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INDIA ENERGY FORUM WISHES ITS READERS
A HAPPY AND PROSPEROUS NEW YEAR 2024

India to become a Developed Nation by 2047 is Achievable: Exponential Growth of Power Supply Holds the Key (Part – III)

R.V. Shahi

In order to make India a developed nation, in the time frame the country is targeting, it will be essential that following thrust areas are given specific focus. While this paper is intended to bring out the role of electricity in terms of per capita consumption at the core of providing the required propelling effect, unless different areas of economic activities commencing from policies and programmes and appropriate implementation strategy are attended to, only per capita consumption as an index will not help. This is an important indicator but it is the economic activities which will generate demand for power and, in turn, will deliver what will ultimately contribute to overall development. Some of the important areas which will need specific focus are briefly outlined below:

- An unprecedented boost in the field of industry will need utmost attention. The whole Country and States Administration System will need to be encouraged and enthused to identify potentials for various types of industrial and other activities. Ultra Mega Manufacturing Hubs will need to be created in different parts of the country. Opportunities should be made available with ease and convenience to major manufacturers of the world to create such Ultra Mega Industrial Centres to provide the economies of scale, deploying the most modern manufacturing machines, tools, and automatic systems to compete on their products in the global market. Such Mega Manufacturing Hubs, in the range of twenty or so located mostly along the costal lines of the country, including of course also in the heart land, on the basis of optimal evaluations.

- This would require Government interventions so that such locations are identified, land is procured by the Central Government, Environmental Clearances are also provided, and basic infrastructure of power and transport connectivity is also made available. The system needs to recognise that ease of doing business has to be made meaningful and effective, so that internationally renowned manufacturing organisations opt to establish their factories, software parks, research and development institutions and data centres, and make massive investments. These will not only meet the requirements of economy in the country, but also, in a significant way, scale up exports.

- The second tier of manufacturing centres should be developed by the State Governments and in the similar manner provide the necessary ingredients and encouraging environment suited to setting up of manufacturing facilities for different types of plants, and machinery and products. States need to recognise constraints which could stand in the way and address these in order to achieve the larger goals of growth and employment.

- What is intended to be emphasised here is not the usual types of Industrial Estates which have been created. State Governments Mega Industrial Hubs and Industrial Hubs the scale and dimensions shall have to be many folds more than have

been envisaged and attempted to be created hitherto. Also the vision of Central and State Governments with regard to the ease of doing business will need to be re-oriented to the requirement of the investors to make it happen rather than the usual procedural changes are often made. What is important is that in the perception of these global manufacturers and others the procedures that are formulated need to be result oriented and driven towards attainment of the objective.

- Another important area of economy is agriculture. India is primarily, in terms of the population, a rural economy more than 60 – 70 percent of population live in villages and depends on agriculture. Transformation of agriculture with all advanced modern developments that have happened world over need to be embraced in a significant way in India. Agricultural produce and processes - both need to be modernised. The storage system, and preservation of produce will need an entirely different approach and structure. Power with reliable supply, apart from technological upgradation in agricultural activities, will be essential. In the medium and long term, corporatisation of agriculture, with large and medium industry groups getting into it, would need to be explored. Obviously, modernisation of agriculture will need capital investments and managerial inputs, which would be possible only if corporate sector gets into it. This will also have the advantage of large scale employment of man power. Gradual transition in this manner will also address the present challenge of larger proportion India's population being dependent on the present form of agriculture.

- Power supply growth at 7% CAGR to be achieved, as mentioned earlier, which will also mean a five-fold increase in power supply, will require upgradation of other related infrastructure – fuel, transmission, etc. All these will require huge capital investments and borrowings. In order that the capital market and lenders will need to be convinced that such massive investments can be serviced. It is needless to mention that in the total supply chain – manufacturing, fuel, transportation, power generation, transmission, and all related logistics along with their investments will need to be supported and serviced by the last link in the chain viz. electricity distribution and supply. It will be of immense importance that the confidence level of those viz. Developers and Financers, about the ability of the distribution and supply organisation, will need to be positive and adequate. Therefore, in order to achieve the vision of making India a developed nation by 2047, it will be essential to set right this final link in the chain. The recent Report of the Reserve Bank of India expresses concern about the functioning of the electricity distribution sector. Extracts from the RBI Report are given below:

"**Distribution companies continue to remain a burden on state finances: RBI**

ANI | Updated: Dec 21, 2024

New Delhi [India], December 21 (ANI): Electricity distribution companies (DISCOMs) continue to weigh heavily on State finances, stated a report by the Reserve Bank of India (RBI).

The report also noted that the total accumulated losses of state Discoms reached a staggering Rs 6.5 lakh crore by 2022-23, accounting for 2.4 per cent of the country's GDP.

It said, "Electricity distribution companies (DISCOMs) continue to remain a drag on State finances,"

The report added that DISCOMs remain a significant challenge for States despite various reform efforts.

To address this, the RBI stressed the importance of measures such as improving productivity, reducing transmission and distribution losses, and aligning tariffs with the actual cost of power supply.

Other recommended steps include unbundling the electricity supply industry and privatizing power generation and distribution. These measures, the report noted, are crucial for enhancing the financial health of DISCOMs and, by extension, improving the overall quality of State finances.

It added, "Unbundling the electricity supply industry, and privatising generation and distribution remain critical and would significantly improve the quality of State finance."

Despite multiple financial restructuring efforts, the report highlighted that the DISCOMs' total outstanding debt has grown at an average annual rate of 8.7 per cent since 2016-17.

The report also outlined that the states need to prioritise operational efficiency by minimising distribution losses, improving metering systems, ensuring timely tariff revisions, and incentivising the power sector to gradually reduce reliance on government subsidies. This reflects an improvement from previous years and demonstrates a commitment to responsible financial management.

Additionally, the report also mentioned that the States have made progress in improving expenditure quality.

On a more positive note, the RBI report observed that States have made strides in maintaining fiscal discipline. In 2023-24, the gross fiscal deficit (GFD) of States was contained at 2.91 per cent of GDP, staying well within the 3 per cent limit set by the Fiscal Responsibility Legislation (FRL).

The capital outlay, which is a critical indicator of investment in infrastructure and long-term growth, rose to 2.6 per cent of GDP in 2023-24, up from 2.2 per cent in the previous year.

Looking ahead, the report projects that States are expected to maintain fiscal discipline in 2024-25, with the GFD budgeted at 3.2 per cent of GDP. (ANI)"

The Power Finance Corporation of India regularly brings out the report on the working of the Discoms (Distribution Companies). The latest available date for the financial year 2022-23 indicates annual loss of almost Rs. 69,000 Crores and a cumulative loss of order of Rs. 6,00,000 Crores. A few relevant data in this regard are given below:

Table 1: Financial details of state-owned power distribution companies

Details	2019-20	2020-21	2021-22	2022-23
Average cost of supplying power (ACS)	7.4	7.7	7.6	8.6
Average revenue realised (ARR)	6.8	7.1	7.3	7.8
Per unit loss (ACS-ARR)	0.6	0.6	0.3	0.7
Total losses (in Rs crore)	-60,231	-76,899	-16,579	-68,832

The adverse financial health of State owned Distribution Companies is not a concern which has emerged only now. In fact, over the decades, the financial sickness of electricity distribution has remained a matter of serious concern and discussion. As a matter of fact, distribution segment of State Electricity Boards over shadowed the performance of most of these, And, because of their poor performance, even the relatively much better performance in the Electricity Boards on Generation side and Transmission side remained eclipsed. Electricity Act 2003 facilitated unbundling the Electricity Boards into Generation, Transmission, and Distribution Companies. Separated from Distribution, in most of the States, Generation and Transmission segments have been doing well. Distribution continues to be a drag. Several financial interventions by the Government of India, aimed at helping these Distribution Companies with the hope that these Schemes would enable them and bring them at a sustainable level of existence and continuation. These expectations have mostly remained unfulfilled. Some of the recent interventions are given in the following Table:

Table 2: Key government schemes for the turnaround of the distribution sector over the years

Year	Scheme	Details
2002	Bailout Package	States take over the debt of state electricity boards worth Rs. 35,000 crore, 50% waiver of interest payable by state electricity boards to central PSUs
2012	Financial Restructuring Package	States take over 50% of the outstanding short-term liabilities worth Rs 56,908 crore
2015	Ujwal Discom Assurance Yojana (UDAY)	States take over 75% of the debt of discoms worth Rs 2.3 lakh crore and also provide grants for any future losses
2020	Liquidity Infusion Scheme	Discoms get loans worth Rs 1.35 lakh crore from Power Finance Corporation and REC Limited to settle outstanding dues of generators, state governments provide guarantee
2022	Revamped Distribution Sector Scheme	Central government to provide result-linked financial assistance worth Rs 97,631 crore for strengthening of supply infrastructure

Sources: NITI Aayog, Press Releases of the Ministry of Power; PRS.

• Gratifyingly, the Indian power sector has performed reasonably well in the area of power generation capacity addition, operations of the power plants, expansion of the transmission infrastructure, and management of the Grid. Performance in these areas can be ranked very high and comparable to international standards. Unfortunately however, with the dismal performance of a number of State Discoms, as highlighted earlier on the basis of the Reports of the Power Finance Corporation and Reserve Bank of India, it would be unreasonable to expect that the nature of expansions, not only in the power sector, but also in the related area of economy of the country, can be financed. It will require a radical reform in the state electricity distribution sector. The outcomes of this alone can raise the level of confidence of all stakeholders, and provide the finances needed for raising the level of per capita consumption, GDP, and per capita income, to qualify to be a developed nation.

How to go about setting right the Distribution Sector will be discussed in the next part.

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India's Renewable Energy Growth in 2024

Dear Colleagues

I am happy to share with you the December Issue of Total Energy. This issue covers energy sector news and views of energy experts during the month.

Now it's time to say good bye to 2024, and welcome the new year 2025.

In 2024, India achieved significant milestones in renewable energy, adding 14.9 GW capacity (April-November) and reaching 205.5 GW total, including large hydro. Solar dominated with 94.2 GW, driven by expanded domestic manufacturing supported by the PLI scheme. The National Green Hydrogen Mission bolstered efforts in decarbonizing hard-to-abate sectors. Grid modernization, including UHV AC/DC lines and strict RPO enforcement, remains crucial. Key 2025 priorities include scaling solar, wind, energy storage, and green hydrogen while addressing infrastructure and financing gaps. With targeted policies and innovation, India is poised to lead the global clean energy transition and meet its 2030 goal of 500 GW.

Between April and November alone, the nation added 14.9 GW of renewable energy capacity, excluding large hydro projects. This included 12,354 MW of solar, 2,071 MW of wind, 373 MW of biomass and bagasse-based power, and 81 MW of small hydro. As of November 30, 2024, India's total renewable energy capacity reached 158.5 GW without large hydro and 205.5 GW when factoring it in. Solar remained the dominant contributor, accounting for 94.2 GW, followed by wind at 48 GW.

This progress reinforced India's pledge to achieve 500 GW of renewable energy capacity by 2030. It also reflects the sector's increasing reliance on hybrid systems, advancements in energy storage solutions, and greater private sector participation, which have collectively strengthened India's leadership position in the global renewable energy landscape.

Solar Manufacturing: A major development was the expansion of domestic solar PV module manufacturing to 40 GW, propelled by the Production Linked Incentive (PLI) scheme. This not only met growing domestic demand but also laid the groundwork for potential exports, highlighting the importance of self-reliance.

Moreover, the government has made commendable progress with the PLI scheme and the Approved List of Module Manufacturers (ALMM) for solar modules and cells. To maintain this momentum, a strategy for manufacturing the full bill of materials for solar modules in India should be prioritized; while also avoiding disproportionate anti-dumping duties, especially as local supply still lags demand.

The Promise of Green Hydrogen: In 2025, India has the opportunity to leverage its low-cost renewable energy resources to become a world leader in green hydrogen production. The National Green Hydrogen Mission, coupled with incentives for electrolyzer manufacturing, will drive investment and technological advancements in this space.

Continued policy support will be vital, including subsidies for production, infrastructure development, and the adoption of green ammonia and e-methanol in vehicles

Grid Modernization: Modernizing the grid remains a vital challenge. While initiatives such as "One Nation, One Grid, One Frequency" have strengthened connectivity and distribution across states, accelerating the construction of UHV AC and DC transmission lines through the ISTS network is crucial to evacuating 100 GW of power from renewable-rich zones like Rajasthan, Madhya Pradesh, and Gujarat to consumption centers. This must be prioritized over the next two years to address

one of the sector's most pressing issues i.e., ensuring timely access to the grid.

In addition, implementing Renewable Purchase Obligation (RPO) compliance regulations stringently and offering ISTS charge waivers to every distribution company (discom) that signs a Power Purchase Agreement (PPA) with Renewable Energy Independent Power Producers (REIA) before June 2025 will further stimulate growth and expedite renewable energy adoption across the country.

During 2023-24, the cost of power procurement for state-owned Discoms increased by 71 paise, according to government data submitted in Parliament. Increased cost of power, imported coal, increased cost of power transmission, and record high demand.

Total debt of discom rose to 70,000 crores for funding their capital expenditure, working capital requirement, and operational losses, according to the Annual Integrated Ranking and Rating report of the PFC earlier this year. The report said 16 states had seen their financial losses increase significantly during FY23. These include large states such as UP, Telangana, Maharashtra, Punjab and Jharkhand.

However, the silver lining is the ACS-ARR gap has improved to Rs 0.21 per kWh in FY24, as per provisional accounts, from 0.45 per kilowatt-hour (kWh) in FY 23. This gap indicates the difference between the cost of purchasing power and the cost of power supply or the financial losses. The goal was to bring it down to zero.

The losses vary from 800 crores in Assam by State Discom to 15000 crores by UP Discom.

CoP29: One significant outcome of CoP29 Summit at Baku, was adoption of Article 6 – which will help countries like India to have bilateral arrangements with rich nations to develop projects, transfer credits, and enable local corporations to access global carbon markets.

As per one estimate, the carbon markets could enable flow of $ 250 billion in annual financing.

The developed countries have shown little initiative to provide finance for green energy projects. Therefore, initiatives like ISA, assumes significant and ISA can become a formidable force if it is backed by a world solar bank, which should be considered by the member countries to meet the financial requirements.

Looking ahead to 2025, the renewable energy sector faces a mix of opportunities and challenges. Scaling capacity addition, particularly in solar and wind, integrating energy storage at scale, and expanding green hydrogen initiatives are key areas of focus. On the other hand, infrastructure gaps, delays in land acquisition, and the need for innovative financing mechanisms remain significant hurdles. Addressing these challenges through targeted policy measures such as strengthening PLI schemes, enforcing Renewable Purchase Obligations (RPOs), and providing grid access on time will be critical to sustaining the sector's momentum.

With over 14.9 GW added in just eight months of 2024, India has demonstrated its ability to drive substantial growth. By embracing global collaboration, fostering innovation, and addressing infrastructure and financial gaps, the nation is positioned to lead the global clean energy transition and contribute meaningfully to combating climate change.

I wish all Readers a very Happy and Prosperous New Year 2025!

K S Popli

India to Become Renewable Energy Capital of the World: Union Minister Pralhad Joshi

Highlighting India's remarkable growth in renewable energy, Union Minister for New and Renewable Energy, Shri Pralhad Joshi said that India is not only witnessing an energy revolution but also becoming the renewable energy capital of the world. The Minister was addressing the 5th CII International Energy Conference and Exhibition (IECE) at New Delhi. Shri Joshi said that India is one of the world's most promising nations in the clean energy space currently under the leadership of Prime Minister Shri Narendra Modi.

"What India does in renewable energy, is not only keenly watched by the world, but also adopted by several countries. " said the Minister. He highlighted the role of International Solar Alliance as a formal setup for global collaboration under India's initiative with 120 countries as signatories.

Union Minister Shri Pralhad Joshi said, "Between April and November of the current financial year, India added nearly 15 GW of renewable energy capacity, almost double the 7.54 GW added during the same period last year." He further highlighted that India's total installed capacity in the non-fossil fuel energy sector has reached 214 GW, marking an increase of over 14% compared to the same period last year. Additionally, he pointed out that 2.3 GW of new capacity was added in November 2024 alone, reflecting a four-fold increase from the 566 MW added in November 2023.

Union Minister Joshi reiterated Union Government's commitment to achieving 500 GW of non-fossil fuel-based capacity by 2030. Despite having one of the largest coal resources globally, India maintains one of the lowest per capita emissions, at one-third of the global average. The Minister highlighted that India is the only G20 nation to have ensured that the Sustainable Development Goals made at the Paris Climate Change Summit in 2015 were fulfilled even before the deadline. The Minister said that the ongoing transformation of India's energy sector is driven by a strong belief that achieving a Viksit Bharat by 2047 is intrinsically linked to sustainable and green growth.

The Minister also outlined several key steps taken by the Union Government to boost the growth of RE sector in India such as the introduction of the Production-Linked Incentive (PLI) scheme, with an outlay of ₹24,000 crore, aimed at boosting domestic manufacturing of solar panels and modules. The Minister also mentioned the ongoing initiative to establish 50 solar parks, with a cumulative capacity of 38 GW by 2025-26.

Additionally, provisions have been made for the declaration of a trajectory for Renewable Purchase Obligation (RPO) up to the year 2029-30. Shri Joshi also said that PM Surya Ghar Muft Bijli Yojana is targeting 1 crore installations by 2026-27, with an outlay of ₹75,021 crore.

Union Minister Joshi also said that Ministry of New and Renewable Energy (MNRE) has organised REInvest in September 2024 and Chintan Shivir in November 2024 to boost the RE sector. Minister Joshi also said that a meeting is being planned in Mumbai in January with representatives of banks, industry and state government officials to find solutions to existing bottlenecks in the RE sector. He invited global leaders and industry stakeholders to partner with India in its journey toward a green and sustainable future.

Union Minister Pralhad Joshi also launched the CII-EY Energy Transition Investment Monitor Report at the event. The conference, themed "Global Dialogue on Energy Transformation" was attended by a distinguished gathering of industry leaders, policymakers, and experts.

Total RE Installed capacity reaches 213.70 GW; Solar Grows by 30.2%

नवीन एवं नवीकरणीय ऊर्जा मंत्रालय
MINISTRY OF NEW AND RENEWABLE ENERGY
सत्यमेव जयते

Ministry of New and Renewable Energy (MNRE) has reported significant progress in India's renewable energy sector from November 2023 to November 2024. This progress underscores India's commitment to achieving its clean energy targets in

line with the 'Panchamrit' goals set by Prime Minister Shri Narendra Modi.

Record Capacity Additions
As of November 2024, the total non-fossil fuel installed capacity has reached 213.70 GW, marking an impressive 14.2% increase from last year's 187.05 GW. Meanwhile, the total non-fossil fuel capacity, which includes both installed and pipeline projects, surged to 472.90 GW, a substantial 28.5% increase from the previous year's 368.15 GW.

During FY 24-25 a total of 14.94 GW of new RE capacity was added till November 2024, nearly doubling the 7.54 GW added during the same period in FY 23-24. In November 2024 alone, 2.3 GW of new capacity was added— marking a dramatic fourfold increase from the 566.06 MW added in November 2023.

Solar and Wind Power Experience Significant Growth
India's renewable energy sector has seen widespread growth across all major categories. Solar power continues to lead, with installed capacity rising from 72.31 GW in 2023 to 94.17 GW in 2024, a robust growth of 30.2%. Including pipeline projects, total solar capacity surged by 52.7%, reaching 261.15 GW in 2024, compared to 171.10 GW in 2023. Wind power also made notable contributions, with installed capacity rising from 44.56 GW in 2023 to 47.96 GW in 2024, reflecting a growth of 7.6%. Total wind capacity, including pipeline projects, increased by 17.4%, from 63.41 GW in 2023 to 74.44 GW in 2024.

Steady Contributions from Bioenergy, Hydro, and Nuclear Sectors
Bioenergy and hydroelectric projects also made steady contributions to the renewable energy mix. Bioenergy capacity rose from 10.84 GW in 2023 to 11.34 GW in 2024, reflecting a growth of 4.6%. Small hydro projects saw a slight increase, from 4.99 GW in 2023 to 5.08 GW in 2024, with total capacity, including pipeline projects, reaching 5.54 GW. Large hydroelectric projects grew incrementally, with installed capacity rising from 46.88 GW in 2023 to 46.97 GW in 2024, and total capacity, including pipeline projects, increasing to 67.02 GW from 64.85 GW in the previous year.

In nuclear energy, installed nuclear capacity grew from 7.48 GW in 2023 to 8.18 GW in 2024, while the total capacity, including pipeline projects, remained steady at 22.48GW.

These impressive figures underscore the Government of India's continued efforts to scale up renewable energy capacity and reduce dependence on fossil fuels. MNRE under Union Minister of New and Renewable Energy Shri Pralhad Joshi has been taking various key initiatives reflecting India's dedication to fulfilling its climate commitments while strengthening energy security.

MNRE Announces Significant Amendment to ALMM Order 2019 to Advance Solar Manufacturing

नवीन एवं नवीकरणीय ऊर्जा मंत्रालय
MINISTRY OF NEW AND RENEWABLE ENERGY
सत्यमेव जयते

Ministry of New and Renewable Energy (MNRE) has announced a significant amendment to the Approved Models and Manufacturers of Solar Photovoltaic Modules (ALMM) Order, 2019 which will have far-reaching implications for India's solar power sector and its clean energy transition. This amendment, set to take effect from 1st June 2026, introduces the long-awaited List-II for solar PV cells under the ALMM framework, marking a major step towards boosting domestic manufacturing and fostering self-reliance in India's renewable energy industry.

Introduction of ALMM List-II for Solar PV Cells
The introduction of List-II, is a response to the country's rapidly growing solar manufacturing capabilities. Until now, the absence of List-II was due to a limited domestic supply of solar cells, However, with substantial growth in India's solar cell production capacity anticipated over the next year, this amendment is poised to change the dynamics of the industry. From 1st June 2026, all solar PV modules used in projects – including government-backed schemes, net-metering projects, and open access renewable energy initiatives – will be required to source their solar cells from ALMM List-II, ensuring quality and reliability in solar PV cells used in India's energy infrastructure.

Exemptions for Existing Projects
For projects that have already been bid out but whose last date of bid submission is before the issuance of this order, an exemption will apply, allowing them to proceed without the requirement to use solar PV cells from List-II, even if their commissioning date is post-1st June 2026. However, for all future bids, the requirement to source both solar PV modules and cells from the respective ALMM lists will be mandatory, marking a decisive shift towards quality assurance and sustainability in India's solar power sector.

Economic and Environmental Benefits
This policy enhancement is expected to have profound economic and environmental benefits. By mandating the use of solar PV cells which will be included in the ALMM List-II following a rigorous procedure to verify the quality and reliability, the government aims to foster a robust domestic solar PV supply chain, reduce the carbon footprint associated with solar module imports, and bolster India's energy security. This move aligns with India's broader goal of achieving 500 GW of non-fossil fuel-based power capacity by 2030 and making substantial strides in its commitment to clean energy.
Stimulating Domestic Manufacturing

The amendment will not only strengthen India's position as a global leader in renewable energy but will also accelerate the growth of India's solar manufacturing sector. The increased demand for solar PV cells in India is expected to stimulate innovation, create new job opportunities, and attract investments in high-tech manufacturing. It will also enhance the overall quality and reliability of solar products used in India, ensuring that projects meet the highest standards.

Promoting Thin-Film Solar Technology Innovation
The government has also recognized the role of thin-film solar technology in India's renewable energy future. Under the new amendments, thin-film solar modules manufactured in integrated solar PV module manufacturing units will be considered in compliance with the requirement to use solar PV cells from List-II, further driving technological innovation and diversification within the sector.

In the coming months, the MNRE will issue detailed procedural guidelines for the enlistment of solar PV cells under ALMM List-II, providing clear instructions for manufacturers and project developers on how to comply with the updated requirements. This is part of the government's ongoing efforts to simplify the regulatory process and ensure that India remains at the forefront of global clean energy development.

By prioritizing solar PV cell manufacturing and reducing reliance on imports, this amendment lays a strong foundation for India's clean energy future. It supports the growth of the solar power industry, generates economic opportunities, and makes a meaningful contribution to the country's climate goals. With this move, India is set to strengthen its energy independence, support sustainable development, and become a global hub for solar energy innovation.

The amendment has been approved by the Minister for New and Renewable Energy Shri Pralhad Joshi and underscores the government's commitment to advancing India's renewable energy agenda and ensuring a greener, more sustainable future for all.

PMSGMBY Set to Surpass 10 Lakh Installations by March 2025, Targeting One Crore by 2027

PM Surya Ghar: Muft Bijli Yojana (PMSGMBY), the world's largest domestic rooftop solar scheme, is transforming the solar energy landscape of India. By March 2025, installations are projected to surpass 10 lakh, ramping up to 20 lakh by October 2025, 40 lakh by March 2026, and the targeted one crore by March 2027. Within just 9 months of PMSGMBY, 6.3 lakh installations have been achieved—an average of 70,000 per month. This marks a ten-fold increase in monthly installations compared to the average of 7,000 per month prior to the launch of the scheme in February 2024. States such as Gujarat, Maharashtra, Kerala, and Uttar Pradesh have demonstrated exceptional progress, reflecting robust infrastructure and stakeholder collaboration.

The early progress of PMSGMBY is a testament to the solid groundwork being laid, and the scheme is on track for accelerated growth in the coming

months, paving the way for a sustainable future in rooftop solar energy.

Implementation Challenges quickly resolved for Faster Rollout
Initial implementation challenges were effectively addressed to accelerate the rollout. DISCOMs undertook auto-load enhancements to ensure the necessary power load capacity, while regulatory barriers were reduced by waiving Technical Feasibility Reports (TFR) for systems up to 10kW. Timely inspections by DISCOMs expedited subsidy releases, and measures ensured the availability of net meters. Efforts to expand the vendor base supported rapid deployment, complemented by affordable financing options through the Jan Samarth Portal for systems up to 3kW.

Building Infrastructure for Large-Scale Deployment
Building robust IT systems to integrate over 90 DISCOMs, banks, and other stakeholders was critical to coordinating operations at this scale. Vendor development has been a priority, with nearly 9,000 vendors activated and more joining daily. Capacity-building initiatives have trained 40,000 personnel, to ensure high-quality installations and service delivery. An additional 2 lakh technicians will be trained over the next eight months. Furthermore, more than 50,000 DISCOM engineers are receiving specialized training to inspect and commission rooftop solar plants and provide net meters.

Simplifying Consumer Processes
The scheme has also significantly simplified consumer processes. Previously, applicants had to submit multiple documents and make repeated visits to DISCOM offices. Now, most DISCOMs have waived Technical Feasibility approvals for systems under 10kW and digitized their processes, reducing the documentation burden and streamlining applications. Application can now be filed in 5 minutes on www.pmsuryaghar.gov.in, which also allows shortlisting and selecting vendors. Applicant can also use the GIS feature of the portal to see his roof and plan the capacity of rooftop solar system. Loan at 7% interest rate could also be applied seamlessly on the portal itself. After installation details can also be uploaded within minutes. Portal automatically informs the DISCOM to inspect, after which applicant could redeem subsidy also on the portal.

Efficient Subsidy Disbursement
Efficient subsidy disbursement has been another key achievement. Following the conclusion of the Model Code of Conduct in June 2024, disbursements commenced promptly. By November 2024, over ₹3,100 crore had been disbursed to more than four lakh consumers. With an average of 67,000 households receiving subsidies monthly, the scheme demonstrates operational robustness and a commitment to timely financial support. Subsidies are now processed within 15 days, enhancing consumer satisfaction.

Satisfied Households
With households receiving subsidy swiftly and with the electricity bills getting significantly reduced more and more applications are pouring through word of mouth. 28% of the households are getting zero electricity bills.

Extensive Awareness Campaigns
Extensive awareness campaigns have complemented these efforts, driving registrations and educating households about the scheme's benefits. These campaigns are expected to further bolster participation, ensuring sustained momentum and widespread adoption.

The PMSGMBY is not merely on course to meet its ambitious targets—it is set to herald a new era of rooftop solar success that stands as an exemplary model of sustainable energy deployment globally. With robust infrastructure, streamlined processes, and a clear vision in place, the scheme is primed for accelerated growth. It is also poised to deliver far-reaching socio-economic and environmental benefits, setting a global benchmark for renewable energy integration and empowering millions of households across the nation.

Private mines, CIL drive record coal output of 988 mt in 2024: Govt

Coal production during the calendar year (CY) reached 988.32 million tonne (mt), compared to 918.02 mt during the same period last year, registering a growth of about 7.66 per cent, the coal ministry said in its year-end report, citing it as a new record.

It is expected that coal production will exceed the last financial year's mark of 997 mt by the end of 2024-25 (FY25), driven by higher output from privately owned mines and enhanced supply from Coal India (CIL) mines.

Coal production from captive and commercial mines was 162 mt between January and November 2024, the ministry reported. Since 2015, 113 coal mines with a peak rated capacity of 257 mt per annum have been auctioned.

The ministry said that opening the sector to private participation aligns with efforts to reduce coal imports and promote domestic production.

"To strengthen India's energy security and realise Atmanirbhar Bharat by replacing imported coal with domestically mined coal, the coal ministry has set a target to produce 1.31 billion tonne (bt) in FY25 and 1.5 bt in 2029-30 (FY30)," the ministry said.
The push towards zero imports comes even as the power ministry continues to mandate a certain threshold of coal imports for power plants, despite increased domestic production.

Recently, the coal ministry also initiated efforts to reduce the import of coking coal (used in non-power sectors).

Parliamentary Consultative Committee of Coal Ministry Discusses on Sustainability & Green Initiatives of Coal Sector

Union Minister of Coal and Mines Shri G. Kishan Reddy chaired a meeting of Parliamentary Consultative Committee of Ministry of Coal on 19.12.2024 in Parliament Annexe, New Delhi on Sustainability and Green Initiatives undertaken by the coal sector. Minister of State for Coal and Mines Shri Satish Chandra Dubey also attended the meeting.

Among the members of Parliamentary Consultative Committee, Shri Surendra Prasad Yadav, Thiru Arun Nehru, Shri Bidyut Baran Mahato, Dr. Rajesh Mishra, Shri Brijmohan Agrawal, Shri Bunty Vivek Sahu, Smt. Kamlesh Jangde, Shri Bharat Singh Kushwah, Shri Ganesh Singh, Shri Babu Singh Kushwaha, Shri Chhotelal, Shri Sanjay Uttamrao Deshmukh, Shri Tangella Uday Srinivas, Shri Jagannath Sarkar, Shri Manish Jaiswal, Shri Rudra Narayan Pany, Dr. M K Vishnu Prasad, Dr Kalyan Vaijinathrao Kale, Smt. Himadri Singh, Shri Sukanta Kumar Panigrahi, Shri Meda Raghunadha Reddy, Shri Ravi Chandra Vaddiraju, Shri Samirul Islam and Shri Khiru Mahto participated in the meeting. Senior officers of Ministry of Coal, CMD (CIL), CMD (NLCIL) and CMDs of CIL subsidiaries were also present.

In his opening remarks, Minister Shri G. Kishan Reddy underscored the coal sector's pivotal role in India's journey toward energy security and economic growth. While acknowledging the global emphasis on renewable energy, he highlighted coal's indispensable role in supporting India's development goals and sustainability initiatives. He also informed the Committee members about the sustainable development activities adopted by Coal/Lignite PSUs where coal production goes hand in hand with environmental conservation, societal well-being, and biodiversity protection. He further apprised the Committee members that environmental protection during mining activities remains a core focus area for coal and lignite Public Sector Undertakings (PSUs). He assured that these PSUs not only ensure compliance with the statutory provisions outlined in environmental laws but also actively exceed these requirements to uphold and enhance environmental standards in and around mining areas. Minister reiterated the government's commitment towards sustainable development and achieving the target of Net Zero emissions by 2070, as announced by Prime Minister.

Minister of State for Coal & Mines Shri Satish Chandra Dubey emphasized that environmentally

sustainable initiatives are a testament to the Ministry's commitment to environmental stewardship and societal well-being.

Coal Secretary Shri Vikram Dev Dutt briefed that the Coal/ Lignite PSUs are undertaking several Sustainable and Environment Friendly Initiatives in a planned and systematic manner. These initiatives also directly or indirectly align with Mission LiFE. He affirmed the Ministry's dedication to balancing India's energy demands with its climate goals.

During the meeting, a presentation was made by Joint Secretary, Ministry of Coal highlighting various Sustainability & Green Initiatives being undertaken by Coal/Lignite PSUs such as afforestation/ bio-reclamation, accredited compensatory afforestation, participation in green credit program, utilisation of mine water for community purposes, development of eco-parks/mine tourism sites, renewable energy, energy efficiency measures, dust suppression measures, First Mile Connectivity Projects, etc.

All present Committee Members participated enthusiastically in the discussion and appreciated the efforts being undertaken by the Ministry and Coal/Lignite PSUs towards environment care and benefits of the society. The members acknowledged the good works done on environmentally sustainable activities in the Coal/Lignite PSUs. The committee members provided valuable insights and suggestions, contributing to the formulation of policies that promote sustainable development in the coal sector. It was also suggested by committee members that best practices of sustainability may be adopted by the coal companies to benefit the local communities.

Union Minister Shri G. Kishan Reddy expressed gratitude to the Committee Members for their active participation and assured that their valuable suggestions would be implemented by the Ministry and Coal/Lignite PSUs. He emphasized that these efforts would ensure the coal sector remains a key driver of economic growth while aligning with India's vision of a sustainable and green future.

Ministry of Coal Launches 11th round of Commercial Coal Mine Auctions

Union Minister of Coal and Mines, Shri G. Kishan Reddy, launched the 11th round of Commercial Coal Mine auctions today with a total of 27 coal blocks on offer at New Delhi.

These 27 coal blocks are spread across the states of Jharkhand, Odisha, Chhattisgarh, Maharashtra, Madhya Pradesh and Arunachal Pradesh and include both fully explored and partially explored mines including 1 coking coal mine.

The Ministry has also executed 9 agreements with successful bidders of 10th round of auctions. These mines upon operationalisation will generate Annual Revenue of Rs. 1,446 crores calculated at PRC of these coal mines and will provide employment to approximately 19,000 people.

The Ministry of Coal has taken a series of reforms to ensure that the coal sector grows at a rapid pace and is able to meet the country's energy needs. For 11th round also, Mines falling under protected areas, wildlife sanctuaries, critical habitats, having forest cover greater than 40%, heavily built-up area etc. have been excluded. The block boundaries of some of the coal mines where there was presence of dense habitation, high green cover or critical infrastructure etc. have been revised to improve the attractiveness of the coal mines.

Addressing the gathering, Union Minister of Coal and Mines, Shri G. Kishan Reddy, emphasized that coal remains the cornerstone of India's energy landscape, asserting that power generation is unimaginable without it. He highlighted the transformative impact of coal block auctions in achieving energy security, fostering self-reliance, and reducing dependency on imports. Urging industry players to participate enthusiastically in 11th round of auctions, he called for collective contributions toward realizing the vision of an energy-independent Aatmanirbhar Bharat, as envisioned by the Prime Minister Narendra Modi.

Union Minister, Shri Reddy reaffirmed the Government's dedication to boost domestic coal production to meet the nation's energy demand. The Minister further reiterated the Government's

commitment to uplift local communities, emphasizing that coal auctions and mining activities go beyond economic growth. They also aim to empower communities by creating employment opportunities, improving infrastructure, and enhancing education and healthcare in coal mining regions. Shri Reddy expressed confidence that these reforms would position India as a global leader in sustainable mining practices while ensuring energy security.

He also highlighted the Government of India's Financial Incentive Scheme with an outlay of ₹8,500 crore to promote Coal and Lignite Gasification projects. This initiative, he noted, is a pivotal step toward achieving India's ambitious target of 100 million tonnes of coal gasification by 2030. By encouraging cleaner and more efficient technologies, the scheme aims to reduce reliance on imported natural gas, lower carbon emissions, and pave the way for sustainable energy development.

In his keynote address, Shri Vikram Dev Dutt, Secretary, Ministry of Coal highlighted the crucial role of policy reforms in creating an ecosystem that encourages innovation, reduces production costs, and meets the growing energy demands of the nation without compromising on environmental standards. Shri Dutt stressed that these reforms are designed to not only enhance coal production but also align the sector with India's broader goal of achieving energy self-reliance and sustainable development. He further emphasised on inter-ministerial collaboration, particularly with the Ministry of Environment, Ministry of Power, and Ministry of Steel. He underscored how such cooperation facilitates the harmonization of policies, streamlines processes, and addresses sectoral challenges more effectively, enabling a balanced approach to energy security and environmental stewardship. Secretary, also spoke about the modernization efforts that are reshaping the sector, leveraging advanced technology to improve productivity, worker safety, and environmental management. He underscored the pivotal role of First Mile Connectivity (FMC) projects in expediting coal evacuation, ensuring efficient transportation, and reducing environmental impact. These initiatives, he stated, are crucial in driving the sector toward modernization and greater operational efficiency.

The Additional Secretary and Nominated Authority, Ministry of Coal, Smt. Rupinder Brar highlighted the need to explore more coal block as there is surging demand of coal. He stressed that leveraging private investment and expertise is crucial for meeting the growing energy needs and ensuring steady coal supply to various industries. By opening more coal blocks for exploration and encouraging private participation will contribute the coal sector in achieving higher production targets.

The commencement of sale of tender document shall start from today i.e. December 05, 2024. Details of the mines, auction terms, timelines etc. can be accessed on MSTC auction platform. The auction shall be held online through a transparent two stage process, on the basis of Percentage Revenue Share.

Significant Growth in Coal Production and Dispatch from Captive and Commercial Mines

The Ministry of Coal is pleased to announce the latest figures for coal production and dispatch from captive and commercial mines, showcasing remarkable growth compared to the previous year.

As of November 30, 2024, total coal production from captive and commercial mines between April 1 and November 30, 2024 reached 112.65 MT, marking a substantial increase of 34.7% from 83.60 MT in the same period last year. In November 2024 alone, the total coal production from these mines was 16.743 MT, with a daily average production of 0.558 MT, which is an increase of 40.9% compared to the daily average of 0.396 MT in November 2023.

The dispatch from captive and commercial mines has also seen remarkable growth. As of November 30, 2024, the total dispatch from captive and commercial mines between April 1 and November 30, 2024 reached 119.62 MT, an increase of 33.9% from 89.32 MT in the same period last year.

In November 2024 alone, the total coal dispatch from these mines was 16.109 MT, with a daily average dispatch of 0.537 MT, which is an increase of 27.6% compared to the daily average of 0.421 MT in November 2023.

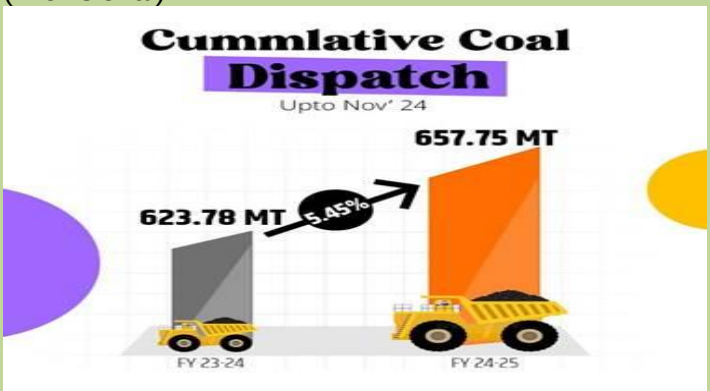
The remarkable surge in coal production and dispatch reflects Prime Minister Narendra Modi's vision for Viksit Bharat 2047. By prioritizing domestic energy capabilities and reducing import dependencies, the government is strategically advancing India's economic self-reliance, infrastructure development, and global competitiveness through transparent and innovative governance.

Overall Coal Production in November 2024 Reaches 90.62 Million Tonnes

The Ministry of Coal has achieved a remarkable milestone in November 2024, with overall coal production reaching 90.62 million tonnes (MT) (Provisional), compared to 84.52 MT in the same month last year, marking a 7.20% growth.

Coal production from captive and other entities has shown significant progress, reaching 17.13 MT (provisional) in November 2024, up from 12.44 MT in November 2023, marking an impressive growth of 37.69% (provisional).

Cumulatively, coal production for FY 2024-25 up to November 2024 reached 628.03 MT (Provisional), compared to 591.32 MT during the same period in FY 2023-24, reflecting a growth of 6.21%. (Provisional)



Additionally, Coal dispatches in November 2024 showed steady improvement, reaching 85.22 MT (Provisional), up from 82.07 MT in November 2023, reflecting a growth of 3.85%. Dispatches from captive and other entities experienced a sharp increase, rising to 16.58 MT in November 2024 from 13.19 MT in November 2023, marking an impressive growth of 25.73%.

Cumulatively, coal dispatches for FY 2024-25 up to November 2024 rose to 657.75 MT (Provisional), compared to 623.78 MT during the same period in the previous fiscal year, recording a growth of 5.45% (Provisional).

The Ministry of Coal remains committed to meeting the nation's energy requirements by focusing on increasing production, improving dispatch efficiency, and ensuring seamless coal availability across the country.

Government has no plans to revise royalty on coal

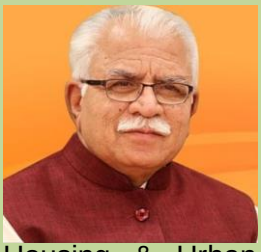
The Central government has no plans to revise the existing rate of royalty on coal, Minister of Coal and Mines G. Kishan Reddy informed the Rajya Sabha recently. Rajya Sabha member Sasmit Patra had asked the government whether it was considering revising the coal royalty for Odisha.

Currently, the rate of royalty stands at 14 per cent, calculated entirely on an ad-valorem basis, reflecting the price of coal as stated in the invoice, excluding taxes, levies, and other charges. "This ensures that with any increase in the price of coal, the royalty collection for states also rises," the minister said in his written reply to the Upper House.

Additionally, the minister argued that any increase in the royalty rate would place domestic coal at a disadvantage compared to imported coal. He further informed the House that a Study Group constituted in 2014 had recommended no increase in the rate of royalty, a recommendation that was subsequently accepted by the government.

"The government has no plans to revise the existing rate of royalty," the minister concluded in his written reply.

Union Minister Shri Manohar Lal chairs meeting of the Consultative Committee of the Members of Parliament for Ministry of Power



The Meeting of the Parliamentary Consultative Committee of the Members of Parliament for the Ministry of Power was held in New Delhi recently. Shri Manohar Lal, Union Minister for Power and Housing & Urban Affairs chaired the meeting. Minister of State for Power Shri Shripad Yesso Naik was also present. Members of Parliament of various political parties from Lok Sabha and Rajya took part in the meeting.

The subject of the meeting was "National Electricity Plan - Generation". Shri Ghanshyam Prasad, Chairman CEA gave a presentation on the subject.

During the meeting, Shri Manohar Lal highlighted that power is a critical component in achieving the goal of a developed India by 2047. He noted that with the rising demand for electricity, it is essential to simultaneou sly increase power generation. Emphasizing India's commitment to achieving carbon net-zero, he stated that the focus would remain on non-fossil-based energy sources. The Union Minister also stressed the importance of enhancing storage capacity to ensure affordable and reliable power for everyone. Shri Manohar Lal also emphasised that state and central government needs to work in coordination to achieve the targets.

Shri Shripad Yesso Naik said that India is energy transition as per the NDCs and is on path of achieving SDGs . He also said that government is working towards skulking people in the field of energy. He said that Power ministry

National Electricity Plan is a short-term framework of five years while giving a 15-year perspective. The fourth National Electricity Plan prepared by Central Electricity Authority includes a review of the period 2017 -22, detailed capacity addition requirement during the years 2022-27 and Perspective Plan projections for the years 2027 -32.

PRESENT SCENARIO:

The installed Generation Capacity as on 31.10.2024 was 454.5 GW comprising of 243.1 GW thermal, 8.2 GW Nuclear, 203.2 Renewables including large hydro of 46.97 GW. The generation installed capacity achieved has grown at a CAGR of 5.97 % since 2014-15.

The gross generation from all the sources during the year 2023-24 was 1739 BU comprising of 1326 BU (76%) from thermal, 48 BU (3%) from Nuclear, 365 BU (21 %) from RE Sources which includes 169 (10.4 %) from Hydro.

Due to concerted efforts of the government, the gross generation has increased from 1033 BU during 2013-14 to 1739 BU in 2023- 24, which has grown at a CAGR of ~ 5.4 % since 2013-14.

The country has observed the maximum peak demand of around 250 GW in the month of May 2024 during the current year (2024-25). The peak demand has grown at a CAGR of 16 % from 2013-14 to 2023-24 while Energy Requirement has grown at a rate of 5% during 2013-'14 to 2023-24. The peak not met and energy not supplied of the country is observed to be very minimal over last five years and was on account of factors other than lack of generation capacity in the country.

Demand Projections:
As per 20th EPS report published by the Central Electricity Authority (CEA), the peak demand and energy requirement is around 366 GW and 2474 BU by 2031-32. The projected electrical energy requirement and peak electricity demand on all-India basis is estimated as 1908 BU and 277 GW for year 2026-27 respectively.

Energy Storage capacity is an important aspect in achieving the targets of NEP. Energy storage capacity of 16.13 GW/82.37 GWh with PSP based storage of 7.45 GW capacity and 47.65 GWh storage and BESS based storage of 8.68 GW/34.72 GWh is required by the year 2026-27.

The Projections of total capacity addition are in line with the target of the country to achieve a non-fossil based installed capacity of 500 GW by the year 2029-30.

The total fund requirement for the period 2022-2027 is estimated to be Rs 14,54,188 Crores, which also includes the likely expenditure during 2022-27 for advance action for the projects expected to get commissioned during 2027-32.

The average emission factor is expected to reduce to 0.548 kg CO2/kWh in the year 2026-27 and to 0.430 kg CO2/kWh by the end of 2031-32.

The share of non-fossil-based capacity is likely to increase to 57.4 % by the end of 2026-27 and may likely to further increase to 68.4 % by the end of 2031- 32 from around 46.5 % as on October 2024.

Members of Parliament provided several suggestions concerning various initiatives and schemes. They commended the plan for its ambitious green energy goals and achievements in electricity generation capacity. The meeting also included discussions on issues related to storage, renewable energy generation, and compensation for farmers. Shri Manohar Lal concluded the meeting by expressing gratitude to the participants for their valuable contributions. He further directed officials to take appropriate actions to incorporate the suggestions made by Members of Parliament and prioritize the welfare of the people.

India's power demand to exceed 700 GW by 2047: EY-CII Report

India's peak electricity demand is projected to cross 700 GW by 2047, 2.5 times the current demand, according to a report jointly released by EY India and the Confederation of Indian Industry (CII). The report, titled 'Energy Transition for Viksit Bharat 2047', outlines a roadmap for India's energy transition and highlights key steps required to ensure a sustainable, low-carbon, and energy-secure future.

The report comes as part of India's long-term strategy to achieve net-zero emissions by 2070 and meet the goal of becoming a developed economy by 2047. It emphasizes the need to scale up renewable energy capacity beyond 50 GW annually, strengthen grid infrastructure, and develop localized renewable energy supply chains to meet the growing energy needs.

Addressing the report's release, Rajiv Memani, Chairman and CEO, EY India, and President Designate, CII, said, "As we move to realize Viksit Bharat by 2047, the peak electricity demand is expected to be more than 700 GW, which will be 2.5 times the current demand. To meet the rising energy needs, it will be critical to scale renewable energy capacity beyond 50 GW annually, a stronger grid infrastructure, localized renewable energy technology supply chain, and incentives to further encourage Green Hydrogen and the biofuels and circular economy." The report highlights India's achievements in decarbonization, noting that the country has surpassed 200 GW of renewable energy capacity, becoming the third-largest renewable energy producer globally. It also points to advancements in biofuel blending and other initiatives aimed at reducing carbon emissions.

A major focus of the report is India's National Green Hydrogen Mission, backed by a $2.4 billion investment. It highlights the mission's role in boosting green hydrogen production and building a robust value chain, positioning India as a leader in the emerging green hydrogen economy.

The report further examines India's efforts to expand its nuclear power infrastructure, stating that the country plans to triple nuclear power capacity to 22.5 GW by 2032. The scaling up of solar, wind, and hydropower capacities is also identified as a key step toward ensuring a steady supply of clean energy

On bioenergy, the report outlines initiatives like bioethanol blending, compressed biogas adoption, and sustainable aviation fuels, positioning bioenergy as a significant contributor to energy security and emissions reduction.

Somesh Kumar, Partner and Leader – Power & Utilities, EY India, said, “India is on an ambitious path to not only achieve 500 GW of renewable energy by 2030 but also transform the way the energy sector operates. We are looking at replacing fossils by electricity in several sectors, innovating newer technologies to improve efficiency and reduce costs, and focusing on enhancing skills as well as reskilling for a just transition.”

The report underscores the role of public-private collaboration in creating an ecosystem that supports renewable energy development, innovation, and economic resilience. It emphasizes the need for policies and technology to integrate renewable energy at scale, improve grid connectivity, and enhance the competitiveness of indigenous energy technologies.

It also highlights the potential for significant job creation in the renewable energy sector. The report projects that millions of jobs will be created as part of India’s energy transition, and calls for skilling and reskilling initiatives to support a “just transition” for workers in fossil fuel-dependent industries.

India to boost power generation, transmission infra to attain power for all

India will set up more coal-fired and hydro-power plants and ramp up transmission infrastructure to achieve round-the-clock Power for All' in 2025, besides meeting rising demand fueled by economic expansion.

To meet the growing energy demand, the government has devised a major plan for power generation capacity addition and the expansion of transmission infrastructure.

According to Minister of State for Power Shripad Yesso Naik, India can definitely achieve 24x7' power for all with all the efforts in the ministry under the leadership of Prime Minister Narendra Modi. We can do it. In 2025, we will be almost there to have 24X7 power for all in the country," Naik told PTI.

He also said that the government is ready to support the expansion plan of the power sector in view of rising demand.

According to government estimates, peak power demand is expected to touch 270 GW in the summer season in 2025, up from the record high of 250 GW in May 2024 and 243 GW in September 2023. The peak power demand is estimated to reach a level of 446 GW by 2035.

The Ministry of Power along with states, has planned about 80 GW by 2031-32. Besides about 14 GW of hydro projects and 6,050 MW Pumped Storage Projects (PSP) are under construction. About 24.22 GW of hydroelectric projects and 50.76GW MW of PSP are under various stages of planning and are targeted to be completed by 2031-32.

About 7,300 MW of Nuclear Capacity is under construction and 7,000 MW is under various stages of planning and approval.

Besides, the government will also add about 300 GW of renewable energy capacity to have 500 GW of non-fossil fuel-based power generation by 2030.

To evacuate electricity from the additional power generation capacity, the government has planned an investment of Rs 9.16 trillion to ramp up transmission infrastructure by 2032 to meet the rising demand for electricity.

Chairman, CII National Power Committee, and Managing Director, Adani Energy Solutions Anil Sardana said, "With significant strides in renewable energy integration, grid modernisation, and an unwavering commitment to carbon reduction, the sector has taken a giant leap towards meeting both domestic and global energy demands." "As we look towards 2025, India's ambitious goal to expand its transmission infrastructure and achieve non-fossil capacity targets of 500 GW and about 800 GW of aggregate supply capacity by 2030 presents both a significant challenge and an opportunity." While we face the task of balancing energy demand with

sustainable growth, the expansion of our transmission grid will unlock new possibilities for efficient power distribution, driving economic growth and enhancing the nation's energy resilience," he said.

Vikram V, Vice President & Co-Group Head - Corporate Ratings, ICRA said that the power sector witnessed healthy growth in capacity addition in the renewable energy sector in 2024 with 25 GW added in the first 11 months of CY2024 (calendar year) driven by the large project pipeline and favourable module pricing.

The bidding activity remained healthy leading to a healthy pipeline for future addition, he said adding that however, delays in signing the PPAs / PSAs (power purchase agreements) by the central bidding agencies remains a concern for the sector.

Apart from the utility segment, the rooftop solar segment and the commercial & industrial (C&I) segment are expected to contribute in a significant manner to the capacity addition, he stated.

Further, he pointed out that the execution challenges remain an area of concern for the sector, with respect to delays in land acquisition and transmission connectivity, which if sustained could hamper the capacity addition prospects.

While the sector is likely to face connectivity challenges in the near term, the ongoing progress in the various transmission projects is expected to ease the connectivity challenges for the sector over the medium term.
The electricity demand growth slowed down post-August 2024 amid the adverse impact of heavy rains across the country and a slowdown in economic activity in Q2 FY2025, he noted.

Nonetheless, he stated that the demand growth is expected to recover in the remaining period of the fiscal year.

While the policy focus remains on renewables, the electricity generation remains dominated by coal-based power, he pointed out.

While this share is expected to reduce over the medium term, there are new coal power project announcements of 27 GW with expected completion by 2032 to meet the growing demand, he opined.

Salil Gupta, Chair, Power Committee, PHDCCI suggested that reforms are required to reduce financial stress on trading companies.

About Open Access, Gupta said, "Massive gap between centre and state thought process. On ground, open access is still very discouraged including Green Open Access.

"Unreliability on regulations changing even after setting up of 25 years projects create a massive hindrance on more and more industries going and investing themselves in RE projects and instead going for Group Captive model which results in further complications and legal disputes." He suggested that regulations/policies should provide confidence to the stakeholders.

On the price gap between RE and thermal power, he stated that high volatility between Time of Day market rates due to high volume of solar during the day and reliance on thermal in the evening and night hours creates an unsustainable gap in the prices.

Khorlochhu Hydropower Project in Bhutan to commission in 2029: Tata Power

The construction work of the Rs 6,900 crore Khorlochhu Hydropower Project in Bhutan has started, and the plant is likely to be commissioned by 2029, Tata Power CEO and MD Praveer Sinha has said.

The 600 MW project is being developed on the Kholongchhu River in the eastern part of the neighbouring nation.

"We are looking at Bhutan. Work has already started for the 600 MW project in Khorlochhu...the tunnel diversion work," Sinha told PTI in reply to a question on plans for hydro projects outside India.

The project is expected to be commissioned in September 2029, he said. In August, Tata Power and Bhutan-based Druk Green Power Corporation Ltd (DGPC) partnered to develop the hydropower project at an estimated cost of Rs 6,900 crore.
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Dependence on traditional fuels would be 30% by the time India turns 100: Hardeep Puri

India's dependence on traditional fossil fuel-based energy will reduce to 30 per cent by the time the country celebrates its 100th year of independence, Petroleum and Natural Gas minister Hardeep Puri said recently.

"The transition (to clean fuels) is not a switch which you can on and off. You have to establish fairly expensive infrastructure also to make the transition," Puri said, speaking at the Times Now conclave.

By 2047, India's 100th year of Independence, the country's dependence on traditional fuels would be 30 per cent or so.

"The test lies in what we are achieving on the green front," Puri said.

Ethanol blending has gone up from 1.4 per cent in 2014 to 10 per cent 2022, and 20 per cent would be reached by 2025.

Ethanol blending in petrol was introduced by the Centre to reduce the country's oil import cost, energy security, lower carbon emissions and better air quality.

"CNG also we are doing very well," the minister said.

The country is moving towards making 15 per cent of its energy mix through natural gas.

"The green hydrogen is where the real success will come," he said, betting on potential the emerging source of energy.

India imports USD 150 billion worth of energy annually. India depends on imports for over 80 per cent of its crude oil requirement. Various steps have been taken by the government to increase the production of domestic crude oil and bring down imports

India's LNG import surges 21% y-o-y in Apr-Nov period on account of higher demand

India's Liquefied Natural Gas (LNG) imports surged 21 percent year-on-year in April-November period of FY2024-25, pushing up the country's import dependency to nearly 51 percent. In the year-ago period, India's LNG import dependency was at 46.5 percent. Official data showed a rise in LNG consumption at 48,682 MMSCM during April-November period of FY2024-25, up from 44,091 MMSCM recorded during the year-ago period. LNG import for the month of November was 2,941 MMSCM which was 21.7 percent higher than the corresponding month of the previous year.

Gross LNG production during April-November period was 24,243 MMSCM, which was lower than the target of 26,217 MMSCM. However, in comparison to the year-ago production figure of 24,081 MMSCM, LNG production so far this year is higher by 0.67 percent only.

India's crude oil imports dependency surges past 88%

Driven by a surge in consumption, India's crude oil import dependency has touched 88.1 percent in April-November period of FY202-25, up from 87.6 percent in the year-ago period. During the period, India produced 19.1 MMT of crude oil and imported 159.4 MMT, official data showed. The country spent USD 91.8 billion on crude oil imports in April-November period of the current fiscal, up from USD 87.4 billion spent on crude oil imports in the year-ago period.

Total Crude oil processed during November was 21.6 MMT which is 0.1 percent lower than November 2023, where PSU/JV refiners processed 14.7 MMT and private refiners processed 6.9 MMT of crude oil. Total indigenous crude oil processed was 2 MMT and total Imported crude oil processed was 19.6 by all Indian refineries (PSU+JV+PVT). There was a growth of 1.8 percent in total crude oil processed in April-November current Financial Year as compared to same period of previous Financial Year.

India's oil demand growth to top China's in 2024, trend to continue next year: S&P

India is poised to close 2024 with a higher oil demand growth rate than China, underscoring its emergence as a key consumption hub in Asia, according to a report by S&P Global Commodity Insights.

In the first 10 months of 2024, India's oil demand climbed 180,000 barrels per day (bpd), a 3.2% year-on-year rise, compared to China's more modest growth of 148,000 bpd, or 0.9%, during the same period in 2023.

"India is set to end the year with its oil demand growth rate surpassing China's, making it one of the fastest-growing consumption centres," the report noted, adding that this trend is likely to persist into 2025. The country's refiners are accelerating expansion plans and diversifying crude sources to capitalize on this momentum.

China's 1.7%, according to Kang Wu, global head of macro and oil demand research at S&P Global Commodity Insights. While China's market size remains over three times larger than India's, stakeholders are increasingly focusing on India due to expectations of peak demand arriving much later than in China.

The report highlighted India's upcoming refining capacity surge, with the country set to commission its first greenfield integrated refinery complex in nearly a decade. The HPCL Rajasthan Refinery Ltd in Balotra, Rajasthan, will process a mix of over 83% imported medium-grade crude and domestic crude. This project is expected to add up to 9 million tonnes of incremental annual feedstock demand, fuelling negotiations with global oil producers for long-term crude import agreements.

As refining capacity expands, India is diversifying its crude import basket to reduce overdependence on traditional suppliers, the report noted. Prime minister Narendra Modi's recent visit to Guyana has heightened expectations of long-term crude supply agreements with South America, while diplomatic outreach to Africa and Latin America is set to further broaden sourcing options, it said.

"Recent diplomatic visits will help bring in crude oil from Africa and Latin America, but the growth in absolute volume would depend on the overall crude market," said Abhishek Ranjan, South Asia oil research lead at S&P Global Commodity Insights.

Ranjan said that the share of West Asian crude shipments in India's basket will likely decline marginally due to the diversification of import sources. "But, overall, the crude grades in India's import basket are expected to remain medium grades and we don't anticipate significant drop in share of sour crude in 2025," he added.

India's crude import dependency, currently at 85%, has led to a pragmatic approach focused on cost efficiency. Russian oil has emerged as a key source, averaging 1.7 million barrels per day between January and September, thanks to attractive discounts.

With a growing appetite for petroleum products and expanded refining capacity on the horizon, India is cementing its position as a pivotal player in the global oil market, even as it navigates challenges tied to geopolitical and market dynamics.

India's refining capacity utilization at 103%, petroleum exports up by 3% in volume

India, the world's fourth-largest refiner, reported a nameplate refining capacity of 256.8 million metric tons per annum (MMTPA) as of April 2024, according to the Petroleum Planning and Analysis Cell (PPAC). With 22 operational refineries, including private firms holding a 34.3% share of the capacity, the country ranks second in Asia.

Capacity augmentation projects are underway at several refineries. These include the Cauvery Basin Refinery (CBR) in Nagapattinam, which is increasing its capacity from 1 MMTPA to 9 MMTPA, and the Numaligarh Refinery, which is scaling up from 3 MMTPA to 9 MMTPA. The HPCL Rajasthan Refinery Ltd., a joint venture between Hindustan Petroleum Corporation Limited (HPCL) and the Rajasthan

Government, is also under construction with a planned capacity of 9 MMTPA.

Production and utilization
India's crude oil processing for the first half (H1) of FY 2024-25 stood at 132.1 million metric tons (MMT), with an average capacity utilization of 102.9%, nearly on par with the 103% utilization reported in FY 2023-24. Total petroleum product production during this period was 139.9 MMT, with lighter distillates like LPG and motor spirit (MS) accounting for 35%, middle distillates such as high-speed diesel (HSD) and aviation turbine fuel (ATF) at 51.6%, and heavy ends like petcoke and fuel oil at 13.4%.

Among domestic production, HSD held the highest share at 43.1%, followed by MS (16.6%), naphtha (6.7%), ATF (6.3%), petcoke (5.3%), and LPG (4.5%).

Export and import trends
Crude Oil Imports: Crude oil imports during FY 2024-25 H1 grew by 3.2%, reflecting the rising domestic consumption of petroleum products.

Product Exports: Exports of petroleum, oil, and lubricants (POL) products increased by 3% in volume terms during FY 2024-25 H1 compared to the same period in the previous year. However, in value terms, exports fell by 6.6% from $23.7 billion in FY 2023-24 H1 to $22.1 billion in FY 2024-25 H1. High-speed diesel (HSD), motor spirit (MS), and ATF led the export basket, accounting for 40.9%, 22.7%, and 14.1% of total exports, respectively.

Product Imports: Petroleum product imports saw a 10.4% increase in FY 2024-25 H1, primarily driven by higher imports of liquefied petroleum gas (LPG), petcoke, and lubricants. LPG dominated the import basket with a 38.1% share, followed by petcoke at 25.2% and fuel oil at 16.3%.

MCG plans 150-tonne biogas plant, but is yet to find land in Gurgaon

MCG is planning to set up a compressed biogas (CBG) facility capable of processing 150-200 tonnes of waste daily. The civic body is currently identifying a suitable location for the project, which will operate under a public-private partnership.

"We will float an expression of interest for companies to propose the biogas plant's design. Once we review their proposals, a detailed request for proposal (RFP) and tender will follow. MCG will not invest in the plant but will provide the land and municipal solid waste for processing," said an MCG official.

The civic body's role will be limited to providing the land to a private organisation. The firm will bear the investment costs and have the rights to market or distribute the processed outputs, including compressed biogas, compost, organic fertilisers, electrical power, and other materials recovered from municipal solid waste processing. Officials said solid waste will be provided from the Bandhwari landfill site or any other source.

However, MCG faces challenges in securing land due to community resistance to waste-processing facilities in residential areas. Authorities are currently planning a single plant but are open to additional facilities if more land parcels become available. Biogas production involves anaerobic decomposition of municipal solid waste, agricultural residues, cattle waste, sewage treatment plant waste, and other biomass. Purification and compression yield CBG, which contains over 90% methane and is comparable to compressed natural gas (CNG) in calorific value and performance.

"CBG is a clean and renewable fuel that can substitute CNG in automotive, industrial, and commercial sectors. With India's significant biomass resources, CBG offers an environmentally friendly alternative," the official said.

Centre grants approval for 47 ethanol projects in Bihar for loan subsidies

A total of 47 projects from Bihar have been issued in-principle approvals for interest subvention on bank loans for establishing new or expanding existing distilleries, the government said recently.

Currently, 22 ethanol distilleries - 8 molasses-based and 14 grain-based - are operational in Bihar, Minister of State for Food Nimuben Jayatibhai Bambhaniya said in a written reply to the Lok Sabha.

The government is implementing the Ethanol Blended Petrol (EBP) Programme nationwide, with

Oil Marketing Companies (OMCs) selling petrol blended with ethanol. Under the programme, the government has set a target of 20 per cent ethanol blending with petrol by 2025-26.

To boost ethanol production capacity and meet blending targets, the Centre has introduced various Ethanol Interest Subvention Schemes from 2018 to 2022. Under these schemes, 47 projects from Bihar have received in-principle approvals, she said. For each Ethanol Supply Year (ESY), OMCs invite bids from distilleries for ethanol purchase based on feedstock availability.

After receiving bids, OMCs allocate ethanol quantities from different feedstocks to be supplied by distilleries during a specific ESY. In cases of feedstock shortages, OMCs have shown flexibility in accepting feedstock change requests and issuing revised allocations.

Tax contribution of petroleum sector set to drop rapidly in FY 2024-25

Sluggish collection of excise duty from petroleum and natural gas — even before the windfall tax regime got scrapped in December — shows that the sector's overall tax contribution to the public exchequer is likely to drop significantly in FY25, said officials.

Tax collected by the Centre from petroleum as excise duty was Rs 1.22 trillion during the first six months (April-September) of FY25. This is less than half of the Rs 2.73 trillion collected for the full FY24, data from the Petroleum and Natural Gas Ministry submitted to Parliament last week showed.

"With the windfall tax now being junked by the Centre in early-December, the government expects lesser tax from the sector in the current year," an official said. Excise duties on petrol and diesel were last changed in May 2022.

Meanwhile, fuel consumption in India, a proxy for oil demand, hit a record 157.53 million tonnes (mt) in the first eight months of the current year. This was up from 152.37 mt in the same period of the previous financial year. It signifies that oil demand is not behind the fall in excise collections.

The slow pace of collections in the first six months of FY25 is due to lower receipts from the windfall tax, Petroleum Ministry officials said.

Excise duty is levied by the Centre on the domestic sale of petrol and diesel. Currently, it is Rs 19.90 per litre for petrol and Rs 15.80 per litre for diesel. On top of that is the state government levy of value added tax (VAT), sales tax and other additional charges.

Meanwhile, classified as special additional excise duty (SAED), windfall tax was levied on domestically-produced crude oil, and export of diesel, petrol, and aviation turbine fuel (ATF).

In place since July 1, 2022, it was designed to tax the profits of oil companies as a result of the Russia-Ukraine conflict. But falling global prices of crude oil have ended the justification for the tax, and it was discontinued last week, after 29 months.

The sector's total contribution had risen in FY23, albeit by a marginal 0.38 per cent to Rs 7.51 trillion from Rs 7.48 trillion in FY24. It had shrunk by 3.4 per cent in FY23 compared to FY22.

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India's Nuclear Power Plant Safety Beyond Doubt: Dr. Jitendra Singh

Union Minister of State (Independent Charge) for Science and Technology; Earth Sciences and Minister of State for PMO, Department of Atomic Energy, Department of Space, Personnel, Public Grievances and Pensions, Dr. Jitendra Singh assured the Rajya Sabha today that India's nuclear power plants are among the safest in the world, with stringent safety protocols and international oversight. Responding to a question on nuclear safety during Question Hour.

The Minister emphasized the rigorous safety protocols followed at every stage of nuclear plant development and operation, assuring the nation that India's nuclear energy program is both secure and sustainable.

Dr. Jitendra Singh declared that safety is the cornerstone of India's nuclear energy policy. "In the Department of Atomic Energy, we follow the rule of 'safety first, production next.' Every stage, from site selection to operational checks, is governed by stringent protocols," he said. He outlined the extensive inspection regimen, which includes quarterly reviews during construction, semi-annual inspections after a plant becomes operational, and a mandatory five-year license renewal process.

India's nuclear safety framework is further bolstered by international oversight. The World Association of Nuclear Operators (WANO) and other global bodies periodically review India's facilities, reinforcing their safety standards.

Dr. Jitendra Singh highlighted evidence-based achievements in reducing radiation emissions, which he called a testament to the Department of Atomic Energy's meticulous efforts. "Globally, the critical safety benchmark for radiation emissions from nuclear plants is 1,000 microsieverts. In India, our plants consistently operate well below this threshold," he explained.

Dr. Jitendra Singh highlighted significant improvements in radiation levels, noting that, for example, at the Kudankulam plant, emissions have decreased from 0.081 microsieverts a decade ago to just 0.002 microsieverts today. Similarly, the Kalpakkam plant has experienced a substantial reduction, with levels dropping from 23.140 microsieverts in 2014 to 15.961 microsieverts in 2023.

India's nuclear plants are strategically designed to withstand natural disasters such as tsunamis and floods. Dr. Jitendra Singh explained that facilities on the eastern coast are situated more than 1,300 kilometers from tsunami-prone zones in Indonesia, while those on the western coast, like the Tarapur plant, are positioned over 900 kilometers away from the nearest tsunami risk zone in Pakistan.In addition, plants are constructed above the highest recorded flood and sea levels to ensure safety even in extreme conditions.

Dr. Jitendra Singh also highlighted milestones that underscore India's emergence as a leader in nuclear energy. The Kaiga Generating Station in Karnataka achieved an unprecedented 962 days of continuous operation, setting a global benchmark. Tarapur, India's first nuclear power plant, has completed 50 years of successful operation, a remarkable feat in the global nuclear industry.

India's first indigenous Pressurized Heavy Water Reactor (PHWR) is now operational at Kakrapar, Gujarat, showcasing the country's growing self-reliance in nuclear technology. Additionally, the Kudankulam plant, which had remained stalled for decades, has been made fully functional under the current administration.

Slew of measures taken under Prime Minister Narendra Modi to boost Atomic Energy sector in India: Dr Jitendra Singh

India's Nuclear power generation capacity has grown significantly in last one decade, nearly doubling from 4,780 MW in 2014 to 8,180 MW in 2024.

This was disclosed here today in the Lok Sabha by Union Minister of State (Independent Charge) for Science and Technology, Minister of State

(Independent Charge) for Earth Sciences, MoS PMO, Department of Atomic Energy, Department of Space, Personnel, Public Grievances and Pensions, Dr. Jitendra Singh addressed the Lok Sabha today, in response to a discussion on Nuclear power.

The Minister highlighted the significant progress and future potential of India's atomic energy program. He elaborated on key developments and outlined a roadmap for achieving greater self-reliance in nuclear power generation.

Dr. Jitendra Singh emphasized the revision of India's power distribution framework, which has increased the home state's share of electricity from atomic plants to 50%, with 35% allocated to neighboring states and 15% to the national grid. This new formula ensures equitable resource distribution and reflects the federal spirit of the nation.

While highlighting how India's Nuclear power generation capacity has grown significantly, nearly doubling from 4,780 MW in 2014 to 8,180 MW in 2024, Dr Jitendra Singh added that the capacity is projected to triple to 22,480 MW by 2031-32, showcasing India's commitment to scaling up its nuclear energy infrastructure.

The Union Minister attributed this progress to several transformative initiatives, including the bulk approval of 10 reactors, increased funding allocations, collaborations with Public Sector Undertakings (PSUs), and limited private sector participation. He credited advancements in technology and streamlined administrative processes for strengthening India's nuclear infrastructure.

In addition to energy production, Dr. Jitendra Singh highlighted the diverse applications of atomic energy. He noted its extensive use in agriculture, including the development of 70 mutagenic crop varieties. In the healthcare sector, India has introduced advanced isotopes for cancer treatment, while in the defense sector, atomic energy processes have been used to develop cost-effective, lightweight bulletproof jackets.

The Union Minister also underscored India's abundant thorium reserves, which constitute 21% of the global total. Indigenous projects like "Bhavani" are being developed to harness this resource, reducing dependence on imported uranium and other materials. He acknowledged the challenges in implementing atomic power projects, such as land acquisition, forest clearances, and equipment procurement, but reaffirmed the government's commitment to addressing these issues. He noted that nine atomic power projects are currently under construction, with several others in the pre-project stage, demonstrating India's dedication to expanding nuclear energy capacity.

Dr. Jitendra Singh provided a historical perspective, highlighting projects like the Kudankulam Nuclear Power Plant, which gained momentum post-2014 under the leadership of Prime Minister Narendra Modi. He reiterated India's commitment to peaceful purposes of atomic energy, as envisioned by Dr. Homi Bhabha, and emphasized leveraging nuclear energy for sustainable development while aligning with the vision of "One Nation, One Government."

This progress underscores India's resolve to achieve energy self-sufficiency, drive innovation, and contribute significantly across sectors through the peaceful applications of nuclear energy.

NTPC and US-based CCTE partnered to explore thorium-based nuclear energy solutions

India's largest power generator, NTPC Limited, announced recently that it has signed a strategic agreement with US-based Clean Core Thorium Energy (CCTE) to explore developing and deploying advanced nuclear energy technologies, specifically focusing on enriched life (Aneel).

Aneel refers to a thorium-based fuel designed for pressurized heavy water reactors (PHWRs). This agreement is subject to approval from both governments.

This initiative is part of NTPC's efforts to enter the nuclear energy sector and utilize it as a clean, reliable, and baseload source of power. The company stated, "As part of its broader commitment to sustainability and energy security, NTPC is focused on collaborations, technology acquisitions, and developing indigenous fuel."

CCTE is recognized as a leading developer of thorium-based nuclear fuel technologies and is dedicated to pioneering research in advanced nuclear fuel cycles.

CCTE's flagship Aneel fuel combines thorium with small amounts of enriched uranium. The expected benefits of Aneel fuel include the utilization of thorium as a fuel in existing PHWR reactors, a significant reduction in nuclear waste, enhancing India's energy security using domestically available thorium, and improved safety and proliferation resistance, the company said. It added that Aneel fuel offers cost savings by delivering greater energy output within existing safety margins and lowering the operating costs of current reactors. NTPC and CCTE intend to collaborate to explore the development and deployment of Aneel fuel in India, NTPC said in a statement.

Discussions on with Westinghouse for Kovvada nuclear project: Govt

The Union government recently said discussions were in progress with the Westinghouse Electric Company of the US for a viable project proposal to build six 1000-MW nuclear reactors at Kovvada in Andhra Pradesh.

In a written reply in Lok Sabha, Minister of State in the Prime Minister's Office (PMO) Jitendra Singh, said the land for the main plant area for Kovvada Nuclear Power Plant of 2079.66 acres has been acquired and mutated in the name of Nuclear Power Corporation of India Limited (NPCIL).

Singh said 190.7 acres of land has been acquired for an R&R (rehabilitation and resettlement) colony and land for the employees' township has been identified by district administration.

The minister said pre-project activities such as preliminary geotechnical investigations, and geological and seismo-tectonic studies have been completed.

The construction of a 13-km boundary wall, the establishment of six micro earthquake stations and the establishment of one meteorological monitoring lab were in progress, he said.

"Discussions with Westinghouse Electric Company (WEC), USA, are in progress to arrive at a viable project proposal for implementation of 6 units of AP 1000 reactors at Kovvada. WEC is yet to submit a Techno-Commercial Offer (TCO) for the same," Singh said.

He said the NPCIL has transferred Rs 506.95 crore to the district administration towards land acquisition and R&R Package for the main plant area, and Rs. 77.234 crore for land acquisition of the R&R colony.

Singh said the balance requirement of approximately Rs. 882.93 crore for the construction of the R&R colony and other pre-project activities has been approved by the government.

Japan to maximise nuclear power in clean-energy push as electricity demand grows

A government-commissioned panel of experts recently largely supported Japan's new energy policy for the next few years that calls for bolstering renewables up to half of electricity needs by 2040 while maximising the use of nuclear power as the country seeks to accommodate the growing power demand in the era of AI while meeting decarbonisation targets. The Industry Ministry presented the draft plan for final review by the panel of 16 mostly pro-nuclear members from business, academia and civil groups. It calls for maximising the use of nuclear energy, reversing a phase-out policy adopted after the meltdown crisis at the Fukushima Daiichi power plant in 2011 that led to extensive displacement of residents and lingering anti-nuclear sentiment.

The plan is due to receive Cabinet approval by March after a period of consultation and will then replace the current energy policy, which dates from 2021. The new proposal says nuclear energy should account for 20 per cent of Japan's energy supply in 2040, up from just 8.5 per cent last year, while expanding renewables to 40-50 per cent from 22.9 per cent and reducing coal-fired power to 30-40 per cent from nearly 70 per cent last year.

The current plan set a 20-22 per cent target for nuclear energy, 36-38 per cent for renewables and 41 per cent for fossil fuel, for 2030.

Webinar on "Resource Adequacy Planning and its Implementation by Discoms" 30th November 2024

1. The Webinar on "Resource Adequacy Planning and its Implementation by Discoms" was held on Saturday the 30th of November 2024. About 65 people participated in the Webinar. The distinguished speakers for the webinar were **Shri Ghanshyam Prasad**, Chairperson, CEA; **Shri RP Singh**, Former Chairperson UPERC, **Shri Chintan Shah**, Group President, ReNew Power and **Shri Balwant Joshi**, MD, IDAM Infrastructures Advisory. For the convenience of the participants and to set the context, a background note on the subject was circulated in advance.

2. **Shri Rakesh Nath, Vice President, IEF** while introducing the subject, mentioned that since a background note has already been circulated on the topic for discussions, he is not going into the legal framework which is already in place.

   i. He mentioned that the Resource Adequacy Planning (RAP) has become complex due to increase in the proportion of Variable RE generation capacity in total installed capacity and challenges in load forecasting faced by the Discoms. Extreme variability in weather in the same months of the different years, distributed RE generation, C&I consumers shifting to meeting part of their demand from captive RE sources and large consumers directly connected to ISTS and migrating to sources of supply other than Discom.

   ii. According to National Electricity Plan, the generation capacity is required to be doubled to 875 GW along with the storage capacity of 77 GW (5-6 hrs. storage) in FY32. Indicative study for FY47 projects the requirement of generation capacity of more than 2000 GW with storage capacity of 475 GW (5-6 hrs. of storage) to meet the projected demand of the country. This would require addition in generation capacity of 54 GW/annum from FY24 to FY32 and 78 GW/annum from FY32 to FY4, as against 20 GW/annum now. Besides, huge storage capacity as indicated will have to be created and additional capacity would also be required to replace the capacity retiring during the above period.

   iii. Some of the issues he flagged for discussion are capacity building at Discom and SLDC for long-term and short term demand forecasting and RAP, floating of tenders for procurement of adequate capacity and timely signing of PPAs, development of transmission and distribution system to provide connectivity and transmission of electricity to consumers, land, financing, supply chain issues and vendor availability. Issues related to high proportion of VRE capacity planned (55% in FY32 and about 80% by FY47).

   iv. FDRA contracts are being signed for duration from 4 to 17 hrs. with no clarity about the quantum of solar, wind and storage capacity. Longer duration contracts add to inflexibility in the system. Instead of FDRA, procurement of power through vanilla solar and wind and standalone storage contracts will provide more flexibility.

   v. Large consumers with demand of 100 MW having supplies from captive sources and sources other than Discom are also getting connected to ISTS. In future some large data centers, green hydrogen electrolyzers may come and get connected directly to ISTS. Such consumers which do not form part of the RAP of the Discom and should be mandated to demonstrate their resource adequacy before they are connected to the ISTS.

   vi. He also stated that CEA has done the resource adequacy planning studies for most of the States and given year wise requirement which will have to tied up by the Discoms.

   vii. The future of coal-based plants is also to be considered. While overall proportion of coal-based capacity may be going down from FY32 to FY47, but a lot of old capacity will be

retiring and will require replacement capacity to be built.

3. **Shri RV Shahi, President, IEF and Former Secretary, Ministry of Power**, in his address, mentioned that the subject is very important and needs to be deliberated at length.

   i. He pointed out that it is not clear under what background the rules relating to RA were framed in 2022 and subsequently guidelines were structured and circulated. Based on it the CEA has done certain RA studies. The objective of Electricity Act and policies that followed is quite clear that gradually we have to open up the sector. However, we could not do much in the distribution sector, though the Act has enabling provisions. Part reform of the sector has been achieved and the responsibility of rest of reforms essentially lies with executives.

   ii. Centralized planning is no doubt important but it has to be in synch with the overall structure that we want to create, evolve and develop Entrusting responsibility of implement-ability of rules and guidelines to Discoms, go counter to the structure that we are anticipating for future. There could be large organizations, factories etc. that can set up their own power plant and seek transmission access through a structured commercial arrangement, which could be short/medium/long term for which policies are in place. The Act and the rules allow captive and group captive generation. Decentralized generation is also being encouraged, such demand and capacity addition could not be anticipated by Discoms.

   iii. It may be noted that the structure of power sector is not going to evolve only through the Discoms, but there will be so many other players who will also have a role.

   iv. He also made the point that per capita income and per capita electricity consumption are highly and closely interrelated. We are far away in attaining our goals. For example, in 1990, India and China were at par in per capita income and more-or-less at par in per capita electricity consumption levels and today there is a sea difference in these parameters.

   v. He opined that demand will always be there, what we need to do is to create capacity. We should be more systematic in demand forecast, interact with various departments and ministries, who all have their planning divisions. All of them may have their respective plans. We need to discuss with large manufacturers, large industrial corporates and check their future plans. More importantly, how the policy of the government will guide the growth of economy and if we have-to-have a growth of economy of the order of 6 to 7%, we must prepare ourselves to meet the corresponding power demand.

4. **Shri Ghanshyam Prasad, Chairperson CEA**, while deliberating about Resource Adequacy Planning, gave the background of various situations faced by the country, leading to formulation of the Rules and Guidelines.

   i. He mentioned that there was a phase when the country was facing acute shortages followed by an era when we added huge amount of coal-based capacity, with growth rate of more than 10% touching up to 13 to 14%, bringing the shortages from as high as 13 to 14% to less than 1%.

   ii. As the demand could not keep pace with the capacity built-up, it landed us in a situation of stranded capacity. Somewhere around 60 to 70 GW of capacity which was coming in the last three years got stressed. High Level committees with all the stakeholders and important ministries dwelled on the issue and the situation could be retrieved in about five to six years' time.

   iii. Earlier the National Electricity Plan was revised every five years. It has now become necessary to carry out mid-course correction.

iv. It was felt that plans must be for longer duration and dynamic in nature. The present-day resource adequacy plan developed by CEA is the starting point in that direction, which involves the stakeholders in the entire value chain starting from the Discoms to Load Dispatch Centers at National as well as regional level. It considers a10 year time horizon particularly in the context of the type of resources required i.e., whether it is coal or nuclear or hydro or hydro pump storage, based particularly from the nuclear perspective which takes around 7-9 years' time for execution.

v. In the context of renewables solar, wind etc., we need to be as fast as possible hence it has been mandated to undertake course correction on yearly basis thus making the plan dynamic. Its timely and effective implementation will of course depend on timely and advance approvals by the respective Regulatory Commissions.

vi. The entire exercise of resource adequacy is presently being done by CEA in close association with the Discoms officials to enable them to build in-house capabilities.

vii. We need to think about how we give capacity credit to these resources due to variability of solar and wind sources. Profiling of these resources in the adequacy plans will, at least, give us visibility so that we do this exercise to a larger granularity as well back-to-back to the correlation with weather data. Discussions are in progress with IMD for signing a MoU to get seamless data for better understanding and developing appropriate model.

viii. Presently the challenge that comes to the solar and wind is in terms of weather data cycle, which is roughly around 12 hours, thus each model is getting updated at best on 12 hourly cycle and we have no visibility about what happens within these 12 hours, thus affecting the accuracy of forecasting. Efforts are on to bring this to one hour cycle.

ix. Efforts are on to work in close association with upcoming industries like EVs, hydrogen, data centers etc., including commercial perspective of various organizations, urban development ministry, so that we can do resource planning in an integrated manner.

x. Review has started from the ministry side; State Commissions have already been mandated to approve resource adequacy plan.

xi. He observed that a lot is still required to be done. Input from this forum and close interactions with the stakeholders and suggestions coming from them will go a long way in making the system robust and reliable.

5. **Shri RP Singh Former Chairman UPSERC**, made a comprehensive presentation with supporting data, salient points of which are as under:

i. On the land front Nuclear has the highest energy output per acre and solar has the least whereas on environmental front nuclear is the least and coal is the worst polluting. The Levelized Cost of Energy (LCOE) of coal is still cheaper than PV+Storage.

ii. VRE share in capacity increases from 30.7% to 56% and 79% in 2032 & 2047, respectively whereas VRE share in Generation increases from 11.4% to 34.6% and 65.3% in 2032 and 2047, respectively. The LCOE would rise with increase in VRE.

iii. The Planned Reserve Margin (PRM) of about 15-20% may be required up to 30% VRE level but may rise to 20-30% up to VRE level of 30-50% and to 30-50% or higher for VRE level above 50%. Hence, for FY47 when VRE share is expected to rise to about 79%, the requirement of PRM would be very high. Under high VRE scenario, the key focus areas should be addressing 'dark doldrums' i.e. low wind and low solar output periods, storage e.g., batteries, PSP, hydrogen, becomes essential and greater reliance is required on demand side management and

flexible loads. He also presented resource availability for 2047 of total capacity available with storage and effective PRM under different scenarios.

iv. He pointed out that the projected RA for FY47 exceeds NDC commitments by surpassing the targets for non-fossil fuel sources. With RE comprising 85% of capacity and 74% of electricity generation, the RAP-2047 sets a fast-track trajectory, surpassing pathways followed by developed economies to achieve Net Zero Carbon (NZC).

v. The major challenges would be a) intermittency and low synchronous inertia capacity of <20% in FY47 may put the grid at risk due to intermittency and variability; b) high cost of VRE in electricity generation is likely to drive the electricity prices up due to additional expenses for high PRM, additional transmission, storage, synthetic inertia and ancillary services, as observed in countries like UK and Germany; c) RAP 2047 falls significantly short of Viksit Bharat targets with per capita electricity consumption falling below the benchmark of developed economies (ranging from 5000 to 15000 kWh/capita); d) diversion of land from agriculture to solar/wind; e) storage losses will reduce electricity availability for consumption; f) may face significant challenge in meeting peak demand during non-solar hours, particularly under critical conditions such as back-to-back cloudy days resulting in insufficient solar for storage replenishment, humid nights during rainy season, “Dark Doldrums”, g) lack of granular, high resolution source-wise and load/net load data hinders precise PRM and RAP; h) missing net load ramping analysis and grid inertia; i) only generation side resources are considered, does not take into account demand response; j) transition from coal will affect 10 million jobs, 2.2% GDP contribution and major source of revenue for Central and State Governments.

vi. While concluding his presentation RAP 2032-2047 he also suggested -

- Adoption of granular load and generation data, including net load and net generation by system operator(s) and their analysis
- Follow Enhanced Effective Load Carrying Capability (ELCC) models to replace Capacity-Credit Method.
- Limiting VRE Resource Penetration to 60% by 2047 for stable & affordable grid
- Sustainable energy growth for higher per capita electricity ~4000 KWh
- Focus Areas:
  - Prioritize Offshore Wind with HVDC to reduce land pressure
  - Increased gas-based generation for ramping and grid inertia
  - Strategic allocation of solar vs. wind resources for non-solar periods
  - Invest in flexible infrastructure (ESS, Smart Grid/AMI, Flexible generation, DSM, DER, EV integration & dynamic pricing)
  - Align Planning Reserve Margin (PRM) with increasing variability (>30%)
- Grid Expansion and Policy Adjustments
  - Expand and upgrade transmission and distribution networks
  - Remove ISTS waivers to eliminate cross-subsidy distortions
- Smart Infrastructure:
  - Advanced Metering to support metering, dynamic pricing & accounting
  - Smart grid technologies for efficient metering and accounting
- Market Mechanism:
  - Advanced forecasting tools
  - Structural changes in sector
  - Real-time electricity markets for better demand-supply management
- Demand-Side Management and Flexibility
  - VPPs integrating rooftop solar, battery storage, -
  - Distributed Energy Resources (DERs)
  - Island-able Microgrids for resilience
- Demand Response (DR):
  - Introducing demand aggregators for different consumer categories

  - Incentivize participants during peak stress
  - Promote behind the meter storage & V2G
- Pricing Models/ Dynamic pricing: Wholesale & Retail
  - Critical pricing
  - Real-time pricing
  - Time-of-use tariffs
- Capacity Building for Stakeholders
  - DISCOMs (Distribution Companies)
  - State Electricity Regulatory Commissions (SERCs)
  - Policymakers and energy planners
- Key Initiatives:
  - Training programs on VRE integration, grid flexibility, and forecasting
  - Knowledge sharing on global best practices in resource adequacy
  - Enhancing technical expertise in advanced metering and smart grid management

- Institutional Strengthening:
  - Provide regulatory frameworks for innovative market mechanisms.
  - Encourage collaboration between DISCOMs, SERCs, and market players.
- Financial Planning for a Flexible Energy Grid
  - Develop Capacity markets for traditional and DERs.
  - Differentiated capacity products for firm and flexible generation.
- Instruments and Incentives:
  - Contracts for Difference (CfDs) for revenue stability.
  - Introduction of long-term electricity forward market in place of PPAs.
  - Introducing derivatives (Futures/Options) for hedging.
  - Financial incentives/VGF for hybrid renewable projects and storage.

6. **Shri Cintan Shah, Group President, ReNew Power,** in his address expressed concern about the large bided solar capacity solar for which PPAs have not been signed. He further made the following points:

- All the projects in renewables are happening on ISTS because of ISTS waiver. Several state transmission utilities have stopped investing in transmission assets because no projects would come at state level. Barring 2 or 3 states, no one is having good transmission capacities at state level. This is required to be addressed.

- "Capacity Credit" should be monthly and may also be on a time basis. We may adopt one level up one level down approach e.g., within a particular state say Maharashtra, where consumption pattern in eastern Maharashtra is quite different from western Maharashtra. Therefore, some states might require drawdown of the capacity credit and some states which are too small might have to compute the capacity at regional level.

- Most of solar is capacity is being installed in a vertical (North-South) orientation mainly due to ISTS waiver. If solar capacity is developed in E-W orientation, we can exploit diversity in generation by creating two humps in solar generation which would reduce the storage requirement.

- More emphasis should be on development of PSP facilities which would also regulate the voltage apart from storing electricity.

- For calculating capacity credit, we are mostly relying on historical data. It is suggested, that in the capacity credit should also explore more technologies, for example in case of wind itself fifth generation technology is globally available which is yet to be introduced in India.

- He suggested sharing of data on RE generation forecasting available with private RE developers.

- He stressed the need for development of power market by promoting merchant power

generators and Contract for Difference for RE sources.

7. **Shri Balwant Joshi, MD IDAM Infrastructure & Advisory** informed that IDAM is active in resource adequacy related modeling and working closely with the FORUM of regulators as well as SERCs.

i. Objectively, resource adequacy regulations are the first point where the state Discoms would be mandated to prepare their resource adequacy plan. So far only 6-7 states have published their final regulations.

ii. Most of the State are assessing demand for one year and 5 years. The rationale for five years is that MYT regulations are for five years therefore the plan would align with the multi-year tariff regulations. On the issue of capacity crediting, most of the states have adopted Top Net Load Hours methodology. The emphasis of the States is to procure 85-90% of their requirement through Long-Term and Medium-Term and the balance only 10-15% of the requirement on Short-Term basis.

iii. The challenges in the entire exercise of resource adequacy and its implementation are:

- Data requirement: -
  - Resource Adequacy (RA) entails granular (hourly/sub-hourly) and extensive data compilation covering multiple years and comprehensive demand drivers for all consumer categories.
  - Timely data collection and recording can be a challenge,
  - Standard data templates for use & deployment by multiple planning agencies (CEA, POSOCO, STUs/SLDCs) need to be put in place.

- Demand forecasting-
  - Scientific and mathematical demand forecasting is considered the best fit methodologies and comprehensive input data. This is a big shift from the practice currently followed by most states and discoms.
  - Timely adoption of the new process and capacity building can be a challenge.
- Optimization modelling-
  - There is a need for application of energy modelling and optimization tools to identify optimal resource mix for meeting RA requirement.
  - Energy modelling is still an evolving field with not much experience and availability of resources amongst planning agencies including STU/SLDC.
  - Timely adoption of the new process and capacity building can be a challenge.
- Constructive collaboration between multiple agencies-
  - Resource Adequacy (RA) framework, by design, needs to optimise planning at national level and fed into state level planning.
  - CEA/NLDC should publish LT/ST-National Resource Adequacy Plan (NRAP), which should contain reliability metrics and allocation of RA requirement to state, based on which state could allocate requirement down to discoms.
  - This requires interdependencies on data & timely actions across multiple agencies and Any slip ups could lead to sub-optimal results that would have undesirable consequences.
- Timelines in initial years
  - RA is a new process and timelines especially for the 1st year of implementation may be quite fast paced, which can be a challenge as discoms, and states are still to adopt the process.
- Non-compliance in initial years
  - Non-compliance charges for shortfall in initial years can be a challenge while discoms and states have still to adopt the process.

- Considering complexities, paradigm shift in planning & preparations required, utilities may be provided transition time or at least deferment of levy of non-compliance charge in initial period.

- He also mentioned that Clarity on treatment of partial and full open-access consumer's needs to be brought in. Further there is a Lack of clarity on capacity markets and lot of work is yet be done.

- Lastly, he remarked that transmission RA is another aspect which will have to be addressed. Further the tenure of the PPA needs to be reduced say from 25 years to around 15 years. Rather we may need more flexible PPAs, not only in terms of tenure but also in terms of pricing. We will also have to look at the must run provisions in the PPA for RE in the time to come and for which a two-part tariff may have to be devised so as to balance the interest of the developer and the buyer.
- RA and implementation is also dependent on availability of transmission capacity and transmission pricing plays an important role. This issue also needs to be addressed so that RE generators are encouraged to install storage.

8. During the webinar, participants also actively interacted. Some of the points made by them are-

- **Shri Alok Kumar**, former Secretary (Power), GoI stated that economic growth and decarbonization are larger policy issues. Power Sector can support them but not drive them alone. The subject of decarbonization is a policy decision and involves many larger issues about climate vulnerability and our responsibility. There is no doubt that India will see continuous unprecedented growth of demand for at least next 20 years. We must be clear in our minds that resource adequacy is not just generation capacity, it also includes transmission, distribution networks and demand response time. Resource adequacy should not be left to discoms alone, it should also be ensured at system level where it oversees that all the demand centers have adequately tied up their requirement. We should distinguish between resource adequacy and capacity expansion planning. Capacity expansion planning is a continuous long-term process whereas resource adequacy is normally done for the next 3 to 5 years to meet demand as per the reliability standards. For resource adequacy we also must define reliability standards which have their own cost implications. The large loads should be made to have their own capacity procurement, as Discoms can't be burdened with capacity requirement for large Open Access consumers. Further power exchange doesn't generate capacity therefore; we cannot depend on power exchanges to meet all our capacity requirements. We must act fast and move from PPA to capacity markets. CERC should take immediate action to develop capacity markets without which it may not be possible to meet RA. Transmission Pricing is very important and should be such that encourages co-located solar and storage projects. On the Discom level he suggested the following action points to facilitate resource adequacy-

  - Pursue National Smart Grid mission. CEA alone cannot ensure RA. There should be active participation at the government level to support the states in RDSS program to spend money on their tools and training.
  - Data templates to be standardized by CEA.
  - Short-term forecasts are more difficult because parameters are very difficult to predict. There are intricate & complex models for short-term demand forecasting – needs more attention.
  - State level RA must be a multi nodal model, more granular, stochastic and must consider interstate power flows.

- Discom should procure plain vanilla solar and standalone solar and move away from RTC and FDRA contracts to utilize the storage optimally.

- **Shri Soonee, Former MD, POSOCO**, laid stress on importance of demand response as a part of RA. He suggested that stress hours should be defined and it should be mandatory for all the entities to declare reserves. The culture of declaring marginal values and duration curves needs to be inculcated. He laid emphasis on availability of data in public domain and capacity building at State level to enable them to carry out their own RA exercise instead of depending on other agencies.

- **Shri Ghanshyam Prasad** responded to the observations made by the speakers and said that the suggestions made by them will be duly considered. He also mentioned that efforts are to create some rotating mass like synchronous condenser, grid forming inverters, speeding up implementation of Hydro and Pump storage plant and identifying old coal-based power plant land sites which are under retirement for setting up nuclear power plants.

9. **Shri RV Shahi** in his closing remarks summarized the important issues raised and suggestions and thanked all the speakers and the participants for their active participation. All the presentations were very extensive and scholastic - very research oriented and have brought greater clarity to the number of issues. He also mentioned that it has now become clear that the guidelines for resource adequacy have implementational challenges.

10. The Webinar concluded with a formal Vote of thanks proposed by Shri BP Singh Former Member, DERC.

11. Recommendations:

I. Capacity building for carrying out Resource Adequacy Planning and demand forecasting for short and long term at State Utility level is necessary. Funds for the same may be provided for under RDSS program.

II. CEA may specify reliability standards for supply through regulations.

III. Data templets may be standardized by CEA for multiple planning and operation entities.

IV. DISCOMs may go for procurement of vanilla solar and wind and standalone storage capacity instead of RTC and FDRA contracts for optimum utilization of the resources.

V. CERC may take action to facilitate development of Capacity Market for procurement of capacity to enable the Discom to ensure resource adequacy without going in for long term PPA for 25 years.

VI. Large Consumers who are intending to be connected directly to ISTS and making arrangement for supply from sources other than Discom should be mandated to demonstrate their resource adequacy before they are connected to the ISTS.

VII. Enhanced Effective Load Carrying Capability (ELCC) models may be considered in place of Capacity-Credit Method in RAP exercise.

VIII. Investment in flexible infrastructure (ESS, Smart Grid/AMI, Flexible generation, DSM, DER, EV integration & dynamic pricing) is required to be enhanced.

IX. Demand Response by measures such as introducing demand aggregators for different categories of consumers, incentivize participants during peak stress and promoting behind the meter storage, etc.; should get due priority.

Withdrawal of ISTS charges waiver and appropriate transmission pricing to encourage optimization of location of solar, wind and storage plants.