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NUCLEAR POWER: PATHWAYS TO RAPID GROWTH

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BUDGET 2025 AND ENERGY SECTOR

R.V. Shahi

Budget 2025 was particularly looked upon as one of the most important policy instruments on account of the fact that this is the first Budget in the third term of the present NDA Government. Experience of the previous two terms – Budgets and outcomes of various years, achievements of different policy initiatives and, more importantly, the approach toward energy transition that has been followed during the last one decade. This time the, post US President Election, it was anticipated that there would be significant impact on the global initiatives towards toward managing energy transition. Obviously, India, which has embarked upon a long-term programmes going up to 2050 on growth of energy sector and particularly on management of transition, will need to be sensitive about the changing global scenario It has also been a wide spread expectation that the Budget 2025 would also factor in the changing global scenario besides India's ongoing programmes and future outlook structured thus far. Prior to the presentation of the Budget in the Parliament, normally Economic Survey is a comprehensive document with detailed analysis of the trend of economic parameters, critical evaluations of policies and programmes and suggestions for different sectors of economy and industry. This document is an important input, besides suggestions from various quarters, in formulation of the Budget.

Budget 2025 appropriately emphasizes on the role of Energy in the development of economy. Some of the important initiatives highlighted in the Budget are discussed below:

(i) The Government will set up a National Manufacturing Mission covering small, medium, and large industries for furthering "Make in India" by providing policy support, execution road maps, governance and monitoring framework for Central Ministries and States. Details of these have also been provided in the Budget separately. Enlarging the manufacturing base is at the core of economic development. This requires faster expansion of energy supply and expansion and management of energy inputs. This also generates employment, improves the quality of life of people, and enables significant amount of export to further strengthen the economy and national income of the country. While our overall GDP has, no doubt, increased, in terms of per capita income India continues to be at 125th rank among 200 nations.

(ii) Following the principle of common but differentiated responsibility toward managing climate change, the Budget highlights India's support for Clean Technology Manufacturing. This will aim to improve domestic value addition and built the eco system for Solar PV Cells, EV Batteries, Motors and Controllers, Electrolyzers, Wind Turbines, Very High Voltage Transmission Equipments and Grid.

(iii) Thrust on Renewable Energy has been further strengthened toward the overall target of 500 GW by the year 2030. And, it is for this purpose that further emphasis has been provided on domestic manufacturing of Renewable Energy Systems. Already the existing policy of production linked incentive undergoes reviews from time to time, and, depending on the need the incentive support is renewed or new schemes are introduced. To the list of exempted capital goods, 35 additional capital goods for Electric Vehicle Battery Manufacturing and 28 additional capital goods for Mobile Phone Battery

Manufacturing has been provided. This will boost domestic manufacture of Lithium-ION Battery both for Mobile Phones and Electric Vehicles.

The Union Budget 2025 – 2026 has allocated Rs. 26,550 Crores to the Ministry of New and Renewable Energy, up 53.48% against revised estimate of Rs. 17,294 Crores for 2024 – 2025. The allocation has increased by more than 900% since FY-2021. The Budget for FY-2026 includes Rs. 1,500 Crores for Solar Power (Grid) Rs. 2,600 Crores toward Kusum and Rs. 20,000 Crores toward PM Surya Ghar Yojna.

(iv) A mention has been made about the reform in power sector "We will incentivize Electricity Distribution Reforms and augmentation of Intra-State capacity by States. This will improve financial health and capacity of electricity companies. Additional borrowings of 0.5% of GSDP will be allowed to States contingent on these reforms." It is relevant to mention that from time-to-time Distribution Sector Reform is emphasized and is also brought on the agenda. However, actions fall substantially short of specifics with appropriate strategy, plans, and management of change. As a result, this segment of power sector continues to be a drag affecting adversely all other segments in the supply chain.

(v) This Budget will always be remembered for the unprecedented priority and thrust accorded to Nuclear Power. Energy Sector professionals have particularly been concerned as to why Nuclear Power continued so long to be in the margin of overall power sector profile. In spite of the Atomic Energy Act providing for Nuclear Energy to produce power, the overall status for Nuclear Power during the last about sixty years has remained between two to three percent of the installed power capacity of the country. The Budget provides "Nuclear Energy Mission for Vikas Bharat – development of at least 100 GW of Nuclear Energy by 2047 is essential for our energy transition efforts." Besides several other reasons, the contribution of Nuclear Power remaining in the margin, was that we could not open up this sector for participation even by other public sector undertakings, let alone private sector participation. This Budget has made a historic move "For an active partnership with the private sector toward this goal, amendments to the Atomic Energy Act and the Civil Liability for Nuclear Damage Act will the taken up." The Budget also provides for Nuclear Energy Mission for Research and Development of Small Modular Reactors (SMR) with an outlay of Rs. 20,000 Crores. The Budget further provides that at least five indigenously developed small and medium reactors will be operationalised by the year 2033. Implementation of the Budget statements will obviously require legislative changes, policy changes, conducive conditions for private sector participation, reinforcement of Safety Regulatory Framework etc. More importantly, sufficient availability of Nuclear Fuel, which will be a challenge, will need to be ensured for the type of expansion which is being targeted.

(vi) Read with the Economic Survey, the Budget 2025 will also be remembered for a renewed trust on coal to be an important source of energy and power "Despite global shifts toward Renewable Energy the Survey argues that Coal cannot be neglected in India's quest for sustainable development due to the countries unique resource endowments. India, which possesses approximately 10% of the world's Coal reserves, has a long-standing reliance on this resource for its power generation." The Survey also highlights Coal continued significance due to limited natural gas availability and argues against prematurely shutting down Coal plants.

(vii) The reforms in the mining sector, especially with respect to critical minerals will mark a major step toward realizing the vision of Vishist Bharat 2047. The allocation of Rs. 300 Crores for Coal and Lignite Gasification will provide pathways to lower emissions, Carbon Capture and Hydrogen Production. Obviously, these Budget provisions will need a close follow up in terms of project formulation and implementation. Coal Gasification has been on the Agenda for several decades without reaching anywhere near critical mass. Carbon Capture Utilisation is also a very important need for continued deployment of Coal. Coal and Power sectors will have to prepare on these fronts more sincerely and effectively than in the past.

(viii) The Budget has allocated Rs. 5,597 Crores to the Petroleum and Natural Gas Ministry for Phase – 2 for the Indian Strategic Petroleum Reserved Ltd. (ISPRL) Project aimed at too vast underground Petroleum Storage facilities. The funds will go toward construction of two commercial cum strategic reserves in Orissa and expansion of the facility in Karnataka. This is an increase from Rs. 408 Crores allocated in 2024-2025. The project is aimed at enhancing in India's energy security.

One of the biggest concerns in the energy sector is the excessive dependence on import for Petroleum fuels including Gas. While several efforts are being made to shift the consumption profile from Petroleum fuels to Power and other sources of energy, for example, shifting consumption in the Railway System from Diesel Engines to Electric Locomotives, in transport from liquid fuel to Electric Vehicles, in agriculture from liquid fuel to Solar Systems etc., continued dependence on Petroleum fuels remain inevitable even though its proportion will be reduced. It is hear that much larger and several other initiatives will need to be taken. The programme and the budgetary allocation for strategic reserves is laudable. Perhaps its volumes will have to be increased many folds. Gratifyingly, Petroleum Sector Companies and organisations are well alive to these challenges and have taken a few initiatives of diversifications. Speed and volume will need to be scaled up since we still continue to depend to the extent of more than 85% on import.

(ix) The Budget has, no doubt, covered many other areas of energy. An attempt has been made in this paper to pick up a few important segments considering the nature and priority of the segment and also considering the type of priority that Budget 2025 has accorded. To sum up the ambitious Nuclear agenda will need quick follow up on legislative and Policy changes, identifying projects, understanding the concerns of new investors, strengthening of the Safety and Regulatory Framework. Most importantly procurement, storage, and allocation of fuels will need a very carefully structured organization and the delivery system. In terms of Nuclear fuel, if the dependence has to be on import, long term arrangement for predictable and comfortable arrangement of supply and appropriate pricing arrangement will have to be worked out. Each of the missions which have been envisaged in the Budget will need not only to be set up, but arrangements for them to work in project management mode will need to be carefully structured and ensured.

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India's Energy Sector Growth in 2024

Dear Colleagues

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

As India accelerates its transition towards a sustainable future, its renewable energy (RE) sector has witnessed unprecedented growth. In 2024, the country made significant strides in solar and wind energy installations, policy advancements, and infrastructural improvements, setting the stage for ambitious targets in 2025. With a commitment to achieving 500 GW of non-fossil fuel-based energy capacity by 2030, India is emerging as a global leader in clean energy. As on 20th Jan 2025, India's total non-fossil fuel based energy capacity has reached 217.62 GW.

Capacity Additions: As of December 2024, India's total renewable energy installed capacity has reached 209.44 GW, marking 15.84% increase compared to 180.80 GW in December 2023. The total capacity added during 2024 amounted to 28.64 GW, representing a significant year-on-year increase of 119.46% compared to the 13.05 GW added in 2023.

Solar and wind surge: In 2024, solar power addition was of 24.54 GW, reflecting a 33.47% rise in its cumulative installed capacity from 73.32 GW in 2023 to 97.86 GW in 2024. Wind energy also contributed to this expansion, with an additional 3.42 GW installed in 2024, increasing the total wind capacity to 48.16 GW, a growth of 7.64% from 2023.

Growth in Bioenergy and Small Hydro Power:
Bioenergy has shown reasonable growth rising from 10.84 GW in December 2023 to 11.35 GW in December 2024, reflecting a 4.70% increase. Small hydro power projects saw incremental growth, with installed capacity increasing from 4.99 GW in 2023 to 5.10 GW in 2024, representing a 2.20% rise.

India added 3.4 GW of new wind capacity in 2024,with Gujarat (1,250MW), Karnataka (1,13 5 MW), and Tamil Nadu (980 MW) leading the way. These states accounted for 98% of the new wind capacity additions, highlighting their continued dominance in wind power generation.

Green Hydrogen Push: The government actively pursued the development of green hydrogen policies to reduce costs and attract investments in this emerging sector.

Manufacturing Expansion: Domestic solar PV and wind turbine manufacturing were scaled up, supporting India's ambition to become a global RE manufacturing hub.

Grid Infrastructure Development: The MNRE proposed significant investments in inter-state transmission systems to evacuate power from renewable-rich states like Rajasthan, Gujarat, and Madhya Pradesh.

India's renewable energy sector is on a transformative journey, with 2024 marking a year of record capacity additions and policy advancements. As the country moves into 2025, addressing regulatory, financial, and infrastructural challenges will be crucial. With continued policy support, increased investment, and a focus on emerging technologies, India is well-positioned to achieve its ambitious renewable energy targets and solidify its status as a global leader in the clean energy transition.

Coal: The Ministry of Coal has reported exceptional progress in coal production and dispatch for the calendar year 2024, reinforcing its dedication to achieving energy security and supporting the vision of an Atmanirbhar Bharat (Self-Reliant India).

In 2024, coal production reached an all-time high of 1,039.59 million tonnes (MT) (provisional), marking a significant 7.28% growth compared to the previous year's total of 969.07 MT.

Similarly, coal dispatches in 2024 also hit a record high, with 1,012.72 MT (provisional) dispatched across the nation, surpassing the 950.39 MT recorded in 2023 by an impressive 6.56%. This consistent growth in both production and dispatch underscores the sector's commitment to ensuring timely availability of coal for power generation and other industries, further bolstering national energy security.

The Ministry's continued focus on optimizing coal production and infrastructure development aligns with the goal of reducing dependence on coal imports, strengthening the country's self-sufficiency, and contributing to long-term sustainable growth

Oil and Gas: Ministry of Petroleum and Natural Gas informed that during the year 10.33 crore connections released under PMUY; No. of LPG connections increase from 14.52 crores in 2014 to 32.83 crores in 2024, a growth of above 100 %; Length of operational Natural Gas Pipeline in the country increased from 15,340 Km in 2014 to 24,945 Kms in 2024, 8985 Km under implementation and E20 petrol being dispensed at more than 17,400 retail outlets across the country

India's indigenous crude oil and condensate production for December 2024 stood at 2.5 million metric tonnes (MMT), recording a modest growth of 0.6% compared to the same period last year, according to data released by the Petroleum Planning & Analysis Cell (PPAC).

Nuclear: The government has recently opened the door for private companies to invest in the nuclear power sector, but with significant limitations, meaning private firms can now participate in building nuclear power plants, but the operation and ownership of the plants will primarily remain with the state-owned Nuclear Power Corporation of India Limited (NPCIL), with private companies essentially acting as investors and users of the generated electricity; this is considered a cautious step to leverage private capital while maintaining strict regulatory control over nuclear power generation.

Power: Ministry of Power informed in its Year End Review announcement that India successfully met an all-time maximum power demand of 250 GW during FY 2024-25; Per capita electricity consumption in India has surged to 1,395 kWh in 2023-24, marking a 45.8% increase (438 kWh) from 957 kWh in 2013-14; Universal Electrification Achieved; 50.9 Giga Watt of Inter State Transmission Projects costing Rs. 60,676 Cr approved; and Ministry of Power revised the Right of Way (RoW) guidelines in June, 2024, linking compensation to the market value of land

During this month, India Energy Forum organized a Webinar on Gas Exchange: Way Forward" on 29th January 2025 which was inaugurated by **Shri A K Jain**, Chairman, PNGRB. The other distinguished Speakers **Shri D K Sarraf**, Ex-Chairperson, PNGRB; **Shri R K Mediratta,** MD & CEO, IGX; **Shri Rajeev Mathur,** Director, HCG; and **Shri Kapil Jain,** Executive Director, GAIL. All the four Speakers made excellent presentations and suggestions and the Webinar was informative.

With best wishes

K S Popli

India’s Renewable Energy Sector is a Leading Global Force: Joshi

Union Minister of New and Renewable Energy Pralhad Joshi, has affirmed India's position as a global leader in the renewable energy sector, expressing confidence in surpassing the 500 GW target by 2030. Speaking at the Regional Review Meeting on Renewable Energy in Jaipur, he emphasized the necessity for renewable energy to play a more significant role in India's energy mix to meet the anticipated doubling of power demand by 2032.

The meeting assessed the progress of renewable energy initiatives in Northern Region states, including Jammu & Kashmir, Ladakh, Himachal Pradesh, Punjab, Chandigarh, Haryana, Rajasthan, Uttarakhand, and Uttar Pradesh. Joshi highlighted the government's commitment to the Panchamrit initiative from COP26 and noted India's leading position in green hydrogen development, supported by recent investments totaling Rs 32 lakh crore in the renewable energy sector.

Recently, the Central Government allocated an additional 5,000 MW to Rajasthan under the PM Kusum Scheme, as requested by the state. Additionally, four solar power projects totaling 1,200 MW were inaugurated in Jaisalmer, reinforcing Rajasthan's pivotal role in India's renewable energy expansion. Shri Joshi underscored the importance of collaboration between the Union and state governments for collective progress.

During the review meeting, incentives were disbursed to various Discoms for promoting rooftop solar installations. Notably, Jodhpur and Ajmer Discoms in Rajasthan received Rs 39.43 crores and Rs 17.59 crores, respectively, for financial years 2021 through 2024. Discoms in Haryana, Punjab, Uttarakhand, and Uttar Pradesh also received significant incentive amounts for their efforts in advancing rooftop solar energy.

The event was attended by key dignitaries, including Rajasthan Chief Minister Bhajan Lal Sharma, Union Minister of State Yesso Naik, and energy ministers from various Northern Region states. Discussions centered on innovative solutions and progress in the renewable energy sector, with a focus on overcoming challenges and adopting best practices to achieve future goals.

India’s power demand to double by 2032; renewables lead the way: Union minister

Union minister for new and renewable energy Pralhad Joshi said India is on track to achieve and surpass its 500 GW renewable energy target by 2030. Addressing the Regional Review Meeting on Renewable Energy in Jaipur, Joshi said the country’s power demand is projected to double by 2032, requiring a greater role for renewables in the energy mix.

The meeting reviewed renewable energy progress in Northern Region states, including Jammu & Kashmir, Ladakh, Himachal Pradesh, Punjab, Chandigarh, Haryana, Rajasthan, Uttarakhand, and Uttar Pradesh.

Joshi announced an additional allocation of 5,000 MW to Rajasthan under the PM Kusum Scheme in January 2025. He highlighted the recent commissioning of four solar power projects in Jaisalmer with a total capacity of 1,200 MW. Incentives for rooftop solar installations were distributed to discoms, including Rs 39.43 crore for Jodhpur and Rs 17.59 crore for Ajmer discoms in Rajasthan. Haryana’s Dakshin and Uttar discoms received Rs 42.68 crore and Rs 22.43 crore, respectively. Punjab discom received Rs 11.39 crore, Uttarakhand received Rs 9.48 crore, and Uttar Pradesh’s Madhyanchal discom received Rs 9.51 crore.

Nidhi Khare, Secretary, MNRE, said India's renewable energy capacity has crossed 200 GW, with solar power at 97 GW, wind power at 48 GW, and hydroelectric power at 52 GW. Sudeep Jain, Additional Secretary, MNRE, said India is committed to achieving 500 GW capacity by 2030 and 1,800 GW by 2047. He emphasized collaboration to address challenges and achieve these targets.

Jammu & Kashmir reported the installation of 35 MW of domestic solar capacity and 3,000 solar pumps. Himachal Pradesh announced over 75% green energy in its portfolio, with a target of 100% non-fossil fuel energy by 2026. Rajasthan is progressing toward its target of 125 GW of renewable energy by 2030, and Haryana is scaling up investments in renewable energy infrastructure.

Joshi said the government is engaging with states and industry stakeholders to address challenges and accelerate renewable energy adoption, with a focus on green hydrogen, battery storage, and distributed energy solutions.

India's renewable energy capacity reaches 217.62 GW with record additions in 2024

India's total non-fossil fuel-based energy capacity reached 217.62 GW as of January 20, 2025, driven by record additions of 24.5 GW in solar capacity and 3.4 GW in wind capacity during 2024, according to official data. The country's renewable energy growth reflects a significant step toward its target of 500 GW of non-fossil fuel-based energy capacity by 2030.

Solar energy continued to dominate the renewable energy mix, accounting for 47% of the total installed capacity. Utility-scale solar installations rose sharply with 18.5 GW added in 2024, a nearly 2.8-fold increase from 2023. Rajasthan, Gujarat, and Tamil Nadu led the growth, contributing 71% of the year's utility-scale installations. Rooftop solar capacity also saw a 53% increase, with 4.59 GW added, supported by the PM Surya Ghar: Muft Bijli Yojana, which enabled 7 lakh rooftop installations within ten months. Off-grid solar recorded a 182% increase, adding 1.48 GW.

Wind energy saw an addition of 3.4 GW, led by Gujarat (1,250 MW), Karnataka (1,135 MW), and Tamil Nadu (980 MW), accounting for 98% of the new capacity.

The ministry of new & renewable energy (MNRE) supported the growth through policy measures such as promoting green hydrogen, scaling up domestic manufacturing for solar PV and wind turbines, and improving grid infrastructure.

India's renewable energy capacity is set to expand further in 2025, with policy support and investments key to addressing challenges in infrastructure, financing, and regulations.

IREDA, SJVN, GMR and NEA Seal Partnership for 900 MW Upper Karnali Hydropower Project in Nepal Indian Renewable Energy Development Agency Ltd. (IREDA) has finalized a Joint Venture Agreement with SJVN Ltd., GMR Energy Ltd., and Nepal Electricity Authority (NEA) for the development of the 900 MW Upper Karnali Hydro-electric Project in Nepal. This strategic initiative aims to strengthen regional energy security and accelerate renewable energy growth.

The joint venture agreement lays out a comprehensive framework for the project development, construction, operation, and maintenance under a Build-Own-Operate-Transfer (BOOT) model, with 25-years project term from the Commercial Operation Date (CoD).

The agreement was formalized today in New Delhi in the presence of senior officials from IREDA, SJVN, and GMR Energy Ltd.

Speaking on the occasion, Shri Pradip Kumar Das, CMD, IREDA, said, "this agreement marks a significant step towards realizing our collective vision of sustainable energy development in the region. By leveraging hydropower's vast potential, the upper karnali Project will serve as a model of cross-border

collaboration, delivering both economic and environmental benefits."

Union Minister Joshi visits India's largest Floating Solar project in Madhya Pradesh

Union Minister of New and Renewable Energy Shri Pralhad Joshi visited the Omkareshwar Floating Solar Park, located in Khandwa district of Madhya Pradesh. Recognized as the largest floating solar park in India, this 600 MW capacity project developed marks a significant step forward in India's renewable energy journey.

Union Minister Shri Pralhad Joshi posted on X ," Visited the Omkareswar Floating Solar Project in Khandwa District, Madhya Pradesh. It is one of the largest floating solar projects in Asia with an impressive capacity of 600 MW. A big thank you to Prime Minister Shri Narendra Modi and Chief Minister Shri Mohan Yadav for their unwavering support in driving India's renewable future forward. This project showcases the scale and ambition of our nation's clean energy goals. "

During his visit, Union Minister Shri Joshi emphasized the importance of innovative solutions like floating solar technology in addressing land constraints while promoting sustainable development. He highlighted the efficiency of this approach, noting that the cooling effect of water enhances solar panel performance, thereby increasing energy output.

Currently, the Omkareshwar Floating Solar Park has commissioned a total of 278 MW. The total estimated development cost of the park is ₹330 crore, supported by a Central Financial Assistance of ₹49.85 crore.

Union Minster Joshi said that Madhya Pradesh is one of the most important States that is contributing to fulfilling the energy security of the country. He noted that the state has significantly increased its renewable energy capacity, achieving a 14-fold growth over the past 12 years, from less than 500 MW in 2012 to its current capacity.

In his X post, Union Minister Joshi said, "Congratulations to all the stakeholders, the Madhya Pradesh Government, and the Solar Power Park Developers – Rewa Ultra Mega Solar Limited, NHDC Ltd, AMP Energy Green Pvt Ltd, and SJVN Ltd – for the successful commissioning of a 278 MW Solar Park along with solar projects. This project was inaugurated last week by PM @narendramodi and is a testament to India's unwavering commitment to sustainability goals.

As the project moves towards full capacity, the entire 600 MW will be fully operational. It will generate more than 4600 million units of clean energy over the next 25 years. This is a remarkable achievement in our journey towards sustainable and renewable energy for the future".

India's RE Capacity Registers 15.84% Year-on-Year Growth

भारत सरकार
Government of India
नवीन और नवीकरणीय ऊर्जा मंत्रालय
Ministry of New And Renewable Energy
सत्यमेव जयते

Union Ministry of New and Renewable Energy (MNRE) has reported remarkable progress in India's renewable energy sector, highlighting significant achievements between December 2023 and December 2024. This growth reflects India's steadfast commitment to achieving its clean energy targets and its broader vision under the 'Panchamrit' goals announced by Prime Minister Shri Narendra Modi.

Record Capacity Additions

As of December 2024, India's total renewable energy installed capacity has reached 209.44 GW, marking an impressive 15.84% increase compared to 180.80 GW in December 2023. The total capacity added during 2024 amounted to 28.64 GW, representing a significant year-on-year increase of 119.46% compared to the 13.05 GW added in 2023.

Solar and wind surge

In 2024, solar power spearheaded this growth with the addition of 24.54 GW, reflecting a 33.47% rise in its cumulative installed capacity from 73.32 GW in 2023 to 97.86 GW in 2024. Wind energy also contributed to this expansion, with an additional 3.42

GW installed in 2024, increasing the total wind capacity to 48.16 GW, a growth of 7.64% from 2023.

Growth in Bioenergy and Small Hydro Power

Bioenergy has shown remarkable growth, with its installed capacity rising from 10.84 GW in December 2023 to 11.35 GW in December 2024, reflecting a 4.70% increase. Small hydro power projects saw incremental growth, with installed capacity increasing from 4.99 GW in 2023 to 5.10 GW in 2024, representing a 2.20% rise.

MNRE under Union Minister of New and Renewable Energy Shri Pralhad Joshi has been taking various key initiatives to achieve Prime Minister Shri Narendra Modi's vision of 500 GW of renewable energy by 2030, reflecting India's dedication to fulfilling its climate commitments while strengthening energy security. These impressive figures underscore the Government of India's continued efforts to scale up renewable energy capacity in India.

MNRE issues Operational Guidelines for implementation of various components under PM-Surya Ghar: Muft Bijli Yojana

Union Ministry of New and Renewable Energy has notified Scheme Guidelines for implementation of 'Payment Security Mechanism' Component and 'Central Financial Assistance' Component for RESCO Models/ Utility Led Aggregation Models under PM-Surya Ghar: Muft Bijli Yojana.

The scheme offers two alternative implementation models for the installation of rooftop solar plants for consumers: the RESCO (Renewable Energy Service Company) model, where third-party entities invest in rooftop solar installations, allowing consumers to pay only for the electricity consumed without bearing the upfront costs; and the Utility-Led Aggregation (ULA) model, where DISCOMs or state designated entities will install rooftop solar projects on behalf of individual residential sector households.

Under this scheme component, ₹100 crore corpus fund has been earmarked for Payment Security Mechanism (PSM) for de-risking investments in RESCO-based grid-connected rooftop solar models in the residential sector, which may be supplemented through other grants, funds and sources after due approval of the Ministry.

It is clarified that these guidelines are in addition to the existing mode of implementation undertaken by consumers (capex mode) through the national portal (https://www.pmsuryaghar.gov.in/), and these alternative models will supplement the national portal-based implementation of the scheme.

CMD, IREDA Vision for 2025: Market Innovations, Retail Renewable Push and Global Expansion

On New Year's Day 2025, Shri Pradip Kumar Das, Chairman and Managing Director, Indian Renewable Energy Development Agency Ltd. (IREDA), addressed all employees via video conferencing. Dr. Bijay Kumar Mohanty, Director (Finance), Shri Ajay Kumar Sahani, Chief Vigilance Officer, and other senior officials were also present.

Shri Das emphasized IREDA's untiring commitment to renewable energy financing. He highlighted IREDA's leadership in driving market innovations, by offering first-to-market support for Green Ammonia, and Pumped Storage Hydropower projects as well as de-centralized generation projects under Solar Rooftop and PM KUSUM.

Highlighting expansion efforts, Shri Das mentioned the provisional registration of IREDA's wholly owned subsidiary at GIFT City, aimed at promoting Green Hydrogen and renewable energy equipment manufacturing through foreign currency financing. He also shared details about the in-principal approval received to establish a retail subsidiary. This subsidiary will focus on handling retail business under the PM-Suryaghar (Rooftop Solar) and PM-KUSUM schemes, as well as emerging B2C segments in renewable energy, including electric vehicles, energy storage, green technologies, and energy efficiency.

As per provisional Q3 figures, Shri Das underlined IREDA's stellar performance, surging 129% Y-o-Y to ₹31,087 crore and disbursements up 41% to ₹17,236 crore. The outstanding loan book grew 36%, reaching ₹69,000 crore. Cumulatively, IREDA has sanctioned over ₹2.39 Lakh Crore and disbursed more than ₹1.52 Lakh Crore.

Shri Das also recapped IREDA's key milestones from the past year, including attaining Navratna status, receiving an international sovereign-equivalent BBB-(Stable) rating from S&P Global, and maintaining domestic AAA ratings. He noted IREDA's record-setting publication of FY23-24 financial results in just 19 days and hosting India's earliest AGM on June 24, 2024. Additionally, IREDA has been recognized as one of the Top 5 Wealth Creators in India for the period November 2023 to November 2024, securing the prestigious 2nd position by the leading Business Newspapers. Notably, it is the only public sector enterprise on this top 5 wealth creators list.

CMD, IREDA expressed his gratitude to Shri Pralhad Joshi, Hon'ble Union Minister of New & Renewable Energy, Consumer Affairs and Food & Public Distribution; Shri Shripad Naik, Hon'ble Minister of State for Power and New & Renewable Energy; Shri Prashant Kumar Singh, Secretary, MNRE; other senior officials of the ministry; and the Board of Directors for their support and invaluable guidance.

Concluding his address, Shri Das praised the employees for their commitment and dedication, urging them to continue driving innovation and excellence in India's green energy mission. He also extended his appreciation to the family members of IREDA employees, acknowledging their crucial role in supporting the workforce behind the company's success. Celebrating IREDA's remarkable achievements and landmark contributions in 2024, he wished all employees a Happy New Year and encouraged them to strive for even greater accomplishments in 2025.

Renewables' share in India's energy mix to be stable at 21% in FY25: Ind-Ra

The share of renewables including large hydro in the country's overall energy mix is expected to remain stable at nearly 21 per cent in FY25, India Ratings and Research (Ind-Ra) said recently. The balance will be largely contributed by thermal capacity, the agency said in a report. "The share of renewables (including large hydro) in the overall energy mix is expected to remain stable at nearly 21 per cent in FY25, with the balance largely contributed by thermal," it said. As per official data, as of December 2024, India's overall power generation capacity was at 462 GW, of which 209.444 GW was renewables including hydro.

The agency further said that it expects all-India energy requirement to grow 5-5.5 per cent year-on-year (yoy) during FY25, with incremental capacity additions of 30-35GW, largely led by renewables. Ind-Ra said it has also maintained a stable rating outlook for solar and wind projects for FY26, based on the historical generation profile (factoring volatility), regular payments from counterparties and comfortable internal liquidity.The renewable energy capacity addition is expected to gain further traction in view of a strong pipeline (largely solar) and contribute 35-40 per cent to the generation mix by 2030.

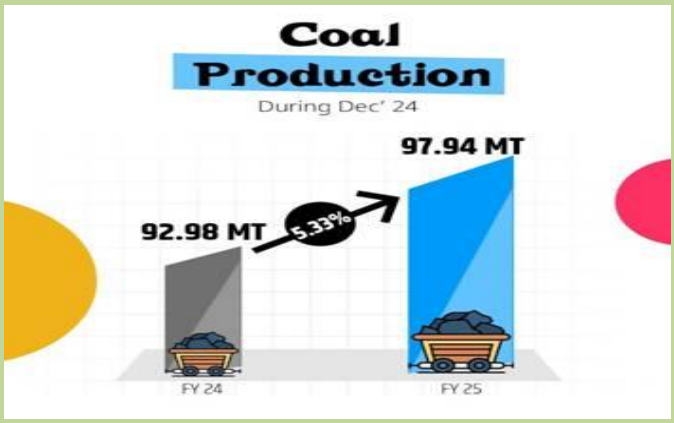
Startups in Indian battery ecosystem to attract $500 million investment: IESA

The Indian battery and mobility startup sector is poised to attract over $500 million in investments in the coming year, according to projections by the India Energy Storage Alliance (IESA). The announcement was made during the Start-Up Connect program organized in collaboration with Hero MotoCorp at the Bharat Battery Show, part of the Bharat Mobility Global Expo 2025.

The event saw participation from over 100 startups, including Polyprotic, Scharge, Neuron Energy, Calton Energy, and PranaGraf. These startups are actively seeking funding from major conglomerates and investment firms to fuel innovations in battery technology, electric vehicle (EV) infrastructure, and component manufacturing. Recent advancements in battery technology, including sodium-ion, zinc-based, and metal-air batteries, are expected to complement traditional lithium-ion batteries, driving India's energy transition.

Ministry of Coal Records Significant Growth in Coal Production and Dispatch in December 2024

The Ministry of Coal has reported remarkable growth in overall coal production and dispatch during the month of December 2024, reinforcing its commitment to achieving energy security for the nation.



The total coal production during Dec'24 reached 97.94 Million Tonne (MT), surpassing the production of 92.98 MT recorded during the same month in the previous year with a growth rate of 5.33%. Captive and other mines produced 18.95 MT, reflecting a significant growth of 29.61% compared to 14.62 MT in the corresponding period of the last year. The cumulative coal production up to Dec'24 also witnessed substantial growth, reaching 726.29 MT (Provisional) in FY 2024-25, compared to 684.45 MT during the corresponding period of FY 2023-24, reflecting an increase of 6.11%. This showcases the Ministry's relentless efforts to meet the rising energy demand.

In terms of coal dispatch, the figures for Dec'24 surged to 92.59 MT, compared to 87.06 MT in December 2023, achieving a growth rate of 6.36%. Dispatch from captive and other mines stood at 18.13 MT, marking a growth of 31.83% compared to the corresponding period of last year. Additionally, the cumulative coal dispatch up to December 2024 reached 750.75 MT (Provisional) in FY 2024-25, compared to 711.07 MT in FY 2023-24, recording an impressive growth of 5.58%.

The Ministry of Coal continues to spearhead initiatives aimed at enhancing production, ensuring seamless dispatch, and catering to the growing energy demands of the nation. The consistent growth in coal production and dispatch underscores the Ministry's unwavering commitment to achieving self-reliance in coal and fulfilling the vision of Atmanirbhar Bharat.

Coal Imports Drop by 3.1% During April-October, 2024

India's coal sector plays a critical role in supporting its rapidly growing economy. However, the country faces a significant gap in meeting its coal demand from domestic reserves, particularly for coking coal and high-grade thermal coal, which are not adequately available. As a result, coal imports are essential to support critical industries such as steel production.

The government's initiatives to reduce coal imports have shown positive results in the first seven months of FY 2024-25 (April-October). Coal imports decreased by 3.1%, totaling 149.39 million tonnes (MT) compared to 154.17 MT during the same period in the previous year. The Non-Regulated Sector (excluding power sector) saw a more substantial decline, with imports dropping by 8.8% year-on-year.

Despite growth of 3.87% in coal-based power generation from April 2024 to October 2024 compared to the same period last year, coal imports for blending by thermal power plants saw a sharp decrease of 19.5%. This decline is a testament to India's determined efforts to achieve greater self-sufficiency in coal production and reduce dependence on imports. The increase in coal imports

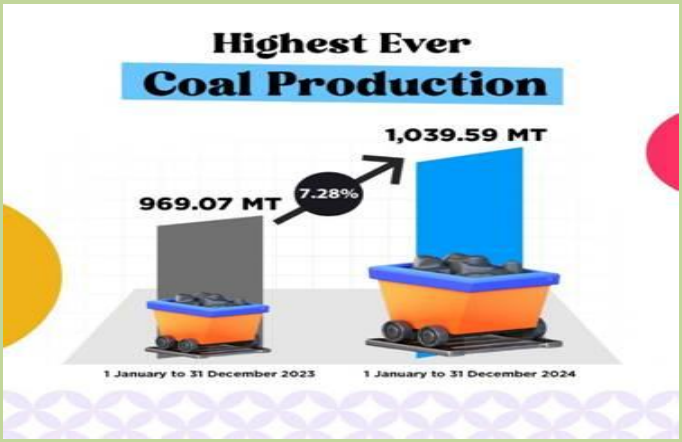
for the power sector, particularly from imported coal-based power plants (designed to use only imported coal), was notable, rising by 38.4% to 30.04 MT, up from 21.71 MT in the previous year.

On the production side, coal output saw a positive growth of 6.04%, rising to 537.57 MT in the April-October 2024 period, up from 506.93 MT in the same period of FY 2023-24. This growth highlights the government's concerted efforts to enhance coal production and optimize its usage within the country.

The Ministry of Coal continues to implement a range of strategic measures to boost domestic production and ensure a stable coal supply. These efforts aim not only to reduce India's dependence on coal imports but also to fortify the country's energy security. By focusing on increasing domestic output, the government is working towards a more self-sufficient and sustainable energy landscape for India.

Coal Sector Achieves Highest Ever Production & Dispatch in Calendar Year 2024

The Ministry of Coal has reported exceptional progress in coal production and dispatch for the calendar year 2024, reinforcing its dedication to achieving energy security and supporting the vision of an Atmanirbhar Bharat (Self-Reliant India).



In 2024, coal production reached an all-time high of 1,039.59 million tonnes (MT) (provisional), marking a significant 7.28% growth compared to the previous year's total of 969.07 MT. This growth reflects the Ministry's strategic efforts to enhance domestic coal availability and meet growing energy demands.

Similarly, coal dispatches in 2024 also hit a record highest, with 1,012.72 MT (provisional) dispatched across the nation, surpassing the 950.39 MT recorded in 2023 by an impressive 6.56%. This consistent growth in both production and dispatch underscores the sector's commitment to ensuring timely availability of coal for power generation and other industries, further bolstering national energy security.

The Ministry's continued focus on optimizing coal production and infrastructure development aligns with the goal of reducing dependence on coal imports, strengthening the country's self-sufficiency, and contributing to long-term sustainable growth

Coal Sector Achieves Impressive 7.5 % Growth in November 2024 among Eight Core Industries

The coal sector has demonstrated a remarkable growth of 7.5% (provisional) to 199.6 points in Nov'24 as compared to 185.7 points in Nov'23 among the eight core industries as per the Index of Eight Core Industries (ICI)) (Base Year 2011-12) released by Ministry of Commerce & Industries. The index of coal industry has reached 172.9 points during Apr-Nov'24 as compared to 162.5 points during the same period of last year, showcasing highest growth of 6.4 % among the all eight core industries.

The ICI measures the combined and individual performance of production of eight core industries, viz. cement, coal, crude oil, electricity, fertilizers, natural gas, refinery products, and steel.

The Combined Index of Eight Core Industries experienced a notable 4.3% increase in November 2024, compared to the same period of previous year and the index for the period Apr-Nov'24 has increased by 4.2 % as compared to the corresponding period of fiscal year 2023-24 underscoring the coal sector's substantial contribution to overall industrial expansion.

The driving force behind this remarkable growth can be attributed to a significant surge in coal production during Apr-Nov'24, with output reaching an impressive 628.4 million tonnes, marking a remarkable increase of 6.4% compared to the same period in the previous year. This surge in production underscores the sector's capacity to meet growing demand of energy and manufacturing industries.

Ministry of Coal Organizes Chintan Shivir 2.0: Shaping the Future of the Coal Sector

The Ministry of Coal successfully hosted Chintan Shivir 2.0 today at Sushma Swaraj Bhawan, providing a platform to foster innovation, sustainability, and collaboration in defining the future roadmap for the coal sector. The event was chaired by Union Minister of Coal and Mines, Shri G Kishan Reddy, and co-chaired by Union Minister of State for Coal and Mines, Shri Satish Chandra Dubey. **Shri Vikram Dev Dutt**, Secretary (Coal), Additional Secretaries Ms. Rupinder Brar and Ms. Vismita Tej, along with all CMDs and Directors of coal PSUs, senior officers of Ministry, and key stakeholders, participated actively in the discussions.

In his keynote address at Chintan Shivir 2.0, Union Minister of Coal and Mines, Shri G Kishan Reddy, emphasized the vital role of the coal sector in ensuring India's energy security while addressing the challenges of sustainability and innovation. He reiterated the Government's unwavering commitment to making the coal sector a key contributor to the Nation's energy transition, focusing on enhancing production, integrating cleaner technologies, and safeguarding the environment. Shri Reddy highlighted the need to align coal mining practices with global sustainability goals, including reducing carbon emissions through innovative technologies like coal gasification and adopting best practices for sustainability.

Shri Reddy stressed the importance of safety in mining operations, calling it a non-negotiable priority for all stakeholders. He urged coal PSUs and industry partners to adopt state-of-the-art technologies and implement rigorous safety standards to safeguard the lives of workers and ensure the well-being of the workforce. He underlined the necessity of developing robust mechanisms for mine closures, focusing on biodiversity conservation, land reclamation, and transforming mined-out areas into hubs of community activity and ecological balance.

The Minister further underscored the critical role of community involvement in achieving sustainable growth. "Coal mining must not only cater to the nation's energy needs but also uplift the communities residing near mining areas," he said. Shri Reddy called upon coal PSUs and stakeholders to actively engage with local communities and self-help groups, promoting welfare programs that improve healthcare, education, and livelihoods. He emphasized that initiatives aimed at skill development, employment generation, and environmental stewardship should become intrinsic parts of coal sector operations.

In his remarks at Chintan Shivir 2.0, Shri Vikram Dev Dutt, Secretary, Ministry of Coal, emphasized the need to make the coal sector future-ready by adopting innovative ideas and exploring transformative possibilities. He highlighted the importance of achieving a quantum leap in coal production to meet the nation's growing energy aspirations while maintaining a thoughtful and systematic approach to accelerating production.

SECL's OBR Crosses 281 MCuM, Achieving 105% of Pro-rata Target

Coal India Subsidiary, South Eastern Coalfields Limited (SECL)'s overburden removal (OBR) has crossed 281 million cubic meters (MCuM) (From April, 2024 to till date), achieving 105% of its pro-rata target and recording 19.82 McuM (7.58%) increase compared to the same period last year.

OBR is a crucial pre-coal extraction process that involves clearing soil and rock layers to access coal reserves.

The Chhattisgarh-based Coal India subsidiary is removing over 1.3 million cubic metres of overburden daily, setting an unprecedented pace in its operations. With this momentum, SECL is confident of surpassing its annual target and achieving an additional 40-45 million cubic metres of OBR, marking the highest-ever in the company's history.

Dr. Prem Sagar Mishra, Chairman-cum-Managing Director of SECL, expressed his optimism, stating, "Despite various challenges, we are confident that our dedicated efforts will not only help us meet the OBR target but also surpass it, setting new benchmarks in SECL's journey."

SECL has deployed the vertical ripper technique, an environmentally friendly, blast-free method for overburden removal in its megaprojects. This approach ensures minimal environmental impact while maintaining high efficiency in operations.

Further, SECL has accelerated its land acquisition process to support its expanding operations. In the calendar year 2024 alone, more than 880 employment opportunities have been provided to landowners whose lands were acquired, reinforcing the company's commitment to community development and welfare.

SECL's focus on overburden removal not only facilitates coal production but also reflects its commitment to operational excellence and environmental sustainability. With these achievements, SECL continues to demonstrate its leadership in the mining sector.

India's lower coal imports mean bad news for power emissions

India lowered imports of thermal coal by over 5.5 million tons in 2024 from the year before, according to data from Kpler, which may seem like good news to climate trackers monitoring trends in the world's second-largest coal consumer.

But total coal-fired power generation hit new highs in India last year, so lower imports mean that higher volumes of domestic coal were burned for power instead, and that's bad news for emissions levels.

India's domestically-mined coal is generally of lower quality and can contain over twice as much ash as most imported coal.

That combination means that power plants need to burn greater volumes of Indian coal than imported coal to generate the same amount of power, and can generate more ash and toxic emissions when burning local coal compared to imported coal.

The trend of using more local coal and reducing coal imports looks set to continue as the government aims to become more self-reliant in terms of energy supplies and ensure support for the local mining industry, which is a major employer.

And that means India's coal use and power emissions look set to keep climbing even as the country also boosts renewable energy capacity and faces growing international pressure to curb coal consumption.

NEW HIGHS

India's power producers generated a record 1,221 terawatt hours of (TWh) of coal-fired electricity in January to November of 2024, according to Ember.

That total was 5.1% more than during the same months in 2023, and marks the fourth straight year of coal-fired expansion.

Coal-fired plants accounted for 73.4% of total electricity generation over the first eleven months of 2024, which is slightly down from 2023's record of

74.2% but remains the highest coal share among all large economies.

Emissions for coal-fired generation also climbed to a new record of 1.1 billion tons of carbon dioxide (CO2), and were also up by around 5% from 2023.

WIDER USE
India's consumption of coal for power also expanded geographically in 2024, with a growing share of coal use taking place outside the traditional largest coal burning states.

Chhattisgarh, Uttar Pradesh, Madhya Pradesh and Maharashtra - with a combined population of 475 million - are the top coal-burning states in the country, and have historically accounted for roughly half of India's total coal-fired generation.

In January to November 2024, the share of coal-fired output in those four states dropped to around 45% and the lowest in five years, as growth in other states accelerated.

The collective coal-fired output of the top four coal states was around 552 TWh in January to November of 2024, which is up around 2% from the same months in 2023. All other Indian states generated 669 TWh of coal-fired electricity in the first eleven months of 2024, which was up 8% from 2023 and the highest on record.

States including Odisha, Andhra Pradesh, Punjab, Bihar and West Bengal all lifted coal-fired output to new highs last year, and rely on coal for over 75% of electricity generation.

Each of those states also saw coal-fired power emissions climb to fresh highs in 2024, and are likely to see further rises in both coal generation and pollution as the country steps up use of locally-sourced coal for power.

And with the ash content of local coal typically around 25% or more, per the Observer Research Foundation, compared to around 10% for imported coal, greater coal use will yield higher emissions.

That in turn will further elevate India's total power sector pollution loads, even as the country tries to roll out growing volumes of clean power capacity. The opinions expressed here are those of the author, a market analyst for Reuters.

Can't afford to ditch coal: Economic Survey 2024 hits India’s energy goals with a reality check

The Economic Survey 2024 reinforces the crucial role of coal in India’s energy landscape, noting its ongoing importance as a reliable and affordable source of energy for the country’s development.

Despite global shifts toward renewable energy, the Survey argues that coal cannot be neglected in India’s quest for sustainable development due to the country’s unique resource endowments. India, which possesses approximately 10% of the world’s coal reserves, has a longstanding reliance on this resource for its power generation.

The Survey underscores that, unlike many developed economies that are moving toward green energy alternatives, India remains heavily dependent on coal.

This reliance is further amplified by the country’s limited natural gas reserves— only 0.7% of the global total. Given these resource constraints, coal remains the most viable energy source to fuel India’s growing economy and meet the increasing demand for electricity.

No rationale for immediate shutdown
The report makes a strong case against the economic rationale of shutting down coal plants without a dependable and scalable alternative in place. The Economic Survey notes that most of India’s coal-fired power plant capacity additions occurred during the 2010s, signalling that coal infrastructure is still relatively new and underutilised. Shutting down coal plants prematurely would result in the waste of substantial investments made in the last decade, leaving these assets stranded without viable alternatives in place. Such a move, the Survey suggests, would not only be economically unsound but would also hinder India's ability to meet its energy needs and development goals.

India's power generation rises 5.41% to 1,378.42 billion units in April-December: CEA

India's power sector witnessed a steady rise in electricity generation, with output increasing by 5.41% to 1,378.42 billion units in the April-December period of the current financial year, up from 1,307.64 billion units in the same period last year, according to data from the Central Electricity Authority (CEA).

With winter demand pushing consumption levels higher, December alone recorded a 5.76% increase in electricity demand, reaching 150.53 billion units. The peak demand stayed above 200GW throughout the month and touched 224GW, driven by rising heating requirements.

Capacity addition also saw strong momentum, with 19.97GW of new power generation capacity added in FY25, bringing the total installed capacity to 462GW. This represents a 60.28% growth compared to 12.46GW added in the previous fiscal.

Renewable energy dominated the new capacity additions, contributing 18.83GW, more than double the 8.72GW added in the same period last year. The data highlights the continued expansion of India's power infrastructure to meet growing energy needs.

GoM reviews Discom viability, report expected in three months

The Group of Ministers (GoM) on the viability of distribution utilities held a virtual meeting, chaired by Union Minister of State for Power and New & Renewable Energy, Shripad Yesso Naik, with participation from energy ministers of Uttar Pradesh, Andhra Pradesh, Madhya Pradesh, Tamil Nadu, Maharashtra, and Rajasthan. The discussion focused on financial challenges faced by Discoms, including cost recovery issues, power purchase costs, and AT&C losses. The GoM agreed to explore innovative solutions and will submit a report within three months.

Union Minister Naik stated that the financial viability of Discoms is critical for the entire power sector value chain. He highlighted that the gap between the average cost of supply (ACS) and the average revenue realized (ARR) is affecting financial stability. He emphasized that high AT&C losses, non-cost reflective tariffs, and under-recovery of power purchase costs remain major concerns. He also noted that Gujarat Discoms have set an example in improving financial performance and suggested studying their model for reforms.

Energy Minister of Uttar Pradesh, A.K. Sharma, commended the Government of India's efforts to improve the operational and financial efficiency of distribution utilities. He called for greater adoption of technology, timely payment of government dues, and improved consumer grievance redressal mechanisms. Andhra Pradesh Energy Minister Gottipati Ravi Kumar spoke about the state's focus on renewable energy expansion and the progress under PM KUSUM and PM Surya Ghar: Muft Bijli Yojana. Madhya Pradesh Energy Minister Pradyuman Singh Tomar emphasized the need for accurate energy accounting and auditing to reduce line losses. Tamil Nadu Electricity Minister V. Senthil Balaji highlighted the role of smart metering in improving Discom revenues. Maharashtra Minister of State for Energy Meghana Deepak Sakore Bordikar discussed the Mukhyamantri Saur Krushi Vahini Yojana, which aims to enhance power supply quality for farmers and reduce power purchase costs. Rajasthan Minister of State for Energy Heeralal Nagar outlined the state's renewable energy potential and projects under the Hybrid Annuity Model for low-cost daytime power supply to agriculture.

The GoM will analyze debt scenarios in key states, identify parameters for productive borrowing, and recommend guidelines for capital expenditure investments with financial due diligence. It will also suggest measures to improve the financial health of the distribution sector and attract private investment into the power distribution value chain. Further meetings will be convened in member states to assess state-specific challenges and policy measures.

Power sector sees strong pipeline as Ind-Ra projects stable FY26 outlook.

India Rating and Research (Ind-Ra) has maintained a Stable rating outlook for energy infrastructure projects for FY26, supported by India's economic growth, increasing renewable capacity, strong capacity addition pipeline, and improved receivables for power generators.

Ind-Ra expects energy requirement growth of 5%-5.5% in FY25. Peak demand has reached an all-time high of 250GW, with a strong supply position aided by better coal availability and government measures. Power generation capacity additions are projected to reach 30-32GW in FY25, led by renewables.

Renewables saw 24.55GW of capacity added in 2024, up from 10GW in 2023. Ind-Ra expects solar capacity additions to reach 22-25GW by FY25-end and remain strong in FY26, driven by a large pipeline of projects. Hybrid, storage, and round-the-clock tenders are gaining traction to mitigate risks related to intermittency.

Thermal power contributed 74% of total power generated in 9MFY25, with a share of 53% in installed capacity. Thermal plant load factors are expected to remain healthy at 69%-70% in FY25-FY26.

Transmission projects under the ISTS-tariff based competitive bidding (TBCB) segment recorded significant awards in 9MFY25, with a capital outlay of INR1,016.75 billion. Stable regulations and operational performance continue to support the transmission sector.

Smart metering projects have commenced installations in 10 states. Ind-Ra cited automated payment mechanisms and government support as key factors supporting a Stable rating outlook for the segment in FY26. Progress in installation and timely receipts from counterparties will remain critical for the outlook.

Challenges such as land acquisition, connectivity, and adequate transmission infrastructure remain key concerns for the energy sector, Ind-Ra said.

Power producers face Rs 1,000-cr loss as CERC bars payment till plants begin ops

Power producers have opposed Central Electricity Regulatory Commission's new norm of not mandating any payments for power they supply to grid before start of commercial production as it may lead to heavy losses. An association of power producers on January 23 wrote to CERC on the new provision for socalled infirm power, seeking a review of the norm.

The decision to not pay for infirm power will lead to a huge loss. Thermal power generators can incur an expense to an extent of Rs 1,000 crore during the 6-12 month trial period towards infirm power before they achieve commercial operation of the plant.

"All generating stations will face serious financial constraints in conducting the testing and commissioning activities to complete the trial run operation, as there will not be any source of funding for the fuel expenses. Normally, lenders do not fund fuel expenses," the Association of Power Producers wrote to CERC.

Earlier, the regulatory regime allowed recovery of some price/cost towards fuel expenses of the infirm energy injected into the grid. Such recovery was in the form of either actual fuel cost or applicable rate. There was no situation where a generating company was deprived of any recovery for the infirm energy injected into the grid.

CERC last month amended this provision to provide for 'nil' payment for infirm power. This will lead to substantial loss for the plant even before it starts commercial operation because infirm power typically flows for 180 days to 1 year.

This will particularly impact merchant power plants that sell power in the market and do not have longterm power purchase agreements. The situation is also challenging for power plants acquired through NCLT proceedings, on an 'as-is, where-is' basis.

The Association said for a certain category of generating station, the fuel expenses incurred to complete the trial run get added to the capital cost, rendering the end consumer to pay about 8-10 paise

per unit higher capacity charge for the entire term of the PPA. For others, the recovery of quoted tariff starts only after the commercial date of operation.

"Hence, if there is no means for recovery of fuel expenses for the infirm energy injected either from the grid or beneficiary, it will adversely impact the viability of the project. This problem will be more in cases where PPAs are already signed based on the assumption that the generator will be able to recover a certain amount for the infirm energy," it said.

"Further, merchant power plants selling power in the power exchanges will also be deprived of any mechanism to recover legitimate expenditures incurred during the generation of infirm power."

As per the extant rules of the central government, a thermal generating station is not entitled for supply of linkage coal till declaration of commerciality. In other words, testing and commissioning activities have to be carried out by consuming alternate costlier domestic or imported coal which severely hurts the financial condition of the generating companies, it said.

"The regulation will result in enrichment by some beneficiary at the cost of new generating stations coming into operation. While the generator will have to inject infirm power without receiving any compensation for costs incurred, particularly fuel costs, the injected power will become part of the energy mix which shall be drawn by the beneficiaries and be paid for," it said.

The revenue generated from selling the infirm power will flow into a state's fund designed to balance grid imbalances. "However, the generator will not receive any share of this revenue for its infirm power injected, despite having incurred the costs for its production. This creates a situation where the state or drawee profits from the sale of power that was generated at the expense of the generator," the association said.

The CERC, it said, should bear in mind that most of the state electricity regulatory commissions adopt the regulations promulgated by CERC and as a result, the intra-generating companies may also be subjected to serious financial constraints, if similar regulations as per the present amendment by CERC, are adopted by them.

"In our view, sudden adoption of such a diagonally opposite concept by the CERC is not in the interest of any stakeholders of the power sector. This will be detrimental to consumer interest as well since it will either increase cost or delay capacity additions. The proposed regulation may seriously impact the government of India's stated capacity addition program of 80 GW of coal based thermal power plants," it said, seeking changes in the regulations to ensure the recovery of fuel expenses incurred till the successful completion of trial run by thermal power plants.

NTPC to set up 160 MWh CO2 battery at Kudgi

NTPC Ltd has announced the launch of a CO_2 battery energy storage project with an energy capacity of 160 MWh at NTPC Kudgi. The project is being executed by NETRA, the R&D wing of NTPC, in collaboration with M/s Triveni Turbine Limited and M/s Energy Dome, Italy. The initiative is part of NTPC's strategy to diversify its energy portfolio and increase renewable power generation. It aligns with the Government of India's 'Make in India' and 'Atmanirbhar Bharat' initiatives.

The CO_2 battery, unlike battery energy storage systems (BESS) based on electrochemistry, operates on specialized electro-mechanical turbomachinery. It functions using the 'Closed Brayton Thermodynamic Cycle,' where anhydrous CO2 is used as the process fluid. Energy is stored and discharged by manipulating CO2's physical state between vapor and liquid.

"This is a landmark development in the domain of 'Long Duration Energy Storage' (LDES). NTPC is proud to be in the technology forefront and setup the 'CO2 Battery' at Kudgi station," NTPC Chairman & Managing Director Gurdeep Singh said. "With several advantages viz very long lifetime (>25 year), no need of critical minerals viz Lithium, Cobalt, topography agnostic, minimal performance degradation - unlike BESS where intricate electrochemistry is involved, very high depth of discharge (100%) - successful demonstration of this technology shall open new vistas in the field of 'Electrical Energy Storage'.

YEAR END REVIEW OF POWER SECTOR - 2024

India successfully met an all-time maximum power demand of 250 GW during FY 2024-25

Ministry of Power revised the Right of Way (RoW) guidelines in June, 2024, linking compensation to the market value of land

The year 2024 marked a landmark period for India's power sector, with historic advancements in energy generation, transmission, and distribution. From meeting record power demand of 250 GW to reducing energy shortages at the national level to a mere 0.1% in FY 2024-25, the sector demonstrated resilience and commitment to sustainable growth. Significant strides in energy conservation, consumer empowerment, and infrastructure development underscore the government's efforts to ensure reliable, affordable, and clean energy for all.

With groundbreaking initiatives such as universal electrification, enhanced rural power availability, and the adoption of cutting-edge technologies, India is firmly on the path to becoming a global energy leader.

Improvement in Power Supply Position:

- Record Demand Met: India successfully met an all-time maximum power demand of 250 GW during FY 2024-25.

- Sharp Reduction in Power Shortages: Due to significant additions in generation and transmission capacities, energy shortages at the national level have reduced to a mere 0.1% in FY 2024-25, a major improvement from 4.2% in FY 2013-14.

- Rise in Per Capita Electricity Consumption: Per capita electricity consumption in India has surged to 1,395 kWh in 2023-24, marking a 45.8% increase (438 kWh) from 957 kWh in 2013-14.

- Universal Electrification Achieved: Villages and households across the country have been electrified, marking a significant milestone in India's power sector.

- Improved Power Availability: The average availability of electricity in rural areas has increased from 12.5 hours in 2014 to 21.9 hours, while urban areas now enjoy up to 23.4 hours of power supply, reflecting substantial improvements in the reliability and reach of electricity services.

Generation:

- Significant Growth in Installed Capacity: India's total installed power generation capacity has surged by 83.8%, increasing from 249 GW as of March 31, 2014, to 457 GW as of November 30, 2024*.

- Major Expansion in Renewable Energy: Since April 2014, 129 GW of renewable energy capacity, including large hydro, has been added. This includes 91 GW of solar power, 27 GW of wind power, 3.2 GW of biomass, 1.3 GW of small hydro, and approximately 6.3 GW of large hydro generation capacity, demonstrating India's strong commitment to clean energy.

- Award of thermal projects: To address the peak demand of India's rapidly expanding economy, the Government has awarded 19.2 GW of new coal-based thermal capacity. The total installed capacity of coal and lignite-based thermal plants now stands at 217.5 GW. An additional 29.2 GW of capacity is under construction, with 13.4 GW expected to be commissioned in FY 2024-25. A further 36.3 GW of capacity is in various stages of planning, clearances and bidding.

- Coal Stock Position: As of March, 2024, Domestic Coal-Based (DCB) power plants held a coal stock of 47.8 MT. As of December, 2024, these plants hold 41.4 MT of coal which is targeted to increase to 50 MT by March 2025. Sustained coal supply during Q1 and Q2 of FY 2025 ensured meeting the peak demand of 250 GW in May 2024. With improved domestic coal availability, the Ministry of Power discontinued its advisory for blending imported coal beyond October 15, 2024.

- Revision of SHAKTI Policy: The Government of India is reviewing the coal allocation policy to encourage private sector participation. The revised policy proposes two simplified windows. Window-I permits allocation of coal at "Notified Price" to Central Generating Companies and State Governments. Window-II allows allocation to all generating

companies (Central, State, or Private) at a premium over the "Notified Price," irrespective of ownership or nature of PPAs. The new policy aims to support the development of an additional 80 GW of thermal capacity.

• Hydro Projects. Central Government in November 2024 has approved Heo Hydro Electric Project (186 MW) in Arunachal Pradesh. The project will be completed in 50 months at a cost of ₹1939 Cr.

• CFA for HEPs NER: Union Cabinet in its meeting held on 28th August, 2024 has approved the scheme of "Central Financial Assistance (CFA) towards equity participation by the State Govts. for development of Hydro Electric Projects (HEPs) in North Eastern Region (NER)". Under this scheme, the equity portion of the State Government of NER (capped at 24% of the total project equity, subject to a maximum of ₹750 crore per project) would be funded through this scheme. The scheme will be implemented during the period from FY 2024-25 to FY 2031-32, with a total financial outlay of ₹4136 crores.

• Enabling Infrastructure HEPs: Union Cabinet Union Cabinet in its meeting held on 11th September, 2024 has approved the scheme of "Modification of the Scheme on Budgetary Support for the Cost of Enabling Infrastructure for HEPs". Total outlay of the scheme is ₹12461 crores for the period from FY 2024-25 to FY 2031-32. A cumulative hydro capacity of approximately 31 GW, including 15 GW of PSP capacity, would be supported under the scheme.

• Pump Storage Projects (PSP): India has the potential of PSPs of about 181 GW with around 5 GW (2.6%) developed so far. Government has set an ambitious target of adding 35 GW PSP capacity by 2031-32 out of which, 6 GW is under construction and rest is under development stage.

• Battery Energy Storage System (BESS): Under the Viability Gap Funding (VGF) Scheme for development of BESS, a capacity of 13,000 MWh is targeted for addition.

Transmission

• National Electricity Plan: Govt. of India has finalised National Electricity Plan from 2023 to 2032 for Central and State transmission systems to meet a peak demand of 458 GW by 2032. The total cost of the plan is Rs 9.15 lakh Cr. Under the previous plan 2017-22, about 17,700 circuit kilometers (ckm) lines and 73 GVA transformation capacity were added annually. Under the new plan, transmission network in the country will be expanded from 4.91 lakh ckm in 2024 to 6.48 lakh ckm in 2032. During the same period the transformation capacity will increase from 1,290 Giga Volt Ampere (GVA) to 2,342 GVA. Nine High Voltage Direct Current (HVDC) lines of 33.25 GW capacity will be added in addition to 33.5 GW presently operating. Inter-Regional transfer capacity will increase from 119 GW to 168 GW. This plan covers the network of 220 kV and above. This plan will help in meeting the increasing electricity demand, facilitate RE integration and green hydrogen loads into the grid.

• 50 GW ISTS Capacity Approved: 50.9 Giga Watt of Inter State Transmission Projects costing Rs. 60,676 Cr has been approved. The transmission network required to connect 280 GW of Variable Renewable Energy (VRE) to the Inter-State Transmission System (ISTS) by 2030 is planned to be 335 GW. Out of this, 42 GW has already been completed, 85 GW is under construction, and 75 GW is under bidding. Balance 82 GW will be approved in due course.

• Improvement in Transmission System: During 2024, 10,273 ckm of transmission lines (of 220 kV & above), 71,197 MVA of transformation capacity (of 220 kV & above) and 2200 MW of Inter-regional Transfer Capacity have been added.

• Right of Way (RoW) compensation Guidelines: To ensure the timely development of power transmission infrastructure for evacuating 500 GW of renewable energy by 2030, the Ministry of Power revised the Right of Way (RoW) guidelines in June, 2024, linking compensation to the market value of land. For tower base area, the compensation has been increased from 85% to 200% of the land value. For the RoW Corridor, compensation has been raised from 15% to 30% of the land value.

Distribution

• Revamped Distribution Sector Scheme (RDSS): Under RDSS which aimed at improving operational efficiencies and financial sustainability of Discoms, 19,79,24,902 prepaid Smart meters, 52,52,692 DT meters and 2,10,704 Feeder meter have been sanctioned at a cost of INR 1,30,670.88 Cr. Loss Reduction works of ~INR 1.46 lakh Cr. have been sanctioned and Rs 18,379.24 Cr have been released towards loss reduction works under RDSS. As a result of reform measures taken under the scheme, AT&C losses have come down to 15.37% and ACS-ARR gap has reduced to Rs. 0.45/kWh in FY2023.

• All identified households from Particularly Vulnerable Tribal Groups (PVTGs) under the PM-JANMAN (Pradhan Mantri Janjati Adivasi Nyaya Maha Abhiyan) and tribal households under the DA-JGUA (Dharti Aaba Janjatiya Gram Utkarsh Abhiyan) are being provided with on-grid electricity connections under RDSS. To date, a total of ₹4,355 crore has been sanctioned for the electrification of 9,61,419 households, including those from PVTGs and tribal communities, along with public places identified under the DA-JGUA initiative.

Energy Conservation

• EV Charging Guidelines: Guidelines for Installation and Operation of Electric Vehicle Charging Infrastructure-2024 have been issued to support creation of a nationwide connected and inter operable EV charging network. This will help increase the chargers from 34,000 presently to about 1 lakh by 2030. These guidelines are expected to create a robust, safe, reliable, and accessible EV charging network, enhance the viability of charging stations, encourage use of solar energy for electric vehicle charging, and prepare the electricity grid to handle increased demand of EV charging.

• Sustainable Building Codes Issued: India has taken a major step towards a greener future with the introduction of two new building codes: the Energy Conservation and Sustainable Building Code (ECSBC) for commercial buildings and the Eco Niwas Samhita (ENS) for residential buildings. The revised codes apply to large commercial buildings and multi-storied residential complexes with a connected electricity load of 100 kW or more, which means the codes will impact big offices, shopping malls and apartment buildings, and will help in reduction of 18% electricity consumption. Additionally, it incorporates sustainability features related to natural cooling, ventilation, water, and wastewater disposal. States may adopt these building codes.

• Indian Carbon Market. The Ministry of Power has notified the Carbon Credit Trading Scheme, empowering industries to reduce greenhouse gas emissions and earn carbon credits. This initiative fosters investments in transformative technologies, positioning India as a leader in global green finance. It is intended to operationalize the trading of certificates of mandatory sectors by October 2026 and of voluntary sectors by April 2026.

• Unnat Jyoti by Affordable LEDs for ALL (UJALA): UJALA programme was launched in 2015 under which LED bulbs, LED Tube lights and Energy efficient fans are being sold to the domestic consumers for replacement of conventional and inefficient variants. Till date, over 36.87 crore LED bulbs, 72.18 lakh LED Tube lights and 23.59 lakh Energy efficient fans have been distributed by EESL across India. This has resulted in estimated energy savings of 48.41 billion kWh per year with avoided peak demand of 9,789 MW, GHG emission reduction of 39.22-million-ton CO2 per year and estimated annual monetary savings of INR 19,335 crore in consumer electricity bills.

• Street Lighting National Programme (SLNP): SLNP was launched in 2015 to replace conventional street lights with smart and energy efficient LED street lights across India. Till date, EESL has installed over 1.31 crore LED Street Lights in ULBs and Gram Panchayats across India. This has resulted in estimated energy savings of 8.82 billion kWh per year with avoided peak demand of 1,471 MW, GHG emission reduction of 6.08-million-ton CO2 per year and estimated annual monetary savings of INR 6,179 crore in electricity bills of municipalities.

Reforms and Initiatives

• Rights of Consumers Rules: Electricity Rules were notified in February 2024 to empower electricity consumers. This framework lays down their rights and provides mechanisms to enforce them. The rules ensure timely access to services such as new connections, grievance redressal, and billing transparency while facilitating rooftop solar adoption and electric vehicle (EV) integration. Key provisions include:

- Simplifying rooftop solar installation processes with exemptions from technical feasibility study for systems up to 10 kW.
- Allowing separate connections for EV charging stations to promote cleanmobility.
- Reducing timelines for new connections: 3 days in metros, 7 days in municipal areas, and 15 days in rural regions (30 days for hilly terrain).
- Mandating consumer rights for separate metering and billing in residential colonies, enhancing transparency and fairness.
- Introducing mandatory check meters to verify consumption in case of complaints.
- Additional Surcharge elimination: The Electricity Rules, 2005 have been amended in 2024 to rationalise open access charges. New rules now allow large consumers (open access consumers) to buy electricity from the cheapest sources across India, not just from their local Distribution Licensee. Some State regulators charge large consumers heavily to buy electricity from other sources. In an effort to reduce these charges, the additional surcharge levied is now being gradually reduced and will be completely removed within four years. Importantly, large consumers who have never bought electricity from their distribution licensee are not required to pay additional surcharge.
- Computer Security Incident Response Team – Power (CSIRT–Power): Union Minister for Power inaugurated Computer Security Incident Response Team – Power (CSIRT–Power) facility in September, 2024. Equipped with advanced infrastructure, cutting-edge cybersecurity tools, and key resources, CSIRT-Power is now well-prepared to tackle emerging cyber threats. With a dedicated team of experts, it is set to become a cornerstone of the sector's cyber defence, coordinating incident response, establishing a strong cybersecurity framework, and implementing crucial measures to enhance overall preparedness and resilience.

*Data provided is till November 2024

Energy efficiency needs ₹1 lakh crore investment, say experts at FEED 2025

Energy efficiency must be treated as a strategic resource akin to oil or coal, experts said at the Forum for Energy Efficiency Dialogue (FEED) 2025, hosted by the Alliance for an Energy Efficient Economy (AEEE). Discussions focused on institutional reforms, investment models, and scaling up efficiency efforts across multiple sectors.

"Energy efficiency should be repositioned as a strategic resource, akin to oil or coal," said Padu S Padmanabhan, International expert on energy and water productivity. "More energy has been saved through efficiency than generated from traditional sources, yet it lacks a dedicated ministry. To truly advance, it needs a ministry that prioritises it as a core energy resource."

Experts called for ₹1 lakh crore ($12 billion) in investments to unlock India’s energy efficiency potential and accelerate adoption.

"A 5% energy efficiency target should be pursued, with a focus on strengthening both central and state institutions," said Saurabh Kumar, Vice-President, India, GEAPP. "A national demand-side management (DSM) policy is critical to drive investment and real change in energy efficiency."

Discussions also focused on expanding efficiency measures beyond steel and cement industries, with MSMEs, residential buildings, and transportation identified as high-potential sectors. Experts noted that urbanization provides an opportunity to integrate efficiency standards in construction and transport sectors.

More US energy exports to India likely, says Hardeep Singh Puri

Petroleum and Natural Gas Minister Hardeep Singh Puri recently stressed there is a possibility of more energy exports from the United States heading to India. Trump administration announced plans to maximise oil and gas production.

“The number of India's oil suppliers has already gone up from 27 to 39 and if more oil comes in, this is something that we welcome,” Puri said on the sidelines of an auto industry event here.

Recently, Trump declared a national energy emergency, which will give him broad powers to reduce environmental restrictions on energy infrastructure and projects. It will ease permits on new transmission and pipeline infrastructure.

He also signed an executive order allowing the US government to resume processing export permit applications for new liquefied natural gas (LNG) projects.

A long-time supporter of fracking and higher crude production, Trump has indicated he wants to raise US oil exports to record levels, and use it to pay off national debt.

Trump’s win is being seen as a net positive for India's energy security, and crude oil import scenario by petroleum ministry officials.

Inbound crude volumes from the US may spike from April onwards as the Trump administration removes barriers to export, and authorises natural gas quotas, officials said.

US shale oil would act as an alternative to India's heavy dependency on Russian crude, which is currently facing sanctions, they said.

“The US is strongly placed to expand its crude supplies to India. Despite the Joe Biden administration's focus on transitioning to cleaner fuels, the US remained the fifth largest source of crude for India for two straight years, dropping a position since FY22,” an official said.

The US was the fifth-largest source of crude for India in the first eight months of 2024-25, according to commerce department data.

Asian buyers of US oil are set to witness significant opportunities to import attractively-priced crude from the US, analysts said.

America's domestic production has continued to grow rapidly while competition with Organization of the Petroleum Exporting Countries (Opec) suppliers has intensified.

“With growth in US crude production and exports, the US will continue to compete with Opec exporters in Asia. It is targeting European refiners and developing new markets in Africa and Latin America,” said Benjamin Tang, head of liquid bulk at S&P Global Commodities at Sea.

Import of liquefied natural gas (LNG) from the US may also rise.

In January, last year, the Biden administration had announced a temporary pause on pending decisions on exports of LNG to nations with which it doesn't have a free-trade agreement (FTA).

India does not have an FTA with the US.

The US is the largest LNG exporter worldwide, with shipments expected to double by the end of this decade.

Data from the US Energy Information Administration (EIA) shows that LNG shipments to India began rising fast from early-2020 after Covid struck globally.

Monthly traded volumes had risen to a high of 28,259 million cubic feet in May 2021, before falling.

Volumes had stood at 13,698 million cubic feet as of October, 2023, after which the EIA discontinued publishing monthly data.

Sanctions on Russia

Discussions on a term deal for crude oil purchase from Russia had come to a halt in the wake of the latest sanctions on Russia, petroleum ministry sources told Business Standard last week.

A joint front of state-owned refiners was discussing crude oil purchase from Russia under a term deal.

Crude oil from Russia is usually purchased on spot prices, while long-term contracts are usually reserved for crude from India's traditional import sources in West Asia.

Spot purchase allows refineries to secure different grades of oil, otherwise unavailable.

But sanctions on Russian oil and gas entities by the US earlier this month, has put the talks on hold.

10th oil and gas bidding round only after passage of oilfield Bill

India is likely to offer areas classified as 'no-go' areas in the tenth round of bidding for exploring and producing oil and gas in early 2025, a top oil ministry official said recently. Bids for 28 oil and gas blocks offered in the ninth Open Acreage Licensing Policy (OALP) round closes on September 21 and the 10th round is in works, the official, speaking on condition of anonymity, told reporters here.

OALP-X round will happen after the Parliament approves in the ensuing winter session amendments to the Oilfields (Regulation and Development) Act (ORDA) of 1948 to expand definition of mineral oils to include any naturally occurring hydrocarbon, coal-bed methane and shale gas/oil. The amendment also replaces mining lease with petroleum lease and decriminalises certain offences.

"We hope that the amendments will be approved in the winter session of Parliament (likely in November/December). The changes are expected to bring confidence for the potential bidders for OALP X exploration acreages being planned in early 2025," he said.

Areas likely to be offered in the next round will include once which till now were in so-called 'no-go' areas where exploration and production of oil and gas were prohibited because of strategic reasons

Following an elaborate exercise to limit the 'no-go' areas to only ones that are critically important for missions such as missile testing in the Bay of Bengal, a large acreage has been released for exploration purposes. This will be offered in the OALP-X round, the official said

The ninth bidding round was announced on January 3 with February 29 as the original bid submission deadline. That deadline has been extended multiple times, with the current one ending on September 21.

The official said the bid opening, evaluation and approval of the Cabinet is likely to take a couple of months and the signing of contracts for OALP-IX blocks is likely only in early 2025. By this time the amendments to the ORDA are likely to be passed and the liberalised terms may be extended to the OALP-IX blocks as well.

"We have stated that we will try and factor in all inputs of ORDA amendments in OALP-IX round," he said.

The OALP rounds are essential for India to raise domestic crude oil and natural gas production. Currently, India imports more than 85 per cent of its crude oil needs and roughly half of its gas requirement.

Of the 28 blocks offered in OALP-IX, nine are onshore blocks, eight shallow-water blocks and 11 ultra-deepwater blocks across eight sedimentary

basins, with an area of 136,596.45 square kilometers. The Directorate General of Hydrocarbons (DHG) "carved out" five of these blocks, while the remaining 23 blocks are based on expressions of interest received from companies during April 2022-March 2023

In the previous eight OALP rounds, 144 exploration and production blocks comprising a total area of 242,055 sq km have been awarded. In the last round, state-owned ONGC won seven blocks while a private-sector consortium of Reliance Industries and BP, Oil India and private-sector Sun Petrochemicals received one block each.

The government introduced the OALP in 2017 to attract oil and gas firms to develop India's upstream sector. The OALP guarantees marketing and pricing freedom with a revenue-sharing model, apart from offering reduced royalty rates.

PNGRB proposes uniform insurance coverage for PNG and CNG consumers

The Petroleum and Natural Gas Regulatory Board (PNGRB) has proposed a uniform insurance policy for piped natural gas (PNG) and compressed natural gas (CNG) consumers, comparable to the insurance coverage provided to LPG users. This proposal was discussed during an open house meeting held on December 20, 2024, with participation from eight city gas distribution (CGD) entities and other stakeholders.

The PNGRB emphasized the growing need for safety and risk coverage as PNG usage expands across India. With over 10 million PNG connections and more than 5,000 CNG stations as of November 2024, the sector is experiencing significant growth. “With the rapid shift of LPG consumers to PNG due to growing infrastructure, it is essential that PNG consumers receive similar insurance benefits,” said Lt Col Kumar Abhishek, Director (CP & CGD), PNGRB.

Currently, insurance coverage in the CGD sector varies among entities. HPCL highlighted its existing public liability insurance for employees at CNG stations, supplemented by contractors’ policies. AG&P Pratham outlined a comprehensive general insurance framework covering risks such as gas leaks and equipment failures, while Indian Oil Adani Gas Pvt. Ltd. stated that it maintains an insurance cover of ₹20 crore under Public Liability (PL) and Commercial General Liability (CGL) policies. Adani Total Gas Ltd. reported a premium of ₹25 crore for its PL and CGL policies, noting the need for a collaborative approach to reduce costs and extend coverage.

The PNGRB proposed implementing a uniform insurance policy across CGD entities to standardize coverage and ensure all consumers are adequately protected. This includes the introduction of collective insurance models to lower premiums and expanding policies to cover damages to neighboring properties caused by PNG operations. The board also stressed the importance of including such insurance coverage in the Quality of Service (QOS) regulations and recommended measures to streamline claim processes to avoid judicial delays.

Stakeholders at the meeting reached a consensus to implement the uniform insurance policy within two months, with PNGRB monitoring compliance and progress. The board also highlighted the need for consumer awareness campaigns to educate users about the benefits and processes related to the proposed insurance coverage.

The proposal comes at a time when India’s CGD sector is witnessing rapid growth, driven by government initiatives to enhance access to clean energy. The implementation of uniform insurance coverage is expected to bolster consumer confidence and ensure safety standards as the sector continues to expand.

Year End Review 2024- Ministry of Petroleum and Natural Gas

The Ministry of Petroleum & Natural Gas is concerned with exploration and production of Oil & Natural Gas, refining, distribution and marketing, import, export and conservation of petroleum products. Oil and Gas being the important import for our economy, many initiatives have been taken by the Ministry for increasing production and exploitation of all domestic petroleum resources to address the priorities like Energy Access, Energy

Efficiency, Energy Sustainability and Energy Security. The progress of various schemes undertaken by Ministry in last one year is shares as follows:

1. PRADHAN MANTRI UJJWALA YOJANA (PMUY)

- Ujjwala is today a 10.33 crore strong family

- Since the inception of the Scheme about 222 crore LPG refills have been delivered to the PMUY households. Also about 13 lakh refills are being taken daily.

- A targeted subsidy of Rs. 300/cylinder is being given to all Ujjwala beneficiaries.

- Government's efforts have led to uptick in LPG consumption by Ujjwala families. Per Capita Consumption, terms of number of 14.2 kg domestic LPG cylinder, has gone up from 3.01 in 2019-20 to 3.95 in 2023-24. In current year, which is still under progress, the PCC (per capita consumption) has reached 4.34 (Pro-rata basis refills till October 2024).

2. LPG COVERAGE

- Since April 2014, the number of LPG connections have gone up from 14.52 crores to 32.83 crores (as on 01.11.2024), a growth of above 100 %.
- As on 01.11.2024, approx. 30.43 crore LPG consumers are enrolled under the PAHAL scheme. Till date, more than 1.14 crore customers have given up their LPG subsidy under 'GiveItUp' campaign.
- Since 2014, LPG Distributors have increased from 13,896 to 25,532 as on 01.11.2024 enhancing LPG access and availability. It is worth mentioning that more than 90 % of new distributors are catering to rural areas.

3. FACILITIES

- Under Promotion of Digital Payment infrastructure at Retail Outlets (ROs), as on 01.12.2024, 1,03,224 e-wallet facilities have been provided at 84,203 ROs across the country. 84,203 ROs have been enabled with BHIM UPI.
- Under Swachchh Bharat Mission, toilet facilities are ensured at every retail outlets. As on 01.12.2024, 83618 ROs have toilet facility which includes 66026 ROs having separate toilet facility for male and female.

- As on 01.12.2024, Oil Marketing Companies (OMCs) have commissioned total 3,097 Door to Door Delivery (DDD) Bowsers through Dealers and Start-ups.
- Electric Vehicle Charging Stations (EVCS) are being provided at Oil Marketing Companies (OMCs) ROs. As on 01.12.2024, OMCs have installed 17,939 EV charging stations and 206 battery swapping Station across India.

4. NATURAL GAS PIPELINES

- The length of operational Natural Gas Pipeline in the country has increased from 15,340 Km in 2014 to 24,945 Kms as on 30.09.2024. Further, development of about 10,805 Kms Natural Gas Pipeline is under execution. With the completion of these pipelines authorized by PNGRB/GoI, the national gas grid would be completed and would connect all major demand and supply centre in India. This would ensure easy availability of natural gas across all regions and also help to achieve uniform economic and social progress.

5. UNIFIED PIPELINE TARIFF

- The Petroleum and Natural Gas Regulatory Board (“PNGRB”) has amended PNGRB (Determination of Natural Gas Pipeline Tariff) Regulations to incorporate the regulations pertaining to Unified Tariff for natural gas pipelines with a mission of “One Nation, One Grid and One tariff”.

- PNGRB has notified a levelized Unified Tariff of Rs.80.97/MMBTU w.e.f. 01.07.2024 and created three tariff zones for Unified Tariff, where the first zone is up to a distance of 300 kms from gas source, second zone is 300 – 1200 kms and third zone is beyond 1200 kms.

- The national gas grid covers all the interconnected pipeline networks owned and operated by entities viz. Indian Oil Corporation Limited, Oil and Natural Gas Corporation Limited, GAIL (India) Limited, Pipeline Infrastructure Limited, Gujarat State Petronet Limited, Gujarat Gas Limited,

Reliance Gas Pipelines Limited, GSPL India Gasnet Limited and GSPL India Transco Limited.

• The reform will specially benefit the consumers located in the far-flung areas where currently the additive tariff is applicable and facilitate development of gas markets and vision of government to increase the gas utilisation in the country.

6. CITY GAS DISTRIBUTION (CGD) COVERAGE

• PNGRB has authorized 307 Geographical Areas for development of CGD infrastructure with a potential coverage of about 100% of country's area and 100 % of the population. As on 30.09.2024, the total number of PNG (D) connections and CNG Stations in the country was 1.36 Cr and 7259, respectively.

7. SATAT INITIATIVES

• SATAT initiative was launched on 1st October 2018, to promote an ecosystem for production and utilization of Compressed Bio Gas (CBG).

· As on 30.11.2024, 80 CBG plants have been commissioned and 72 CBG plants are at various stages of construction.

· The Ministry has issued guidelines for synchronization of CBG with CNG in CGD Network;

· A scheme for the development of pipeline infrastructure (DPI) for injection of CBG into the City Gas Distribution (CGD) network has been launchedto provide financial support for extending pipeline connectivity from CBG plant to the city gas distribution grid.

· Online portal for receiving application under DPI Scheme has been activated w.e.f. 1st September, 2024.

· Ministry has also issued detailed guidelines for procurement of Biomass Aggregation Machinery (BAM) on 2nd February 2024. The Scheme envisages financial support to the CBG producers for procuring Biomass Aggregation Machineries.

· Government has announced phase wise mandatory selling of CBG in CNG (T) and PNG (D) segment of CGD network to promote the production and utilization of CBG.CBG Obligation (CBO) is presently voluntary till FY 2024-2025 and mandatory selling obligation would start from FY 2025-26. CBO shall be kept as 1%, 3% and 4% of total CNG/PNG consumption for FY 2025-26, 2026-27 and 2027-28 respectively. From 2028-29 onwards CBO will be 5%.

8. REVIEW DOMESTIC GAS ALLOCATION FOR CGD ENTITIES

• To cater the growing demand of CGD sector and to protect the common people from price volatility, the Government has released new CGD sector Gas allocation Guidelines wherein the allocation of PNG (Domestic) segment was increased (i.e. 105% of PNGD consumption in the previous quarter) and balance available volume to be supplied to CNG (T) segment on prorate basis.

• The revised methodology has been helpful for the CGD entity as the lag between the allocation and reference period has been reduced from average of 6 months to average of 3 months which reflects a more realistic consumption data.

9. DOMESTIC GAS PRICING

• Revised guidelines have been issued in April 2023 for gas produced from nomination fields of ONGC/OIL, New Exploration Licensing Policy (NELP) blocks and pre-NELP blocks, where Production Sharing Contract (PSC) provides for Government's approval of prices.

• The price of such natural gas shall be 10% of the monthly average of Indian Crude Basket and shall be notified on a monthly basis and shall have a floor and a ceiling.

• The reduced gas price shall positively impact the domestic, Fertilizer and power consumers.

10. BIO FUELS AND ETHANOL BLENDING

• Under Ethanol Blended Petrol (EBP) Programme, supplies of ethanol has increased from 38 crore litres in Ethanol Supply Year (ESY) 2013-14 to 707.40 crore litres in ESY 2023-24, thereby

achieving an average blending of 14.60% ethanol in Petrol. For the ongoing ESY (2024-2025), Ethanol blending have further improved to 16.23% as on 29.12.2024. The Public Sector OMCs have started dispensing E20 petrol (20% ethanol in petrol) at more than 17,400 retail outlets across the country.

- In the last ten years, EBP programme has translated into forex impact of over Rs.1,08,600/- crore, net CO2 reduction of 557 Lakh Metric Tonnes (LMT) and expeditious payment to farmers to a tune of over Rs. 92,400/- crores.
- During April to November 2024, OMCs have procured 36.68 crore litres of biodiesel for the bio-diesel blending programme as against 29.25 crore litres during April to November 2023.

- Green Hydrogen: Oil & Gas PSU have planned for 900 KTPA Green Hydrogen Projects (EPC & BOO mode) by 2030. 42 KTPA tenders have been floated by PSU refineries, which are likely to be awarded by March 2025. Approximately 128 KTPA tenders will be issued by PSU refineries based on the outcome of the ongoing tenders.

- The Government has set an indicative target of 1%, 2% and 5% blending of SAF in Aviation Turbine Fuel (ATF) initially for international flights with effect from 2027, 2028 and 2030, respectively.

- The PM JI-VAN Yojana has been amended vide notification dated 21.08.2024, incorporating key changes, such as Inclusion of advance biofuels in place of "2G ethanol.", Eligibility for bolt-on and brownfield projects and Extension of the scheme's timeline up to FY 2028-29.

11. REFINING CAPACITY

- The country has 22 operating refineries with a total refining capacity of 256.8 Million Metric Tonnes Per Annum (MMTPA).

- Eighteen refineries are in public sector, three are in private sector and one as a joint venture. Out of the total refining capacity of 256.8 MMTPA, 157.3 MMTPA is in the public sector, 11.3 MMTPA in joint venture, and the balance 88.2 MMTPA is in the private sector.

- Further, refining capacity is likely to increase from 256.80 MMTPA to 309.50 MMTPA by 2028 on account of refinery capacity expansion projects being implemented in 11 PSU refineries as well as setting up of new grassroot refinery.

12. EXPLORATION AND PRODUCTION

- Hydrocarbon Exploration Licensing Policy (HELP): To exploit the huge potential of oil and gas in Indian sedimentary basins, the government launched the Open Acreage Licensing Program (OALP) as a part of the Hydrocarbon Exploration Licensing Policy (HELP) in March 2016. The new exploration policy provides for a paradigm shift from Production Sharing Contract (PSC) regime to Revenue Sharing Contract (RSC) regime. Total 144 blocks covering more than 2,42,056 Sq. Km. area have been allocated to the companies in eight concluded OALP Bid Rounds with committed investment of ~ 3.137 billion USD. Till date, 13 hydrocarbon discoveries have been made in blocks awarded under OALP and one discovery is already producing gas (0.44 MMSCMD) in Gujarat while other discoveries are under appraisal phase. Further in round IX of OALP, area of approximately 1,36,596 Sq. Km. spread over 8 sedimentary basins was offered and the same has received a very good response from the bidders. The bids received are under evaluation and Blocks will be awarded to successful bidders very soon. Thereafter, an area of 1,91,986.21 Sq. Km. have been finalized for International Competitive Bidding in OALP Bid Round-X.

- Further, a total of 741 (132 exploratory and 609 development) wells have been drilled in FY 2023-24. The gas production has increased from 34.45 BCM in FY 2022-23 to 36.44 BCM in FY 2023-24. A total of 12 discoveries have been made in nomination and contractual regimes in FY 2023-24. A total of 16645.31 LKM of 2D seismic and 15701.17 SKM of 3D seismic surveys have been conducted during FY 2023-24. Moreover, during FY 2023-24, under Airborne Gravity Gradiometry and Gravity Magnetic Survey (AGG & GM) Survey, a total of 42,944 Flight LKM 2D Seismic Data was also acquired.

- Discovered Small Field Policy (DSF) Policy: Government introduced DSF Policy in Year 2015. Three Rounds of DSF Bidding concluded till date and

85 Contracts signed whereas 55 Contracts are currently active. 5 fields are on Production and cumulative production till March 2024 is 520 Mbbl Oil and 138 MMSCM Gas. DSF Rounds has brought 15 New Players.

• CBM in India: With 15 Blocks and a production rate of 1.8 MMSCMD, CBM has achieved a cumulative production of ~6.38 BCM, with more than USD 2.46 billion investment received till date. More blocks are being identified for offer in future bid rounds.

• No-Go areas opened for E&P: Around 99% of erstwhile 'No-Go' area of the Exclusive Economic Zone (EEZ) which were blocked exploration for decades have been opened for E&P. After the release of 'No-Go' areas, so far bids/expression of interests for 1,52,325 Sq. Km. area have been received. Two gas discoveries have also been made by ONGC in Mahanadi offshore recently in a block having 94% area in 'No-Go' area. Andaman offshore area has also been opened for exploration and production activities after a long-time post removal of restrictions imposed by defense and space agencies.

• Government Funded Programs for E&P: The Government is committed to increase exploration in Indian sedimentary basins. An investment of around Rs. 7,500 crore is planned for acquisition of new seismic data, including that of the Exclusive Economic Zone (EEZ), financing stratigraphic wells and acquiring aerial survey data in difficult terrains in the recently launched Mission Anveshan and Extended Continental Shelf Survey Schemes.

• Stratigraphic Wells: Four offshore stratigraphic wells in Category-II and Category-III basins, namely Mahanadi, Bengal, Saurashtra and Andamans, with the outlay of Rs 3200 crores will help us understand the sub surface geology better in these basins where prospectivity is yet to be commercially established. [figure Rs.3200 crore is included in the figure of Rs.7500 crore mentioned in the above point.

• National Data Repository: In July 2017, Government of India has set up an E&P data bank, National Data Repository (NDR), with state-of-the-art facilities and infrastructure for preservation, upkeep and dissemination of data to enable its systematic use for future exploration and development. Having an NDR for India has helped in enhancing prospects of petroleum exploration and facilitating the Bidding Rounds by improving the availability of quality data. National Data Repository (NDR) is being upgraded to a cloud based NDR, which will enable instant dissemination of seismic, well and production data. The project is expected to be completed by the end of this financial year.

• National Seismic Program: Government formulated National Seismic Programme (NSP) in October, 2016 to appraise the unappraised areas in all sedimentary basins of India where no/scanty data was available. Under the programme, Government approved the proposal for conducting 2D seismic survey for data Acquisition, Processing and Interpretation (API) of 48,243 Line Kilo Metres (LKM). A total of 46,960 LKM (~97%) 2D seismic data could be acquired out of the target 48,243 LKM. Processing and interpretation of 46,960 LKM data has been completed and the data has been submitted to National Data Repository (NDR) along with reports.

13. INTERNATIONAL CO-OPERATION

• Diversification of Oil & Gas Sources:

• In the financial year 2023-24, the Ministry of Petroleum and Natural Gas undertook robust measures to strengthen India's energy security. We expanded our crude oil sourcing, reducing dependency on specific geographies.

• To transition towards a gas-based economy and diversification, Indian PSUs IOCL and GAIL executed long-term LNG supply agreements with ADNOC, UAE, securing approximately 2.7 MMT of LNG annually.

• Global Biofuels Alliance:

• The Global Biofuels Alliance (GBA), launched in September 2023 by the Hon'ble Prime Minister during the G20 Summit, has seen remarkable growth, with 28 member countries and 12 international organizations joining the alliance and continues to expand.

• Additionally, GBA signed Head Quarters Agreement with Government of India in October 2024 for establishment of the GBA Secretariat in India underscores our commitment to global leadership in clean energy.

• Engagement with Neighbouring countries:

• India has proactively fostered energy linkages with neighboring countries. For instance, with Nepal, Government of India signed a G2G MoU in May 2023 for development of petroleum infrastructure, followed by a commercial B2B agreement between IOCL and NOC of Nepal in October 2024.

• Additionally, Government of India signed a landmark MoU with Bhutan for the supply of petroleum products.

• International partnership on clean energy and Hydrocarbon Sector:

• India and the United States continued to deepen their partnership through the Strategic Clean Energy Partnership (SCEP), aligning with the India-US Climate & Clean Energy Agenda 2030. The September 2024 Ministerial Meeting marked significant advancements in clean energy collaboration.

• In November 2024, during the Hon'ble Prime Minister's state visit, India and Guyana entered into a landmark agreement to strengthen cooperation in the hydrocarbon sector.

• India's commitment to clean energy extends to 2G/3G biofuels, green hydrogen, and other emerging fuels. Recently in June 2024, India signed a Letter of Intent (LOI) with Italy for collaboration in green hydrogen and sustainable biofuels.

• Hon'ble Minister PNG along with Minister of Mines and Energy of Brazil issued a joint statement on Sustainable Aviation Fuel for coordinated position at international forum to promote SAF.

14. STRATEGIC PETROLEUM RESERVES

• Hon'ble Prime Minister in February 2019 dedicated 5.33 MMT of strategic crude oil storage in SPR Phase-I (1.5 MMT SPR facility in Mangalore and 2.5 MMT SPR facility in Padur and 1.3 MMT SPR facility in Vishakhapatnam).

• Under Phase II of the petroleum reserve programme, Government has given approval in July 2021 for establishing two additional commercial-cum-strategic facilities with total storage capacity of 6.5 MMT (underground storages at Chandikhol (4 MMT) and Padur (2.5 MMT)) on PPP mode.

• Indian Strategic Petroleum Reserve Limited (ISPRL) had completed the Detailed Feasibility Report (DFR) and geotechnical surveys for the project site in Chandikhol, District Jajpur, Odisha. Environmental Impact Assessment (EIA) for the project has also been carried out by National Environmental Engineering Research Institute (NEERI), Nagpur.

• In December 2022, Government of Odisha requested ISPRL to explore other sites in Odisha. In view of anticipated delay in pursuing alternate land and need for carrying out feasibility studies once again, Government of Odisha has been requested to allocate the same land at Chandikhol for which ISPRL had earlier submitted application and completed feasibility studies.

15. HYDROCARBON PROJECTS & INVESTMENTS

• Oil and Gas sector is a key driver of economic growth and, therefore, infrastructure projects provide a boost to the national economy and would contribute towards job creation, material movement, etc. As of October 2024, there are 283 projects under implementation of the Oil & Gas CPSEs costing ₹ 5 crore & above with a total anticipated cost of ₹ 5.70 lakh crore. The targeted expenditure on these projects in FY 2024-25 is ₹ 79,264 crore against which Rs.37,138 crore is the actual expenditure as of October, 2024. These projects, inter-alia, include Refinery projects, Bio Refineries, E&P Projects, Marketing infrastructure projects, Pipelines, CGD projects, drilling/survey activities, etc. Out of 283 projects, 89 are major projects costing ₹500 crore & above with an anticipated cost of ₹ 5.51 lakh crore. 50 projects have been completed in the current FY 2024-25 with an anticipated cumulative cost of ₹ 4,519 crore.

- Reducing Energy Dependence: Government has adopted a multi-pronged strategy to reduce the import dependency on oil & gas which, inter alia, includes demand substitution by promoting the usage of natural gas as fuel/feedstock across the country towards increasing the share of natural gas in the economy and moving towards gas-based economy, promotion of renewable and alternate fuels like ethanol, second-generation ethanol, compressed biogas and biodiesel, refinery process improvements, promoting energy efficiency and conservation, efforts for increasing production of oil and natural gas through various policies initiatives, etc. The Government has been promoting the blending of ethanol in petrol under the Ethanol Blended Petrol (EBP) Programme. Blending of Petrol has reached approximately 14.6% during Ethanol Supply Year (ESY) 2023-24. During the last ten years, EBP Programme helped in expeditious payment of approx. Rs. 92,409 crore to the farmers as on 30.09.2024. During the same period, EBP programme has also resulted in approximate savings of more than Rs. 1,08,655 crore of foreign exchange, crude oil substitution of 185 lakh metric tonnes and net CO2 reduction of about 557 lakh metric tonnes. It is anticipated that 20% ethanol blending in petrol is likely to result in payment of more than Rs. 35,000 crore annually to the farmers. For promoting the use of Compressed Bio Gas (CBG) as automotive fuel, the Sustainable Alternative Towards Affordable Transportation (SATAT) initiative has also been launched.

- Financial performance of Oil PSUs : Financial performance of Oil PSUs: Total budgeted Internal and Extra Budgetary Resources (IEBR) for CPSEs' under the Ministry of Petroleum and Natural Gas in FY 2024-25 is ₹ 1,18,499 crore against which Rs 97,667 crore is the actual expenditure as on 30.11.2024 which is 82.4 % of the budgeted IEBR. During the same period of FY 2023-24, against IEBR of Rs 1,06,401 crore, actual expenditure was Rs.75418 crore which was 70.9% of the budgeted IEBR.

16. FLAGSHIP PROGRAMMES

- StartUp India: The PSUs under the Ministry of Petroleum and Natural Gas have created startup funds aggregating to Rs. 547.35 Crore. At present, a total no. of 303 Startups have been funded by Oil and Gas PSUs with disbursed fund value of approximately Rs. 286.36 Crores.

- Skill Development: Skill Development Institutes (SDIs) for hydrocarbon sector have been set up at six cities viz Bhubaneswar, Vizag, Kochi, Ahmedabad, Guwahati and Raebareli by IOCL, HPCL, BPCL, ONGC, OIL and GAIL respectively. Till Nov'24, more than 41547 trainees have been trained in these SDIs. Several high priority trades have been identified in consultation with the industry members for National Occupational Standard (NOS)/ Qualification Pack (QP) development. Till date, 55 QPs have been approved by National Skill Qualification Committee (NSQC).

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NPCIL issues proposals to set up small nuclear reactors for captive use

India's nuclear power operator NPCIL invited proposals from the industry to set up 220 MW Bharat Small Reactors for captive use, replacing the existing coal-fired thermal power plants used by the steel, aluminum, copper, and cement industries.

Bharat Small Reactors are 220 MW Pressurised Heavy Water Reactors (PHWR) with an impeccable safety and excellent performance record, which are compact and tailored for captive use, according to a statement from the Nuclear Power Corporation of India Limited (NPCIL). "NPCIL has today invited Request for Proposals (RFP) from visionary Indian industries to set up 220 MW Bharat Small Reactors (BSRs) for captive use," said the statement.

It would also help these industries secure economic benefits resulting from savings in carbon emission-related taxes, thus increasing the competitiveness of their products in the global markets, the statement said. The government plans to deploy 40-50 of these nuclear reactors over the next decade in partnership with the private sector.

This refers to the 220-megawatt BSR that Finance Minister Nirmala Sitharaman announced in her budget speech in July. "In line with the announcement made in the 2024-25 Union budget, BSRs are intended to be established with private capital, adhering to the existing legal framework and approved business models," stated the NPCIL.

Small Modular Reactors (SMRs) refer to a newly developed and upcoming class of land-based nuclear fission reactors, which can be built and fabricated in specialized factories and can be assembled on-site.

Thorium-based fuel tech from US can help cut India's nuclear power cost by up to 30 per cent

A cooperation between India's engineering major Larsen & Toubro (L&T) and US-based Clean Core Thorium Energy has the potential to reduce the cost of electricity generated by India's nuclear plants by 20-30 per cent. CCTE claims its proprietary nuclear fuel technology named Advanced Nuclear Energy for Enriched Life (ANEEL) has emerged as a promising nuclear fuel solution for powering India's Pressurized Heavy Water Reactors

"Today, in the natural uranium reactors in India the LCOE (levelized cost of electricity) or the cost of electricity is about Rs. 6/kWh. We are expecting that with ANEEL fuel, the cost would drop by 20-30 per cent," said Mehul Shah, founder and chief executive officer, Clean Core Thorium Energy.

Shah highlighted that the Indian authorities have expressed interest for the company to demonstrate the fuel technology in a reactor and that CCTE has applied for the relevant licence from US authorities to be in compliance with US civil nuclear technology export control norms.

In October, the US-based advanced nuclear fuel company entered into a Memorandum of Understanding with L&T wherein the latter will help in establishing the supply chain for ANEEL fuel, by leveraging its manufacturing prowess. L&T has had several decades of experience of being engaged in India's nuclear sector as an engineering and construction player.

Currently in the advanced stages of testing at Idaho National Laboratory, ANEEL fuel is made of thorium and a small amount of enriched uranium, suitable for use in Pressurised Heavy Water Reactors, predominantly used by India.

According to the International Atomic Energy Agency, thorium is a more abundant and efficient substitute for uranium, the dominant nuclear fuel. "It (Thorium) actually delivers the most advanced benefits like proliferation resistance, reduction of waste by over 85% and in turn giving you a cost benefit, improved safety," said Shah.

Anil V Parab, whole-time director and senior executive vice-president at L&T, looking after the company's heavy engineering and valves business, outlined that India's nuclear power capacity is expected to grow to 22 GW by 2032 from current 8.2 GW, opening tremendous opportunities for fuel technology such as ANEEL.

"In the interim (between 2025 and 2032), there are two other huge cases which are likely to expand in a big way. One is what the government has already announced, BSRs for industries like steel plants, cement plants, refineries, fertiliser. So that is for decarbonizing," said Parab.

"Second, all these artificial intelligences, infrastructure, data centers, they all need a lot of power and that too clean power. So these BSRs will also be very useful for that," he added.

Renewed Indo-Us Nuclear Energy Cooperation

The recent visit by outgoing US National Security Advisor Jake Sullivan to India has initiated the process of renewed civil nuclear cooperation between the two countries which got stymied after the enactment of Civil Liability for Nuclear Damage Act, 2010, wherein supplier of materials, systems, to a nuclear plant were also made liable in the event of a nuclear accident.

Shah outlined that since CCTE is a nuclear fuel technology company and not a reactor maker, the act as such will not pose any hindrance. He outlined that the fuel technology will be supplied and handled by the Department of Atomic Energy and supplied to the operator.

"Even if the law is not changed, we can still supply this fuel," said Shah. The White House in a statement on January 6 outlined that the US will make efforts to finalize necessary steps to delist Indian nuclear entities, in order to promote civil nuclear cooperation and resilient clean energy supply chains.

"We aim to establish ANEEL fuel as a bridge between the two bilateral partnerships," Shah added.

Nuclear energy cooperation between private Indian and US entities holds immense potential at a time when India is giving renewed push to the civil nuclear sector through development of small and modular reactors in partnership with the private sector.

Taking steps to clear hurdles for US-India civil nuclear ties: NSA Sullivan

The United States is finalising steps to clear hurdles for civil nuclear partnership with Indian firms, US National Security Advisor Jake Sullivan said recently, seeking to give fresh momentum to a landmark deal between the two countries.

Washington and New Delhi have been discussing the supply of US nuclear reactors to energy-hungry India since the mid-2000s.

But a longstanding obstacle has been the need to bring Indian liability rules in line with global norms which require the costs of any accident to be channelled to the operator rather than the maker of a nuclear power plant.

The deal was signed by then President George W. Bush in 2007, a major step toward allowing the United States to sell civilian nuclear technology to India.

"United States is now finalising the necessary steps to remove long-standing regulations that have prevented civil nuclear cooperation between India's leading nuclear entities and US companies," Sullivan said in New Delhi recently.

He is on a two-day visit to the Indian capital, days before President-elect Donald Trump is due to be sworn in.

Washington expects the impact of Chinese upstream dams, artificial intelligence, space, military licensing and Chinese economic overcapacity to be discussed while Sullivan is in New Delhi, a U.S official said recently.

The two countries agreed in 2019 to build six US nuclear power plants in India.

The South Asian nation's stringent nuclear compensation laws have previously hurt deals with foreign power plant builders, subsequently deferring India's target to add 20,000 MW of nuclear power from 2020 to 2030.

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.