Through customised solutions for its clients in the fields of renewable energy, resource management and urban planning, Bridge to India contributes to a sustainable world by implementing the latest technological and systemic innovations where their impact is the highest.

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