A Deal for the Planet

The latest attempt at saving the planet from the dangers of climate change has paid off. However, the power sector has to gear up for the new dynamics it brings in.

The world was expected to arrive at a time to pay for its sins and excesses by 2050, if the activities resulting in climate change were to go unchecked till then. To stem the rot, at least from now on, the heads of about 200 governments gathered in December 2015 in Paris to strike out a path for limiting the havoc the climate change could cause.

The now-or-never dialogue ended on a positive note with all of them arriving at an agreement on the collective steps to cap the planet's temperature rise below $2^{o}C$ from the climate level seen at the beginning of the industrial revolution (about 1750), by 2030, which has been signed, sealed and delivered to the people of the world. The nations will also pursue efforts aimed at the more difficult objective of pegging temperature rise under $1.5^{o}C$. The agreement also proposed for instituting a regime of financing of developing economies to help make the transition. Now, the stage is set for all the countries to move to a low carbon pathway with the Paris Agreement on climate change, which is scheduled to go into

effect from 2020.

Voluntary pledges, called intended nationally determined contributions (INDC) made by individual countries to peak their greenhouse gas emissions that are warming the atmosphere and changing the climate underpinned the agreement at the Paris Summit that concluded on December 12, 2015.

India, the third biggest emitter of greenhouse gases as a country after China and the United States, was one of the countries in the spotlight at the Paris Summit, having made an ambitious commitment of bringing down greenhouse gasses (GHG) by 30-35 per cent from the levels seen in 2005. Several of India's commitments made to the **United Nations Framework Convention on Climate Change (UNFCCC)** are expected to impact the strategies of power sector players in India the next 15 years, if not more.

IN UNISON

Perhaps this is one of the rare occasions during the last half-a-century where the developed and developing countries have read from the same "climate change" script, even though they were not on the same page on several finer points. Developed countries used to keep away from making any commitments for reduction of climate change, earlier. The big fight was between the US-led umbrella group and others' bloc of developing and less developed nations, who were at the receiving end of the climate change impact. Unfortunately, nobody had been looking beyond their own national interest.

There were a lot of compulsions for the developed countries to change their approach to climate change, which has reached a tipping point, before they reached Paris. **Dr Manish Kumar Shrivastava, Fellow, Earth Science and Climate Change Division, The Energy and Resources Institute (TERI)** says, "The primary compulsion for the Paris summit was political. After the failure of Copenhagen meeting (in 2009), significant amount of political capital was invested in rebuilding the trust and finding a pragmatic global agreement. Another failure in reaching any agreement was perhaps politically not viable. A corollary to this was the common denominator of acceptability for countries, particularly the US, China and India. This happened to be non-legally binding climate commitments, which form the basis of Paris Agreement."

"The second compulsion was the shrinking window of opportunity to stay within the possibility of restricting the temperature rise to below 2^{0}C from pre-industrial levels," Shrivastava added.

SALIENT FEATURES

Besides, setting a firm target of cap the planet's temperature rise below 2^{0}C from pre-industrial levels, the Paris Agreement enjoins upon the developed countries to raise finances with $100 billion per year as the floor by 2020, to help developing nations in both mitigation and adaptation activities, while other nations are encouraged to provide funding voluntarily. However, any basis for liability of countries which have historically accumulated greenhouse gases in the atmosphere causing disastrous climate events such as droughts, floods and extinctions, has been excluded.

Road to curb global temperature rises

The goal of the 2015 Paris Climate Conference, CoP21, is to keep average global temperatures no more than 2°C above pre-industrial temperatures.

Global mean temperatures above pre-industrial levels

- 1850-1900

Average temperature 13.7°C

- 1.0°C

Temperature rise expected to surpass 1°C in 2015

- 2.7°C

Forecast warming† by 2100 even if all COP21 pledges are implemented

- 4-5°C

Forecast rise by 2060 if current emissions levels continue

- 2.0°C

2010: 193 nations sign Cancun Agreements committing governments to "hold increase in global average temperature below 2°C above pre-industrial levels"

- 3-5°C

Warming on existing emissions-reduction policies. Low-lying island states at risk from rising sea levels

Note: Accurate assessment of temperatures in 1750s – when industrial revolution began – is difficult. To overcome problem, climatologists use average temperatures recorded between 1850 and 1900.

Sources: UK Met. Office Hadley Centre, Climate Action Tracker, WMO

"THRUST ON SUSTAINABLE ENERGY SOURCES AUGURS WELL"

Ashish Khanna | Chief Executive Officer and Executive Director, Tata Power Solar

How do you look at the Paris Climate Change summit outcome?

We were pleasantly surprised to see a more positive and concrete outcome in this particular summit versus Copenhagen. Perhaps the earlier expectations were a bit higher. May be a lot of groundwork has happened this time leading to a positive outcome and intent in this summit.

How do you see the summit outcome affect the power industry in general and solar sector in particular?

The summit, virtually, has put a lot of thrust on sustainable energy sources vis- -vis fossil fuels that have been a staple source of energy for a number of countries, and that is a major shift that is visible in the outcomes of this meet. The summit's impact on the power industry is, yes. In fact people have realised that fossil fuels cannot grow in the manner it has been growing in the last 25 years as a source of energy and hence we may need to rely on sustainable and renewable energy sources like solar, which is and will play a critical role in providing that energy source. In a nutshell, there is a big shift from fossil fuel energy sources to renewable energy (RE) sources and this is very critical. There are a few things that have come out as takeaways: The intent is Intended Nationally Determined Contributions (INDCs). And also intent is to hold the temperature rise to 1.5 degree level.

(For full interview, log on to www.powertoday.in)

The first global evaluation of the implementation of the Paris Agreement is to take place in 2023, and thereafter every five years to help all countries. Pledges by countries with an end date of 2025 or 2030 will need to be updated by 2020, and enhanced action every five years thereafter. It will also be possible for countries to cooperate voluntarily, form groups of nations for climate goals, and use both public and private finances, market and non-market mechanisms to meet the objective. A facilitative dialogue of countries is to be held in 2018 to review the collective efforts, and the Intergovernmental Panel on Climate Change is to be asked for a special report in the same year, on the impacts of global warming of 1.5^{o}C above pre-industrial levels.

A heaving of a sigh of relief was palpable among the environmentalists and civil society groups after clinching the deal on December 12, 2015, though the latter had to go home with some unfulfilled wishes.

Prime Minister Narendra Modi tweeted after the conference that 'it was a win for climate justice.'

"We were pleasantly surprised to see a more positive and concrete outcome in this particular summit versus Copenhagen. Perhaps the earlier expectations were a bit higher. May be a lot of groundwork has happened this time leading to a positive outcome and intent in this summit," **Ashish Khanna, Chief Executive Officer and Executive Director, Tata Power Solar** said in an exclusive interview to Power Today.

"As far as an agreement is concerned the Paris summit has achieved its objective. We do have an agreement with provisions of continuous revision of commitments from countries and tracking the progress towards the 2^{o}C goal," said Shrivastava.

Union Environment Minister Prakash Javadekar expressed happiness that the text addressed the concerns raised by India in almost all areas — mitigation of carbon emissions, adaptation to climate change, financing, technology development and transfer, capacity building and transparency. He said there were some concerns, which he would raise at the Plenary.

THE COMMITMENT

India has pledged to reduce its GHG emissions intensity — the ratio between a country's gross emissions to its gross domestic product at a particular point — by 33-35 per cent by 2030, compared to 2005 levels. For this, India announced that it will ensure about 40 per cent of its electricity comes from non-fossil fuel sources. India has also committed to increase its forest cover to create an additional carbon sink of 2.5-3 billion tonnes of carbon dioxide equivalent. These targets, under INDC, were

"POWER & TRANSPORT SECTORS NEED TO TRANSFORM"

Dr Manish Kumar Shrivastava | Fellow, Earth Science and Climate Change Division, The Energy and Resources Institute (TERI)

Which environmentally sensitive industries have to mend their ways and help in achieving Paris summit targets?

Power and transport are the most critical sectors that would need to be set on the immediate transformation trajectory. Here the scope of high emission lock-in in terms of infrastructure is large and they are also expected to grow significantly.

Higher efficiency in power generation along with increasing share of renewable energy is critical. Move away from private transportation and towards electrification of transport services will enable achievement of emission reductions envisaged in the INDCs of different countries. Another sector, that would need careful development trajectory is the buildings sector. Energy efficient buildings will play an important role in decoupling energy demand from the rates of urbanisation in coming decades.

Do you think Paris Summit has achieved its objectives?

As far as an agreement is concerned the Paris summit has achieved its objective. We do have an agreement with provisions of continuous revision of commitments from countries and tracking the progress towards the 2oC goal. Whether or not it will be able to achieve this goal is a different matter and only time would tell. Success would depend a lot on how determined countries are to deal with climate challenge.

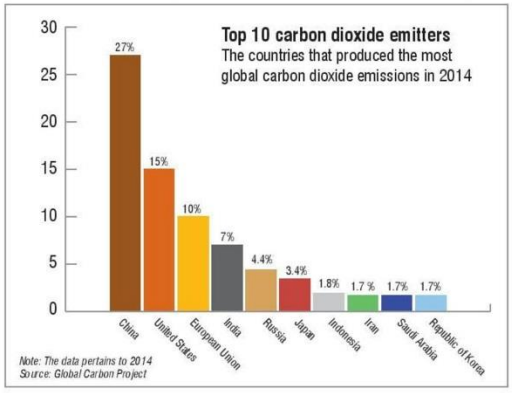
(For full interview, log on to www.powertoday.in)

presented to UNFCCC ahead of the Paris summit on October 1, 2015. Thus, it is more ambitious than what it committed to in 2010 - to reduce the emissions intensity of its economy 20-25 per cent compared to 2005 levels by 2020.

Up to 2030, these emission intensity-reduction targets and adaptation to climate change will require about $2.5 trillion, besides an array of technologies, India said. It had committed to mobilise new funds from developed countries and said it would work to build an international architecture for diffusion of cutting-edge technologies, as well as collaborative research and development in this regard.

India was one of the fiercest advocates of UNFCCC principle of 'Common but Differentiated Responsibilities' ensuring equity among the commitment of nations to curtail climate change at the 21st meeting of the Conference of the Parties (CoP21) as the summit is officially called. Ultimately, joining the forces with several developing nations, India was successful in getting this principle incorporated in the Paris agreement.

While making its submission on INDC, India has also said, "The successful implementation of INDC is contingent upon an ambitious global agreement, including additional means of implementation to be provided by developed countries, technology transfer and capacity building,



COVER STORY

"LOOKING AT IMPLICATIONS, NOT AT CHANGING STRATEGIES"

Pramod Menon | Director-Finance, JSW Energy

What will be the impact of the Paris summit on corporate strategies of the power sector? Do they have to redraw their strategies in the wake of its outcomes?

At this point in time we are not thinking of changing strategies, but looking at implications. As a responsible company we also plan to interact with the government on the MoEF norms, the direction of which is going that (Paris Summit) way. And we are all preparing the Indian companies to be nimble footed and tighten them particularly in terms of automobile industry, particularly in terms of upcoming BS-VI norms and skipping BS-V. As a society also we are being prepared for these kind of norms. Ultimately, it will benefit the humanity.

Traditionally power companies are saddled with old technologies, unlike you who have started off with modern technologies. To what extent it is difficult to implement policies directed at achieving the Paris Summit outcomes?

Implementation is not an issue if we are clear about how much investment is required and how much pain we have to bear and how much of it should be shared.

Whether you will be in a position to share the pain with the customer, is the issue...

It all depends on how you have entered into PPAs with distribution companies, and so say if something has to be successful there should be a meaningful sharing of the pain. Ultimately, it has to be shared by the customer as well.

(For full interview, log on to www.powertoday.in)

following articles 3.1 and 4.7 of the convention."

Javadekar said while a large proportion of funding would come from domestic sources, developed countries were obliged to provide funding and technology. "We were not part of the problem but we want to be part of the solution," he said, adding on several emission metrics, India was and would remain well below developed-world levels, though it had a huge development deficit to bridge in the coming decade-and-a-half.

However, India did not succumb to pressures from some developed countries to undertake sector-specific targets. India has explicitly stated, "India's goal is to reduce overall emission intensity and improve the energy efficiency of its economy over time and, at the same time, protect the vulnerable sectors of the economy and our society."

Nitin Pandit, CEO of the World Resources Institute in India, said: "As one of the most vulnerable countries to climate change, India recognises the domestic benefits of confronting this issue. Its climate plan does a good job combining opportunities to reduce emissions in the near term, and it includes clear goals to restore landscapes that will bring long-term benefits."

RIGHT EARNEST

Time-bound initiatives in the power sector would be crucial for achieving the Paris summit targets which are intended to save the planet. Responding to a query, Shrivastava of TERI said, "Power and transport sectors are the most critical sector that would need to be set on the immediate transformation trajectory. These are the sectors where the scope of high emission lock-in in terms of infrastructure is large and they are also expected to grow significantly (going ahead)."

Higher efficiency in power generation along with increasing share of renewable energy is critical. Move away from private transportation and towards electrification of transport services will enable achievement of emission reductions envisaged in the INDCs of different countries. "Another sector, that would need careful and cautious development trajectory is the buildings sector. Energy efficient buildings will play an important role in decoupling energy demand from the rates of urbanisation in coming decades," Shrivastava explained.

Already India has embarked on an action plan to reduce emissions and adapt to climate change, most of which impact the power sector strategies at least during the next 15 years. These include the ambitious target of setting up 175

How India's INDC compares to others *(all targets for 2030)*

Country	INDC promises
China	1. Achieve peaking of carbon dioxide emissions around 2030 and make best efforts to peak early 2. Lower carbon dioxide emissions per unit of GDP by 60 to 65 per cent from the 2005 level 3. To increase the share of non-fossil fuels in primary energy consumption to around 20 per cent 4. To increase the forest stock volume by around 4.5 billion cubic meters on the 2005 level.
India	1. Reduce emissions intensity of its GDP by 33 to 35 percent by 2030 from 2005 level. 2. Achieve about 40 percent electric power installed capacity from non-fossil fuel based energy resources by 2030 with help of transfer of technology and low cost international finance 3. Create an additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent through additional forest and tree cover by 2030.
European Union	At least 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990
South Africa	Let its emissions peak between 2020 and 2025, plateau for approximately a decade, and decline in absolute terms thereafter
Russia	Limit greenhouse gas emissions to 70 to 75 per cent of 1990 levels by 2030
Japan	Reduce emissions by 26 per cent by 2030 compared to 2013 levels (25.4 per cent compared to 2005)
United States	Reduce emissions by 26 to 28 per cent below 2005 levels in 2025; make best efforts to reach upper level
Brazil	Reduce greenhouse gas emissions by 37% below 2005 levels in 2025. Reduce it further, by 43% below 2005 levels in 2030

GW of solar and wind power capacity by 2022 and an enhanced energy-efficiency mission across industrial sectors. It also promises to increase the share of renewable energy in the energy mix that will be required to take the non-fossil fuel power capacity to 40 per cent. The INDC also unveiled the government's plans for introduction of new, more efficient and cleaner technologies in thermal power generation, reduction of emissions from the transportation sector, promotion of energy efficiency in industry, transportation, buildings and appliances, and reduction of emissions from waste.

BOOSTING CAPACITIES

India is aiming for a total installed power production capacity of somewhere around 800 GW in 2030, almost a three-fold jump from the current levels. To fulfil this commitment, it would have to install 320 GW of non-fossil fuel capacity by that time. The 63 GW target for nuclear energy for 2032 is unlikely to be met considering that most of the nuclear projects are running several years late. The current installed capacity of nuclear energy is only 5.7 GW. Hydropower currently contributes about 42 GW of capacity. Considering the kind of opposition to big dams now, it would be a difficult task to double the capacity in the next 10 to 12 years as is being planned.

It would, therefore, fall on the renewable energy sources — solar, wind and biomass — to achieve the 40 per cent target India has set for itself. The government has already unveiled an ambitious programme

of installing 175 GW of renewable capacity by 2022. If this is achieved, adding another 50 GW in the next eight years would not be a very difficult task.

"The summit, virtually, has put a lot of thrust on sustainable energy sources vis- -vis fossil fuels that have been a staple source of energy for a number of countries, and that is a major shift that is visible in the outcomes of this meet. The summit's impact on the power industry is, yes. In fact people have realised that fossil fuels cannot grow in the manner it has been growing in the last 25 years as a source of energy and hence we may need to rely on sustainable and renewable energy sources like solar, which is and will play a critical role in providing that energy source. In a nutshell, there is a big shift from fossil fuel energy sources to renewable energy (RE) sources and this is very critical," Khanna of TPS said.

STRATEGIC SHIFT

The Paris accord has been successful in sending a resounding signal to the markets that the era of fossil fuels is gradually approaching an end to meet its goal. This is set to change the dynamics of the power sector in India, particularly coal-based power companies have to rush to drawing board to redraw their long term strategies, while renewable energy sector has to gear up their plans to meet the country's target of 175 MW by 2022.

"Solar is a new technology, it has compatibility and is competitive. As such it is going to give to coal-based power, especially the imported coal-based power generators, a tough time at the grid level tariffs. As you said these people have to rush to their drawing boards and revisit their models. All those companies which are primarily relying on coal-based power will have to revisit their financial requirements and also the tariffs," says Khanna.

However, **Pramod Menon, Director-Finance of JSW Energy** said, that his company was not thinking of changing strategies at present, "but (we are) looking at implications." However, as a responsible company, we also plan to interact with the government on the MoEF norms, the direction of which is going that (Paris Summit) way," Menon added.

"As far as an agreement is concerned the Paris summit has achieved its objective. We do have an agreement with provisions of continuous revision of commitments from countries and tracking the progress towards the 2°C goal," Dr Manish Kumar Shrivastava, TERI.

Increasing the share of non-fossil fuel energy in power generation is one of the major commitments of India. India has said 40 per cent of the total installed power capacity in 2030 would be based on non-fossil fuel based sources. At the end of July 2015, renewable energy, nuclear energy and hydropower — all non-fossil fuel sources — together contributed 30 per cent of the overall installed capacity.

FOSSIL FUELS

India is also taking steps to address climate change issues pertaining to transportation sector also. The transportation sector in India today accounts for 60 per cent of the demand for oil. The balance is consumed by industry (25 per cent), residential and commercial establishments (10 per cent) and electricity (5 per cent). Looking though a linear eyeglass, oil looks like it will retain and indeed increase its monopoly share well into the future. This is because there are no obvious scalable alternatives. Natural gas is a possibility but massive investments in pipelines, etc, have to be made and engines have to be redesigned. Biofuels are also an option, but they compete with agriculture and are not as energy efficient as gasoline.

Recently, the **International Energy Agency (IEA)** has projected that coal and oil will remain the bulwark of the future global energy system and that China and India will be the drivers of fossil fuel demand, adding credibility to fears expressed by some experts. It has estimated that India's oil demand will increase from 3.6 million barrels per day (mb/d) today to around 10 mb/d by 2040, and that it will be the largest incremental contributor to coal demand in the world. That way Paris summit and the IEA are not mutually consistent. Narendra Modi's suggestion for global "partnership" and "innovation", seems to be the only way out from this impasse.

FINANCING

Climate finance, which has been a regular bone of contention at the negotiations—failed to see any scale of ambition. Developed nations agreed to raise $100 billion annually by 2020, with a commitment to enhanced financing thereafter. The nature of finance, its source, accounting and distribution remains unresolved and deeply contentious. An Organisation for Economic Cooperation and Development (OECD) report earlier this year claimed that climate finance had reached $62 billion in 2014 but the numbers were quickly dismissed by several member countries.

India sought $2.5 trillion in finance for achieving its INDC by 2030, so a global commitment of $100 billion pales in comparison. The coming few years will consequently witness a greater push for materialising this finance through a variety and public and private channels.

If we are to replace coal, we need access to cleaner energy sources and technology at a viable cost. Even with the huge strides we are making in the direction of renewable energy sources, to do more, at a faster pace, we need help from developed nations. That's why international contributions towards the development and generation of greener technologies should be increased at the earliest possible opportunity through global carbon pricing, and by incentivising companies in the developed world to invest and share their research and development in this area, India says.

The Paris accord isn't legally binding on two key aspects. There is no obligation on developed nations to enhance mitigation targets or increase climate finance.

Countries are instead tacitly relying on a system of naming and shaming nations to influence climate targets. One of the key points on the table for the island nations was the question of loss and damage. How will the developed world pay for climate-related disasters that are impacting vulnerable nations today? The accord acknowledges the impacts but does not provide a basis for liability or compensation. The legally-binding nature of the agreement is on developed nations to report progress on the climate finance being delivered to developing countries on a biennial basis, and mitigation targets with a five-year review mechanism starting in 2018.

Photo Courtesy: Le Monde

Achieving a 33-35% reduction in emissions by 2030 is going to be a slightly difficult task for India

LOOKING AHEAD

Achieving a 33 to 35 per cent reduction in emissions by 2030 is going to be a slightly difficult task for India, considering that the low hanging fruits have already been plucked, though officials say it is achievable. The progress in emission intensity reductions thus far has been enabled mostly by energy efficiency measures, like the shift first to CFL bulbs, and then to LED lights. From here on, however, industry-wide efforts would be required to take the emission intensity further down.

India has been banking heavily on its afforestation drive to score some easy points in the international climate change negotiations. In its INDC, India has said it wants to create an additional carbon sink of 2.5 to 3 billion tonnes of carbon dioxide equivalent by 2030. An afforestation fund was set up for redevelopment of forests to 33 per cent of geographical area in 2005, from 24 per cent now and to develop 140,000 km of tree-line along both sides of national highways. But, the ability of trees, or plantations, to act as a carbon sink is limited as compared to natural dense forests, according to experts.

Even if fossil fuels continue to remain relevant in the energy system, innovation can ensure they have a cleaner impact than today. The key solution to this impasse can be found through global partnership towards a future in which these fuels will inexorably lose their pre-eminence. The next-generation clean energy technologies like carbon capture and sequestration, cellulosic biofuels (so that there is no competition with agriculture), hydrogen fuel cells and safer nuclear reactors can be taken up on a war footing from the pilot and demonstration level to commercial applications through this joint effort.

The power sector companies that are mostly coal-based may have to diversify into renewable energy sources too in the times to come, so that they can manage transitions in the wake of emergence of any disruptive or breakthrough technologies in the next two decades.

However, the journey towards 2030 destination may have several detours in policies, technologies and funding, and the industry should be prepared for any kind of eventuality. PT

— BS SRINIVASALU REDDY