



Volume 18, Issue 10

March 2024



Dr R B Grover conferred with IEF Distinguished Energy Service Award 2022

A Blue Print for Accelerated Growth of Nuclear Power Capacity

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In the context of managing energy transition globally, as also in India, and considering the characteristic of Nuclear Power being carbon free, the relevance of high-rate growth of Nuclear Power generation capacity has come into sharp focus. In India, during last ten years, the exponential rate of growth of Renewable Power – Solar, Wind, etc. has been placed at the top

of the Agenda to manage energy transition. With a view to providing solution to the challenge of management of power supply, more particularly of the grid security, due to unavailability of Solar Power during night hours, several options are being evaluated. Technologies aimed at Hydrogen, Pump Storage System, Battery backup, coupled with possible shifts in the consumption pattern from liquid and gas to electricity, are all being explored. Nuclear Power, as a base load power supply has also emerged as one of the options.

It is under this background that the present situation of Nuclear Power being in the margin-of-the-energy-equation has come up for serious debate. Indian Nuclear Scientists and Engineers have demonstrated an excellent record of designing, constructing, and operating Nuclear Power Plants with high degree of safety and reliability. Yet, during the last sixty years we have been able to build a capacity of only about 7,000 MW – less than 2% of total installed power generating capacity and just about 3% of total power generation. The challenge is how to bring this important source of energy into a higher orbit of capacity planning. In the recent years, a more focused attention to this issue has, no doubt, been given, yet, if we consider the projects under implementation, whose outcomes will be available in next five to seven years, the contribution in terms of

capacity may not be more than 3% of total power capacity and about 4% of generation.

It is, therefore, essential that we prepare a vision for next twenty years with an ambition and objective to have Nuclear Power generation of total power generation to be at least more than 5%. This may require that when India's power generation capacity reaches 800 GW in the next ten years and over 1500 GW in next twenty years, the Nuclear Power generation capacity is 75 GW in next twenty years. Obviously, to raise the capacity from 7 GW as at present to 75 GW in twenty years is not an easy task. Even though it is too challenging, an attempt can definitely be made to see how best it is realized. A Blue Print for the accelerated growth of Nuclear Power capacity will need integration of multiple strategies, as outlined below:

(i) India's Nuclear Scientists, with more than twenty years of intensive research have been able to achieve a major milestone on Fast Breeder Reactor (PFBR). This opens up an enormous opportunity to enable faster expansion of Nuclear Power generation capacity. This should now be placed in project management mode. Next stages of prototype, commercialization followed by project development could be planned in a manner that this leads to substantial contribution, over next twenty years, to generation capacity addition.

(ii) It would be important to further strengthen Nuclear Power Corporation, which has established themselves as a highly successful power generation organization with excellent track record of operating Nuclear Reactors. It would be desirable that this organization develops a Twenty-Year Corporate Plan of growth.

(iii) Nuclear Power Corporation should definitely be provided Government Budgetary Support to substantially achieve these targets. But it would also be equally essential that this Company accesses the capital market to finance its ambitious capacity plans. Power Sector Companies, when they decided to approach capital market during the first decade of this Century, all of them achieved a high degree of success, Government overall control remaining intact. It is definitely seen that the dependence of Nuclear Power Corporation for Government Budgetary Support, despite over thirty-five years of

its successful existence, has affected pace of its growth. We have a number of Companies in the public sector, as also in other major industrial sectors, who have demonstrated exceptional performance and have created a high level of confidence in the capital market both India and abroad. Allowing 40% to 45% of Government equity, in successive tranches to the capital market has proved to be an effective strategy to support ambitious growth plans of a large number of Companies in the public sector and private sector.

(iv) The Atomic Energy Act does provide for Government Companies to enter into Nuclear Power generation. This important provision of the Act needs to be tapped to allow a few successful large Companies in the public sector to get into Nuclear Power generation field. They can hire best of experts from Nuclear Power Corporation to lead these initiatives. The recent initiative of NTPC and Nuclear Power Corporation getting into a Joint Venture is a laudable step. Very soon NTPC on its own could take up a number of projects.

(v) A few other Companies in the public sector may also be identified to take up Nuclear Power projects. NTPC and others may also be advised to develop Corporate Plans for over twenty years with the ambition to contribute substantially to raise the Nuclear Power profile.

(vi) Nuclear Power Corporation may consider setting up a strong Consultancy Company which can provide guidance and support in Designing, Construction and Operation of Nuclear Power Plants to be developed by other Companies at least during the initial few years, until they are able to develop their own groups of experts.

(vii) Government may consider an amendment to the Atomic Energy Act to facilitate private sector participation in Nuclear Power generation. The real breakthrough in the pace of capacity addition can happen when we open up this sector for private sector participation, may be initially as Joint Venture, and subsequently private sector on their own. Any excessive reservation on this initiative might appear misplaced considering the global experience in this regard.

(viii) With a number of Companies joining the group on Nuclear Power generation, it may be necessary to have a fuel supply organization under the full control of Government to take care of the fuel supply to these Companies for their effective and efficient operations. A sustainable arrangement of fuel supply will be an essential requirement of planning and implementing the growth plan. Dependence on import would be inevitable. Hence, the need for an appropriate arrangement of fuel supply, with reliable and predictable price behavior and also security of supply, will need to be appropriately tied up.

(ix) The present concern of safety and health associated with Nuclear Power installations is genuine. Obviously, when we gradually open up this sector, the challenge of maintaining, in a sustainable manner, the safety and health aspects, will need more stringent regulations coupled with independent organisations at the level of every plant and a coordinating organization at the apex level to ensure absolute reliability. The existing Regulatory mechanism on safety has, no doubt, been very effective. However, the mechanism will have to be strengthened further as we progressively open up this sector.

(x) Developing Nuclear Power Projects, with the pace being projected, would also need commensurate back up of manufacturing sector and construction organisations. Import dependence cannot be avoided altogether. However, existing power manufacturing organizations may need to re-orient their plans to support substantially the expansion plans in the Nuclear Power sector.

(xi) Capacity building across the entire chain of expertise – Design and Engineering, Manufacturing, Plant Operations, Maintenance, Safety, Safety Regulatory issues, will need to be focused in an appropriate manner to ensure not only the quantitative needs of manpower, but also the qualitative aspects of the technology.

This Paper is based on Presidential Address in the Nuclear Energy Conclave organised by the India Energy Forum on 12th March, 2024

From the Desk of the Honorary Secretary General



I am pleased to share with you that India Energy Forum presented its “**Distinguished Energy Service Award 2022**” to Dr Ravi B Grover, A Padma Shri Awardee and Member, Atomic Energy Commission for his exemplary

services for the Indian energy sector. The Award was presented by **Dr A K Mohanty** Secretary Department of Atomic Energy, and Chairman AEC.

In this month, IEF Nuclear Energy Vertical organized its flagship event, 13th Nuclear Energy Conclave on 12th March 2024 on the theme “Nuclear Energy: Essential for Transition to Net Zero”. **Dr. A. K. Mohanty**, Secretary Department of Atomic Energy, and Chairman AEC was the Chief Guest and inaugurated the Summit. The Guest of Honour of the Summit was **Shri Gurdeep Singh**, CMD, NTPC. The Presidential address was given by **Shri R V Shahi**, President, IEF and Former Secretary (Power). **Dr. R.B. Grover**, Chairman, Nuclear Group, IEF & Member, AEC set the content of the Conclave. Shri S M Mahajan, Convenor, Nuclear Group, IEF gave an opening remark and started the proceedings of the Conclave.

After the Inaugural Session, there was a Session on Invited Thematic Presentation which was chaired by Dr R B Grover. The other prominent speakers of this Session were **Shri Harish Kalsi**, Exec. Advisor to CMD NPCIL, **Dr. B. Venkataraman**, Director, IGCAR; and **Shri R K Porwal** Director (System Operation) Grid India. While Shri Kalsi shared his views on “Role of

Nuclear Energy in Decarbonising the Indian Economy”; **Dr Venkataraman** talked about “Fast Reactors: The Way Forward” and Shri Porwal about “Role of Nuclear Energy in maintaining Grid Stability.

The post lunch session was started with Panel Discussion which was co-chaired by **Shri Ranjay Sharan**, Director (Projects), NPCIL and **Shri Rajnath Ram**, Advisor (Energy), NITI Aayog. Shri Ranjay Sharan, Dir. (Projects), NPCIL also gave a special address on “Modular Construction in NPPs: Benefits and Challenges”. The other prominent national and international experts who shared their views were Shri **Mudit Dayal**, Nuclear Business Deptt, BHEL; **Shri Sushil Agarkar**, Exe V.P. (Precision Engg), Godrej & Boyce; **Shri Praveen Bhatt**, Vice President (Nuclear Business), Larsen and Toubro; **Shri DS Badami** Jt. GM (Heavy Construction), Larsen & Toubro; **Shri N M Nadaph**, Consultant, Walchandnagar Industries Ltd; **Mr Dmitry Gumennikov**, Sr Project Manager, Rosatom; **Mr Stephane Salib**, Mg Director, Nuclear Projects (I), EDF; Ms Minu Singh, MD, NUVIA india; and **Shri T T Mani**, Mg Director, Avsarala Technologies.

The Summit was a grand success.

Now I am pleased to inform you that the next event of IEF “8th Roundtable Conference on Coal” will be held on 12th April 2024 at Hotel Le Meridien, New Delhi. The Chief Guest will be **Shri Amrit Lal Meena IAS**, Secretary, Ministry of Coal. I request our members to participate in this event and make it a grand success.

I have the pleasure to release the March Issue of our flagship publication Total Energy. This March issue gives sectoral news of India's energy sector and IEF activities during the period.

K S Popli

India can easily surpass 500 GW RE target before 2030: Official



India can easily surpass the 500 GW renewable energy target before 2030, a senior official said recently. Ministry of New and

Renewable Energy (MNRE) Additional Secretary Sudeep Jain said that India has the 4th largest installed capacity for renewable energy. "500 GW we will easily surpass ahead of time.

We have been surpassing a lot of NDCs (Nationally Determined Contribution) before time," the official said. As India strives towards its net-zero goals, the official emphasised that a major role is to be played to create awareness for new technologies concerning green hydrogen. "For the green hydrogen mission the target is 10 MMT (Million Metric Tonnes) and 125 GW is needed just to power that and we are confident we'll be fulfilling that," he said.

CERC Approves Tariffs for NTPC's 1.25 GW Solar Power Projects

The Central Electricity Regulatory Commission (CERC) has approved tariffs discovered through competitive bidding for NTPC's procurement of 1,250 MW power from grid-connected solar power projects under the "Program for Flexibility in Generation and Scheduling of Thermal/Hydro Power Stations through Bundling with Renewable Energy and Storage Power."

Three successful bidders were selected by NTPC – Solairedirect Energy (ENGIE) for 300 MW at ₹2.55 (~\$0.031)/kWh, ReNew Solar Power for 400 MW at ₹2.55 (~\$0.031)/kWh, and NTPC Renewable Energy (NTPC REL) for 550 MW at ₹2.56 (~\$0.031)/kWh.

Background

NTPC filed a petition under Section 63 of the Electricity Act, 2003 for tariff adoption for 1,250 MW grid-connected solar photovoltaic power projects. It requested CERC to adopt the tariffs of ₹ 2.55 (~\$0.031)/kWh, ₹ 2.55 (~\$0.031)/kWh, and ₹ 2.56 (~\$0.031)/kWh from Solairedirect, ReNew Power, and NTPC REL, respectively, as discovered through bidding conducted by REC Power Development and Consultancy (RECPDCL) on behalf of the petitioner.

On December 2, 2022, NTPC issued a request for proposal to select solar power developers for setting up 1,250 MW grid-connected solar power projects in India under the Flexibility program.

In response, nine bids were received, with eight bidders meeting qualification requirements. Six bidders were shortlisted for an e-reverse auction, resulting in the three respondents securing letters of award on July 28, 2023.

The commissioning date for the project's full capacity was 18 months from the power purchase agreement's (PPA) signing date once the tariff is approved by CERC. The case was first heard by CERC on September 20, 2023.

NTPC was then instructed to include beneficiaries of thermal generating stations affected by the 1,250 MW solar power, along with RECPDCL, with replies requested from all respondents. Further directives on furnishing details including relevant tariff, consent from beneficiaries, and status of PPAs were given on September 20, with RECPDCL instructed to affirm compliance with Flexibility Guidelines in bid documents. The respondents raised their respective objections to the ongoing tariff adoption proceedings initiated by the petitioner.

West Bengal State Electricity Distribution Company (WBSEDCL) said that the flexibility program allows NTPC to include additional costs beyond the competitive bidding tariff for supplying renewable energy power to beneficiaries, constituting a trading transaction as defined in Section 2(71) of the Act, involving the purchase of electricity for resale.

How new rooftop solar scheme will help boost capacity addition

While the Narendra Modi government has been pushing solar energy capacity since it came to power, its targets always looked tall. The new rooftop solar scheme 'PM Surya Ghar Muft Bijlee Yojana' is yet another step towards meeting the target of 500 giga watt (GW) RE capacity by 2030, while boosting solar installations, by combining the elements in several previous schemes.

The government has come out with many policies and reforms aiming at a 40 GW solar rooftop capacity target by 2022. However, the country has fallen short of meeting the goal with just 10 GW of rooftop capacity being installed by 2023. Of this, the residential rooftop category accounts for only close to 3 GW.

"The government is easing the rules in terms of getting approval from discoms (for sale of surplus). It has also improved the financing options and aims to bring about awareness among households," said Vikram V, Vice-President & Co-Group Head – Corporate Ratings, Icra.

As per a report by the Council on Energy, Environment and Water (CEEW), the country has a potential to deploy 637 GW of solar energy capacity on rooftops, and deploying just one-third of this total solar technical potential could support the entire electricity demand of India's residential sector which is nearly 310 TWh (Terwatt hours).

However, the present lower levels of electricity consumption in most residential households reduces this technical potential to further 118 GW and then to further just 11 GW with no capital subsidy, as per the report. But with the government's capital subsidy, the potential increases to 32 GW making the solar systems feasible for more consumers.

The government in 2015 had approved the Grid Connected Rooftop and Small Solar Power Plants Programme aiming at the installation of 4,200 MW rooftop solar plants in the country by 2019-20. In the year 2017, the Centre then launched the programme with an increased budget of Rs 50,000 crore for rooftop solar projects by 2019-20. Realising

its shortcomings, the renewable energy ministry again came up with a new notification asking distribution companies and its local offices to work as nodal points for its implementation.

Now, the new scheme has all the components altogether and analysts believe that the only challenge now remains is that of increasing awareness among consumers, availability of quality vendors, and implementation at the state level.

"The major challenges are the awareness among consumers, easing of approvals has to happen at state level, availability of quality developers and vendors to enable a successful implementation of the scheme," Vikram said.

Solarising residential households also offers huge economic benefits to power distribution companies including reduced cross-subsidy burden, improved transmission and distribution losses, and lower average cost to serve consumers, as per report by CEEW.

"Their apprehension might be coming from the fact that they might lose consumption from the high paying consumers," Vikram said. "Typically for 200-300 units, the tariffs are more at 6-7 rupees. For them (discoms), it is more advantageous to install rooftop energy."

The benchmark cost of a rooftop solar system of size 1-2 kW is Rs 43,140 per kW as notified by the Ministry of New and Renewable Energy, applicable for general category states and UTs. The payback period of availed loan for rooftop solar installation is 5-6 years. The life of a module is 25 years and for 2-3 kW category, you can pay off the loan in 5-6 years, as per analysts.

Power minister RK Singh envisages the target of installing rooftop solar at 10 million households in two years. The country has a total residential rooftop solar capacity of 2.7 GW, according to government data with 0.67 million households having a rooftop solar. Singh is confident that the number of 10 million households for installation of rooftop solar will further increase.

Moreover, the industry sees availability of domestic modules to improve by the latter half of FY25 under the second tranche of PLI (Production Linked Incentive) scheme for high efficiency solar PV modules rolled out by the government. This is expected to boost the implementation of the scheme.

“The first tranche of volume should come out by the end of December this year,” said Subrahmanyam Pulipaka, Chief Executive Officer of National Solar Energy Federation of India. “The supply of domestic modules in the market is expected to increase in the last quarter of FY25, giving a boost to RE capacity addition next fiscal compared to this year,” he said.

As per the government, manufacturing capacity totaling 7,400 MW is expected to become operational by October 2024, 16,800 MW capacity by April 2025 and 15,400 MW capacity by April 2026 under the scheme.

While the earlier attempts at increasing the rooftop solar installations failed, industry players are confident in the new framework and improved module supply that will increase the rooftop solar capacity of the country.

Robust recycling of increasing solar waste critical for India’s energy security: CEEW

As India expands its renewable capacity to go net-zero, cumulative waste from its existing and new solar energy capacity (deployed between FY24 and FY30) could reach up to 600 kilotonnes by 2030, equivalent to filling up 720 Olympic-size swimming pools, a new study by the Council on Energy, Environment and Water (CEEW) released recently said.

Most of this waste will come from five states: Rajasthan, Gujarat, Karnataka, Andhra Pradesh, and Tamil Nadu.

The waste from India’s current installed solar capacity alone will increase to 340 kilotonnes by 2030, containing about 10 kilotonnes of silicon, 12-18 tonnes of silver, and 16 tonnes of cadmium and tellurium, the majority of which are critical minerals for India.

The study found that the rest of the 260 kilotonnes of waste will come from new capacity that will be deployed in this decade. This is an opportunity for India to emerge as a leading hub of circular economy for the solar industry and ensure resilient solar supply chains.

India plans to amass around 292 GW of solar capacity by 2030, making solar PV waste management crucial for environmental, economic, and social reasons.

The CEEW study, ‘Enabling a Circular Economy in India’s Solar Industry: Assessing the Solar Waste Quantum’, for the first time, estimates India-specific solar waste generation from various streams, excluding manufacturing.

This information is crucial for creating data-driven waste management policies. India is already implementing several measures to tackle the waste. Last year, the Ministry of Environment, Forest and Climate Change (MoEFCC) issued E-waste Management Rules 2022 that shall govern the management of solar PV cells and modules waste in India. These rules mandate the producers of solar cells and modules to manage their waste under the extended producer responsibility (EPR) framework.

Arunabha Ghosh, CEO, CEEW, said: “India must proactively address solar waste, not just as an environmental imperative but as a strategic necessity for ensuring energy security and building a circular economy.

“As we witness the remarkable growth of solar from only 4 GW in March 2015 to 73 GW in December 2023, robust recycling mechanisms become increasingly crucial. They safeguard renewable ecosystems, create green jobs, enhance mineral security, foster innovation, and build resilient, circular supply chains.”

Neeraj Kuldeep, Senior Programme Lead, CEEW, said: “India’s G20 Presidency had identified a circular economy as a thrust area for sustainable development. A circular solar industry and responsible waste management will maximise resource efficiency and make domestic supply chains resilient.

“The CEEW study provides robust evidence of the opportunity in solar waste management. However, solar recycling technologies and the industry are still at a nascent stage and require policy push and support.”

While the design life of the solar modules is currently 25 years, some witness an early end of life due to factors such as damage during transportation, module handling, and project operations.

The CEEW study recommends that the Indian solar industry prepare for these new responsibilities by arranging reverse logistics, storage, dismantling centres, and recycling facilities. The industry should also explore innovative financing mechanisms and business models for solar waste management.

India's Energy Transition: Securing the Ecosystem

India's green energy transition is accelerating. In the past decade, the installed capacity for renewable energy went up from about 28 GW in 2013 to over 180 GW currently with another 88 GW in the works. Prime Minister Narendra Modi announced the Pradhan Mantri Suryodaya Yojana (PMSY) in January this year for roof-top solar and that could potentially double the current installed capacity of 11 GW for the same. India could well achieve 500 GW of renewable energy capacity before 2030, the targeted year. In addition, India's EV sales surged to 1.5 million in 2023, up 50% from the year before.

While the downstream capacities and supplies are expanding, there is no scope for complacency as the green energy upstream story has been less encouraging so far. Solar photovoltaic modules and panels, and Lithium Ferro-phosphate (LFP) batteries, for our solar farms and EVs respectively, are still largely being imported. While the government has designed excellent Performance Linked Incentive (PLI) schemes for solar panel manufacturing and Advanced Cell Chemistry production, our manufacturing plants are still dependent on imports of raw materials and processed inputs of critical minerals required for solar PV cells and EV batteries.

Securing the ecosystem

To be totally Atmanirbhar, Indian companies – especially those that are investing heavily in the green energy capacities – and the government need to work closely together to build a strong presence across the entire value chain so that our dependence on imports reduces.

This would mean securing mining rights for crucial raw materials needed for solar panels and LFP batteries in various geographies. Currently, Lithium required for LFP batteries that run EVs are mined in Australia and the Lithium triangle countries of Argentina, Bolivia, and Chile). Cobalt – another critical mineral required for EV batteries – is mined in the Democratic Republic of Congo (DRC), which has over 50% of the world's cobalt reserves. Other minerals required in smaller quantities (Tellurium, Selenium, Cadmium, Gallium) are currently sourced from China and a few other countries.

Of late, the interest in Lithium and other minerals has resulted in discoveries of new reserves across the globe, from India to the US. Indian players need to keep track of these too – because while some of these new reserves are in ecologically fragile zones, and therefore not suitable for extraction, other large reserves can be commercially exploited.

We also need to plan for building processing plants for refining these minerals from ore after they have been mined. Currently, we have no presence in the processing part of the ecosystem. For this, we need to source technology from those who have it and that may not be easily available without some government help, in terms of modification of investment policies and visa regulations. The government will also need to ensure that the Approved List of Models and Manufacturers (ALMM) for solar modules – a non-tariff barrier that would encourage domestic manufacturers and help them get more competitive – is not delayed any further. It was initially supposed to come in play in 2021.

Corporate India also needs to speed up research into alternate chemistries such as Sodium Ion and Fuel Cells to reduce dependence on imported Lithium.

Recycling for Minerals

There is another path to securing the critical minerals – and that is by creating a recycling industry that retrieves the minerals from old, decommissioned solar panels and EV batteries. Solar panels have a life of around 30 years while EV batteries can last 10 years or more. Critical minerals can be extracted from end-of-life renewable products. This is an approach that has been favoured by EU nations which have mandated a 75% recycling rate of portable batteries by 2025 and 80% by 2030. It has also passed a law that new batteries should contain 85% recycled lead, 20% recycled cobalt, 10% recycled Lithium and 12% recycled nickel by 2035. This approach also provides a great opportunity for smaller Indian firms which may lack the capital and resources to get into other parts of the ecosystem, such as mining.

Making the Right Policies

The government needs to work closely with the corporate sector to tailor incentives that can help them move quickly. It also needs to ensure that import duties and anti-dumping duties are aligned with our interests in upstream parts of manufacturing. Finally other incentives – such as allowing R&D expenses to be treated as part of CSR, perhaps – could go a long way in helping our energy transition story.

The Capital Question

Building a strong presence across the renewable energy ecosystem will require a lot of capital. Fortunately, global investors ranging from sovereign investment funds to green energy investment funds are prepared to fund projects that have a clear pathway. Global investment in energy transition technologies crossed \$1 trillion annually in 2022. The World Bank has also approved \$1.5 billion in financing to aid India's low-carbon transition. It is for the corporate sector to create these plans to take advantage of the investment interest waiting in the wings

Import dependency and high costs: India's solar sector at crossroads, says Alok Kumar, former Power Secretary

Shri Alok Kumar, the former Secretary of the ministry of power, underscored the challenges facing the

country's solar energy sector, emphasizing the high costs linked to import dependency and the critical need for diversification and innovation.

Speaking at the ETEnergyworld Solar Power Congress 2024, the former power secretary highlighted the pressing issues of managing solar power's real absorption cost and the importance of exploring alternative energy sources like hydro and nuclear power.

Highlighting the financial aspects of solar power, Kumar noted, "Absorbing solar power in India incurs a cost of approximately Rs 5 per unit, primarily because of our heavy reliance on imports, with 80% of cells and all polysilicon coming from abroad." He identified the dual challenge of managing the cost of solar power absorption alongside significant import expenses as a critical hurdle for the sector.

With an eye on energy security and emissions control, Kumar emphasized the need for India to broaden its energy mix. "It's imperative to explore alternative technologies such as hydro and nuclear power in pursuit of energy security and controlled emissions," he advised, pointing towards the importance of reducing dependency on imports by diversifying energy sources.

Kumar also underlined the significance of innovation in the solar sector. "Advancing research, development, and innovation to introduce more efficient solar cells and modules is crucial for a sustainable future," he said, highlighting the role of technological advancement in overcoming current limitations.

On the topic of solar power costs, Kumar expressed the need for a strategic approach focused on the immediate use of generated solar energy. "Reducing solar power costs is essential. The focus should be on utilizing solar energy as it is generated, rather than on storage solutions," he remarked, indicating a shift towards efficiency and cost-effectiveness.

Addressing policy interventions, Kumar was clear about the limitations of certain strategies. "Implementing carbon pricing is not a viable strategy for India in its effort to encourage solar adoption among consumers," he stated, suggesting that

alternative measures are needed to promote renewable energy adoption effectively.

Wind power projects in India set for volume boost in FY24

Wind power projects in India are expected to see an uptick in volumes during fiscal 2024, as per S&P Global Ratings, with a 20% year-on-year increase in the all-India level wind load factors in the second half of the 2023 calendar year, signaling a recovery.

The renewable power generation in fiscal 2023 saw a resurgence yet fell short of the P90 estimates at the portfolio level. The underperformance gap narrowed to 0.5% in fiscal 2023, down from the 1%-2% experienced over fiscals 2021-2022.

Wind energy, a significant component of the renewable sector, has notably achieved the P90 output only once in the past eight years, with particularly lower performances in Andhra Pradesh, Karnataka, and Maharashtra.

The consistent shortfall against the P90 performance indicator suggests initial resource estimations for these projects may have been overly optimistic. Around 70% of projects missed their P90 forecasts during fiscals 2021-2023, a marked increase from 50% in earlier years. In response, some industry players are adjusting their resource estimates to more realistic levels, aiming to enhance the stability of performance and cash flow predictability.

Advancements in wind technology are expected to benefit newly commissioned assets, potentially boosting their plant load factor (PLF) to about 35%, an 80% increase from the past decade. Additionally, cash collection from state-owned distribution companies has shown improvement, bolstered by the implementation of the Late Payment Surcharge (LPS) Scheme.

S&P Global Ratings anticipates renewable energy firms to experience a reduction in working capital outflow to about 10% of EBITDA, a significant improvement from the previous 20%.

Aligning on the findings, Devansh Jain, Executive Director, INOXGFL Group said, "As we stand at this juncture, it's evident that India's renewable energy landscape is at an inflection point. With the Government of India's steadfast commitment to clean and green energy, coupled with ambitious targets set forth in the National Electricity Policy (NEP), the renewable energy sector in general and wind energy sector in particular, is poised for unprecedented growth. The targets of achieving 596 GW of renewable energy installed capacity and approximately 125 GW of wind installed capacity by 2032 underscore the scale of opportunities that lie ahead."

Tripling renewable power capacity by 2030 requires policy support: IRENA

Achieving the global target set at COP28 to triple renewable power capacity by 2030 relies heavily on establishing conducive conditions for such growth.

Tripling renewable power capacity by 2030 is technically feasible and economically viable, but its delivery requires determination, policy support and investment at-scale.

"Tracking COP28 outcomes: Tripling renewable power capacity by 2030" highlights that 2023 has set a new record in renewable deployment, adding 473 gigawatts (GW) to the global energy mix.

However, the brief by the International Renewable Energy Agency (IRENA) concludes that tripling renewable power capacity depends on overcoming systemic and structural barriers to the energy transition.

Evolving policies, geopolitical shifts and declining costs have all played a role in propelling the rapid expansion of renewable energy in markets worldwide. Yet, to triple renewable power capacity, concerted efforts are required to enhance infrastructure, policies and workforce capabilities, underpinned by increased financing and closer international cooperation, as outlined in IRENA's World Energy Transitions Outlook brief presented at the Berlin Energy Transitions Dialogue recently.

An average of almost 1,100 GW of renewables capacity must be installed annually by 2030 — more than double the record set in 2023. Annual investments in renewable power generation must surge from \$570 billion in 2023 to \$1,550 billion on average between 2024 and 2030.

Francesco La Camera, Director-General of IRENA, said: “In the wake of the historic UAE Consensus on tripling renewables at COP28, these capacity additions, despite setting a new record, clearly indicate that achieving the target is far from guaranteed. As the custodian agency, IRENA monitors related progress across key indicators every year. Our data confirms that progress continues to fall short, and the energy transition remains off track. We urgently need a systemic shift away from fossil fuels to course-correct and keep the tripling goal within reach.”

Achieving the tripling target is far from assured as an additional 7.2 terawatts (TW) of renewable power would need to be deployed to reach the required 11 TW by 2030. However, current projections indicate the target will remain out of reach without urgent policy intervention.

G20 nations, for example, must grow their renewable capacity from under three TW in 2022 to 9.4 TW by 2030, accounting for over 80 per cent of the global total.

Accelerated investments in infrastructure and system operations (e.g. power grids, storage), revised policies and regulations (e.g. power market design and streamlined permitting), measures to fortify supply chains and cultivate requisite skills, and substantial increases in investments, including public funds facilitated through international collaboration, are imperative.

Edited & e-printed by **Mr K S Popli, Secretary General, IEF**

Published by **Mr S S Rawat, Head (Admn), IEF**

on behalf of



Registration No. DELENG/2007/20915

303 PHD House, 4/2 Siri Institutional Area, August Kranti Marg, New Delhi – 110 016

Disclaimer: The information has been taken from reliable sources but no responsibility can be accepted for its correctness.

Coal India achieves 610.8-MT supply to power sector, tops annual target



Coal India Ltd (CIL) has surpassed its annual supply target of 610 million tonnes to the thermal power sector, achieving 610.8 MT till March 27, a company official said. "This marks the highest coal supply till date to the power sector," he said.

CIL's coal supply to the sector rose by 29.3 million tonnes in absolute volume terms compared to the corresponding period last fiscal, he said. The miner's current average daily supply to coal-fired plants stands at 1.76 million tonnes, reflecting the growing demand from the power sector, according to a company statement.

CIL is aiming at boosting production in the wake of the estimated peak demand for electricity of 250 GW this summer.

In 2022-23, offtake to power plants reached 586.6 million tonnes, surpassing the commitment of 565 million tonnes, the official said.

As per data, coal stock at domestic coal-based power plants stood at 47.1 million tonnes as of March 26, an increase of 13.7 million tonnes as against the corresponding period last year.

India's coal imports rise marginally to 212 MT in April-January period

The country registered a marginal rise of 1.65 per cent in coal imports to 212.24 million Tonnes (MT) in the April-January period of the ongoing fiscal, over the year-ago period.

India's coal import was 208.78 MT in the corresponding period of the previous fiscal, according to data compiled by mjunction services ltd.

During the April-January period of the current fiscal, the volume of non-coking coal imports was 136.47 MT, slightly lower than 136.90 MT imported during

the same period last financial year, according to the data.

Coking coal import was at 47.32 MT during the April-January 2023-24, higher than 46.09 MT recorded in the April-January period of FY23.

The coal import in January through the major and non-major ports also increased to 19.81 MT, over 16.97 MT in the corresponding month of the previous fiscal.

Of the total imports in January, non-coking coal import was at 12.10 MT, against 10.01 MT imported in January last financial year. Coking coal imports stood at 4.50 MT, marginally lower than 4.74 MT imported in the corresponding month of previous fiscal.

"The demand for imported coal in India has weakened in recent weeks. We expect this trend to continue in March in view of the ample availability of domestic coal at mine pitheads and thermal power plants," mjunction services MD and CEO Vinaya Varma said.

According to the provisional data of the government, the country's coal production in the April-January period rose to 784.11 MT over 698.99 MT during the same period in 2022-23.

CIL's coal gasification projects in EPC contract model for better viability: Official



Coal India Limited recently said that the coal gasification projects will be executed in an EPC (Engineering, Procurement, and Construction) model to make the projects more viable by eliminating the risks for the operators of the plants.

This means that the entire equity for the project's capex will be funded from the special purpose vehicles to execute these projects, and not by the "operator of the plant", which will be appointed to run these highly sophisticated technologically advanced units to produce coal-to-chemical and coal gasification projects.

EPC, also known as turnkey construction contracts, is used for complex infrastructure projects.

"We will opt for the EPC contract model to make the execution of the gasification projects more attractive as it de-risks the operator. This will help us in faster execution of the project," Coal India's Director (Technical) B Veera Reddy said on the sidelines of the 17th Indian Coal Markets Conference organised by mjunction.

Coal India has announced the setting up of coal gasification plants to achieve the target of gasification of 100 MT of coal by 2030. CIL has already signed MoUs for JVs with PSUs in this regard.

CIL signed a JV agreement with GAIL for setting up a Coal-to-SNG Project at the Sonepur Bazari Area of Eastern Coalfields Limited (ECL) of West Bengal, at an estimated project cost of Rs 13,052.81 crore, considering a debt-equity ratio of up to 70:30.

CIL has also signed MoUs with BHEL for setting up a Coal-to-Ammonium Nitrate Project at the Lakhanpur Area of Mahanadi Coalfields Limited (MCL) in Jharsuguda district of Odisha, at an estimated project cost of Rs 11,782 crore.

Coal India has already received cabinet approval for equity investment in these projects.

On coal production, Reddy said it has produced 735 million tonnes and was trying to meet the target of 780 million tonnes.

The production may remain restricted to 770 million tonnes due to issues in South Eastern Coalfields Ltd. However, Reddy remained confident about the one billion production target in 2028-26 and said all plans are in place to achieve the target.

Addressing the delegates, he stated that the company is also focusing on underground mining, which is part of the sustainability action plan.

Meanwhile, around Rs 4,050 crore has been provisioned only for government PSUs, in which up to three projects will be supported by a lump-sum grant of Rs 1,350 crore each or 15 per cent of the capex, whichever is lower as viability gap funding. This amount is part of the total Rs 8500 crore VGF provision for coal gasification projects.

'Coal stocks to rise even in summers, inventory may hit 155mt by FY24-end'

Coal stocks across power plants in the country will be enough to meet the anticipated surge in power demand in the upcoming summer, according to Amrit Lal Meena, secretary, union ministry of coal.

In an interview, he said the accretion of coal stock at plants will continue even during the summer and monsoon, in contrast to last year's depletion.

Total coal stocks may touch 155 million tonnes by the end of the fiscal, against 125mt last year, he added.

Noting that since November coal stocks at thermal plants have increased at a rapid pace, he said daily coal stock accretion stood at about 194,000 tonnes in the second half of February, compared with 26,000 tonnes in the corresponding period of last year.

Similarly in the first half of March, stocks grew by about 209,000 tonnes, compared with a depletion of 42,000 tonnes during the corresponding period of the last fiscal as temperatures rose in March last year.

"In the first 15 days of March last year, depletion of coal stock started because temperatures had increased. But this year, it has increased by 200,000 tonnes per day. This trend will continue, because capacity has increased significantly, both for production and transportation. There is not much chance for depletion during April, May and June. This trend will continue even in monsoons," Meena said. However, the rate of daily increase in stocks may slow down in the monsoons.

Usually, with high power demand and coal consumption by plants, stocks at the plant-end deplete during the summers, while monsoon rain impacts both production and transportation of the mineral, adding to the fall in inventory.

The remark on having a healthy coal stock position in the high demand period gains significance as the union ministry of power has directed power generating companies to continue blending 6% imported coal till June amid projections of high-power demand and concerns over logistical issues.

The peak power demand in the next fiscal is expected touch 260 GW, a new high, and way above the 243 GW hit last year.

Meena, however, said that the increase in production capacity and improvement in logistics, higher number of rakes, and enhanced first mile connectivity for evacuation of coal, would ensure adequate stocks at plants in the months ahead. He also said blending of imported coal by domestic coal-based power plants has declined nearly 28% on a year-on-year basis in FY24 to 22.2 million tonnes.

He said that overall stocks currently stand at a record 141 million tonnes.

"Both, stocks at thermal power plant and the total stock are at highest-ever levels. Total stock may go up to 155 million tonnes. The closing stock in March last year was at 125 million tonnes and the stock at thermal power plants was at 34 million tonnes," Meena said, adding that stock at thermal plants may reach 46 million tonnes by the end of the month.

He said several first mile connectivity (FMC) projects, aimed at mechanized evacuation of coal, have been inaugurated which would help in faster transportation of coal in the coming months.

The average daily availability of rail rakes for transportation of coal has increased about 6% to 392 rakes currently, from 370 rakes in the year ago period. "Next year this will further go up by about 6% on a daily basis. It will be about 420 rakes on an average. A consistent supply of these many rakes would help us have adequate stocks" he said.

The ministry has asked the railways to supply 447 rakes in the upcoming April-June period. The union power ministry has sought a total of 874 million tonnes of coal for power generation in FY25, against 821 million tonnes in the current fiscal. As of 13 March this fiscal, total coal dispatch to the power sector stood at 763.17 million tonnes.

The secretary said he was confident coal companies would be able to achieve the ambitious target of 1.01 billion tonne production in the fiscal. As of 13 March, total production stood at 920.12 million tonnes.

8th Roundtable Conference on Coal

Friday, 12th April 2024, Desire Hall, Hotel Le Meridien, New Delhi

Theme: Role of Coal in Energy Transition

India Energy Forum jointly with ISMAA DC and MGMI DC is organising 8th Roundtable Conference on Coal on Friday, 12th April 2024 at Hotel Le Meridien, New Delhi.

Shri Amrit Lal Meena IAS, Secretary, Ministry of Coal has kindly agreed to inaugurate the Conference. Shri P M Prasad, Chairman, Coal India Ltd will be the Guest of Honour. The Presidential Address will be given by Shri R V Shahi, President, IEF and Former Secretary, Ministry of Power. Shri Alok Kumar, IAS (Retd.), Former Secretary (Power), will be the the Chief Guest at the Valedictory Session.

The other policy makers and coal & mining experts who will participate at the conference and share their views are: Shri Anil Razdan, IAS (Retd.), Former Secretary, Ministry of Power; Shri Alok Perti IAS (Retd), Former Secretary, Ministry of Coal; Shri C. Balakrishnan, IAS (Retd.), Former Secretary (Coal); Shri Partha Bhattacharyya, Former Chairman, Coal India Ltd; Shri Ghanshyam Prasad, Chairperson, CEA; Shri Anil Jha, Former Chairman, Coal India Ltd.; Capt R S Sindhu, Chairman, ACB India; Shri M Prasanna Kumar, CMD, NLC India Ltd; Dr B Veera Reddy, President, MGMI; Shri U Kumar, Former CMD, SECL/NCL; Shri Anandji Prasad, Advisor (Coal), Ministry of Coal; Shri Satish Jha, Director, CMPDI; Shri Kapil Dhagat, Executive Vice President – Head BU Coal & Mining, JSPL; Shri Himanshu Singh, Director (Strategy), Vedanta; Shri Suresh Behera, Chief Manager (Systems), CMPDI; Shri Avinash Kumar Mishra, ED (Coal), Railway Board; Shri B C Tripathi, Former CMD, GAIL India; Shri A N Tiwary, Angul Jindal Steel & Power Ltd; Dr. R K Malhotra, Former DG, FIPI; Shri Rajiw Lochan, Prabha Energy; Dr. Rasesh Kotdawala, Sr Manager (Clean Energy System), BHEL; Shri Rahul Tongia, Sr Fellow, Centre for Economy and Social Progress; Shri Chiranjivi Patra, GM (Underground), CMPDI; and Shri Manoranjan Hota, Former Director, MoEFCC.

For Invitation and participation, please contact:

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Thermal capacity addition gains pace in FY24 amid high power demand projections

Despite ambitious net-zero targets and an ongoing energy transition, India's coal production continues to meet its growing electricity demand. The country recorded a multifold rise in its thermal capacity addition so far in FY24 (April-February) to 5.75 GW compared to just 450 MW a year ago, according to data from the Central Electricity Authority (CEA).

The executive summary for February 2024 released by the CEA showed that 2.78 GW of thermal power capacity was installed in February.

This growth is in line with the projections of record power demand in summers. The CEA estimates peak power demand at 260 GW in FY25, well above the 243 GW recorded in FY24. Coal shortage and near crisis in FY22 has led the government to increase the number of thermal power plants despite its ambitious renewable-energy plans to curb carbon emissions.

The baseload for India's power demand is still coal-fired power plants. Baseload refers to the minimum amount of power the electrical grid requires at any given time. Renewable energy such as solar or wind power usually cannot ensure stable supplies and require utility-scale batteries to store energy, which are not yet adequately available in India.

Several thermal plants were inaugurated in February, just before the model code of conduct for the upcoming general elections came into force. At the end of that month, India's coal-based power capacity stood at 210.96 GW, the report said. Coal production and supply to power plants have also improved. Currently, power plants have enough stock for around 17 days.

In a recent interview to Mint, Amrit Lal Meena, secretary at the union coal ministry said coal stocks across power plants would be adequate for the upcoming summer. He also said India's total coal stock could touch 155 million by the end of the fiscal year, from 125 million tonnes in the previous year.

Addition of renewable energy capacity, however, has slowed so far this fiscal year. As of February, a total of 11.47 GW of renewable energy capacity, including

large hydro projects, had been added, against 12.34 GW in the corresponding period of the previous fiscal year.

The government plans to bid out 50 GW of renewable capacity by FY28 to achieve the targeted installed non-fossil capacity of 500 GW by 2030. A report released by ICRA in February said that as of December, 19 GW renewable capacity has been bid out by the government.

According to the monthly CEA report, India currently has an installed renewable energy capacity of 183.49 GW, of which 46.92 GW is from large hydro plants.

India's Smart Meter Programme to invest Rs 1.5 lakh cr for prepaid smart meters

India's 's Smart Meter National Program (SMNP) is aiming to replace 25 crore conventional electricity meters with prepaid smart meters, along with upgrading infrastructure such as feeders and transformers, with an estimated capital expenditure of Rs 1.5 lakh crore slated for implementation over the next five fiscal years. According to CRISIL Ratings, this initiative will provide significant improvements in operational and financial efficiencies for distribution companies (discoms).

The Smart Meter National Program (SMNP) uses a flexible spending plan and a secure payment system to lower risks usually found in big projects. These steps aim to get more private companies involved and speed up the installation of smart meters.

This will make billing and payment collection easier for distribution companies (discoms). The SMNP also helps track electricity usage in real time, reduces power theft, and makes supply schedules better. Overall, it brings important improvements through its modernization efforts.

In the SMNP framework, state distribution companies (discoms) will divide their areas among private concessionaires. These companies will handle buying, setting up, and maintaining smart meters for a 10- year period.

Contracts will be given out through open auctions where bids are based on the amount per smart meter that concessionaires will receive annually. Discoms

will fund these concessionaires from the money they collect from consumers, and they will also get grants from the central government for each smart meter installed.

Ankit Hakhu, Director at CRISIL Ratings, highlights the potential capex opportunity of Rs 1.5 lakh crore in India's power distribution sector through the SMNP. He said, "Since smart meters are prepaid, their roll-out will improve the collection efficiency of discoms. There will also be support in the form of grants of up to Rs 1,350 per smart meter from the Centre, which will improve the financial profile of discoms."

To ensure a smooth launch, the contracts for smart meter projects have been standardized to make them more attractive to banks and investors by addressing implementation challenges. Innovations include allowing projects to start with as little as 5% of their total scope to facilitate early revenue generation. Since these projects are usually financed mostly through loans, this approach allows debt to be paid off gradually as the project progresses, which is supported by incoming cash flows. This reduces the risk of not being able to pay off debts on time.

Varun Marwaha, Associate Director at CRISIL Ratings, noted another important innovation in the SMNP program. It involves setting up a direct debit facility (DDF) where all online payments from consumers go directly into a designated account. From there, payments to the project's bank account are prioritized. This significantly reduces the risk of delays or non-payment from distribution companies (discoms), which is a major concern in the power sector.

However, there are challenges to be mindful of. Aggressive bidding can impact the quality of projects and their ability to generate enough cash flow to repay debts. The projected expenditure of Rs 1.5 lakh crore is also sensitive to how aggressively bids are made and the pace at which contracts are awarded to private concessionaires.

Power sector needs massive investments; govt must do all it takes to avert a crisis

Power minister R K Singh's plan for near-doubling of the capacity in the entire electricity



value chain by 2030 involves a Herculean task, and requires much higher level of private investments than what's in the

pipeline. Yet, success of his endeavour is critical to India's energy security, and the ambition to achieve high economic growth on a sustained basis. Power demand in recent quarters have outpaced all projections, and is tending to go up further. Peak demand could be as high as 380 giga watt (GW) by 2030, way higher than the current level of 243 GW. The minister is optimistic when he says that the conditions in the sector are now more conducive for private risk capital. His confidence stems from the fact that the vicious circle of payment defaults that bogged down the sector for long has been corrected to a large extent, using a tactics that combined persuasion and coercion. Distribution entities' (discoms) outstanding dues to the power producers have come down by two-thirds from the June 2022 level of Rs 1.35 trillion to the current level of less than `45,000 crore. That definitely is an unprecedentedly steady pace of dues reduction.

What enabled this achievement in the first place is prompt release of subsidy amounts from state budgets. With most states complying with a phased payment plan, the dues are hopefully on course to be eliminated. In tandem with this, the technical losses of discoms are being brought down with smart meters helping the process a lot. State monopoly in the transmission sector is being progressively undermined too, paving the way for larger private investments. Most parts of the nation is now seamlessly connected to a single grid, and in Singh's words, India' is now "the largest synchronised grid in the world." The unified grid has an inter-regional capacity to transfer 116 GW of power from one

corner of the country to another, even while maintaining consistent frequency.

While these accomplishments are commendable, the plan drawn up by Singh still involves a lot of uncertainties. There is a big gap between the investments required to double capacities in such a short period, and the actual prospects. It is also a daunting challenge to reform and modernise the distribution sector, which still lacks sufficient competition in most parts of the country. Another major issue that needs tackling is the intermittent nature of the renewable energy (RE). Capacity creation in the RE segment has been quicker in recent years; yet, RE share in actual energy supplies is still around a fifth only, as there is a problem with such energy when it comes to meeting peak demand. In fact, a shortage is already being felt during the peak hours in the night.

The government has been prescient in according high priority to capacity creation, accelerating the coal-based thermal power projects for the medium term, and deciding not to exert itself to add costly gas-based units. It, however, face three distinct challenges in meeting the objective of averting a serious power crisis: lack of enough credit flows to the coal-mining and thermal-power ventures; a political hurdle that makes it difficult to replicate the Mumbai model of multiple distribution licensees that use same infrastructure based on common carrier principle; and a lack of investor zeal in RE battery-storage. The power minister seems mindful of these challenges, and the need to devise appropriate policies.

NTPC exceeds 400 billion units in power generation



NTPC surpassed its previous record by crossing the 400 Billion Units (BU) mark in generation on 13th

March 2024. This exceeds the company's generation during the fiscal year 2022-23, which stood at 399.3 BU.

As of 13th March 2023-24, NTPC Coal stations reported a plant loading factor (PLF) of 77.06%. The company also marked a significant milestone earlier in the year with its highest single-day generation of 1428 MU on 1st September 2023.

NTPC aims to achieve 60 GW of Renewable Energy capacity by 2032, in addition to its already substantial installed capacity of 75.4 GW, which includes 18 GW currently under construction, including 5 GW in renewables.

Beyond power generation, NTPC has diversified its business interests into areas such as e-mobility, Waste-to-Energy, and Green Hydrogen solutions. The company has also participated in the bidding for power distribution in Union Territories.

BHEL bags Rs 4,000 cr order for 1600 MW thermal project from Adani Power



State-owned engineering firm Bharat Heavy Electricals Ltd (BHEL) has received an order worth Rs 4,000 crore from Adani Power Limited for setting up the 1,600 MW

Raigarh Phase-II Thermal Power Plant at Raigarh, Chhattisgarh.

The boiler and Turbine Generator are to be manufactured at BHEL's Trichy and Haridwar plants respectively. The supply of Unit-1 will take 31 months and Unit-2 (35 months).

The supply of Unit-1 will take 31 months and Unit-2 (35 months).

India to boost CNG, PNG infrastructure with 17,500 stations, 120 million connections by 2030: Puri



India is set to have around 17,500 Compressed Natural Gas (CNG) stations and approximately 120 million Piped Natural Gas (PNG) connections by the year 2030, Union minister for petroleum and natural gas,

Hardeep Singh Puri said.

This expansion is expected to significantly develop ancillary industries, such as those manufacturing CGD meters, compressors, and dispensers, contributing to the vision of an Atmanirbhar Bharat or SelfReliant India.

In an event marked by the dedication of 201 new CNG stations and the inauguration of India's first small-scale Liquefied Natural Gas (LNG) unit by GAIL, the minister emphasized the importance of developing the National Gas Grid (NGG) and a comprehensive City Gas Distribution (CGD) network to connect supply points with consumption centers, which is pivotal to transitioning to a gas-based economy.

"Our energy security, combined with sustainable growth, depends significantly on how we progress towards becoming a gas-based economy," Puri said.

The new CNG stations, established by GAIL's City Gas Distribution entities across 17 states, and the pioneering small-scale LNG unit at Vijaipur signify India's progressive efforts in energy sustainability and accessibility. The inauguration, witnessed by key officials and stakeholders, marks a substantial step towards enhancing the availability of cleaner fuel options in the country.

The deployment of these CNG stations and the novel LNG unit demonstrates the government's commitment to reducing the carbon footprint and addressing climate change. Puri highlighted the importance of policy and regulatory support to make sustainable fuels widely accessible. He also praised GAIL's innovative approach in setting up the LNG unit, with a project cost of ₹150 crore, designed to bridge the gap between isolated gas sources and the market, aiding in resource monetization.

This extensive infrastructure plan is not just an energy strategy but also a pathway to economic growth, creating opportunities across various sectors vital for fulfilling India's self-sufficiency ambitions.

India's crude oil output rises 7.9% to 2.3 MMT in February, imports decline 6.6% YoY: PPAC

India produced a total of 2.3 million metric tonnes (MMT) of crude oil in February 2024 - registering a growth of 7.9 per cent compared to the year-ago period, according to Petroleum Planning & Analysis Cell (PPAC).

Out of 2.3 MMT, Oil and Natural Gas Corporation (ONGC) produced 1.4 MMT of crude oil while Oil India Limited (OIL) and private sector producers contributed 0.3 MMT and 0.6 MMT, data released by the Oil Ministry showed.

Crude oil imports decreased by 6.6 per cent and increased by 0.4 per cent during February 2-24 and April-February 2024 respectively, compared to the corresponding period of the previous year. The net import bill for oil and gas was \$9.2 billion in February 2024 compared to \$9.6 billion in February 2023, according to PPAC.

Out of this, crude oil imports constitute \$10.2 billion, liquified natural gas (LNG) imports \$1.1 billion and the exports were \$4.1 billion during February 2024, the data showed.

The Indian basket crude price averaged \$81.62 per barrel during February 2024 compared to \$79.22 per barrel during January 2024 and \$82.68 per barrel during February 2023. The price of Brent Crude averaged \$83.93 per barrel during February 2024

compared to \$80.32 per barrel during January 2024 and \$82.49 per barrel during February 2023.

The production of petroleum products was 22.4 MMT during February 2024 which is 2.6 per cent higher than February 2023. Out of above 22.4 MMT, 22.1 MMT was from refinery production and 0.3 MMT was from fractionator. There was a growth of 3.8 per cent in production of petroleum products in April February FY 2023 – 24 compared to same period of FY 2022 – 23.

On the other hand, natural gas consumption (including internal consumption) for February 2024 stood at 5,332 MMSCM (million metric standard cubic meters), which was 20.4 per cent higher than the corresponding month of the previous year, according to the official data.

The cumulative natural gas consumption for the current financial year till February 2024 stood at 60,578 MMSCM, which was higher by 11.1 per cent compared with the corresponding period of the previous year.

In addition, LNG import for February 2024 was 2,445 MMSCM which was 33.3 per cent higher than the corresponding month of the previous year. The cumulative import of 29,933(P) MMSCM for the current financial year till February was higher by 17.6 per cent compared with the corresponding period of the previous year.

The gross production of natural gas increased by 11.1 per cent at 2,947 MMSCM in February from last year. The cumulative gross production of natural gas was 33,299 MMSCM for the current financial year till February, higher by 5.7 per cent compared with the corresponding period of the previous year.

India is dependent on imports to meet over 85 per cent of its crude oil requirements and around 50 per cent of its natural gas requirements.

In January 2024, India produced a total of 2.5 MMT of crude oil - registering a growth of 0.7 per cent compared to the year-ago period. The net import bill for oil and gas was \$11.7 billion in January 2024, according to PPAC.

‘India targets to hike share of natural gas in the energy mix to 15 per cent’

India targets to increase the share of natural gas in its overall primary energy mix to 15 per cent by 2030 from the prevailing 6 per cent share, said credit rating agency CARE Ratings.

In its latest report on the industry, CARE Ratings said India is envisaged to have robust demand for natural gas from all the major consumption segments viz. fertiliser, city gas distribution, power, refineries, and petrochemicals

“After digesting the shocks of the Covid-19 pandemic and the Russia-Ukraine war, gas consumption in FY24 is expected to be the highest ever in the country,” it said.

According to the report, imported LNG prices which had shot up significantly in FY23 due to supply disruptions, arising from the outbreak of the Russia-Ukraine war, have also now normalised during the last year.

Further with a sizeable expansion of LNG export capacities being undertaken by the gas surplus hubs/regions of the world, imported LNG prices in India are expected to remain range-bound, thus supporting demand, the report states.

“The higher demand for natural gas in the country is also expected to be supported by sizeable growth in domestic gas production wherein nearly 30 MMSCMD of new domestic natural gas production has gradually come on-stream over the last three years and another around 15 MMSCMD of new domestic natural gas production is expected to come on-stream during FY25,” CARE Ratings said.

With the rise in domestic natural gas production, India’s dependency on imported LNG, which stood at 53 per cent of total consumption in FY21, has gradually declined over the last three years and is expected to remain at around 45 per cent by FY26, it added.

Crude oil imports rise to 4-year high in March

India's crude oil imports rose to 5.2 million barrels per day in March, the highest level since early 2020 amid increased refinery runs by the Indian refiners, an analysis of the data provided by intelligence firm Kpler showed. Imports were 11% higher than February volumes and up 4.5% from 4.9 million barrels a day in March 2023.

Additionally, the country's crude oil imports from Russia rose to 1.8 million barrels per day in March, highest after the July of last year primarily on the back of higher discharge of Urals, according to the data. Imports were, however, slightly down from 1.87 million barrels per day in the same period a year ago.

"India's strong crude imports is partly a signal of refiners ramping up runs, although we have also seen a slight uptick in the country's onshore crude inventories this month," said Serena Huang, analyst at Vortexa. "India's imports of Russian crude will likely remain robust in the near-term," she said.

Post the outbreak of conflict in Ukraine, Russia has emerged as the top supplier of crude oil to India on the back of healthy discounts it offered. Despite retaining its position at the top, Russia's share in total imports of the country has come down to 34.5% in March from the earlier peak of 45% in May 2023 when the purchase volume stood at 2 million barrels per day. Russia's share has however increased from 32.5% in February. Amid all Russian grades, Urals discharges to India remained at the highest at around 1.5 million barrels per day, up from 1.1 million barrels per day in February. Now as the western sanctions on Venezuela kicks in beginning April 18, Russian supplies are once again expected to fill in for the lack of Venezuelan crude India started purchasing after sanctions eased last December. Imports from Iraq too surged significantly from last month registering an increase of 66% to 1.3 million barrels per day. Iraqi imports in March were the highest since 2020, suggesting that Indian refiners have returned to their traditional suppliers of oil in West Asia. India's growing reliance on supplies from West Asian nations can be attributed to many reasons including the narrowing discounts on Russian crude, rising uncertainty of sanctions on tankers by the United

States for violation of G7 price cap, and increased freight cost amid the Red Sea crisis.

India's dependence on LNG imports may fall to 45% in FY26

With increasing local production, the import dependency of natural gas in general and LNG in particular, is likely to come down to 45 per cent by FY26, says a report.

According to a Care Ratings analysis, with the rise in domestic natural gas production, the dependency on imported LNG (liquefied natural gas), which stood at 53 per cent in FY21, has gradually declined over the past three years and is expected to remain at around 45 per cent by FY26, the agency said.

Higher demand for natural gas is also expected to be supported by sizeable growth in domestic gas production, wherein nearly 30 MMSCMD of new domestic natural gas production has gradually come on-stream over the past three years and another 15 MMSCMD of new domestic production is expected to come on-stream next fiscal alone.

There has been a steady growth in natural gas consumption till FY20.

However, following the pandemic and a sharp increase in imported LNG prices due to geopolitical situation, the demand for natural gas declined since fiscal FY21-23, the agency said.

Hardik Shah, a director at the agency expects the trend to reverse and the country is likely to record the highest-ever gas consumption in FY24.

The government aims to increase the share of natural gas in its primary energy mix from the present 6 per cent to 15 per cent by 2030, focusing on key end-use sectors like fertilizers, city gas distribution, power, refineries, and petrochemicals.

Despite high reliance on imports in the past due to falling domestic production, significant growth in domestic output from FY22 onwards along with expected increases in FY24 and FY25 offer hope for reduced imports.

Enabling regulatory measures to adjust domestic pricing, stabilizing imported gas prices, adequate LNG capacity, and expanding gas pipeline infrastructure are expected to support this shift towards a greater share of natural gas, while keeping the import dependency at around 45 per cent by FY26, Shah added.

City-gas distribution entities lag on minimum work programme: PNGRB

Only 12 million cooking gas connections have been extended by city-gas distribution (CGD) entities so far, which is half of their total prorated commitments of 22 million connections, the Petroleum and Natural Gas Regulatory Board (PNGRB) has said.

PNGRB said that this is the reason for issuing letters to defaulting entities to complete their minimum work programme (MWP) commitments and striving to open up gas infrastructure for common usage.

“The present progress of CGD entities is not in keeping with their commitments. Now, PNGRB is focusing on the rapid development of piped natural gas (PNG) connections, and in this regard, it initiated PNG drives from January 26 to March 31,” the regulator said in response to questions regarding its recent decision not to extend infrastructure exclusivity to Mahanagar Gas and Vadodara Gas.

According to existing rules, the MWPs are mandated by PNGRB and techno-commercial feasibility. Apart from providing a minimum number of PNG connections, CGD entities are required to cover all charge areas through pipelines within their marketing exclusivity periods.

In line with the PNGRB Act and regulations framed under it, the regulator takes action if a CGD defaults on its MWP targets.

“PNGRB is mandated to ensure equitable distribution of natural gas across the country. To fulfil its statutory duty, the regulatory body has authorised the whole of India (mainland) for the development of CGD networks. After the awarding of authorisation, the prime function of PNGRB is to monitor the progress committed by CGD entities,” the statement added.

Ambitious plans

To ensure the momentum of connections growth remains high and on-ground infrastructure is laid out quickly, PNGRB has been strict in enforcing the MWPs, sources said.

Last year, the ministry informed Parliament that authorised entities have to provide 125 million PNG connections by 2030, including in rural and urban areas based on MWP targets.

Expanding nationwide CGD coverage is part of the government’s target of raising India’s share of natural gas in its energy basket to 15 per cent by 2030, up from the current 6.8 per cent.

As a result, as many as 300 geographical areas (GAs) covering about 98 per cent of the population and 88 per cent of the total GA of the country spread over around 630 districts in 28 states and Union Territories, including rural areas, have been authorised by PNGRB by May 31, 2023, data from the Ministry of Petroleum and Natural Gas show. This was up from 2.54 million connections across 66 districts in 2013-14.

With the 12th round of CGD bidding concluding, and letters of intent being issued on March 4, 2024, CGD licences for the whole of India, apart from the Andaman and Nicobar Islands, and Lakshadweep, have now been issued.

To fire up PNG adoption, govt may hand out free connections

The petroleum and natural gas ministry is drawing up plans to offer free piped natural gas (PNG) connections and consumption subsidies to poor households to help its wider adoption on the lines of the Ujjwala scheme, which popularised liquefied petroleum gas (LPG) among the poor, said people familiar with the matter. The plan is likely to be part of the ministry’s proposal for the first 100-day agenda of the government which will be sworn in after the general election, they said. The Modi government has asked all ministries to propose new ideas and plans that could be launched or implemented in the first 100 days of the next regime.

Officials are busy preparing the plans, which are likely to be discussed with the cabinet secretary in

early May in the middle of the election, according to people in the know.

Building a natural gas-based economy has been at the heart of Government's energy agenda for a decade. Popularising PNG has been a key objective the government has set for city gas distributors, but its adoption has been far slower than that of LPG. There are just about 12 million PNG customers compared to 320 million LPG consumers, including 103 million Ujjwala beneficiaries. The government wants city dwellers to rapidly shift from LPG to PNG

State financial support can help promote PNG the way it boosted LPG, said petroleum and natural gas ministry officials. The ministry is likely to propose waiver of connection charge, including the installation and security fee, and introduction of subsidy to make it distinctly cheaper than LPG under the proposed scheme, which may be called "Prajwala" to rhyme with Ujjwala, said one of the persons cited earlier, who did not wish to be identified. A nod from the cabinet will be required to launch the scheme.

The ministry's plan also aims to solve the problem of lower consumption by introducing prepaid meters, the person said. A household can recharge a prepaid meter with small amounts frequently unlike in the case of LPG, where it must pay for the full cylinder in one go. Lower average LPG consumption by Ujjwala customers has been a concern for the government.

Since piped gas is always available at home, the average consumption may increase unlike in the case of LPG, where a few days are lost in getting refills.

Consumers have to shell out about Rs 7,000 for a fresh PNG connection in Delhi. An Ujjwala customer gets a free LPG connection and stove, and a subsidy of Rs 300 per refill. In Delhi, a 14.2 kg LPG cylinder effectively costs a Ujjwala customer Rs 503, slightly lower than the price of PNG, the person said.

Licences for city gas distribution have been awarded for almost the entire country and a gas pipeline grid has been built to ensure supplies to all licensed areas. City gas distributors must take piped gas to a certain number of households every year, but in

many licensed areas they have missed the targets and are facing penalties.

Imports of natural gas continue to surge

India's appetite for imported natural gas is dramatically growing with prices falling in the international markets.

Imports of liquefied natural gas (LNG) surged 33% year-on-year in February, after increasing 26% in January, 12% in December last year and 5% in November.

LNG imports cost \$1.1 billion in February, as much as in the year-ago period, even though the volumes were a third higher this year at 2.45 billion cubic metres. For the first 11 months of this financial year, LNG imports cost \$12 billion, lower than \$15.9 billion last year, even though volumes were up 18% this year.

For consumers, gas became more attractive than alternative fuels due to unusually low prices this winter, said an industry executive, adding that industrial consumers are switching to gas as it has become more affordable. Fertiliser, city gas and power sectors accounted for two-thirds of the increase in imported gas consumption in January.

LNG is currently available for about \$8.5 per mmbtu in the Asian spot market. It averaged \$10 in the three months through February, about half of \$21 in the year-ago period. Crude oil fell to \$80 from \$85 per barrel during this period. Crude is currently around \$85.

Booming imports have boosted domestic consumption of natural gas, which increased 20% year-on-year in February and 11% in the April-February period. Domestic consumption was also aided by an 11% year-on-year expansion in local production of gas in February and nearly 6% in the April-February period.

Increased global gas supply, mainly from the US, milder winter, lower-than expected demand from China and higher gas storage in Europe have all weighed on gas prices this season.

The easy and cheaper availability of LNG has induced Indian consumers to order more of it after more than a year of having to deal with extremely high spot prices and supply shortages. In 2022-23, India imported 15% less LNG even as it paid 27% more year-on-year.

Big Oil executives push back against calls for fast energy transition

Top oil executives took to the stage of a major energy conference recently to vocally oppose calls for a quick move away from fossil fuels, saying society would pay a steep cost to replace oil and gas.

Big oil companies including BP and Equinor have written down renewable energy projects and others have been forced to push back their greenhouse gas reduction targets due to greater uncertainties with the transition to clean fuels.

That and unexpected strong demand for oil has stiffened the industry's opposition to government and activist demands to phase out fossil fuel development. Policymakers also have shifted their focus to energy supply security and affordability since Russia invaded Ukraine and during the latest conflict in the Middle East.

"We should abandon the fantasy of phasing out oil and gas, and instead invest in them adequately" to reflect demand, Amin Nasser, CEO of Saudi Aramco, the world's largest oil producer, said to applause.

Despite the growth of electric vehicles, solar and wind power, oil demand this year will reach a new record of 104 million barrels per day this year, Nasser said.

Alternative energy has yet to show it can displace hydrocarbons at current requirements or prices, Nasser added. He rejected the International Energy Agency forecast of peak oil demand in 2030.

Other oil CEOs echoed his view, with Shell's Wael Sawan pointing to government bureaucracy in Europe as slowing needed development. Petrobras CEO Jean Paul Prates said caution should overrule haste. Exxon Mobil CEO Darren Woods also said

regulations governing clean fuels have still not been resolved.

"If we rush or if things go the wrong way, we'll have a crisis that we will never forget," said Prates. "You're hearing some very pragmatic views up here," said Meg O'Neill, CEO of Woodside Energy, who rejected what she called simplistic views that the transition to cleaner fuels can "happen at an unrealistic pace."

Public debate over the transition and its cost has become increasingly divisive in many countries. "It has become emotional. And when things are emotional, it becomes more difficult to have a pragmatic conversation," O'Neill said. It could take 20 to 40 years to build the market for and test some new clean-fuel technologies, O'Neill said.

US Energy Secretary Jennifer Granholm pushed back at oil industry views on renewable fuels.

"That is one opinion," she said of Nasser's prediction of continuing long-term demand for fossil fuels. "There have been other studies that suggest the opposite that oil and gas demand and fossil demand will peak by 2030."

She called the transition to clean fuels "an undeniable, inevitable and necessary realignment of the world's energy system." She added that the world will need fossil fuels well into the future, and said technologies that remove carbon "are ways that we can keep the lights on and continue to press for clean energy solutions."

Exxon's Woods, whose company spent \$4.9 billion on a carbon sequestration company, raised concerns about building a business around hydrogen and carbon capture and storage.

He said in remarks at the conference he is not confident that carbon capture and storage will "necessarily come to the right solution" because of its current high costs and lack of market incentives.

On the use of hydrogen as a fuel, "the challenge has been translating the legislation of the IRA (Inflation Reduction Act) into regulation," Woods said.

"There isn't a lot of incentives" to drive low-carbon hydrogen fuel projects, he said, referring to hydrogen derived from natural-gas.

Government takes centre stage in global green hydrogen dialogue

The 41st Steering Committee Meeting of the International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE) began its formal proceedings on March 19, 2024, at Sushma Swaraj Bhawan in New Delhi. Delegates from across the globe, including Austria, Chile, France, and the European Commission, are participating in the two-day event focused on green hydrogen and its role in economic decarbonization. IPHE Vice Chair, Dr. Noe Van Hulst, in his opening remarks, recognized India's efforts in the National Green Hydrogen Mission. Ajay Yadav, Joint Secretary of the Ministry of New and Renewable Energy, emphasized the need for international cooperation to harness green hydrogen for a sustainable economy.

The meeting has convened international delegates to discuss the integration of green hydrogen initiatives with global agendas such as the Hydrogen Energy Ministerial and Clean Energy Ministerial. Progress of various IPHE working groups and task forces on regulations, education, hydrogen production, and trade were reviewed, with suggestions for their enhancement. The role of the World Trade Organization in facilitating hydrogen trade was underscored, alongside the review of the IPHE's short and medium-term vision and roadmap. Preceding the steering committee sessions, the IPHE Academic Outreach was held at IIT Delhi on March 18, 2024, engaging scholars and experts on the future of hydrogen and fuel cell technologies.

Uttar Pradesh Targets 1 Million Metric Tons of Green Hydrogen a Year by 2028

The Uttar Pradesh government aims to produce one million metric tons of green hydrogen annually by 2028 to replace the grey hydrogen used in its fertilizer and refinery industries. The current demand

for hydrogen in the state is around 0.9 million metric tons per annum.

While green hydrogen, produced by splitting water molecules using renewable energy sources like solar or wind power, is a zero-emission fuel, grey hydrogen is derived from unabated fossil fuels like natural gas.

The government will provide incentives and financial support to develop the core infrastructure across the entire value chain of green hydrogen, according to the policy document posted on the website of the Uttar Pradesh New and Renewable Energy Development Agency (UPNEDA), which will also act as the nodal agency for the program.

The project's overall capital investment size will determine the subsidy level. The first five investments (barring the Meerut division) will receive financial incentives of up to 40% of the total investment. This subsidy is capped at ₹2.25 billion (~\$27 million) per project per annum during the policy period.

"Booster" subsidies will also be provided for firms employing a certain percentage of female workers or a higher number of employees than the stipulated minimum amount. Additional booster subsidies can be availed if the production facility exports green hydrogen. An ecosystem booster subsidy can be availed if a certain percentage of input or raw material is sourced from Uttar Pradesh.

Additionally, for public sector undertakings, government land will be leased at the nominal rate of ₹1 (~\$0012) per acre per year for 30 years. Private investors, however, will have to pay the lease rate of ₹15,000 (~\$181) per acre per year.

Green hydrogen projects that seek to set up dedicated solar energy units will be granted a maximum land allotment of 5 acres per MW of solar capacity installed, capped at 20 MW per kiloton of annual green hydrogen output capacity.

Additionally, to bring down the cost of green hydrogen production, two Centers of Excellence will be set up, and startups engaged in the production of green hydrogen will be incentivized.

India to triple N-power generation capacity by 2030: AEC chief

India aims to triple its nuclear power generation capacity by 2030, increasing from around 7.5 GW currently, announced atomic energy commission (AEC) chairman Ajit Kumar Mohanty at the recent first-ever nuclear energy summit held in Brussels.

“Our aim is for nuclear energy to have a significant share in the electricity mix of India by 2047 when India celebrates 100 years of Independence,” he said, stressing country's commitment to achieving net zero emissions by 2070.

India has initiated steps to increase the share of nuclear power capacity, he said. “The growth of the Indian nuclear power programme is imperative to meet the twin goals of energy security and sustainable development,” said Mohanty. India recently added two indigenously designed 700 MW pressurized heavy water reactors at the Kakrapar Atomic Power Project in Gujarat, with nine more reactors under construction. Additionally, govt has approved setting up of 10 such reactors in fleet mode, he added.

“Recently, in a historic milestone marking entry into the vital second stage of our three-stage nuclear power programme, the ‘core loading’ took place at our first indigenous fast breeder reactor (500 MWe). We are also considering steps for the development of small modular reactors. This is a testament to India’s scientific and engineering capability,” he explained.

The AEC chief highlighted India's commitment to full international civil nuclear cooperation for the country's development needs, engaging in discussions with foreign companies to further expand the nuclear energy programme.

Rosatom in talks with India for small modular reactors

Rosatom, Russia’s state-owned atomic energy company, is in talks with the Indian nuclear establishment for a possible supply of technology for ‘small modular reactors’, or SMRs, Evgeny

Pakermanov, President, Rosatom Overseas, told RECENTLY on the sidelines of Atomexpo 2024, a global nuclear energy conference, organised annually by Rosatom.

While he did not elaborate, he answered in the affirmative when asked if Rosatom was in talks with India.

SMRs are typically small and are about 100-200 MW in size. Many countries, including India, are keen on SMRs as a source of green energy.

The interest the world has in SMRs can be gauged by the fact that the hall in which the session on SMRs was held at Atomexpo 2024 was overflowing and many had to stand at the entrance to listen to the dozen-odd speakers.

Pakermanov dwelt on Russia’s expertise in SMRs and stressed on its advantages such as fast construction (4 years) and much less water consumption. Russia is building two nuclear-powered ice-breakers to open up the Northern Sea Route, and has a 77 MWe ship-mounted nuclear plant—Akademik Lomonosov—stationed at the Arctic Sea port of Pevek. It is building its first land-based SMR in the remote province of Yukatlia. The 190 MWt (55 MWe) power plant is designed to operate on 20 per cent enriched uranium, needing only 15 acres. It is expected to go on stream in 2028.

“Rosatom is prepared to offer a flexible, tailor-made SMR solution, which is designed to address most peculiar customer demands,” says the company’s website.

Li Feng, Deputy Director of the Safety Production Committee, China National Nuclear Power Co, noted that 18 countries were working on 83 SMRs. Quoting the Nuclear Energy Agency (an intergovernmental body of the Organisation for Economic Cooperation and Development, which is a club of rich countries), Feng said that by 2050, SMRs could reach 375 GW of installed capacity, in an ambitious case.

China has 55 operating nuclear plants and 36 more are under construction. The country has also embarked upon an SMR programme. It is building a 125 MWe SMR at the island province of Hainan. The

SMR is designed for electricity generation, heating, steam production and seawater desalination.

Common Regulations

All the experts who spoke at the conference stressed that there should be common regulations for SMRs across countries. Feng said that the International Atomic Energy Agency (IAEA) had identified 19 "issues" relating to SMR deployment such as safety, radiation protection, emergency planning, nuclear fuel cycle and radioactive waste management.

Mikhail Chudakov, Deputy Director General and Head of the Department of Nuclear Energy, IAEA, rued that there was no uniformity among the nuclear regulators of various countries on SMRs and said that IAEA was trying to find common points for evolving standardised documentation. "It is not easy," he said.

Chudakov observed that floating nuclear power plants were the "safest in the world", noting that in case of any mishap "you can sink the ship".

Fast-breeder reactor crucial for long-term energy security: Experts

India's top nuclear scientists have welcomed the initiation of core loading in the Prototype Fast Breeder Reactor, terming it one of its kind in the world and an important step towards achieving long-term energy security of the country. Former Atomic Energy Commission chairman Anil Kakodkar, who played a key role in ensuring India's integration into the global nuclear order, termed the Prototype Fast Breeder Reactor a major advancement in terms of technology by global standards.

"China has a small programme on fast breeders. Japan, France, the US had this (fast breeder reactors), but due to anxiety over nuclear energy, several programmes have been shut down," Kakodkar told recently.

Former Atomic Energy Commission chairman Ratan Kumar Sinha said India's PFBR has taken a long time in the development stage and was first of its kind to have breeding. Sinha said the fast-breeder reactors use depleted uranium (U-238) and plutonium (Pu-239) to produce energy and more fuel,

hence the name breeder reactor. Sinha said the fast breeder reactors formed the second stage of India's three-stage nuclear programme, which would allow the use of thorium for the next generation of reactors. Kakodkar said India has massive thorium resources and harnessing the same was necessary for long-term energy security.

"Well, the point is that nuclear power is becoming increasingly important for our energy security, particularly in the context of clean energy transition," he said.

"Therefore, in terms of technology, it (PFBR) is a major advancement even by global standards because it is a large reactor 500 MWe and it is extremely important for long-term energy security of India," he said. Kakodkar said the India-US Civil Nuclear Cooperation opened the doors for India to buy uranium for its domestic reactors. "We are able to expand the nuclear programme now. Importing uranium contributes more to energy security than importing fossil energy," he said.

India aims to increase the share of nuclear power in its energy mix by 2032 and has approved construction of 10 PHWRs in fleet mode. By 2032, India is looking forward to producing 22.4 GWe power from its nuclear power plants. Prime Minister Narendra Modi witnessed the initiation of core loading at the Prototype Fast Breeder Reactor in Kalpakkam in Tamil Nadu recently.

The push for nuclear energy as climate solution
Last week, Brussels hosted a first-of-its-kind Nuclear Energy Summit that was billed as the most high-profile international meeting on nuclear energy ever, boasting the attendance of representatives from 30 countries, including a few heads of state. This day-long meeting on March 21 was the latest in a series of efforts being made in the last few years to pitch nuclear energy as an important solution to global problems like climate change and energy security.

The International Atomic Energy Agency (IAEA), which organised last week's event, called it a "landmark" and a "turning point" in the efforts to expand the use of nuclear energy for generating clean electricity.

The meeting was not meant to produce any decisions or finalise any agreement. Rather, it was another attempt to build momentum for a greater acceptance of nuclear energy which many countries continue to have apprehensions about. Such apprehensions were aggravated by the Fukushima accident in 2011. The continuing crisis at the Zaporizhzhya nuclear power plant in Ukraine, the first nuclear facility to have been caught in a dangerous armed conflict, has also been a source of grave concern.

But global nuclear advocates, led by the IAEA, an intergovernmental organisation that works for the safe and peaceful use of nuclear science and technology, have been very active in the last few years in highlighting the potential of nuclear power to accelerate the clean energy transition that the world so desperately needs to achieve its climate change goals.

The IAEA has launched an 'Atoms4Climate' initiative to talk about this and has begun an engagement with the climate community, especially at the COPs or the annual year-ending climate conferences. Two years ago, at COP27 in Sharm el-Sheikh, IAEA set up a pavilion for the first time, and at COP28 in Dubai last year, about 20 countries pledged to work towards tripling global nuclear energy installed capacity by 2050.

The case for nuclear energy

The case for nuclear energy as a possible substitute for fossil fuels, at least for electricity generation, is not without merits. It is a clean source of energy with a minimal carbon footprint. There is negligible release of emissions during the electricity generation process.

Even when the entire life cycle is considered – accounting for activities like reactor construction, uranium mining and enrichment, waste disposal and storage, and other processes – greenhouse gas emissions are only in the range of 5 to 6 grams per kilowatt hour, according to IAEA. This is more than 100 times lower than coal-fired electricity, and about half the average of solar and wind generation.

Some independent studies have put the emission from nuclear life cycles at much higher levels, around 50-60 grams per kilowatt-hour in some instances,

depending on the processes and energy used for extraction of minerals, construction and other activities. But in most cases, nuclear power plants are known to have substantially lower carbon footprint than solar or wind projects over their entire life cycle.

The other great advantage of nuclear is its perennial availability, unlike wind or solar which are season or time-dependent. It is thus suitable for baseload electricity generation that solar or wind projects are unable to do unless breakthroughs in battery storage technologies come along.

For these reasons, nuclear energy features prominently in most of the decarbonisation pathways suggested by the IPCC (Intergovernmental Panel on Climate Change) and others. IAEA says nuclear energy is already contributing very significantly to reducing greenhouse gas emissions. Nuclear power generation results in avoiding emissions of more than 1 billion tonnes of CO₂ equivalent every year, according to IAEA. In the last five decades, this has resulted in a cumulative avoidance of about 70 billion tonnes of CO₂ equivalent.

What explains the poor uptake of nuclear energy?

But despite these advantages, there has been a serious lack of enthusiasm for the accelerated deployment of nuclear energy. Only 31 countries in the world use nuclear energy for generating electricity. And barely seven more are working towards joining this club.

The number of operational nuclear reactors has actually come down in the last 20 years, from 437 in 2003 to 411 now, IAEA data shows. The average life of these reactors is more than 31 years, which highlights the fact that few new reactors have come onboard in the last decade.

Safety concerns are not the only reason for the poor uptake of nuclear energy in recent years, though those would be some of the most important, particularly after the Fukushima accident. Nuclear power also happens to be the costliest electricity right now.

Nuclear reactors require high investments and technology base, take years to build, and have to operate under a variety of regulations and

constraints, making them unattractive for countries wanting to quickly ramp up their electricity generation in an affordable manner.

The kind of technology breakthroughs that have driven down the costs of solar and wind in the last decade, thus enabling rapid adoption, have not happened in the nuclear sector. The much-discussed technology of small modular reactors is far from being mature.

It is hurdles like these that have worked against a rapid growth in nuclear energy in the last three decades. But the climate emergency is creating an opportunity for a greater push for nuclear energy.

As IAEA director general Rafael Mariano Grossi told The Indian Express in a recent interview, there was a growing realisation that without nuclear “you would never get anywhere near the climate goals. Nowhere near”.

COP outreach

Die-hard climate activists who have been demanding deep and rapid cuts in production and consumption of fossil fuels aren't really great supporters of nuclear energy. The annual climate conferences have usually maintained a safe distance from the nuclear industry and its advocates. But that is changing.

In the last five years, nuclear energy has progressively gained visibility at these conferences. IAEA has now begun participating in these like any other international agency with observer kind of status, organising side events and talks on the potential of nuclear energy.

The Dubai meeting last year was particularly eventful. Representatives from 22 countries, including several that do not currently use nuclear-generated electricity, committed themselves to working together to achieve a tripling of global nuclear energy installed capacity by 2050 from 2020 levels. This is an extremely ambitious goal, though

broadly in line with some pathways projected by the IPCC for achieving global net-zero emission levels by 2050.

Only Brazil and Iran have a lower share of nuclear energy in their electricity generation mix. Even after expansion, this share is not expected to go beyond 5 per cent.

Interestingly, India skipped the tripling declaration at COP28 in Dubai. It was not the only nuclear power-producing country to do so, several others also did not sign up. But India was very much part of the Brussels meeting last week, with Department of Atomic Energy Secretary Ajit Kumar Mohanty in attendance. Mohanty said that India was firmly of the view that “nuclear power is a clean and environment-friendly source of electricity, which is available 24×7, and can provide the country long-term energy security in a sustainable manner.”

Mohanty talked about India's ongoing efforts to triple its current nuclear power capacity by 2030, and said that the aim was for nuclear energy to have a “significant share in electricity mix of India by the year 2047”. He did not offer a target for 2047.

Former head of the Department of Atomic Energy Anil Kakodkar believes that India wasn't moving fast enough to expand its nuclear power sector. In a recent interview with The Indian Express, Kakodkar expressed surprise at India staying away from the tripling declaration at COP28 and said India had the potential, and also the imperative, to grow its nuclear energy sector at a much faster pace.

“There is a perception that renewables will solve everything. In the short-term, that might be the case. But as our hunger for clean energy increases, the demand cannot be met without getting in nuclear energy in a big way. Every projection shows that,” Kakodkar had said.

21st Renewable Energy Summit

16th February 2024

India Energy Forum held its 21st Renewable Energy Summit on the theme “**Achieving 500GW of RE Capacity by 2030**” on 16th February 2024, Hotel Le Meridien, New Delhi. The issues and opportunities for meeting the challenges were deliberated in a Panel discussion and three Technical Sessions.

- ❖ In the **Inaugural Session**, **Shri B. S. Bhalla, Secretary, Ministry of New and Renewable Energy (MNRE)** attended as **Chief Guest**. He inaugurated the Summit and presented the scenario of Renewable Energy (RE) capacity development in the country for achieving the 500GW target by 2030. He highlighted the role of new technologies and challenges being addressed in them by policy level decisions. Growth in RE by adding 50GW every year is expected. The Guest of Honour of the Summit was Shri R. P. Gupta, CMD, Solar Energy Corporation of India (SECI). He addressed critical issues and spoke about SECI new initiatives in support of achieving 500 GW target, including concentrated solar power.
- ❖ The **Presidential Address was given by Shri R. V. Shahi, President, IEF** and Former Secretary (Power). He said that in the energy sector policies and incentives should be according to the national priorities. The Energy Transition needs are different for each country. The Shri Rajeev Gupta, CEO, NTPC Renewable Energy Ltd. from NTPC said that industry support is vital for achieving the target. The NTPC has set a goal of 60 GW RE capacity additions by 2030. Vote of thanks was given by Dr. (Mrs.) Goel, Convener, Renewable Energy Group India Energy Forum. The Souvenir on ‘Achieving 500 GW of RE Capacity by 2030: An Industry Perspective’ by Knowledge Partner Grant Thornton Bharat LLP was released on the occasion.
- ❖ Shri V. Subramanian, Former Secretary, MNRE Chaired the **Panel Discussion on Developers and Manufacturers Plan and Perspective** and made opening remarks. The prominent renewable energy experts who participated at the Summit and shared their views were, Shri Vineet Bhatia, ED – Energy & Renewables, Grant Thornton Bharat LLP; Shri Surender Pal Singh, Chairman, Premier Energies Ltd; Shri Shri Rakesh Sarin, President Corp Development, Suzlon Energy Ltd. Theme paper presentation and manufacturing challenges in solar and wind sectors with perspective steps were the highpoints.
- ❖ Dr. Ashvini Kumar, Technical Adviser, Shakti Foundation & Former MD, SECI Chaired the session on **Support of Various Technologies to Achieve 500GW** and made the opening remarks. Dr. (Mrs.) Malti Goel was the Moderator. Shri Surinder Ahuja, Director & Founder, Sunmaster; Shri Deepak Gadhia, Chairman, Sunrise CSP India Pvt Ltd - Solar Thermal; Shri Amrit Rajani, Mg Director, Aneeka Universal; Shri Pankaj Kumar, Director, Quant Solar attended as distinguished panelists. The highlights of the session included start-up presentations in technologies like AgriPV, Floating solar, Green hydrogen, Solar thermal CSP and the industries strides to sustain.
- ❖ Shri K. S. Popli, chaired the session on **Energy Transition in Urban Areas through Bio-gas** and made brief opening remarks. Shri R. S. Dhillon, Former CMD, PFC; Shri Ashhok Kapoor, Advisor- Policy & Strategy, Organic Recycle System (ORS); Dr. N. P. Singh, Sr Technical Advisor, UNIDO & Ex Advisor, MNRE; Col Rohit Dev Mg Director, Reveille Energy attended as distinguished panelists. The panelists shared their experiences in biogas plant developments, issues and prospects.
- ❖ Shri Rajnath RAM, Adviser (Power & Energy), Niti Aayog chaired technical Session on **Support of Storage for Grid Stability**. The distinguished speakers were Shri Ronnie Khanna, Partner–Energy & Renewables, Grant Thornton Bharat LLP; Shri A. K. Saxena, Sr Director, TERI; Shri Alexander Hogeveen Rutter, Manager, Research and Diligence and Electricity Sector Lead, Third Derivative. Development Finance, Climate Tech and Shri Om Krishan Singh, Joint Director, MEITY. In the last session, it was pointed out that BESS has a critical role in integration of RE and grid stability. Experience of organizations like TERI, CDAC and Climate Tech were shared.

- ❖ The Summit was very well attended by distinguished participants from industry and other stake-holder organizations in large number, followed by lively question and answer sessions. Perspectives in Four Key Pillars of Manufacturing, Technology, Biofuels and Battery storage were deliberated for achieving the target of 500GW by 2030 in the 21st RES, organized by the India Energy Forum on 16.2.2024. **The detailed Recommendation of the Summit and the Programme are attached.**

RECOMMENDATIONS

1. India has set an enhanced target at the COP26 of 500 GW of non-fossil fuel-based energy by 2030. Renewables are expected to make up approximately 50% of the total installed capacity. As of Dec 2023, India ranks 4th globally in renewable energy installed capacity of ~180 GW. This comprises of solar – 73 GW, Wind – 45 GW, Hydro - 47GW, Biomass - 11 GW and Small Hydro - 5GW. Solar and wind power are having leading contributions. India's current power situation is challenging, with a peak demand of 223 giga watts (GW) in June 2023, rising 3.4% from the highest level in 2022.
2. The electrification rate in India has reached over 99% of households, and initiatives like the *Saubhagya* Yojana and others have facilitated the electrification of millions of households, reaching especially in rural and remote areas. India pledged to achieve carbon neutrality by 2070 and made five nationally determined commitments as part of its *Panchamrit* action plan at COP26 held in Glasgow in 2021 under the UNFCCC. Rising global temperature, resulting changing climate and strategy implementation are part of the problem statement.

Panel Discussion on Developers and Manufacturers Plan and Perspective

3. Current status and prospects in manufacturing sector are: Solar PV module manufacturing capacity surpassed 38 GW in 2023 and is poised to exceed 110 GW by 2026; domestic market for electrolyzers could reach 226 GW capacity, which translates to USD 31 billion by 2050; global

wind turbine manufacturing capacity may rise from 7% share to 12% in global gearbox manufacturing; and battery storage potential to exceed 208 GWh by 2030. In New Technologies the perspectives are: offshore wind target of 30 GW in installed offshore wind projects by the year 2030; with 22 operational AgriPV projects across India, 1% of India's agricultural land can lead to additional 630 GWp at the rate of 450kWp per hectare; the floating solar capacity in the reservoirs encompassing 18,000 sq. km of area, is 280 GW and biofuels expected to grow at a CAGR of 5% with annual biomass availability of approximately 750 MTPA.

4. Global wind capacity is approaching 900 GW and the projections are 2,200 GW by 2030. India has set a target of 100 gigawatts of wind energy by 2030. To meet the goal, hybridization of the existing 65 gigawatt capacity with solar, might help and out of all the 65 gigawatts, and an addition of 15 GW could be made. In off-shore development, we already have 4 gigawatts worth of seabed bids open from Tamil Nadu side, and others coming from Gujarat. The MNRE has come out with the Revised List of Models & Manufacturers (RLMM). Views of 4000-5000 MSMEs engaged in wind energy development on RLMM could be solicited.
5. Changing energy geopolitics gives India an opportunity to step up its manufacturing capabilities and become an exporter in the long run. Make in India is very sensible policy and important challenge in solar cell manufacturing though competition from China continues. Indian government is extending support to industry and we expect plan incentives for manufacturing of ingots and wafers in the first instance.

Technical Session on Support of Various Technologies to Achieve 500GW

6. Agrophotovoltaics (AgriPV) provide for effective utilization of land i.e., producing electricity and growing crops under the solar panels. SunMaster developed its first Agrovoltaics Farm of capacity 2527 kW in 2020-21 in 3.4 acres of farmland. Primarily initiated due to global warming concerns, the crop selection and maintenance are two important considerations. Benefits of using same land for electricity and agriculture are

protection of crops from extra heat during hot season, reduced evaporation and protection from birds. Challenges are; uncertain grid connectivity, cross subsidy, surcharge and wheeling charges in power transmission.

7. In Floating solar, quant Solar made a beginning with a 10 kilowatt project in a remote village of Assam. India's first megawatt scale floating solar plant came up in Vishakapatnam. Challenges of the wind forces impacting the structure and the design of anchoring system come into play. Water bodies have diverse challenges associated with the water layer variation and the wind conditions, the wave conditions. With our huge water reservoir capacity already 24-25 projects have been undertaken in India and floating solar has potential to emerge as a third front of a solar generation. Lack of offshore wind infrastructure, unclear regulatory framework, inadequate financial incentives, and a skilled workforce are some of the bottlenecks.
8. Evolution of Solar Concentrators in India has led to institutional applications in Brahm kumari, Mount Abu, at Tirupati and at Shirdi for large-scale cooking. A Solar Thermic fluid System enables making chappati and frying and also for storage of energy at night. India's first Solar Steam boiler for 100 TR Air-conditioning running VAM Chiller cooling application has been developed. In April 2023, Sunrise CSP commissioned the first commercial Big Dish Project at Muni Seva Ashram Campus. Big Dish occupies roughly 1/3rd of the area occupied by the Scheffler Solar Field, while supplying the same amount of steam of significantly higher quality. Big dish has also been installed in Cancer Hospital, Vadodara. Although neglected for a long time, development of molten salt storage is receiving attention.
9. India's target of 500GW renewable energy capacity by 2030, including Green hydrogen offers compelling investment opportunities for private investors and companies. Demand for hydrogen is expected to be approximately 12MMTPA, implying that green hydrogen will need to account for 80-100% of total additional requirement. Green hydrogen offers economic development by creating new business opportunities and jobs in various sectors. Green

hydrogen could replace 85TWh of electricity by 2050, equivalent to 7% of the country's current energy consumption. The market size for green hydrogen is estimated to be 1.8 million FCEVs, 10,000 hydrogen-powered buses, and 1,000 hydrogen-powered trains by 2030. Additionally, India's robust renewable energy sector positions it well for green hydrogen exports.

Technical Session on Energy Transition in Urban Areas through Bio-gas

10. Biomass utilization has many concerns, issues and challenges for the entrepreneur's. Waste generation in urban areas is linked with the life styles. Cities are producing about 60 MT of waste in a year, 70 % of it is collected. About 12 MT is being processed. Biggest plant was created by ORS of 400MT capacity in 2013 for city waste. It has suffered from many issues and became a learning cycle in dealing with this technology. Entrepreneurs face many difficulties such as risk taking, nonavailability of waste, technology familiarity etc. Entry of big companies in biomass utilization for production of CBG might throw some light. The UNIDO has been big promoter and has invested in 9 bio-CNG technology demonstration projects in reference in different cities utilizing organic waste.
11. Although biomass is most attractive resource for different applications in energy transition, climate and green financing needs are vital to create entrepreneurs in large number. Standardization of plants, supply chain, skill required and proactive policies are the other challenges. Sugar Mills exist in large number in India and have a big potential for biogas generation. Energy security is different in different situations. More technical inputs increased R&D is missing in the upstream sector for improving the efficiency and financing.

Technical Session on Support of Storage for Grid Stability

12. How do we see the role of storage for India to become Viksit Bharat? Energy capacity as per CEA study suggests 32-35% share of RE by 2030, which is 3 times from now. To meet the 24x7 demand, storage is essential. It would require balancing the power on daily basis, at seasonal level and to respond to other

unforeseen variability. Use of battery storage in grid scale systems for grid stability is vital for our energy security. It is required to overcome the inertia of coal based plants. Moreover coal based generation depends on the supply of fuel, whereas a RE system though variable, it continues to generate for 10, 15, 20 years. If RE capacity is growing 20 gigawatts a year, we actually need 20 gigawatts of new firm capacity. Energy security benefits of renewable energy are not talked about.

13. The National Mission on Power Electronics Technology (NaMPET) addresses infrastructure development needs in the field of power electronics. A model interconnected micro grid has the ability to tackle intermittency of renewable sources, share excess generation, and improve the reliability of electrical systems in remote settlements. The technical aspects involve converters, power electronics for grid stability needed SPVP deployed by CDAC needed for solar rooftops in different parts of the country up to 500kW Capacity. Remote microgrid deployment and Battery Energy Storage System (BESS) Power Converter System for variable speed, wind electric generator with importance given to R&D is the goal.

CONCLUSIONS

14. Among institutions like PFC, REC and IREDA have been promoting renewable energy in a very big way. Among the PFC is one of the largest financer of renewable energy. Government of India is raising sovereign green bonds and has raised around 8000 crores through these. Furthermore, PFC, REC has gone international for raising Green Bonds. With regard to financing in RE sector, it is encouraging that there is government willingness to support projects and private investors are coming up.
15. It was concluded that investment potential in renewable technologies continues to be high. Infrastructure, necessary regulatory framework, financial investment, and skilled workforce are significant challenges. Investment, innovation and consumer friendly approach with private sector participation are vital for achieving the set

targets. India needs to accelerate clean energy transition by developing enhanced capabilities in the RE sector, through industry friendly policies, potential investment, technology development and support to R&D.

GLIMPSES OF THE SUMMIT



Lighting of Lamp (L to R) Shri Rajiv Gupta, CEO, NTPC Renewable Energy Ltd; Shri B S Bhalla IAS, Secretary, Ministry of New and Renewable Energy; Shri R V Shahi, President, IEF; and Shri K S Popli, SG, IEF



Release of the Theme Paper: (L to R) Shri Vineet Bhatia, ED – Energy & Renewables, Grant Thornton Bharat LLP; Shri K S Popli, SG, IEF; Shri R V Shahi, President, IEF; Shri B S Bhalla IAS, Secretary, Ministry of New and Renewable Energy; Shri Shri Rajiv Gupta, CEO, NTPC Renewable Energy Ltd; Shri R P Gupta, CMD, SECI; and Dr Malti Goel, Convenor, RE Group, IEF.



Session I was chaired by Shri V Subramanian, Former Secretary, Ministry of New and Renewable Energy: (L to R) Shri Vineet Bhatia, ED – Energy & Renewables, Grant Thornton Bharat LLP; Shri Surender Pal Singh, Chairman, Premier Energies Ltd; Shri K S Popli, SG, IEF; Shri V Subramanian,; and Shri Rakesh Sarin, President Corp Development, Suzlon Energy Ltd.

13th Nuclear Energy Conclave

12th March 2024, New Delhi



Session II was chaired by Dr Ashvini Kumar, Technical Adviser, Shakti Foundation & Former MD, SECI: (L to R) Shri Deepak Gadhia, Chairman, Sunrise CSP India Pvt Ltd; Shri Pankaj Kumar, Director, Quant Solar; Shri R S Dhillon, Former CMD, PFC; Dr Ashvini Kumar; Dr (Mrs) Malti Goel, Convenor, Renewable Group, IEF; Shri Amrit Rajani, Mg Director, Aneeka Universal; and Shri Surinder Ahuja, Director & Founder, Sunmaster.



Session III was chaired by Shri K S Popli, Former CMD, IREDA. (L to R) Shri Rakesh Sarin, President Corp Development, Suzlon Energy Ltd.; Dr N P Singh, Sr Technical Advisor, UNIDO & Ex Advisor, MNRE; Shri K S Popli, SG, IEF and Former CMD, IREDA; Shri Ashhok Kapoor, Advisor- Policy & Strategy, Organic Recycle System (ORS); and Col Rohit Dev Mg Director, Reveille Energy.



Session IV was chaired by Shri Rajnath RAM, Adviser (Power & Energy), Niti Aayog: (L TO R) Shri Alexander Hogeveen Rutter, Manager, Research and Diligence and Electricity Sector Lead, Third Derivative. Development Finance, Climate Tech; Shri Ronnie Khanna, Partner–Energy & Renewables, Grant Thornton Bharat LLP; Shri Rajnath RAM, Adviser (Power & Energy), Niti Aayog; Shri A K Saxena, Sr Director, TERI; and Shri Om Krishan Singh, Joint Director, MEITY.

India Energy Forum – Nuclear Energy Group - organized the 13th Nuclear Energy Conclave on 12th March 2024, in Hotel Le Meridien, New Delhi. The theme of the conclave was, “Nuclear Energy: essential for the Transition to Net Zero”.

Dr. AK Mohanty, Secretary DAE and Chairman, AEC was the Chief Guest and delivered a Keynote address. He brought out the role of various technologies in enhancing the contribution of Nuclear Power in the overall energy mix. Earlier to the keynote by Dr. Mohanty, presentations were made by Sh. Gurdeep Singh, CMD of NTPC, Sh. RV Shahi, President of IEF, and Dr. RB Grover, Member AEC, and SM Mahajan, Convenor, Nuclear Energy Group.

During the inaugural function, IEF honoured Dr. RB Grover with the “Distinguished Energy Service Award” for the year 2022. Reading the citation for the award, Sh. KS Popli, Secretary General of IEF, highlighted the exemplary services of Dr. Grover to the Indian Energy sector. The award was presented by D. AK Mohanty.

In the session on Invited Thematic Presentations, the Executive Adviser to the CMD of NPCIL, Sh. Harish Kalsi, Director of IGCAR, Dr. B Venkataraman, and Director Operations of Grid India, Sh. RK Porwal participated and made exhaustive presentations. Representatives of eleven Industries from the Manufacturing and service sectors participated in the Panel Discussions on the theme.

All these presentations are available for downloading from the link:

https://drive.google.com/drive/folders/1vy1P2TM32b0bAK2FMRxZcBQp4SQC3Dzf?usp=drive_link

Dr RB Grover, while setting the context of the conclave, observed that since India aims an economy-wide net zero by 2070, one has to consider several perspectives. The first and foremost is the development perspective. He made a distinction between development-led transition and transition-led development. Based on modelling done by his group, he projected that India would need about 15,600 TWh per annum of electricity for direct use

with the rest of the energy services provided by hydrogen or hydrogen derivatives. If all the hydrogen that is needed is produced by electrolysis, India would need another about 5600 TWh per annum for hydrogen production. This number will come down to the extent that hydrogen is produced by other sources such as biomass etc. In total, India would need about 24,000 TWh of electricity. This only will enable India to achieve an HDI of 0.9.

If one shifts the focus to transition-led development, India will not be able to reach an HDI of 0.9. He called for interrogation of assumptions made by modellers who are coming up with very low projections.

He highlighted the importance of indigenous resources based on a holistic approach that looks not only at fuel, but also at land, water, and a trained workforce. As the aggregate of the potential of solar, wind, and biomass is less than the projected demand, India has to depend on nuclear, and coal with carbon capture. Along with the development of technologies for carbon capture, due attention has to be paid to developing institutions, legislation, and

Dr. Venkataraman informed about the beginning of core loading of 500 MW Prototype Fast Breeder Reactor (PFBR) coming up at Kalpakkam. PFBR is a totally fully indigenous effort. Regarding future, he said that PFBR would be followed by FBR-1 and FBR-2 at the same site. Subsequently, plan is to FBR-3 and FBR-4 and to replace oxide fuel with metal fuel with the objective of raising breeding ratio. Sh Sharan opined that modular construction could be applied to both small reactors and large reactors. Sh. Porwal called for building flexibility in the system and projected further evolution of the demand profile as new loads such as charging electric vehicles and induction stoves are deployed by consumers.

Industry projected its readiness to take up a large nuclear power programme.

There was a lively discussion in all sessions and also during tea and lunch breaks. At the end, Dr. Grover summarized the proceedings and highlighted that along with design and manufacturing capability, a framework for the governance of nuclear power has

processes to manage the risk, liability, and economic issues associated with the storage of carbon dioxide.

Next, he dwelt on the supply chain. In the area of nuclear energy, India has already deployed Pressurized Heavy Water Technology and nearly 100 percent supply chain is in India. We need to import uranium but infrastructure for fabricating fuel assemblies is in place.

Explaining the rationale of including a presentation by Grid India, he said that solar and wind are cost-effective when they are available and to make them provide electricity when the consumer needs it, the grid manager has to do a lot. This adds to system complexity and cost. The result is that at the consumer end, the cost of solar PV and wind becomes very high. Regarding balancing demand and supply, he suggested that energy storage and hydrogen production should be synergized to minimize capital investment, avoid curtailing renewables, and place no demand on the flexing of nuclear power plants. The present policy of looking at hydrogen generation and storage in a disaggregated manner needs a rethink.

also been established in the country. All this will enable India to take up a large nuclear programme.

GLIMPSES OF THE CONCLAVE



Lighting the Lamp (L to R) Mr S M Mahajan, Mr R V Shahi, Dr A K Mohanty, Dr R B Grover, Mr Gurdeep Singh and Mr K S Popli



Inaugural Session: (L to R) Mr K S Popli, Mr Gurdeep Singh, Dr AK Mohanty, Mr R V Shahi, Dr R B Grover and Mr S M Mahajan



Session on Invited Thematic Presentation (L to R) Dr Shri Harish Kalsi, Exec. Advisor to CMD NPCIL, Shri R K Porwal Director (System Operation) Grid India; Dr R B Grover; and Dr. B. Venkataraman, Director, IGCAR.



Panel Discussion (sitting in scattered) Shri Ranjay Sharan, Director (Projects), NPCL; Shri Rajnath Ram, Advisor (Energy), NITI Aayog; Shri M Dayal, (Nuclear Business), BHEL; Shri Sushil Agarkar, Exe V.P. (Precision Engg), Godrej & Boyce; Shri Praveen Bhatt, Vice President (Nuclear Business), Larsen and Toubro; Shri DS Badami Jt. GM (Heavy Construction), Larsen & Toubro; Shri N M Nadaph, Consultant, Walchandnagar Industries Ltd; Mr Dmitry Gumennikov, Sr Project Manager, Rosatom; Mr Stephane Salib, Mg Director, Nuclear Projects (I), EDF; Ms Minu Singh, MD, NUVIA India; and Shri T T Mani, Mg Director, Avsarala Technologies