THE INDIA FORUM
A JOURNAL-MAGAZINE ON CONTEMPORARY ISSUES

September 22, 2020

Is India Concerned about its Energy Security?

By: Tejal Kanitkar

India's overambitious targets for solar energy could destabilize its power sector and threaten energy security. Rather than 'green' political posturing, the country must plan an energy transition based on its developmental interests.

India has set itself an ambitious target of achieving an installed capacity of 100 gigawatts (GW) of solar energy and 60 GW of wind energy by 2022. In September 2019, at the United Nations Climate Action Summit held in New York, the prime minister announced an even more ambitious target of 450 GW of renewable energy (RE) capacity. However, no timeline has been decided for this 450 GW target.

Since 2014, solar energy seems to be one of the main agendas of the government, directly overseen by the Prime Minister's Office. The prime minister has been personally credited for putting together the International Solar Alliance (ISA) at the Conference of Parties in Paris in 2015, where the Paris Agreement was adopted by all the parties to the United Nations Framework Convention on Climate Change (UNFCCC). India is to be the seat of the ISA, which boasts of a membership of 66 countries . It would not be hyperbole to say that the current political leadership in India considers the attention given to solar energy a hallmark of their time in government.

The energy system, however, is complex and for India to achieve the targets that have been set would be extremely difficult if not impossible to do so. The regionally differentiated potential of various sources of energy, the technical constraints of each fuel technology, the regulatory regime to determine energy costs, and energy delivery options for final consumption are aspects of the energy system that cannot always be made subservient to the requirements of political posturing.

In this article, I will discuss the broad contours and directions of India's energy policy, focusing on the power sector. There are many issues that must be addressed during a planned transition in the country's energy system, especially the potential impact on the country's energy security.

Growth of Renewable Energy in India's Power Sector

As of 31 July 2020, the total installed power capacity in India was 372 GW. Of this, coal and lignite-based power capacity is about 55%. India has 88 GW of RE capacity (excluding hydro power of over 25 GW in size), which is equivalent to 24% of the installed capacity. Of total RE, 35 GW is solar and about 39 GW is wind.

> India is one of the few countries that is on track to meeting the pledges made under the Paris Agreement.

If we add hydro and nuclear energy capacity , the share of non-fossil fuels in installed capacity is 38%. In its Nationally Determined Contribution (NDC) to climate change mitigation, submitted to the UNFCCC in 2015 as part of the Paris Agreement, India had pledged to increase its non-fossil fuel based installed capacity to 40% of the total capacity by 2030. Given the pace of growth of solar and wind energy installations, this target is likely to be achieved much before the intended date. It is important to note that India is one of the few countries that is on track to meeting the pledges made under the Paris Agreement.

Between 2010 and 2019, the total power capacity in the country increased by 9% per annum. Coal based capacity increased by 10% a year and RE capacity increased by 12% a year in this same period. All other sources of energy grew at a much slower rate as compared to these two. Growth in RE capacity has been faster than that of all other sources. Utility scale or grid-connected RE has in fact grown by 17.5% per annum during this period, far outstripping all other sources of energy. Most of the new RE capacity in the last 10 years has come from solar photovoltaics. In 2010, the cumulative capacity of grid connected solar photovoltaics was 0.011 GW. By March 2019, this had increased to 28.2 GW and by August 2020, India had added another 6.8 GW.

Despite this spectacular growth, it is necessary to take a dispassionate view of the intended domestic targets of the Government of India for the year 2022: India needs to add 21 GW of wind and 65 GW of solar energy capacity in the next two years. Even with a booming economy, achieving this in two years would have been next to impossible. With one of the worst economic crises on our hands, the task has become more challenging. India's economy had slowed down even before the pandemic arrived on its shores. And

this was already having an impact on the power sector. With Covid-19, the crisis in the power sector has become severe.

Pre Covid-19 woes of the power sector

The slowdown in the economy even before Covid-19 had already resulted in a lower than anticipated growth in power demand. The actual power demand in 2019-20 was almost 70 GW lower than what had been projected by the Central Electricity Authority (CEA). This has led to a severe crisis in the power sector that has been worsened by other policy changes that the sector has been subjected to in the last decade.

Expectations of a high offtake of power from the grid, had led in the previous decade to a rapid expansion of thermal, i.e. coal based capacity, while RE capacity was also expanding at a fast pace. The enhanced target of achieving 100 GW of cumulative solar capacity by 2022, announced soon after the National Democratic Alliance (NDA) Government came to power in 2014 was made without taking into account the impact that this would have on the power sector, especially its the distribution segment that is already in dire financial straits. Many distribution companies signed long-term power purchase agreements with thermal power generators and, at the same time the policy of "must run" for RE sources was introduced by the government to incentivize higher deployment of RE. The "must run" status of RE sources implies that all energy generated by these plants must be absorbed by the distribution utilities irrespective of the cost.

> [S]olar energy is not available when power demand peaks, typically in the evening.

The combination of these two developments has meant that thermal power plants are running at much lower loads than they should, increasing the cost for distribution utilities. The capacity charges for these plants (i.e. the cost of capital invested to build the plant) are still paid by distribution utilities as per the power purchase agreements. On the other hand, electricity generators that did not sign such agreements in the hopes of making windfall profits by selling energy in the power markets, are unable to repay their debts, contributing, in turn, to the non-performing assets of public sector banks (Chandrasekhar 2018).

Solar energy is not available 24 hours a day. The generation profile of a solar plant follows a bell-shaped curve, with generation starting at sunrise, picking up rapidly to reach a peak in the afternoon, decreasing just as rapidly thereafter to reach zero around sunset. This also means that solar energy is not available when power demand peaks, typically in the evening. If one does not have technology in place to store energy when demand is low but generation is high and utilize it when the situation is reversed, then other sources of energy have to be used to balance the rapid entry and exit of solar energy in the grid.

These other sources can be wind, hydro or thermal sources. Wind energy, also a renewable source, varies seasonally, being the highest in the monsoon months when overall power demand is relatively low due to low agricultural consumption and a lower cooling load. In southern India, which currently houses 49% of India's total RE capacity, hydro power plants are being increasingly used to balance RE. However, hydro projects are typically multipurpose, simultaneously serving drinking water, irrigation, and industrial requirements. Their availability therefore is subject to many considerations and not just those of grid balancing in the electricity sector. That leaves the thermal sector, of which natural gas capacity constitutes a very small fraction in India (6.7% of total thermal capacity). This is because India does not have natural gas reserves in abundance and importing gas is expensive as one must do so through pipelines or liquefaction facilities and terminals.

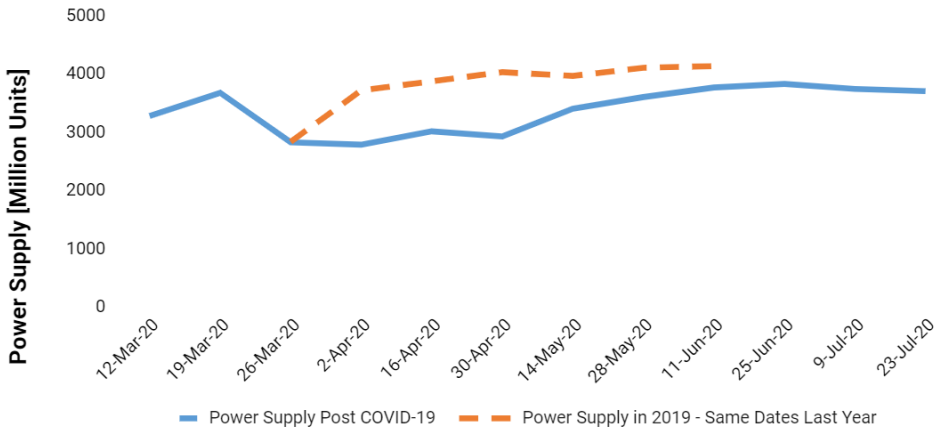
Thermal power plants are therefore being used substantially to balance power supply from RE sources, increasing their cost and reducing their efficiency.

Power sector during and after a nation-wide lockdown

In 2019-20, the overall annual growth in power supply was less than 1%. This was a fall from the previous year's growth of 5.2%, which itself was a slower growth in power supply than between 2010 and 2015 (an average of about 7%). In 2020-21, that is up to July 2020, power supply in fact had contracted by 12.7% .

A sharp drop in demand was seen in the first month of the nation-wide lockdown announced on 25 March 2019 by the Prime Minister, to contain the spread of Covid-19. The lockdown was extended to the end of May and subsequently it has been differentially relaxed across sectors and regions. However, while there is some recovery after the sharp dip of almost 15% in the first month of the lockdown, total power supply remains lower than it was at the same time last year (Figure 1).

Figure 1. All India Power Supply for Select Days Pre and Post Covid-19
(millions of units)



Data Source: Daily Generation Reports of POSOCO (Power System Operation Corporation Limited)

Given the pervasive and continuing impact of Covid-19 on the economy it is very likely that power demand will continue to remain low in the near to medium-term, affecting the capacity utilization of all plants, conventional and non-conventional.

The power sector, already reeling under a crisis of oversupply, is therefore likely to face more difficulties going forward as the supply demand gap increases, unless the power capacity installation targets for the power sector are revised.

Solar technology and energy security

There is a general cry for "green recovery" post Covid-19, underscored by the recent statement made by the Secretary General of the United Nations asking India to phase out coal by 2020. This statement is remarkable in its complete disregard for the economic circumstances in India especially after Covid-19, India's limited responsibility in causing climate change compared with that of developed countries, and for the country's capability to undertake an energy transition that not even the richest countries in the world have been able to achieve.

A call for more and more green energy to replace coal in the power sector also ignores the crucial aspect of energy security that had at an earlier time been a significant focus of energy policy in India. The country's overwhelming dependence on imported oil has been a constant source of worry for policymakers for many decades. The development of the nuclear energy programme has always been defended as a necessity for securing India's independent energy future. However, RE does not seem to be measured by the same yardstick.

> [O]ver the last five years, an average of 83% of India's solar imports have been from China.

While the growth in solar energy capacity in India has been impressive, it must be remembered that India lacks the capacity to manufacture solar panels. The trade statistics published by the Ministry of Commerce and Industry show that India imported 796 million solar cells, panels, and modules, worth Rs. 11,899 crore in 2019-20. Of these imports, 78% came from China. In fact, over the last five years, an average of 83% of India's solar imports have been from China. This is despite a 25% safeguard duty that was imposed in July 2018 on solar cell and module imports from China. Given the current border tensions between India and China, the Government of India is likely to impose a customs duty on imports from China when the safeguard duty, currently in place, expires.

However, the fact remains that Chinese solar panels are cheaper. Turning to private local manufacture of panels or imposing customs duty is likely to have the same impact: increase the cost of energy. If the Government of India wants to become self-reliant in the production of solar energy equipment, it must expand its investment and undertake the development of solar technology in the public sector.

The Jawaharlal Nehru National Solar Mission had a domestic content requirement (DCR) to support and incentivize the local manufacture of solar energy equipment. However, in 2016, a World Trade Organisation (WTO) ruling deemed the DCR violative of its trade rules. A way to circumvent this clause would have been to undertake equipment manufacturing in the public sector. But the government quietly agreed to the WTO ruling and the country is now stuck with being dependent on a private sector that is incapable of competing with Chinese manufacturers. The imposition of tariff barriers on Chinese imports is likely to result in an increase in the cost of solar energy equipment, eventually translating to a higher cost of energy for consumers in India. This will also be inevitable if the targets set for solar energy deployment continue to be aggressively pursued. There is therefore an urgent need to go back to the drawing board, rework plans, and revise the timeline and targets set by the government.

A reworked plan must consider the need to promote domestic production of RE technology by supporting manufacturing in the public sector. Such a strategy would address the challenge of achieving a just transition to renewable energy, giving due consideration to the interests of India's economy and its people.

Additionally, as discussed earlier, the effective utilization of solar energy requires adequate energy storage systems. The two main technologies available for this are Pumped Storage Plants (PSP) and Battery Energy Storage Systems (BESS). In PSPs, the energy generated by solar plants (or other energy sources) when the demand is relative low, can be used to pump water to a higher reservoir and the potential energy of this stored water can be used to run a turbine to generate electricity later in the day, when power demand peaks. BESS works in the same way as any ordinary battery would work but at a much larger scale.

> [T]he rhetoric of Atmanirbhar Bharat seems to have been hollowed out by vested interests and lobbyists providing "policy advice" to New Delhi.

There has been a growing push in the corridors of power in Delhi to promote BESS systems for the effective utilization of solar. This is despite the fact that BESS is currently expensive, though prices have been falling steadily. In the next 10 years, however, the price of energy from BESS is likely to be between Rs. 4 to Rs. 8 per unit of electricity, even if one assumes a sharp reduction in battery prices globally and long hours of discharge for the battery system. Further, India also does not manufacture battery systems domestically. We would therefore be dependent on imports for these as well. On the other hand, PSPs are an older technology and India already has the experience of installing and running PSP systems. The pumps and turbines involved in the PSPs can be easily and cheaply manufactured domestically, and their construction would also create local employment.

The Parliamentary Standing Committee on Energy has in fact identified a potential to install 96 GW of pumped hydro storage capacity in India. We have 4.8 GW of operational capacity currently, 5.8 GW of capacity under construction and 11.2 GW of existing plants that can be converted to PSPs. Unfortunately, here too, the rhetoric of Atmanirbhar Bharat seems to have been hollowed out by vested interests and lobbyists providing "policy advice" to New Delhi.

Conclusions

On the one hand, we have an acute crisis in the power sector, exacerbated now by the economic crisis brought on by the country's response to Covid-19. On the other , we are experiencing ever-growing increasing pressure to pursue "green solutions" touted to be healthy in the short and long-term without regard to the specific technological and economic circumstances in India. A sustainable power sector is both necessary and desirable. However, economic, developmental, environmental, and technological requirements and constraints must be balanced while one decides on a potential trajectory or set of trajectories for the future.

First, the Government of India must revise its RE targets taking into consideration the changing economic circumstances in the country. Recovery from an economic impact of the scale we are currently witnessing will not be immediate. To avoid stranded or non-performing assets in the power sector and a further decline in the health of the sector, the targets and their timelines must be revised.

> The hype around India's RE [renewable energy] plans, evident in ever increasing ambition in the announcements made by the prime minister, is likely to backfire.

Second, a careful discussion of domestic requirements and the best possible means to meet them should be a central aspect of a plan for the power sector. High levels of unemployment and underemployment cannot be addressed without a plan to enhance industry. This would run into certain constraints on the fuel supply options and the pace of transition for the energy sector. For example, if the

country has to enhance agricultural productivity through mechanisation and increased irrigation, as well as expand industrial production and intensify labour absorption, then it requires the supply of "base load power", i.e. power that is supplied continuously throughout the day and across the year. This is possible if we use sources of energy that can supply such power, such as coal or nuclear power plants, or supplement variable RE sources with storage technologies.

Wild forecasts for the future based on unreasonable estimates of expected GDP growth should be avoided. However, a set of reasonable scenarios can be constructed to transparently evaluate the array of possible options of energy supply, based on cost, environmental impacts, availability of technology, and the specific character of India's fuel consumption patterns.

Third, as a responsible member of the global community, India must do its fair share to mitigate climate change. However, this fair share should be determined by the extent of its responsibility in causing climate change and its capability to mitigate the effect of this change. We must not forget that India is vulnerable to the impacts of climate change and protecting our people from these impacts should be our priority. A strategy for the energy sector should therefore balance the requirements of mitigation with increasing the resilience of our people to the impacts of climate change. A balanced view of these requirements would enable a more scientific plan for a transition in the power sector.

> [P]olicies that are driven by target-setting without manufacturing capacity to back these targets will be detrimental to a just and equitable transition in the power sector in the long term.

Fourth, a planned energy transition should focus on energy security, not as a reaction to international aggression but as a desirable goal to enhance domestic productive capacity and labour absorption. This would mean that all available technology options must be considered transparently without obscuring existing knowledge about them. The policies being pursued by the government currently are antithetical to the creation of a truly Atmanirbhar Bharat. The hype around India's RE plans, evident in ever increasing ambition in the announcements made by the prime minister, is likely to backfire. The bizarre advice from the UN Secretary General to India, to phase out coal by 2020 is an example of such an effect. An honest and people-centric attempt at creating an energy secure country would mean a focus on developing domestic capacity for the production of required technology.

In summary, it must be emphasized that policies that are driven by target-setting without manufacturing capacity to back these targets will be detrimental to a just and equitable transition in the power sector in the long term. At the current juncture, when the country, is facing an unprecedented economic crisis, we must redraw the plan for the power sector: a plan that is not driven by pre-existing notions of green recovery or fossil fuel expansion, but one that takes a transparent and scientific view of all available options and charts a pathway that protects and furthers the interest of the people.

References:

Chandrasekhar, C., P., (2018). Non-performing Power Sector Assets: Signalling a Larger Crisis, *Economic & Political Weekly*, Vol. 53, No. 37

Central Electricity Authority Monthly Reports Archive

Energy Statistics 2020, Ministry of Statistics and Programme Implementation