

INDIA
ENERGY
FORUM

17th Annual General Meeting

**ADDRESS OF THE PRESIDENT,
INDIA ENERGY FORUM**

INDIA
ENERGY
F O R U M

OUR VISION

To Contribute Effectively for Development of Sustainable Energy Security for India

OUR MISSION

- To help evolve a dynamic national energy policy
- To provide a platform for deliberation and recommendations towards development of competitive energy sector.
- To advise and assist the stakeholders in formulation and implementation of policies and programmes in energy sector.
- To promote a favourable regulatory framework for development of energy sector.
- To contribute towards optimal, efficient and sustainable use of energy resources.



A very warm welcome to fellow Members, ladies and gentlemen to the Annual General meeting of your Forum. This Annual Assembly gives us an opportunity to dwell on the larger macro energy scenario.

Since we last met on March 25, 2018, the global and Indian energy and political landscape has continued to show volatility and greater uncertainty. The impending Energy Transition that we deliberated upon the last time is definitely on top of the global agenda of climatologists, and environmental pollution in cities, particularly in our own Indian context, is a subject of heightened concern and debate. It is not as if environmental deterioration has suddenly set

in. These concerns are bound to grow with greater awareness, transparency and a desirable urge to remain healthy. The satisfaction level of the citizen's energy needs has improved and his expectations from the State have also increased, and will continue to increase in a year of national elections. The satisfaction and affordability of energy needs at home, in the kitchen, at the workplace or farms, and also for transport, will continue to be high priorities for governments at the Centre and State level and the citizen. While the generation of electricity is almost entirely a domestic issue, the affordability of petrol, diesel, LPG, CNG and Natural Gas is highly dependent on the vagaries of international oil and gas markets and geopolitics of oil. Availability is never an issue, it is the affordability which conflagrates, national and domestic budgets.

The satisfaction of the energy needs of a developing country with the world's second largest population, a substantial population living below the poverty line, and also in employment transition from shrinking land holdings and un-remunerative agriculture to cities, coupled with increasing educational and aspirational levels, is an unenviable task for any government at the federal and state level. The situation is often aggravated by populist sops and competitive political agendas, geared to garner a larger share of electoral votes. A democratic process compels the removal of poverty and inequalities, without the compulsive processes and discipline of a totalitarian system. Competitive compulsions of economic and infrastructural amenities, without the harsh instruments of enforcement in an environment of constitutionally guaranteed liberties and freedoms, provide a constant challenge to budgetary resources, and the public implementation agencies. The temptation to go politically overboard is always there. Modern media and IT have made the world a global village, in which literacy is no longer a requirement for political awareness. A growing malady is Breaking News, which propels those in authority to make pronouncements and commitments which may never meet their stated timelines in a country as vast, diverse and complex as India.

When we met at this Forum last year in March, the major global consensus was the agenda and the nationally determined contributions by nations across the globe to address the impending and urgent issue of climate change at CoP 21 in Paris. A definite shift from carbon emitting fossil fuels to non-fossil sources of energy was almost universally agreed upon. It was thought an imperative to contain a global temperature rise to below 2°C from pre-industrial levels, and greenhouse gas emissions. Meanwhile, the Intergovernmental Panel on Climate

Change (IPCC) has submitted its tasked special report on October 6, 2018, at Incheon, Korea on the impacts of global warming of 1.5°C above pre-industrial levels, and related greenhouse gas emissions, in the context of strengthening the global response to the threat of climate change, sustainable development and efforts to eradicate poverty. A major finding was that adhering to the nationally stated mitigation measures at Paris would lead to GHG emissions of 52-58 Gt CO₂ eq emissions a year in 2030, and would not limit global warming to 1.5°C. A temperature rise of 2°C could be very catastrophic. Thus the threshold now seems to be 1.5°C above pre-industrial levels and not 2°C as was being envisaged earlier. This makes it imperative to decarbonise energy sources and a greater challenge for a developing country like India, which in any case has very low per capita energy consumption and does not occupy large per capita historical space, unlike the developed countries. India is also waging a creditable battle against poverty. The irony is that in 2018, the USA which is the world's wealthiest nation, having one of the highest per capita emissions, has declared that it has walked out of the CoP21 consensus at Paris. It cannot constrain its development. At the same time, the USA has become a net exporter of oil and could be the world's largest producer as well. It has also imposed sanctions on trade of oil with Iran and Venezuela, two of the largest oil producers, with some concessions. Such is the geopolitics of Climate Change and Oil.

Getting back to the global agenda of Energy Transitions, some home truths and realities need to be recognised, as has been revealed in studies from the developed world last year, based on statistics for 2014.

The energy consumption per capita in 2014, in Giga Joules (GJ) was 22 for Ethiopia, 28 for India, 31 for Nigeria, 93 for China, 144 for Japan, 219 for Russia, 229 for Australia, 290 for USA, and 294 for UAE/Saudi Arabia. The average for Non OECD was 56, for OECD 177, and the world 100GJ. The Average required for a good living standard is 100GJ. An equitable shift to a desirable Energy System would require energy consumption of 80-100 GJ per capita. The Annual Carbon Emissions have to come down from 36 Gt of CO₂ to 20Gt by 2040. This has been proposed to be achieved by

- (i) Decarbonising Energy Supply by increasing the share of energy from zero carbon sources by 1% a year, and
- (ii) Though improvement in Energy Productivity, by enhancing GDP per unit of energy to 3% compared to 1.7% per annum at present.

Such a transition can possibly be attained through Decarbonisation of power, combined with extended electrification, Decarbonisation of activities which cannot be cost effectively electrified, acceleration in the pace of Efficiency Improvement, and a Consistent, Predictable, and Well-funded Policy Framework. The optimisation of fossil fuel use has to be attained by giving space to Developing Countries and switching from Coal to Gas, and Coal to Liquids and Coal to Chemicals, particularly in coal rich countries. The action on Climate Change taken so far by G20 countries seems to indicate that global temperature is set to rise by 3.2°C by 2030, while it would be 4°C on the path taken by US, Russia, Saudi Arabia, <3°C by EU, UK, Australia <4°C by China, Canada, Japan and <2°C by India. While this is good news from India, the bad

news is that GHG emissions had stalled between 2014 and 2016, globally, but have increased again in 2017 and CO₂ emissions reached a global high in 2018.

The World Energy Outlook 2018 released by the International Energy Agency (IEA) in November 2018, has some well analysed forecasts for the future. India is now an Associate Member of the IEA along with China. Earlier, it was a body of the Developed Countries (OECD). It works on present trends and two future scenarios, namely the New Policies Scenario (NPS), based on policies adopted or agreed to by countries, and the Sustainable Development Scenario (SDS) based on more optimistic desirable energy actions and scenarios based on almost ideal demands of the future, addressing climate change concerns.

The following are the findings:

- There are mixed signals about the pace and directions of change in global energy
 - i. Oil markets are entering a period of renewed uncertainty and volatility
 - ii. Natural Gas is on the rise, with China in the lead for growth
 - iii. Solar PV has shown great progress and momentum while other key technologies and efficiency need a push
 - iv. Energy related CO₂ emissions could reach a historic high in 2018
 - v. For the first time in recent decades the global population without access to electricity fell below 1 billion.
- Electricity is the hope of the future, but questions remain over the extent of its future reach and how the power systems of the future will operate.
- In 2000, more than 40% of global demand was in Europe and North America, and 20% in the developing economies in Asia. In 2017, China was by far the leader followed by US, EU and India. In 2040 the situation is completely reversed with China, US, India, Africa and EU, as leaders, in that order of consumption.
- In the period 2017 – 2040 Renewables will grow more than twice in Developing Economies, compared with Advanced Economies. Nuclear will go up substantially in the Developing Economies and will come down in Advanced Economies, and the same is the case with Oil and Coal. However, Gas consumption will go up in all economies, though nearly five times more in the developing ones.
- China will lead Gas Imports in 2040, almost level with EU at 380 bcm. LNG will overtake pipeline gas trade in long distance trade compared with 2017.
- Integration with Variable Renewables like Wind and Solar PV was highest for Germany 22%, UK 18%, EU 15% in 2017. The situation is expected to be 55% for UK, 50% for Germany, 35% for EU and around 20% for India and China in 2030.

ADDRESS OF THE PRESIDENT, INDIA ENERGY FORUM

- The future growth markets for nuclear till 2040 are China (120GW), India (30GW) and Russia (10GW).
- Increased electrification could lead to a peak in Oil Demand around 2030.
- Coal Plants make up 1/3rd of CO₂ emissions today and half are less than 15 years old, and will need Carbon Capture and Utilization, Efficient Operations and Technology Innovations in their future useful life.
- Geopolitics and Energy are getting more interlinked and complex, with a greater bearing on energy security and prices.
- Rapid growth of electricity brings new opportunities, but market designs, flexibility and prudent government policies are crucial.
- Government policies and actions will determine the future energy destiny.

The India Energy Forum has been very active through the year with its well-crafted, comprehensive and very well attended 7th Coal Summit 2018, Conference and Expo, the 21st India Power Forum, (a record run), the 10th Nuclear Energy Conclave and the 18th Renewable Energy Summit, to be followed by 16th Petro India very soon. These extensive conferences attended by top energy practitioners and strategists from the government and private sectors have discussed and debated national issues in great depth and have given policy makers very useful inputs from a non-partisan, non-commercial-interest-linked platform. These have been supplemented by very frank and informative sessions of Urja Vichar Manch ranging from Cross Borer Energy Trade to Stressed Assets in the Power Sector and Electric Mobility.

My address and Report to you will not be complete without highlighting and flagging some of the key achievements and concerns relating to Power, Coal, Oil and Natural Gas, New Renewables, and Nuclear Sectors in India.

The Energy Landscape in India is marked by a mix of State owned monopolies in the Coal, Petroleum, Gas and Nuclear Sectors and a mix of State and Privately Owned Generation in the Non-Nuclear Power Sector, with largely State Owned Transmission and almost entirely State Owned Distribution, a legacy of the State Electricity Boards. Coal transportation by rail is entirely in the government sector. The rail freight tariff heavily subsidises the passenger tariff. The nascent Electricity Regulatory apparatus is state appointed, and is moving towards transparency. Wherever it exists, it is trying to maintain a fine balance between a free market and state monopoly. Nuclear power, Coal and Petroleum are in the domain of the Central Government.

The installed capacity in the Power Sector at the end of December 2018 stood at 3,49,288 MW, dominated by Coal at 1,91,092 MW, Lignite 6360 MW, Gas 24,937 MW, Diesel 637 MW, Nuclear 6780 MW, Hydro 45,399 MW and New Renewable 74,081 MW. The significant shift has been in the change of ownership in power generation, with the Private Sector owning 46% at 160958 MW, the State Sector 30% at 104408MW and the Central Sector 24% at 83921 MW. 14974 CKm of high voltage transmission was added from April 2018 to December 2018, against 16236

CKm from April 2017 to December 2017. Similarly, 48055 MVA Transformation Capacity was added between April to December 2018 against 63,765 MVA last year. The All India Energy Deficit level was 0.5%, with 1.8% in the North East and 1.4% in the North. The reported Peak Deficit was 2% in the North and 0.8% in the country. The average power supply to the Agriculture Sector ranged from about 4 hours to 24 hours across the country. The biggest achievement in the country has been the landmark 100% achievement of electrification of all Census villages of the country on April 28, 2018, after nearly 2 decades of the national resolve to do so. The pace of household electrification has also picked up and 99.85% villages have attained saturation. The rest will also be covered soon. In a major Demand Side Management programme, nearly 32 crore LED bulbs have been distributed under the UJALA schemes and 75 lakh LED street lights have been installed. There is no dearth of acronyms, dashboards and initiatives in the power sector. However, the major source of worry is the continuing shortfall in the targeted reduction of AT&C losses under the UDAY Scheme for power distribution entities. At the end of December 2018, the AT&C losses stood at 21.1% against a target of 15% by March 2019. There was a reported improvement of only 0.4% over one year. In an election year, the scope for any further improvement appears dim. Uttar Pradesh with 31.24%, Bihar 38.9%, Jharkhand 36.1% and Chhattisgarh 29.8% continue to be the biggest laggards.

The gap between the Cost of Supply and the Revenue Realised stood at Rs.0.28 per unit. There seems no way, other than delicensing the inefficient electricity distributors across the country. The distribution sector is also causing huge distress to the generating sector. The worst sufferers are the private sector generating companies as they cannot take recourse to adjustments or transfers from the State revenues under the securitisation scheme. The total Outstandings from the Discoms is around Rs.45,000 Crore with Rs.9,000 Crore in the wind sector. The major defaulting states are UP, Karnataka, Tamil Nadu, Rajasthan, Telengana and Bihar. The Stressed Assets in the power generation sector stand at about 45,00 MW.

This has a direct bearing on the health of the financial sector. The debt resolution process is ongoing, with asset acquisitions by new owners, or consolidation of a few lead players. However, till the demand for electricity in the manufacturing sector picks up, there may be no easy resolution to the capacity glut. The Plant Load Factor (PLF) of Private Sector Generation Companies continuous to be low. Privatisation of power generation which moved very swiftly post the Electricity Act 2003, making the private sector, the biggest contributor to installed capacity has been jolted by unequal treatment in terms of payment security and non-availability of assured and affordable supplies of coal and gas. The distribution sector continues to be the single biggest factor of financial distress and inefficiency. The separation of carrier and content may improve performance at the distribution end.

New Renewable Energy power generation is the flavour of the season. India has attained 4th position globally in wind power installed capacity, and 5th position in solar installed capacity. While we have good domestic manufacturing capacity in wind power, installation of solar PV is heavily import dependent. The country does not need solar power alone. It also needs jobs and employment. The Government of India has set a generating capacity target of 175 GW Renewable Energy and is executing the world's largest renewable energy programme. While

the tariffs for wind and solar power are now equal to, if not lower than thermal or nuclear power, it is intermittent power and needs storage or balancing power from other sources. 73.35 GW of renewable energy capacity had been installed till October 2018, with a break up of 35 GW from Wind, 24.3 GW from Solar, 4.5 GW from Small Hydro and 9.5 GW from Bio Mass. Projects of nearly 47 GW have been bid out or were under installation. An additional 60 GW of solar energy and 20 GW of wind energy is likely to be installed by mid 2020. It would be desirable to align it with 'Make in India'. Otherwise a huge manufacturing and employment opportunity would be lost. Solar PV panels are mostly imported. The focus also has to be on efficiency assurance and storage, besides domestic manufacturer. Roof top Solar installations have a huge employment potential. Some recent ECB curbs have jolted bidders for low tariff. The race for an unreasonable L1 bid could kill the prospects of domestic manufacturing. The country has a surplus conventional generation capacity, and hence renewable capacity addition could be spaced out to enhance domestic manufacturing and jobs. Smart grids would also be needed for large scale infusion of intermittent power.

On days where the sun is shining and the wind is blowing, Renewable Energy meets 12.5% of the country's electricity demand. On other days it is around 7%. The Ladakh Solar Project should be a very efficient and useful one, given the high solar insolation and land availability. Solar energy farming is also a good initiative. For long term investment and success, a predictable and stable renewable policy is needed. Distributed generation also has to become a substantial player for extracting the full benefits of renewable energy.

Coal is India's mainstay of hydrocarbon resource and has made the single largest contribution to universal electrification in the country. It is a versatile carbon source and luckily Indian coal is very low in the harmful sulphur context, though it is high in ash. Besides extensive use in power generation, it can and should be used for coal gasification. Coal to gas, coal to liquid, and coal to chemicals, is the way forward. The development of hydrogen fuel cells from coal deserves the highest priority. It could provide the future energy source for mobility in India. We do not have reserves of Lithium or Cobalt and should work strenuously in the direction of Hydrogen besides Methanol. The vast collection of Clean Energy Cess at the rate of Rs.400 per tonne for each tonne of coal, that is mined or imported, provides a resource of Rs.35,000 Crore a year for appropriate utilisation in futuristic research and development, besides funding the clean up of existing coal fired power plants and setting up badly needed coal washeries. Unfortunately, the collections have reportedly been diverted to GST compensation or revenue balancing. The lack of timely research and action will cost the nation dearly in terms of future energy security and environmental pollution. The coal sector continues to function without a credible regulator and the absence of private sector in commercial mining. We continue to be prisoners of past ideologies. The production target of 1 billion tonnes annually seems a distant dream. Import of steam coal, besides metallurgical coal, continues to rise.

The global energy future is 'Electric' as the least polluting form of end use energy. However, the generation of electricity should also come from least polluting energy sources, coupled with energy security, as far as feasible. Though India has embarked on a massive renewable energy capacity addition programme, it has to simultaneously work on a grid balancing capacity

through hydro power, battery or other storage energy, and probably to a substantial degree on flexible gas or coal based thermal power. India was one of the first countries in the world to harness nuclear power. However, global sanctions on nuclear materials and technology stymied the programme. It is a carbon free generation source. India has mastered the complete nuclear cycle and has gained expertise in building Pressurised Heavy Water Reactors indigenously. With the help of two Russian Light Water Reactors it has attained a capacity of 6780 MW. Some more Uranium mines have been opened and imported fuel is also available. The Stage II Fast Breeder Reactor is also ready for commissioning at Kalpakkam. This would take India closer to attaining Stage III of its nuclear programme using Thorium. Vast reserves of the same are available in the country. The Government of India has decided to give the go ahead to build 10 PHWRs in a fleet mode of 700 MW each in Madhya Pradesh, Karnataka, Rajasthan and Haryana, besides 2 more 1000 MW LWRs at Kudankulam, in addition to 4 PHWRs of 700 MW and 2 LWRs of 1000 MW each. This will give a fillip to the idling indigenous manufacturing capacity besides providing base load carbon free nuclear power. China is already on this path with a massive nuclear power capacity addition programme.

India's heavy dependence on imports for its Oil and Gas Sector has been an area of great financial concern in terms of foreign exchange outgo. India is importing over 80% of its crude Oil requirements and domestic production has declined from 38 Mt in FY12 to about 35.5MT in FY18. Natural Gas production has declined from about 48 BCM to 33 BCM in FY18. This decline is a cause of great concern.

BP had estimated in 2018 that Oil accounted for 30% of India's energy consumption and Natural Gas accounted for 6.2% energy consumption. India had, some time back, projected a 15% share of gas in the primary energy mix. This would mean a substantial jump in gas availability and distribution. India has launched various exploration and production initiatives, and has also introduced pricing liberalisation. They are yet to yield any significant benefit. The major initiatives in the last few years have been the gas pipeline infrastructure expansion, new LNG terminals and a highly subsidised LPG cooking gas programme. The existing gas pipeline network length is 16,900 Km. This is being expanded by 12,800 Km. The existing Regasification capacity for LNG is 26.5 MTPA, and is being expanded to 56 MTPA/200 MMSCMD with many new terminals..

The Petroleum and Natural Gas Regulatory Board has decided to expand the City Gas Distribution network across the country. Till Sept 2018, 96 cities/districts were covered for development of CGD networks. Nearly 46.5 lakh households and 32 lakh CNG vehicles were availing clean fuel through this network. However, the administration and regulation of this network through a single regulator could be a nightmare. Nearly 24 million CNG vehicles are envisaged by 2030. If 15% of primary energy mix of gas is to be attained by 2030, gas consumption should grow at 10% CAGR, translating into over 600 MMSCMD of gas by 2030.

The Clean Cooking Gas programme, the Ujjawala Scheme, has seen the release of nearly 6 crore LPG connections, an unprecedented achievement. This will certainly have a very positive health impact. The introduction of BS VI fuel in Delhi and BS IV fuel across the country will help reduce vehicular pollution.

However, the major concern in the oil and gas sector is the vulnerability to imports, and foreign exchange. The volatile oil prices which are linked to the financial dependence of OECD countries on oil revenues, and the recent aggressive oil diplomacy of US, a major player after the success of shale and tight oil and gas, as well as the Indian Rupee-US Dollar exchange rate fluctuation are a cause for constant worry. The summer of 2018 was a very volatile one for the Indian consumer and the Indian economy, when petrol prices rose above Rs 80 a litre, while the US Dollar was appreciating and crude prices were on the upswing. There has been relief thereafter. Oil is a major source of revenue for the central government on account of excise duty and for the state governments on account of VAT etc. Volumes gave the central government larger revenue when international prices were low, and the states began to benefit from VAT with higher prices.

India must immediately speed up the harnessing of domestic sources of oil and gas from shale, and also the gas hydrate potential along the coastline and basins. Oil and gas security are essential till Electric Vehicles and fuel cells become commercial and affordable. The transition to EVs has to become a flagship 'Make in India' Programme, lest we become mere consumers of imported products, fuels and technology.

At the core of this Energy Transition will lie our resolve to invest heavily in Research, Development and Deployment of future technologies and fuels, with a vision of energy security. Minimum Income Guarantee must flow from employment, manufacture and exports, and certainly not from doles and freebies, if India has to emerge as a strong and sustainable player in the 21st century. India's demographic strength must be harnessed towards futuristic skill development and technology.

I thank the Members of the Board of Management and National Advisory Board, Chairs and Convenors of Energy Groups, our Secretariat, Forum Members and Sponsors for their unstinted support.



Anil Razdan

Feb 24, 2019, New Delhi

PROPOSED PROGRAMMES FOR 2019-20

1. 7th Round Table Conference on Coal
 2. 19th Renewable Energy Summit
 3. 11th Nuclear Energy Conclave
 4. 22nd India Power Forum
 5. 16th Petro India
 6. Chennai Conference
- Urja Vichar Manch (Aim – Minimum Five Meetings)

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