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Towards Net-Zero: Ensuring Reliability and Resilience in a high Renewable Power System

INDIA ENERGY FORUM 908 Chiranjiv Tower, 43 Nehru Place, New Delhi 110 019, India

Enhancing Power Consumption and Demand: Emergence of A Major Challenge

R.V. Shahi

It is a matter of great satisfaction and pride for India that, during the two decades of this century, and particularly in last ten years, its global rank in terms of GDP has improved significantly. Very shortly the country will occupy the third rank after USA and China leaving behind Japan and Germany. Having achieved what the country has, the level of confidence of the whole governance system and of people at large has enhanced. The expectation now is that the country should rise in its ranking in terms of not only national GDP, but also in terms of per capita income. The country is targeting to become a developed nation by the time of the centenary celebration of independence in the year 2047. The aspirational target is commendable but the challenge is daunting though achievable. It will require tremendous amount of foresight to formulate the vision, comprehensively capture all elements of development and associated requirements to charter the path and reach the destination. There are several aspects and determinants which characterise a country as a developed nation. The most important element is the per capita income, which influences significantly many other aspects of several factors which characterise a developed nation. Energy, more particularly power consumption on per capita basis, is highly correlated with the per capita income. The fulfilment of the vision for India to become a developed nation, therefore, requires apart from many other factors, considerable thrust in planning and setting targets to enhance energy and power consumption at a rate which is unprecedented, and to move forward on an accelerating path of power consumption. Obviously, it has to be ensured that power consumption is efficient and most optimal.

India had to struggle, since its independence, to provide access to people and to industry, electricity and energy, and this task emerged too formidable during the first fifty years after independence. In the last two decades of the Twentieth Century, even though the growth profile of power availability saw a significant improvement, the industry and the people were faced with huge shortages of power, of the order of twenty to twenty five percent in many parts of the country. Providing access to power people itself proved a challenge till the end of the last century. According to Census 2001, more than sixty percent of rural India did not have access to power. There were many States where eighty to ninety percent of the rural India did not have access to electricity at all. Industry had to suffer extensive shortages of power affecting their production and supply, in turn, affecting adversely the economic growth of the country. Agriculture was equally affected, and in many parts even more adversely suffered for want of power needed for irrigation. With per capita power consumption in the range of about 600 kwhr., average for the country (varying from approximately 200 to 800 Kwhr. across different States), inadequacy of power emerged as the major critical factor. The GDP growth thus continued to be affected mainly due to power starved industry as well as agriculture.

It is only toward the end of the last century, when it was recognized that until the power sector of India, in terms of its institutional and governance structure, was entirely overhauled, a quantum jump in power production and supply growth was not possible. It was also a general consensus that, just with the small change made in the Indian Electricity Supply Act in 1991, post economic reforms, it would be impossible to accelerate the pace of power generation and supply. This consensus led to finally the enactment of Electricity Act 2003 and a number of policies and rules envisaged under this Act. Even though there are gaps here and there in proper and timely

implementation of many of the provisions of the Act and the Policies, the outcomes on the whole have been remarkable. With reference to the year 2005-06 when the Act and the associated statutory rules and policies were put in place, during the last twenty year period, the power sector saw unprecedented growth in enhancing the power generation capacity and transmission and distribution infrastructure. Delicensing of Power Generation, one of the most important enablers of the Act, did work and delivered. The power generation capacity grew from 130 GW in 2005-06 to 500 GW in September 2025. The current per capita consumption of power is around 1500 Kwhr. During the last ten years, the power generation capacity through renewable energy sources grew from approximately 14 GW in 2010 to 245 GW as in September, 2025.

As a result of enhanced power generation capacity, the country has already started experiencing the shortage of demand. This shift from power supply shortage to power demand shortage is a matter of concern. There are several instances of backing down of generation in Thermal Power Stations which can obviously be explained by the availability of comparatively less expensive power from Solar Power Plants during day time. There are several instances of Solar Power Plants facing the challenge of dispatch. A part of the backing down or Solar Capacity can also be explained by some mismatches between availability of power from generation sources and inadequacies of transmission infrastructure. It will, however, not be entirely correct to assume that the gap between availability of power supply and power demand is totally attributable to these two reasons. It would be better to see this in terms of lack of consumption demand for power which appears to be the primary reason for the mismatch. These appear to be the initial signals of emergence of a challenging scenario of power consumption lagging behind the supply of power. This should not obviously be a scenario for a country looking for a much higher rate of economic growth and aspiring to become a developed nation well before 2050. It will be advisable to seriously examine this trend of lack of demand for power consumption which, if not checked and reversed, the economic growth as aspired might be difficult to achieve. India needs to explore all possible avenues for enhancing and accelerating energy and power consumption which will propel the economic growth rate into a much higher orbit.

The present level of electricity supply in rural areas has been a highly satisfying outcome as compared to power shortages and load shedding that existed in the past. Agricultural economy, however, has to be seen in an altogether different context with potentials for not only new methods and technology of agriculture, but also in terms of agro based and other associated industrial developments in the rural area. The emergence of Solar Power enables this enormous possibilities and potentials to be harnessed to enable and facilitate agriculture of tomorrow in altogether different framework – an agriculture system which will be modern, will need energy and power which will drive much higher levels of productivity to be achieved, a rural India which will enter into a phase of networks of small scale and medium scale industries requiring skilled manpower, generating employments, creating wealth and, in turn, creating further demands for goods and services. Modern infrastructure of education and health are other segments of development in villages which will need large scale upgradation requiring much more energy and power. Rural India's potentials in various areas of economic development have remained unharnessed to a great extent. Goal directed extensive actions on these will entail enhancing energy and power demands. The ultimate objective is to generate employment and income which, in turn, will further create more economic demands. Rural India has to be visualised to be having almost all facilities which the urban India will have, may be to a lesser scale, a scenario which will nearly be comparable to a village in a typical developed country. We need to project this to be achieved progressively over a time frame – perhaps this can be made possible by the time India completes hundred years of independence. Availability of Power will be most essential input for these objectives to be achieved.

Industrial sector of India needs even much higher levels of upgradation in terms of size and quality. This is the sector which will have maximum potential of generating income and employment. Manufacturing will upgrade the size of domestic consumptions in turn enhancing the living standards of people at large, and further raising the level of consumption. Large scale international trade supported by the manufacturing sector will enhance the economy of the country further. We need to study the format of industrialization in other countries, not only for meeting the domestic requirements, but for large scale exports. Efficient Manufacturing with, modern digital support, will require economy of scale and high standards of quality to be competitive in international trade. India has, no doubt, achieved significant improvements on important manufacturing sectors, but we need to recognize that to catch up on generating wealth which will enhance per capita income ranking on global basis, much more is required to be done on this front. The industrial development framework needs to be reassessed in terms of the scale of manufacturing to match with the needed growth in the next about twenty five years.

In a previous paragraph, a brief outline of rural India's format of development and contribution in this field through a network of small and medium industrial units, have been discussed. The size, scale and nature of Manufacturing Infrastructure at the State level and at the National level will have to be much larger. The present developments in different States, and the scales at which various manufacturing infrastructure have been established, require major upgradation in terms scale of operations as also quality. We may consider a network of State Manufacturing Hubs for different types of industries, which will spread over hundreds of square kilometers to house these manufacturing facilities producing different types of products. Mechanism has to be developed at the State level to create such State manufacturing Hubs to attract investments, including FDI, and local and global manufacturers. Implementation of this approach will need a proactive and supportive framework of assistance and facilitation by Government agencies so that the investors and developers find it comfortable to move forward on various issues which need to be addressed at pre-construction stage. Infrastructure such as land, transport connectivity, electricity supply infrastructure, environmental clearance, etc. should be organised by the concerned Government, so that the investments and development in these Hubs attract interests for commitments and actions.

National Manufacturing Hubs could be conceived in terms of thousands of square kilometer of area together with basic infrastructure as mentioned in the case of State manufacturing Hubs. The nature of manufacturing which could be planned in these national manufacturing Hubs could be visualized in terms of global experiences. In these cases, the pre-construction challenges could be tackled by the Government. Acquisition of land, including perhaps waste land available in different parts of the country, could be one of the options Proximity to Ports and connectivity to Ports and Railway System could be an important consideration. These establishments could be incentivised to create initial momentum Encouragement for export through other policy inputs could be considered to enable not only viability but also profitability of these investments.

Economic reforms over the years have seen the outcomes of opening up of industry and business for wider participation – de-licensing of setting up industry and business, opening up of Airlines, Telecommunication, Electricity Generation and Transmission, Roads and Highways, and, recently of the Coal Sector. The pace of expansions and the support to various economic activities provided through these policy reforms have been enormous. Railway System is the only one which has practically remained aloof to such initiatives, though for some of the support activities private sector participation has been introduced recently. In view of rather stagnant growth of Railway infrastructure, the Railway System has been losing

its transport share to roads. Their inadequacies have been experienced but industry over the years. It is time that the Railway is opened up for private sector participation. This will lead to a major contribution to enhanced levels of transportation with required degree of reliability. A rapid expansion of railway network to support accelerated investments in manufacturing will be essential. It would also require larger inputs of electricity. The Railway's decision to substitute Diesel Locomotive System with Electric Traction has made a significant difference, not only in their economics, but also on carbon emission. The large scale industrial manufacturing, which have been articulated in this paper earlier, through State manufacturing Hubs and National manufacturing Hubs, will have greater degree of transport reliability once the Railway System is also opened up for private sector participation.

In major towns and cities, the transport system is facing the challenge of providing adequate services. Transportation through buses has continued to serve the needs, but to cope up with the expansion of these cities, Metro System has emerged as an additional support. It has the potential of being the main transport system progressively. The pace of its development needs to be enhanced, to cover, to start with, all the State capitals and subsequently to the major District towns. This will lead to not only higher level of convenience to the public, as compared to the usual road transport, but also, it would address the challenge of climate concerns in a significant way. Obviously, this cannot provide the total solution to the transportation requirement, but it would be a major option to the road transport, which progressively has to shift from Diesel run buses to Electric buses. Transport systems as a whole need to shift from petrol and diesel to electricity.

Data Centers have emerged as important input to all the major economic activities. These will need to be located at a number of places, and will require large amount of electricity to be supplied in a reliable manner. With require push on manufacturing, Research and Technology Development will be essential to keep the industry competitive globally. Public and Private Sector Companies should be obligated to provide adequate budgets to create these institutions and have the scientists and the technology developers in right numbers and of right quality and motivation. This important element of industrial development has not received the encouragement and priority that it deserves. Thus, the growth of per capita consumption of power will get accelerated once suitable paths are drawn, as mentioned in this paper, with reference to rural economies, setting up of large manufacturing Hubs at State level, establishing mega manufacturing Hubs at national level, opening up of the Railway System, accelerated introduction of Metro transport in State capitals and other cities etc. Success of all these will depend on the well-structured format of development of these initiatives. The overarching requirement will be that pre-construction requirements will have to be directly undertaken and fully supported by Government. A brief mention about development of Ultra Mega Power Project in this regard appears relevant, which followed a framework heavily supported by concerned Government Ministries coordinated by Power Ministry. Based on experience, this Model can be further improved.

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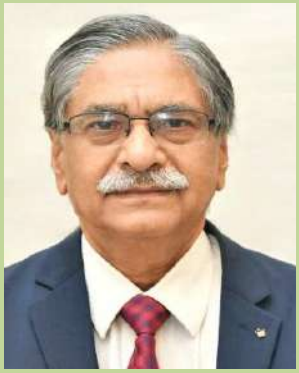
Dear Reader,



The October 2025 issue of Total Energy is with you now.

During the month, IEF organized an interesting Energy Debate on the topic of "Meeting Power Demand or Accelerating Power Demand ", participated by Sh RV Shahi, Sh Anil Razdan and Sh Alok Kumar, all Former Secretaries Power. Earlier, on the11th Oct. an interesting Webinar on Transmission titled "Price it Right" was conducted during which a Report by Sh. Ashwini Gambhir of Prayas Energy, Pune was discussed

Detailed Report of both these events is in this issue.

Global warming due to increasing concentration of GHGs resulting from human activity has brought increasing changes in climate. We are witnessing hostile changes in temperature, wind pattern & precipitation etc. with devastating effects.

As per a report published by an Energy Institute, Fossil Fuels contribute, globally; around 85% of energy supply- as on 2024. Primary users being transportation, power and Industry sectors using coal, petro products etc. All these sectors are increasingly developing and using alternate sources that are green i.e. have low or no emissions to reduce GHGs. Renewable Energy Sources, Blended Petro products etc are now exclusively being used.

The new green energy revolution presents a unique opportunity for India and its entrepreneurs to accelerate economic growth, employment opportunities and clean environment for a more prosperous and vibrant India of the future.

The transformation would require a revamp of the technology & technical workforce geared to meet the manufacturing requirements covering generation, transmission, distribution as well the consumer end. Artificial intelligence will also play a significant role in the new Energy Paradigm.

The capacity addition profile for Renewable Energy in India is heavily weighted towards solar power. Renewable Energy has already surpassed energy from Coal. India stands fourth in the leading RE producers. Wind power should assume a far greater role taking advantage of India's long coastline and the mountainous terrain in the North and the North East. Small hydro power, pumped storage as well as conventional hydro power and energy storage will be the key players in the new Energy Transition.

While the intermittent nature of Renewable Energy generation, whether from solar or wind sources will require concomitant facilities for electricity storage, it also necessitates the development of alternate strong base load electricity to reduce dependence on coal-based electricity. A strong candidate for this base load energy is Nuclear Power. As per a report published by IAEA, world over the power generating capacity from nuclear sources is about 9% of the total capacity, whereas in India, it is as low as less than 2%. India has already set a Roadmap to reach 100 GW Nuclear Power Generation Capacity by 2047 from different technologies.

While all these developments for transition to green energy throw challenges to the industry and R&D capabilities in the country, Manufacturing Industry also has to gear up to meet the challenges of evolving technologies and higher demand levels arising from improvements in living standards and our quest to be a Developed Nation by 2047. IEF, in its webinars and Conferences, also focuses on this aspect

Preparation by IEF is also on for its 24th Power Conference on 23rd December, 2025 in Delhi. It will focus on the reliability & resilience of the grid in the emerging high renewable power system. Details are in this issue

S M Mahajan

India fourth largest renewable energy producer at 257 GW: Pralhad Joshi

Union minister Pralhad Joshi recently said India is the fourth-largest nation in the world in terms of renewable energy capacity, at 257 GW, a three-fold jump from 81 GW in 2014.

Addressing the 8th session of the International Solar Alliance Assembly, the union minister of new and renewable energy said India's solar capacity increased from 2.8 GW in 2014 to 128 GW recently.

He said, "India is now the world's 4th-largest in RE capacity. Renewables in 2014 V/s Now: 81 GW - 257 GW."

He informed that solar module manufacturing capacity increased from 2 GW in 2014 to 110 GW at present.

Similarly, the solar cells manufacturing increased from 'zero' to 27 GW.

He said under the leadership of Prime Minister Narendra Modi, India achieved the Nationally Determined Contribution target of 50 per cent capacity from non-fossil sources, five years ahead of the deadline.

India's renewable tariffs, be it solar, solar-plus-battery, and green ammonia, are among the lowest globally, he said, adding that this reflects India's ability to combine scale, with speed and skill to make clean energy affordable.

The International Energy Agency projects that India will become the world's second-largest renewable market

The International Renewable Energy Agency calls India an energy transition powerhouse. And the Climate Change Performance Index continues to rank India among the top performers, he noted.

In fact, among the G20 countries, India is the only nation to have achieved its 2030 renewable energy targets as early as 2021. "We have consistently been at the forefront of global efforts to mitigate climate change", he said.

India now ranks third globally in growth in power generation capacity over the past five years.

For a nation with one of the lowest per capita emissions and one of the lowest per capita energy consumptions globally, India's commitment to a clean energy transition is truly remarkable, he stated.

He highlighted that global solar energy has now exceeded 1,600 GW and accounts for nearly 40 per cent of total renewable generation.

"Yet the progress remains uneven. In sub-Saharan Africa and small island nations, millions still live without reliable electricity. Bridging this divide demands collective ambition and equitable finance", he said India invites all partners of the International Solar Alliance to join this mission to engage, energise, and empower a new global energy order, together, he stated.

India is working on a $25 million contribution to the Africa Solar Facility under ISA to support investments in mini-grids and distributed renewables across Africa. This reflects our belief in equitable growth within the Global South, he added.

India’s non-fossil fuel power capacity to touch 300 GW soon; 40 GW projects in advanced stages

India’s non-fossil fuel-based power generation capacity is set to reach around 300 gigawatts (GW) soon, with over 40 GW of renewable energy projects in advanced stages of signing power purchase agreements (PPAs) and securing transmission connectivity, the ministry of new and renewable energy (MNRE) said recently.

As of September 30, India’s non-fossil fuel capacity stood at 256 GW, including 50 GW of large hydro and 8.78 GW of nuclear power.

The additional projects under finalisation are expected to push capacity closer to 300 GW,

supporting the country's broader target of 500 GW of renewable energy by 2030, the ministry added.

"India's renewable growth remains among the fastest in the world, driven by multi-pathway expansion. Over 40 GW of awarded renewable projects are presently in advanced stages of securing PPAs, PSAs, or transmission connectivity," MNRE said, highlighting that capacity addition is progressing not only through Central Renewable Energy Implementing Agencies (REIAs) but also via state agencies and commercial and industrial consumers.

In 2025, REIAs conducted bids for 5.6 GW, while state agencies carried out bidding for 3.5 GW, and nearly 6 GW is expected from industrial consumers.

The ministry noted that India continues to add 15–25 GW of renewable capacity annually, maintaining one of the fastest growth rates globally despite global challenges such as supply-chain disruptions, fluctuating module prices, and tighter financing conditions.

Domestic manufacturing incentives, including the production-linked incentive (PLI) scheme and duties on imports, are further reducing import dependency and strengthening industrial depth.

To ensure an uninterrupted power supply, MNRE is expanding inter-regional transmission capacity through High-Voltage Direct Current (HVDC) corridors, planning to increase transmission from 120 GW today to 143 GW by 2027 and 168 GW by 2032, reported news agency PTI.

As per a recent report by S&P Global Ratings, India continues to outpace its South and Southeast Asian peers in renewable capacity additions, benefiting from low-cost renewables, a competitive bidding framework, supportive regulatory policies, growing storage tenders, and strong private sector funding.

The report also noted that India added 35 GW of renewable capacity in the first nine months of 2025, keeping it on track to meet its annual targets.

"With a combination of supportive policies, multi-pathway execution, and robust funding, India is leading the region in renewables growth while advancing towards its 2030 energy transition commitments," the S&P report concluded.

India's Solar Power Capacity Rises from 2.8 GW in 2014 to 125 GW Today: Union Minister Pralhad Joshi

Union Minister for New and Renewable Energy, Shri Pralhad Joshi, addressed the 'Vibrant Gujarat' Regional Conference organized today at Ganpat University in Mehsana. He lauded Gujarat's achievements in the clean energy sector and expressed pride in the renewable energy revolution that has swept the nation under the leadership of Prime Minister Shri Narendra Modi.

The Union Minister stated that, under the leadership of the Prime Minister and the efforts of Chief Minister Shri Bhupendrabhai Patel, Gujarat now sources about 60% of its installed capacity from renewable energy. When Prime Minister Shri Narendra Modi first initiated the solar energy endeavor 25 years ago, the cost per unit was ₹18 to ₹20. He added that a visionary is someone who can foresee what will happen 20-25 years later. The Prime Minister had envisioned it at that time. Today, this vision has become a revolution. Recently, the cost of a solar unit in Madhya Pradesh has dropped to just ₹2.15 per unit. Even with battery storage, the price per unit was recorded at ₹2.70. The initiative that many doubted has today positioned India as a frontrunner in the global solar revolution, he said.

The Minister mentioned that in 2014 when Prime Minister Modi took office, the country's total solar power generation was only 2.8 Gigawatts (GW). Today, the country is getting 125 GW of electricity solely from solar power.

Praising Mehsana, Shri Joshi said, "Mehsana is a very dynamic place, which is considered a beacon of clean energy." He highlighted that Modhera in the district is perhaps the only village in the world to

generate 24x7 clean electricity, which is a matter of great pride.

Drawing attention to the serious challenge of climate change, the Union Minister said, "Due to our increasing demand, we are becoming unsustainable, not sustainable. We are destroying nature and biodiversity." He warned that the Earth's temperature has risen by 1.1 degrees Celsius since the Industrial Revolution, leading to the extinction of creatures like the polar bear and polar fox. Shri Joshi emphasized, "We have a maximum of 7 years before the temperature rises by 1.5 degrees. If we cross this, the situation will become very serious.

He appealed to the youth and industrialists of the country, stating that this is the time, we must protect the Earth. We must protect biodiversity. He commended Gujarat's solar initiative and requested everyone to promote solar energy and clean energy.

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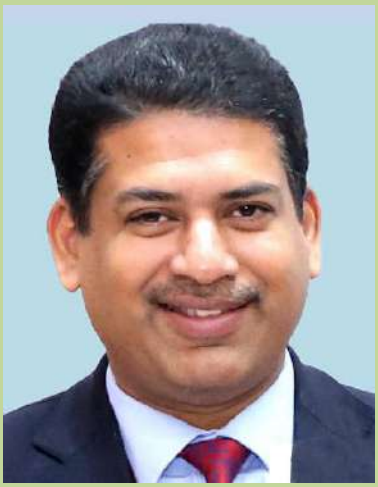
Distributed Renewable Energy (DRE) Creates Rural Job Opportunities; States Urged to Develop Skilling Ecosystem and Innovative Green Financing: Secretary MNRE

Association of Renewable Energy Agencies of States (AREAS) and Natural Resources Defense Council in partnership with the Uttar Pradesh New & Renewable Energy Development Agency and Self-Employed Women's Association organized a two-day national workshop focusing on accelerating



India's clean-energy transition. State government representatives from over 25 Indian states were present along with clean energy technology developers and civil society institutions.

On the first day of the workshop, participants were taken to visit a compressed biogas plant in Barabanki followed by a tour of National Thermal Power Corporation's 40 MW solar plant in Ayodhya. State representatives got insight into their operations while engaging with management of both plants.

The second day of the national workshop was inaugurated by Shri Santosh Kumar Sarangi, Secretary, Ministry of New and Renewable Energy. "We need to understand and acknowledge the transformative impact of renewable energy (RE) on India's citizens," he said. "Renewable energy is presently the most powerful tool to empower individuals to be self-sustainable when it comes to electricity," he added.

Shri Sarangi also highlighted how Distributed Renewable Energy (DRE) is a great example of creating job opportunities in the rural areas and encouraged States to develop a skilling ecosystem where people are trained throughout the supply chain and work on innovative green financing models. Furthermore, he acknowledged that role of State Nodal Agencies (SNA) needs to be reevaluated, through methods such as a SWOT analysis; to address the evolving RE landscape and how SNAs can better work towards national climate targets.

The workshop hosted sessions on accelerating the adoption of RE, increasing clean energy financing and strengthening institutional capacities for driving RE. A breakaway session was also organized on different aspects of DRE technologies where State representatives discussed the challenges, solutions

and actionable steps to further not only the adoption of DRE technology but also its efficient monitoring and evaluation.

Renewable energy surpasses coal for first time in 6 months: ISA, DG

For the first time, in the initial six months of this calendar year, the total energy generated from renewable energy was higher than that from coal according to International Solar Alliance (ISA) Director General Ashish Khanna.

Khanna said this in his address to the 8th session of the ISA Assembly at Bharat Mandapam in New Delhi recently. Highlighting the rapid global growth of solar energy, Khanna said, "It took 25 years for the world to reach 1000 gigawatt of solar capacity, yet in just two years, the next 1000 gigawatt has been reached." He added that projections indicate this capacity could double again within the next four years, "reaching 4600 gigawatt globally."

The ISA Director General said that around 71 per cent of new solar installations are taking place in the Asia Pacific region, while Latin America is emerging as the next major growth hub. He also emphasized Africa's untapped potential, calling it "the continent with the best solar radiation yet to be fully tapped."

Khanna noted that the ISA is working to attract greater private-sector investment through initiatives such as the Global Solar Facility, which will begin operations in Africa before expanding to the Asia Pacific. He added that ISA is also focusing on capacity building to help countries develop local solutions and reduce investment risks. "We are setting up a new technology roadmap and policy to guide member countries on how solar and new technologies can be most useful," he said.

Announcing a major initiative, Khanna said the Africa Solar Facility will be launched next year. He also revealed plans for a new programme on regional interconnection, aimed at reducing dependence on battery storage.

Khanna further outlined ISA's focus areas, including the management of waste and recycling materials as part of a critical mineral strategy. "We will discuss harmonizing of standards using India's experience and IEC of how we can all work towards shared standards for all 125 countries," he added.

He also announced plans to establish an ISA Academy and Global Capability Centre to bring digital learning solutions to all 125 member countries. "Wherever you are, in whatever strata of income, you will have access to all the information on what solar can do for your countries," he said.

Khanna said the ISA will also launch several flagship reports, including those on global solar trends, solar compass, ease of doing solar, and floating solar.

SECI Issues Tender Seeking Developers to Build 600 MW Wind Project

SECI has issued a tender request for bids from developers to set up ISTS-connected Wind Power Projects. It includes setting up a transmission network to the Interconnection/Delivery Point, to supply wind power to SECI at its own cost. It sought online bids till November 24, 2025, and offline bids two days later, till November 26, 2025.

Through this tender, SECI offers a minimum of 50 MW and a maximum of 300 MW capacity from Wind Power Developer (WPD) to set up projects, including transmission network up to the Interconnection/Delivery Point.

Further, the wind tender allows SECI to allocate and tie up additional capacity of up to 300 MW under the 'Greenshoe Option.' Additionally, the tender allows the developer to locate the projects at sites chosen by the bidder/WPD at its own discretion and cost, risk, and responsibility.

A stand-alone wind tender has become a rare occurrence, in a market dominated by solar and solar

plus storage projects now. Wind projects have counted on being part of Hybrid projects with solar over the past year, with the off stand-alone project where the case is strong for wind energy. The reason is obviously costs, as wind costs have failed to match the drops seen in solar plus storage. However, the future remains good as long as costs remain in a range, as specific segments like data centres coming up are likely to create their own demand for clean energy, which solar probably cannot meet alone.

Scope of Work
Moreover, the bidders would be responsible for declaring the annual CUF of the projects at the time of submission of their response to the tender. This would be subject to the revised CUF, which should be not less than 10% and not greater than 10% of the annual CUF quoted at the time of bid submission.

Further, the wind developers can declare/revise annual CUF, which in no case can be less than 22%. The WPD is required to maintain an energy supply to achieve an annual CUF not less than 80% of the declared/revised value and not more than 120% of the declared/revised CUF value during the PPA duration of 25 years.

In the previous tender, SECI has awarded the wind tender to Torrent Power's subsidiary, Torrent Green Energy Private Limited. It issued a Letter of Award (LoA) for a 300 MW wind power project at a tariff of ₹3.97/unit. In that project, SECI awarded 300 MW out of the 600 MW project. Originally, SECI had released a tender for 300 MW, which was later revised to a 600 MW project.

MNRE Rolls Out Modalities for Import of Key Solar, Wind Equipment

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

In a recent move, the Ministry of New and Renewable Energy (MNRE) has issued a new notification elaborating on the modalities for the mandatory registration of key renewable energy equipment in the country.

This comes days after the Directorate General of Foreign Trade (DGFT) issued a notification mandating the registration of all imports of key renewable energy items such as solar cells, solar glass, and wind energy equipment.

The ministry said that importers can use the online portal developed by MNRE and the National Informatics Centre (NIC) for the same. "The online portal is available at www.reims.mnre.gov.in. All concerned importers can register the details of their imports through the portal," MNRE said.

MNRE stated that imports need to be registered based on the Import Export Code (IEC) generated with DGFT. It added that after submission of the application, the importer must generate the certificate from the REEIMS portal. The final generated certificate will be available for download and can also be viewed on the front end of the portal.

According to the latest MNRE guidebook, exporters need to submit details such as the exporter's name, address, port of exportation, and expiry date of export. On the other hand, importers must provide the purpose of import, including whether the supply is intended for self-use, manufacturing, export, supply under EPC contracts, system installation, or research and development activities.

India Reframes Its Renewable Revolution: The Next Big Leap from Speed to System Strength for Viksit Bharat

India's renewable energy sector is entering a transformative new phase, one defined not merely by the pace of capacity addition, but by the strength, stability, and depth of its systems. After a decade of record expansion, the focus is now shifting toward creating a robust, dispatchable, and resilient clean energy architecture that can support the nation's ambitious goal of achieving 500 GW of non-fossil capacity by 2030.

The Ministry of New and Renewable Energy (MNRE) underscores that India's renewable growth story remains one of the fastest and most forward-looking in the world, evolving from speed to system strength, from quantity to quality, and from expansion to enduring integration.

A Shift from Quantity to Quality

In the last decade, India's renewable energy capacity has grown more than fivefold, from under 35 GW in 2014 to over 197 GW (excluding large hydro) today. Such exponential growth inevitably reaches a point where the next leap requires not just more megawatts, but deeper system reforms.

The sector has entered that phase, where the focus is shifting from capacity expansion to capacity absorption. We are now dealing with grid integration, energy storage, hybridisation, and market reforms, the real foundations for a 500 GW plus non-fossil future. In that sense, the recent moderation in capacity addition is a recalibration, a necessary pause to ensure that future growth is stable, dispatchable, and resilient.

India's RE Growth Remains Among the Fastest in the World, Driven by Multi-Pathway Expansion

Over 40 GW of awarded renewable projects are presently in advanced stages of securing PPAs, PSAs, or transmission connectivity — a clear reflection of the sector's robust pipeline of committed investment. The reality is that India's renewable market has outpaced the pace of its grid and contractual institutions, a challenge common to all countries undergoing large-scale energy transitions. In this context, enforcement of Renewable Power Purchase Obligation by states/ DISCOMs, upgrading the transmission lines for evacuation of power and use of technology for grid integration remain top priorities before going ahead with large scale bids for RE.

In the current year, Central Renewable Energy Implementing agencies (REIAs) have done bids for 5.6 GW, while State agencies have done bids for 3.5 GW. Additionally Commercial and Industrial Consumers are likely to add nearly 6 GW of renewable energy capacity in calendar year 2025. Thus, capacity addition of RE is progressing through multiple pathways and not necessarily through REIA led bids alone.

Global headwinds have also played a role: supply-chain disruptions, fluctuating module prices, and tighter financing conditions have slowed commissioning timelines. Yet India continues to add 15–25 GW of new renewable capacity annually — a rate that remains among the fastest in the world.

A Deliberate Policy Pivot

Over the past two years, policy attention has consciously shifted from pure capacity growth to system design. Tenders for RE power with energy storage or peak power supply now dominate auctions, signaling a move toward firm and dispatchable green power. Battery Energy Storage Systems (BESS) are being integrated at both grid and project levels, marking the emergence of a new market. Domestic manufacturing, incentivised through the Production-Linked Incentive (PLI) scheme, Domestic Content Requirement, imposition of duties, implementation of ALMM, and duty exemptions for capital equipment, is reducing import dependency and creating industrial depth.

In addition, the recalibration of GST structures and ALMM provisions represents a strategic consolidation phase, aligning fiscal policy with the twin objectives of domestic value chain depth and technology assurance. Far from being disruptive, these adjustments are designed to stabilise costs, enhance module reliability, and promote scale efficiencies in India's maturing solar manufacturing ecosystem. Concurrently, the trajectory of battery storage deployment is advancing through viability gap–funded projects, sovereign tenders, and emerging storage obligations, establishing the foundation for firm, dispatchable renewable capacity. These measures signal a shift from expansion-led growth to a more resilient, quality-driven, and system-integrated renewable energy architecture.

Such transitions take time to yield visible capacity figures, but they represent lasting structural progress — the kind that underpins a robust energy future.

Transmission Reforms Poised to Unlock Over 200 GW of Renewable Potential

Transmission has emerged as the new frontier. India's grid is being reimagined through the ₹2.4 lakh crore Transmission Plan for 500 GW, linking renewable-rich states with demand centres. The Government is prioritizing investment in transmission infrastructure through the Green Energy Corridors and new high-capacity transmission lines from

Rajasthan, Gujarat, and Ladakh. While these projects are multi-year efforts, once operational they will unlock over 200 GW of new renewable capacity. The current stage is therefore temporary - a transition lag, not a structural ceiling.

Government has already planned for building HVDC corridors and boosting inter-regional transmission capacity from 120 GW today to 143 GW by 2027, and 168 GW by 2032.

Additionally, the recent amendments to the CERC General Network Access (GNA) Regulations, 2025 have significantly improved the outlook for transmission readiness. The introduction of time-segmented access— 'solar-hours' and 'non-solar-hours'— allows dynamic sharing of corridors between solar, wind, and storage projects, unlocking idle capacity and easing congestion in RE-rich states. Provisions for source flexibility, stricter connectivity norms, and greater substation-level transparency further streamline grid access and curb speculative allocations. These reforms mark a decisive step toward optimising transmission utilisation and fast-tracking stranded renewable projects, directly addressing one of the sector's core implementation challenges.

India Remains a Magnet for Clean Energy Capital

Despite short-term delays, India remains a magnet for clean energy capital. Renewable tariffs continue to be among the lowest globally, ensuring long-term competitiveness. India continues to be one of the most attractive destinations for investment in clean energy sector, and international interest remains high. Global investors are not exiting India; they are repositioning towards integrated and storage-backed portfolios. The sector's fundamentals — strong demand growth, policy continuity, and cost competitiveness — remain firmly intact.

The Real RE Story: From Expansion to Integration

The deeper story is one of evolution, not erosion. India's clean energy transition is entering a phase where the core challenges are about integration, reliability, and scale efficiency. A temporary flattening of project pipeline in this context is a mark of maturity. The sector is doing the harder work now — synchronising renewables with grid infrastructure, financial discipline, and long-term market design.

To complement physical grid expansion, Virtual Power Purchase Agreements (VPPAs) and other market-based instruments will play a pivotal role in accelerating renewable energy deployment. VPPAs allow corporate and institutional buyers to contract renewable power virtually—decoupling procurement from physical delivery—thereby deepening demand, providing price certainty to developers, and stimulating private investment in projects awaiting grid connectivity. Coupled with green attribute trading, market-based ancillary services, and day-ahead and real-time market integration, these instruments will create a robust ecosystem for flexible, demand-driven renewable growth. Such mechanisms are in the process of being strategically incorporated under the Electricity (Amendment) Bill or through CERC market regulations, with enabling policy support from MNRE and MoP, to align corporate procurement, grid flexibility, and national decarbonisation targets.

Looking Ahead

The next phase of growth is already taking shape:

- Large hybrid and RTC projects are moving into execution across Rajasthan, Gujarat, and Karnataka.
- Offshore wind and pumped hydro storage are gaining momentum.
- Distributed solar and agrovoltaic initiatives under PM Suryaghar and PM KUSUM are deepening rural participation.
- The National Green Hydrogen Mission is linking renewables with industrial decarbonisation.
- RE integration through strengthening of Green Energy Corridor Phase III

These are the levers that will propel India toward its 2030 targets — not by sheer speed, but by strategic endurance.

Viksit Bharat: A Renewable Energy Transition Growing Up

India's clean energy transition is not defined by quarterly numbers but by institutional durability and stickability. After a decade of sprinting, the sector is learning to move forward by synchronising capacity with grid strength, local manufacturing, and financial stability. India's RE journey is, in a phase of consolidation — one that ensures that when the next acceleration comes, it will be both faster and far more sustainable. India's renewable story has not lost momentum. It has gained maturity.

Ministry of Coal Launches 14th Round of Commercial Coal Mine Auctions

41 Coal Mines offered under 14th Round of Auction and and Provisions for Underground Coal Gasification introduced for the first time; 21 Mines with UCG Potential up for Grabs

The Ministry of Coal recently launched the 14th Round of Commercial Coal Mine Auctions in New Delhi, marking another milestone in India's journey toward energy self-sufficiency and sustainable growth. **Union Minister of Coal and Mines, Shri G. Kishan Reddy** graced the occasion as the Chief Guest through video conferencing. Shri Vikram Dev Dutt, Secretary, Ministry of Coal; Ms. Rupinder Brar, Additional Secretary; Shri Sanoj Kumar Jha, Additional Secretary; senior officials of the Ministry; industry leaders; and key stakeholders from across the coal sector were present at the occasion.

The Ministry of Coal has successfully auctioned 133 coal mines across 12 rounds of Commercial Coal Mine Auctions, with a Peak Rated Capacity (PRC) of~276 million tonnes per annum (MTPA). Notably, for the first time, provisions for Underground Coal Gasification (UCG) have been introduced in the 14th Round of Commercial Coal Mine Auctions, reflecting the Ministry's commitment to technological advancement and sustainable coal utilization.

Under the 14th Round, a total of 41 coal mines have been offered, of which 21 mines possess UCG potential, opening new avenues for the underground gasification of deep-seated coal reserves. Of these 41 mines, 20 are fully explored and 21 are partially Eeplored, offering a balanced mix of opportunities for investors and developers. The round includes 5 mines under the Coal Mines (Special Provisions) Act, 2015 (CMSP) and 36 under the Mines and Minerals (Development and Regulation) Act, 1957 (MMDR).

Minister highlighted that under the visionary leadership of Prime Minister Shri Narendra Modi, the coal sector has undergone an unprecedented transformation from reform to perform and from perform to transform. The Minister noted that the commercial mining reforms introduced by the Government have unlocked vast new opportunities, leading to enhanced domestic production, reduced import dependency, and greater employment generation at the regional level.

Shri Reddy further emphasized that commercial coal mining has catalyzed a paradigm shift, making the sector more competitive, efficient, and investment-friendly. He underscored that one of the most significant features of this tranche is the focus on Underground Coal Gasification (UCG) an innovative technology being promoted for the first time in the auction process. Nearly 40% of India's coal reserves lie deep underground, beyond the reach of conventional mining methods.

Referring to the Ministry of Environment, Forest and Climate Change (MoEFCC), he informed that pilot UCG projects are exempted from environmental clearance, ensuring faster implementation. He added that the Government, through a Whole-of-Government Approach, is working in close coordination to accelerate the pace of coal gasification. The success of this initiative, he emphasized, will depend on collaboration between the Government, private industry, and academia.

The Minister urged all stakeholders to enthusiastically seize this opportunity and join hands in shaping the future of coal utilization in India.

In his insightful discourse, **Shri Vikram Dev Dutt, Secretary, Ministry of Coal**, emphasized the Ministry's steadfast commitment to accelerating reforms, enhancing transparency, and deepening digital integration across the coal ecosystem.

Shri Dutt underlined that the Ministry is constantly working on reforms and policy-process changes to ensure timely, efficient, and sustainable outcomes. With a futuristic mindset, the Ministry aims to take reforms to a much higher level driving accelerated coal production, especially in underground mining, while ensuring responsible and optimized use of resources. Highlighting the Government's mantra of Reform, Perform, and Transform, Shri Dutt stated that these efforts are not only improving operational

efficiency but also paving the way for private participation and technological innovation in the sector.

Shri Dutt noted that the 14th Round of Commercial Coal Mine Auctions represents a major step towards energy security and self-reliance, with several identified blocks suitable for Underground Coal Gasification (UCG), a technology holding immense potential for the future of clean coal utilization.

In her address, **Ms. Rupinder Brar, Additional Secretary and Nominated Authority, Ministry of Coal,** highlighted that the recently concluded 13th Round of Commercial Coal Mine Auctions has painted a rosy and progressive picture of India's coal sector, marked by enthusiastic stakeholder participation and robust investor confidence. She observed that this encouraging response reflects the success of the Government's reform-driven policies aimed at promoting transparency, competitiveness, and self-reliance in coal mining.

Ms. Brar further stated that the launch of the 14th Round of Commercial Coal Mine Auctions is not just a continuation but an evolution integrating cutting-edge technology, digital platforms, and data-driven processes to streamline operations and strengthen governance. She emphasized that these transformative efforts are positioning India's coal sector on a future-ready path, ensuring optimal resource utilization, minimal environmental footprint, and maximum efficiency.

Ms. Brar also noted that the Ministry's vision is to create a sustainable, technology-enabled, and investor-friendly ecosystem that empowers both established players and new entrants to participate in India's dynamic energy transition. The ongoing adoption of digital tools, including real-time dashboards and integrated monitoring systems, is ushering in a new era of accountability, speed, and transparency, reinforcing India's march towards energy independence and industrial growth.

In his address, Shri Sanoj Kumar Jha, Additional Secretary, Ministry of Coal, highlighted that commercial coal mining remains pivotal to ensuring energy security and achieving the goals of AtmaNirbhar Bharat. Shri Jha emphasized the Ministry's continuous efforts toward transparency, efficiency, and digital empowerment, noting that initiatives like Koyla Shakti and CLAMP Portals will foster a data-driven, accountable, and future-ready coal ecosystem.
The launch of the 14th Round of Commercial Coal Mine Auctions reaffirms the Ministry's vision to build a robust, transparent, and self-reliant coal ecosystem, fostering industrial growth, regional development, and sustainable energy security for the nation.

Coal exchange rules to be finalised by November-end: Coal Secretary

The draft rules for the country's proposed coal exchange will be finalised by the end of November after examining feedback received from the public, Coal Secretary Vikram Dev Dutt said on Thursday.

"The draft coal exchange rules are in the public domain. Comments have come, and we are examining those. The rules will be finalised by the end of November," Dutt told reporters on the sidelines of the Asia Mining Congress here.

The proposed coal exchange aims to bring transparency, efficiency and a market-driven mechanism to domestic coal trading.

According to the draft rules, the coal controller organisation (CCO) will be appointed to register and regulate the coal exchanges to be established in the country.

The Ministry of Coal had invited comments from stakeholders by mid-October.

On the disinvestment front, Dutt said the process for Bharat Coking Coal Ltd (BCCL) and Central Mine Planning and Design Institute Ltd (CMPDIL) has made significant progress.

"We have moved ahead in this regard for both BCCL and CMPDIL. The DRHPs were cleared by SEBI in September. Roadshows for BCCL are at an advanced stage, and we are reaching out to investors. There is healthy interest, and the roadshow will conclude by this month," he said at the

11th edition of the MGMI International Mining Exhibition.

Coal import drops marginally in August to 20.58 MT

India's coal import dropped by marginal 0.6 per cent to 20.58 million tonne in the month of August, over the year-ago period.

The country's coal import was 20.70 MT in the corresponding period of the previous fiscal.

In the April-August period of FY26, the coal import dropped to 118.07 MT from 121.18 MT a year ago, according to data compiled by B2B e-commerce solution provider mjunction services. Of the total imports in August, non-coking coal volume stood at 11.55 MT, against 13.04 MT a year ago. Coking coal import was at 4.82 MT against 4.53 MT imported in August last fiscal.

During April-August FY26, non-coking coal import was at 72.17 MT, lower than 78.68 MT imported during the same period last fiscal. Coking coal import stood at 27.04 MT as against 24.79 MT a year ago.

mjunction services CEO Vinaya Varma had earlier said that the coal demand before the festive period was subdued due to an extended monsoon, and the overall demand scenario is likely to remain sluggish in the current fiscal year.

From a mid-to-long term perspective, however, coal demand is expected to keep growing, albeit at a slower rate, in view of the strong pipeline of thermal power projects being planned and announced.

Vesting Orders Issued for 3 Coal Blocks Under Commercial Auctions

The Nominated Authority, Ministry of Coal has issued the Vesting Orders for 3 coal blocks under commercial coal block auctions on October 23, 2025. The Coal Mine Development and Production Agreements (CMDPA) for these blocks were signed on August 21, 2025.

The blocks for which vesting orders have been issued are Rajgamar Dipside (Deavnara), Tangardihi North and Mahuagarhi. Among these, 2 blocks are partially explored and 1 block is fully explored with peak rated capacity of ~ 1.00 MTPA. The total geological reserves of these three blocks are ~1,484.41 MT. These blocks are expected to generate an Annual Revenue of ~Rs. 189.77 crores and attract Capital Investment of ~Rs. 150 crores. It will provide employment to ~1352 people directly and indirectly.

With this, vesting/ allocation orders have been issued for 130 coal blocks under commercial auctions with cumulative PRC of ~267.244 MTPA. It will result in generating Annual Revenue of ~Rs. 37,700 crores and will generate employment for ~3,61,301 people directly and indirectly.

Govt exempts pilot underground coal gasification projects from environmental clearance

The Ministry of Coal announced recently that pilot underground coal gasification (UCG) projects will be exempted from seeking environmental clearance, a move aimed at ensuring faster implementation of the technology in India.

The decision, announced as part of the launch of the 14th round of commercial coal mine auctions, underscores the government's intent to accelerate coal gasification and promote cleaner coal utilisation through technological innovation, said the ministry. For the first time, the latest round of commercial coal mine auction features 21 coal mines with potential for underground coal gasification.

Explaining the framework, Coal Secretary Vikram Dev Dutt said the Ministry of Environment, Forest and Climate Change (MoEFCC) has agreed that pilot UCG projects will not require environmental clearance for the pilot phase. "It is part of the framework and for that pilot phase MoEFCC has kind of agreed to not have an EC (environment clearance) for the pilot phase only," Dutt told reporters on the sidelines of the event.

He added that the 21 blocks on offer with UCG potential are blocks that have deep-seated coal seams and it is uneconomical to extract coal through conventional mining methods.

India on track to peak coal power emissions by 2030 as clean energy soars: CREA

India could see its coal power emissions peak before 2030 if it meets its 500 gigawatt (GW) non-fossil power capacity target, according to a new analysis published recently.

The report by the Centre for Research on Energy and Clean Air (CREA) said China, India and Indonesia, the three largest coal growth markets and top drivers of global CO2 emissions since the Paris Agreement, are now on track to peak power sector emissions by 2030, provided they sustain their clean energy momentum.

Together, these countries accounted for 73 per cent of global coal consumption in 2024.

According to the study, India's clean electricity growth has accelerated sharply, with a record 29 gigawatt (GW) of non-fossil capacity added in 2024 and 25 GW more in the first half of 2025. "Meeting India's 500 GW of non-fossil power capacity set by Prime Minister (Narendra) Modi could in fact peak coal power before 2030. The country has already crossed the 50 per cent mark well ahead of its 2030 deadline, even as electricity demand continues to rise in line with rapid economic and population growth.

"Strengthening grid flexibility, storage and transmission will be key to sustaining this momentum and ensuring reliable, affordable electricity," said Manoj Kumar, Analyst at CREA. India's national policy framework, driven by competitive renewable energy auctions and ambitious manufacturing targets, has transformed it into a fast-growing solar manufacturing hub, the report said.

The country's annual solar module capacity stood at 118 GW by mid-2025 and is projected to reach 200 GW by 2028, reducing import dependence and supporting its clean energy goals.

CREA said China has already achieved a milestone by adding enough new clean electricity generation to cover all new demand growth.

"China has already added enough new clean electricity generation to cover all new demand growth and power sector coal use and emissions have been falling since 2024 as a result. While the coal power decline is unlikely to be linear and may experience occasional setbacks, maintaining China's current pace of clean energy growth means a coal power peak is imminent," said Lauri Myllyvirta, Co-founder and Lead Analyst at CREA.

In Indonesia, the report said President Prabowo Subianto's 100 GW solar programme could ensure that coal power generation peaks by 2030.

"The real opportunity lies in translating this vision into a concrete delivery roadmap that positions clean energy to dominate new capacity additions," said Katherine Hasan, Analyst at CREA.

The report cautioned, however, that all three countries continue to expand coal-fired capacity which is a major risk to their clean energy transition. India plans to add about 100 GW of new coal capacity by 2035, while China has 230 GW under construction.

"Unchecked coal power expansion risks creating powerful vested interests that could potentially delay the energy transition in China, India and Indonesia. Rapid reduction in power sector emissions post coal peak would not only require maintaining pre-2030 renewable energy growth rate in all three countries but also ensuring power market and grid reforms. The total reduction in power sector CO2 emissions could be equivalent to India's total 2019 CO2 emissions, compared to business-as-usual," Myllyvirta added.

The report said that the three countries are driven by similar motivations: improving energy security, reducing import dependence and attracting manufacturing investment.

But sustaining clean energy growth beyond 2030 will require strong policy support, modernised grids and political will to phase down coal use.If successful, CREA said, China, India and Indonesia would join other BRICS nations such as Brazil, South Africa, the UAE and Ethiopia in having peaked their power sector emissions.

Power demand set to rise 4.5% in FY26: ICRA

The domestic electricity demand growth is expected to be in the range of 4-4.5 per cent in FY26, according to rating agency Icra. As per Icra, the country's power demand was 1,695 billion units in FY25. Ankit Jain, Vice President and Co-Group Head - Corporate Ratings at Icra.

As per Icra, the country's power demand was 1,695 billion units in FY25.

Ankit Jain, Vice President and Co-Group Head - Corporate Ratings at Icra, said that following a muted 1 per cent growth in H1 FY2026 due to an unfavourable base and an early monsoon, Icra foresee a recovery in the H2 period.

"As weather patterns normalise and underlying economic activity remains stable, we project full-year electricity demand growth to settle at a healthy 4-4.5 per cent," he added.

On the supply side, coal inventory levels at domestic power plants have moderated but remain comfortable.

As of October 10, 2025, coal stocks were sufficient for 14.7 days of requirement, which is notably better than the stock levels witnessed in the corresponding period of the previous years. This reflects sustained improvements in coal supply and logistics management, Icra said.

Ministry of Power Launches Consultation On Draft Electricity Amendment Bill 2025 to Reform Power Distribution

विद्युत मंत्रालय
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सत्यमेव जयते

The Ministry of Power has taken a major step toward reforming India's electricity laws by launching a public consultation on the proposed Draft Electricity Amendment Bill, 2025.

An official circular was issued recently to a wide range of stakeholders, inviting their comments and feedback on the draft proposals. This consultation is seen as an important step to gather diverse opinions from across the country's power sector before finalizing the amendments.

The Ministry has reached out to an extensive list of stakeholders, including top officials from central and state government agencies, regulatory bodies, and industry associations. Among those notified are Secretaries from major Central Ministries such as the Ministry of New and Renewable Energy, the Ministry of Housing and Urban Affairs, and the Ministry of Micro, Small & Medium Enterprises. The Ministry has also sought inputs from key regulatory institutions, including the Chairperson of the Central Electricity Authority, the Secretary of the Central Electricity Regulatory Commission, and the Secretaries of all State Electricity Regulatory Commissions.

On the operational side, the consultation has been extended to the Chairmen and Managing Directors of all Public Sector Undertakings under the Ministry of Power, as well as the CMDs and MDs of State-owned power distribution companies and generation companies. To ensure a wide-ranging discussion, the circular has also been sent to power trading platforms such as the Indian Energy Exchange (IEX), Power Exchange India Limited (PXIL), and the Hindustan Power Exchange (HPX). Industry associations like the Association of Power Producers, FICCI, CII, PHDCCI, and ASSOCHAM have also been included in the list of consultees, reflecting the Ministry's intention to seek feedback from every major segment of the power ecosystem.

The proposed amendments in the draft bill focus largely on the electricity distribution sector, which continues to face major structural and financial challenges. One of the most significant proposals is the introduction of a framework for allowing multiple distribution licensees to operate within the same area. This move, which would amend Section 14 of the existing Act, aims to introduce competition in electricity supply and provide consumers with more options. The framework for this competitive structure will be defined under a new clause in Section 181 (2), which will outline detailed rules and conditions for implementation.

Other proposed changes strengthen the responsibilities of distribution licensees in developing and maintaining their distribution networks under Section 42. Amendments are also being considered for Section 43, which deals with the obligation of licensees to supply electricity to consumers. The Ministry is proposing that distribution licensees may be exempted from supplying power to certain categories of consumers. However, to protect consumers' interests, a counter-provision ensures that a designated distribution licensee will be responsible for ensuring uninterrupted supply if any existing arrangement fails.

The draft bill also introduces a new clause under Section 183 to address the "Removal of difficulties." This clause empowers the Central Government to issue orders, published in the Official Gazette, to resolve practical challenges that may arise in implementing the amended Act. These orders, however, must remain consistent with the Act's provisions.

With the consultation process now open, the Ministry of Power aims to gather comprehensive feedback from all stakeholders before finalizing the Electricity Amendment Bill, 2025. The exercise is expected to play a crucial role in shaping the future of India's power sector, with an emphasis on competition, accountability, and reliable electricity supply for all.

India's installed energy storage capacity reaches 490 MWh by June 2025: Report

India's cumulative installed energy storage capacity reached 490 megawatt-hours (MWh) as of the end of June 2025, according to a report released by Mercom India recently. The report, which presented findings on India's energy storage landscape, stated that in the first half of 2025, approximately 48.4 MWh of energy storage capacity was added in the country, representing a 74 per cent decline compared to 186 MWh installed in the same period last year. The report stated that the slowdown reflected the sector's dependence on hybrid project-linked deployments, where commissioning delays and lower tender activity impacted growth.

Solar-plus-storage systems accounted for 56 per cent of the cumulative installed capacity, followed by 32 per cent from solar-plus-wind projects with round-the-clock capability, and 12 per cent from standalone battery energy storage systems. India also had 5 gigawatt (GW) of operational pumped storage capacity as of June 2025, the report said.

"Lower installation numbers in the first half are not a setback – they represent a pause before the next phase of strong growth," said Raj Prabhu, CEO of Mercom Capital Group. "Strong policy support through the ISTS waiver extension and the expanded VGF program is laying the foundation for rapid deployment. Investor confidence is rising, tender activity is accelerating, and the sector is now positioned for sustained growth," he added.

According to the report, Karnataka (33 per cent), Chhattisgarh (24 per cent) and Gujarat (16 per cent) were the top three states in terms of cumulative installed storage capacity.

As of June 2025, India had about 13.7 gigawatt-hour (GWh) of standalone battery storage, nearly 3.9 GWh of solar-plus-wind projects with storage capabilities, 3.2 GWh of solar-plus-storage projects, and 1.4 GWh of solar-plus-wind round-the-clock projects at various stages of development.

The report stated that more than 81 GW of pumped storage capacity was in the development pipeline, with 12.4 GW under construction, 3.3 GW in pre-construction, and approximately 63 GW under survey and investigation.

Gujarat had the largest pipeline of standalone battery storage capacity under development, followed by Maharashtra and Rajasthan. The report said favourable renewable energy policies and annual storage obligations in these states drove this growth.

During the first half of 2025, government agencies issued over 16 GW of energy storage tenders and auctioned more than 9 GW of projects, with or without associated renewable capacity. Solar-plus-storage tenders saw a 381 per cent year-on-year increase over the same period in 2024, the report added.

Over ₹5.5 lakh crore push thermal power plans get all charged up

India's leading power producers Adani Power, Torrent Power, JSW Energy, and state-owned NTPC have lined up investments exceeding ₹5.5 lakh crore to expand their thermal capacity by more than 50 GW by 2032, even as they continue to invest on renewables.

Adani Power is targeting to expand its coal-based power capacity to 41.87 GW by FY32 from 18.15 GW at present, with a planned investment of ₹2 lakh crore. NTPC in August said it is adding 27 GW of thermal capacity by 2031-32 on top of 62.8 GW capacity now. While it did not share its investment target, NTPC may have to invest over ₹2.25 lakh crore to achieve it. The estimated capital cost for setting up new coal-based thermal capacity, as considered in the National Electricity Plan, is ₹8.34 crore per MW (at 2021-22 price level).

Torrent Power is evaluating plans for 5-7 GW of new coal-based plants by 2032, which could entail an outlay of ₹60,000-90,000 crore. Currently, it has 2.7 GW of gas-based power capacity.

JSW Energy, while maintaining its primary focus on green growth, has signalled selective additions to its 5.7 GW thermal fleet within a broader portfolio of 30.5 GW by 2030. However, it has not specified a thermal investment figure.

Tata Power, one of the oldest thermal power players in the country, is yet to firm up its thermal power addition plans. Currently, it has a thermal power capacity of 8.8 GW.

The fresh investments come amid soaring electricity demand from industrial, commercial, and residential segments as well as increased urbanisation.

"India's power demand is expected to grow rapidly, with peak demand rising to 400 GW by 2031-32 and 700+ GW by 2047," an Adani Power spokesperson said. "Thermal power, with its inherent ability to provide large-scale, reliable, and round-the-clock power, will continue to remain the backbone of our energy security."

Adani Power has already emerged as India's largest private thermal generator.

Sharad Mahendra, joint managing director and CEO of JSW Energy, said the company's strategy balances sustainability and reliability.

"In our total portfolio of 30.5 GW by 2030, our growth engine remains renewables, but we are evaluating selective thermal additions to meet peak demand and ensure grid stability," Mahendra told ET. "This does not dilute our green push. Any thermal capacity is only to support the reliability of the grid."

Torrent Power, which is considering one of the biggest private-sector greenfield coal investments in a decade, also stressed that its move is about balancing demand and green energy. "The coal-based power capacity addition being envisaged is to meet the growing power demand and avoid future deficits, particularly in peak hours. In parallel, our push towards renewables has not and will not slow down," a Torrent spokesperson said.

The peak load in the country is around 250 GW at present. As of June 2025, India's total installed power capacity reached 476 GW. Thermal power remains dominant, accounting for 240 GW, or 50.52 per cent of the total. The Central Electricity Authority (CEA) has targeted a total thermal capacity addition of 80-90 GW by FY32, encompassing both committed and planned projects. India's per capita power consumption was approximately 1,538 kWh (kilowatt-hour) in 2024-25 (as of June 2025), a significant increase from 1,395 kWh in the previous fiscal year. Bihar has the lowest per capita power consumption at 317 kWh, while Gujarat has the highest at 1,983 kWh.

India considering $12 billion plan to bail out state power distributors

India is considering a bailout exceeding 1 trillion rupees ($12 billion) for debt-laden state-run power distribution companies.

To receive the bailout funds, the states will be required to privatise their electric utilities and transfer managerial control or keep control but list them on a stock exchange, according to three government

officials and a document outlining the plan prepared by the Indian Ministry of Power.

The plan marks Prime Minister Narendra Modi's toughest reform push yet to overhaul the chronically inefficient state-run electricity distribution companies, seen as the weakest link in India's energy chain.

The Power Ministry and the Ministry of Finance are discussing the final details of the bailout, with an announcement expected in the February budget, said two of the government sources.

Under the proposal, at least 20% of the state's total power consumption must be met by private companies and the states must assume part of the retailer's debt, according to the Power Ministry presentation.

To do so the states can choose to privatise their distribution operations for access to loans to pay off existing debt under two options.

First, the states can create a new distribution company, divest 51% of the equity, which will enable them to access a 50-year interest-free loan for the privatised company's debt, along with access to low-interest federal loans for five years, the presentation showed.

The second option would let states privatise up to 26% of the equity of an existing state-owned power distribution company in exchange for access to low-interest loans from the federal government for five years, it showed.

Alternatively, states that do not decide to transfer managerial control through privatisation must list their utilities on a recognised stock exchange within three years.

States that choose to list would receive low-interest loans from the federal government for infrastructure management, the presentation showed.

DEBT AND LOSSES

The state power retailers have accumulated losses of 7.08 trillion rupees ($80.6 billion) and outstanding debt of 7.42 trillion rupees ($84.4 billion) as of March 2024, the document showed.

Despite three federal bailouts worth billions of dollars over two decades, state-run power distributors remain financially strained, unable to recover costs due to deeply subsidised tariffs.

Private companies such as Adani Power, Reliance Power, Tata Power, CESC and Torrent Power are expected to benefit from the reforms as they are likely to gain stakes in the state companies.

Past efforts to privatise India's state-run power distribution firms have faced resistance from employees and opposition parties, which has stalled reforms.

"Privatisation is much needed to improve both financial and operational metrics of many power distribution companies. However, this move could face some resistance and will require strong political will," said Debabrat Ghosh, Head of India, Aurora Energy.

Only a handful of distribution zones – including national capital Delhi and industrial states like Maharashtra and Gujarat – are privatised. The government is working on amending the law in the next parliament session to allow private firms to use existing state-run networks.

India, Nepal sign pact to develop power lines

India and Nepal recently strengthened their energy partnership by signing agreements to develop new cross-border power transmission lines aimed at boosting electricity trade and regional grid stability.

Nepal's energy minister Kulman Ghising met power minister Manohar Lal in Delhi to review the progress on hydropower projects in Nepal and initiatives to deepen regional grid connectivity for cleaner and more reliable energy exchange.

The proposed transmission system projects include the development of the Inaruwa (Nepal)-New Purnea (India) 400 KV double circuit (quad moose) transmission link and Lamki (Dododhara) (Nepal)-Bareilly (India) 400 KV double circuit (quad moose) link, it said.

Enough crude oil available globally, says Union Minister Hardeep Singh Puri

Asserting that trade is not governed by any established set of rules, Union Minister for Petroleum and Natural Gas Hardeep Singh Puri recently said there is adequate crude oil supply in the international market and if one supply stream is disrupted there are alternative sources available.

Speaking at an interactive session here, Puri said India ranks fourth globally in refining capacity, exporting refined products worth over USD 45 billion during last fiscal to 50-plus countries, and is aiming to reach the third position.

According to the minister, currently, India is importing crude from 40 countries and they are increasingly integrated with petrochemicals, enhancing efficiency and export competitiveness even as the crude consumption is expected to to reach six million barrels per day in a couple of quarters from the existing 5.6 million.

"So, I mean, today, I shouldn't say this, because I could be misquoted. But the fact is there is enough supply in the global market of crude. So even if one supply goes down, you put alternatives elsewhere," he said.

Puri pointed out that the International Energy Agency estimated that over the next two decades, 25 per cent of the increase in global demand will come from India. However, the figure has been revised upwards to 30 per cent.

He also highlighted India's success in meeting its ethanol blending target ahead of schedule. "When I joined the Oil and Gas ministry in 2021, there was a target of 10 per cent ethanol blending to be achieved by the end of 2022 November. However, it was achieved five months in advance."

Citing reports, Puri said over 101 of the world's 420 refineries, representing nearly 18.4 million barrels per day, about 20 per cent of global capacity are at risk of closure within the next 7 to 10 years.

"But the fact of the matter is, whilst 21 per cent of global capacity is being reduced, by the way, that's not the only one. Some of those teapot refineries will also go. So the figure is much higher. But the good news is that you've got India. You've got today, what, 250 or 258 or so million metric tons per annum," he said.

The minister said energy will play a crucial part in India's growth from USD 4 trillion to 10 trillion, and that the energy framework enhancement will not only supply India, but in the years to come for countries around India, and globally.

Meanwhile, a senior official of the Department of Petroleum and Natural Gas, replying to a query on the crude imports from Russia, clarified that such decisions are taken by companies, not the government.

"Companies decide what the most economical oil is and in compliance with the law. Companies also decide that," the official told PTI.

He further said there was no direction for the government to any crude importers whether to buy or not to buy from Russia.

Currently, Russian imports account for about 20 per cent of the overall crude imports in India.

India’s energy demand soars: 67 million daily fuel station visits, says Hardeep Puri

Union Petroleum Minister Hardeep Singh Puri recently said that nearly 67 million Indians visit fuel stations every day -- reflecting the country's growing energy demand in line with its rapid economic progress.

Highlighting India's impressive growth, Puri said the nation has emerged as the world's fourth-largest economy with a GDP of $4.3 trillion and recorded a strong 7.8 per cent growth in the first quarter of FY25-26. "India currently consumes about 5.5 million barrels of oil per day -- showcasing the scale of its expanding energy needs," Puri wrote on social media platform X.

The minister shared that India's gas pipeline network, which spans 24,500 km, is being expanded to 33,000 km by 2030 to ensure wider energy access.

He also noted that over 10.60 crore households have been provided LPG connections under the Ujjwala Yojana, while 1.55 crore homes are connected through piped natural gas (PNG).

"The country now has around 8,300 CNG stations catering to millions of vehicles daily," the Union Minister stated.

Emphasising India's push toward clean and sustainable energy, Puri said 114 compressed biogas (CBG) plants are operational, and projects in green hydrogen and sustainable aviation fuel (SAF) are being rapidly scaled up.

Puri added that under the leadership of Prime Minister Narendra Modi, India's energy sector is driving the country's unstoppable march toward the goal of becoming a developed nation by 2047 -- #ViksitBharat.

Meanwhile, last week, Puri said that the government has opened up 99 per cent of India's offshore area for oil & gas exploration and widened the import basket of crude to over 40 countries from 27 earlier.

"India's energy journey stands on "four strong pillars" which include diversification of crude imports, innovation, increase in domestic exploration of oil & gas, and a clean transition reflected in the Green Hydrogen Mission and 10.60 crore Ujjwala families who have benefited under the PM's scheme for subsidised LPG," the Union Minister added.

India needs significant hydrocarbon discoveries to meet future needs: Petroleum Secretary

India urgently requires significant hydrocarbon discoveries to meet its future energy needs, said Secretary of Union Petroleum and Natural Gas Ministry, Pankaj Jain, recently.

Addressing the 15th Biennial International Conference of the Society of Petroleum Geophysicists here, Jain said the country must pursue bold, time-bound exploration strategies aligned with the National Deepwater Mission to achieve energy self-reliance. "One day, we will be looking at a situation where alternative forms of energy will increasingly matter more for incremental demand satisfaction than fossil fuels," Jain said.

The petroleum secretary asserted that the immediate focus must be on securing major discoveries through accelerated exploration efforts.

Speaking on the occasion, ONGC Chairman Arun Kumar Singh said that technological breakthroughs in seismic imaging and Artificial Intelligence-driven interpretation would be crucial for future discoveries.

The conference, themed 'Rock to Cloud: Geo-Exploration Empowering Energy Evolution', was attended by professionals from the geoscience community and representatives from leading international organisations including the Society of Exploration Geophysicists (US), European Association of Geoscientists and Engineers (Netherlands), and Australian Society of Exploration Geophysicists.

Oil India CMD Dr Ranjit Rath described India as "one of the most promising destinations for exploration," citing progressive reforms like the Open Acreage Licensing Policy and Hydrocarbon Exploration and Licensing Policy, according to a statement.

He urged geoscientists to remain "restless in pursuit of exploration," particularly in frontier basins and ultra-deepwater domains.

India's September crude oil imports rise 1.7% m/m

India's crude oil imports rose 1.7 per cent in September to 19.93 million metric tons month-on-month, government data showed recently. India is the world's third-biggest oil importer and consumer, making this data a key indicator of its oil demand. On a yearly basis, crude oil imports rose 6.1 per cent, from 18.79 million tons in September 2024, data from the Petroleum Planning and Analysis Cell shows.

Imports of crude oil products rose about 20.9 per cent on a yearly basis to 4.40 million tons in September, while product exports fell 4.8 per cent to 6.18 million tons.

India's Russian oil imports between April and September fell 8.4 per cent on year due to narrower discounts and tighter supplies, with refiners seeking more oil from the Middle East and the US, according to trade sources and shipping data.

Two Indian refiners have bought 4 million barrels of Guyanese crude oil from US major Exxon Mobil to be delivered at the end of 2025 or in early 2026, in rare imports from the South American producer, trade sources said recently.

India opens 99% offshore area for oil and gas exploration amid energy diversification Strategies

Petroleum Minister Hardeep Singh Puri said recently that the government has opened up 99 per cent of India's offshore area for oil & gas exploration and widened the import basket of crude to over 40 countries from 27 earlier, as part of a four-pronged approach that is shaping "a future where energy is secure, affordable & sustainable".

India's energy journey stands on "four strong pillars" which include diversification of crude imports, innovation, increase in domestic exploration of oil & gas, and a clean transition reflected in the Green Hydrogen Mission and 10.60 crore Ujjwala families who have benefited under the PM's scheme for subsidised LPG as clean cooking fuel for the poor to replace firewood and dung cakes. "Under Prime Minister Narendra Modi's leadership, Bharat is building a cleaner, stronger and self-sufficient energy future," the minister said in a post on X.

The Government had said recently that its import policy for oil and gas is guided entirely by the interests of the Indian consumer amid a volatile global energy market.

The statement was issued hours after US President Donald Trump said in Washington that Prime Minister Narendra Modi has "assured him that India will reduce purchases of Russian crude oil".

"India is a significant importer of oil and gas. It has been our consistent priority to safeguard the interests of the Indian consumer in a volatile energy scenario. Our import policies are guided entirely by this objective. Ensuring stable energy prices and secured supplies have been the twin goals of our energy policy. This includes broad-basing our energy sourcing and diversifying as appropriate to meet market conditions," ministry of external affairs spokesman Randhir Jaiswal said.

"Where the US is concerned, we have for many years sought to expand our energy procurement. This has steadily progressed in the last decade. The current administration has shown interest in deepening energy cooperation with India. Discussions are ongoing," he added.

Puri had earlier pointed out that India has diversified its sources for buying oil in the global market. India's oil purchases from Moscow had played an important role in stabilising prices in the global market, he said. He said crude oil prices could have skyrocketed to $130 per barrel in the absence of the IndiaRussia oil trade, when the Ukraine war began in 2022. Prior to the Russia-Ukraine war, India used to buy a mere 0.2 per cent of its crude imports' requirement from Moscow. This, today, stands close to 40 per cent.

India's oil demand to outpace all other countries through 2050

India's oil demand will rise more than those of any other country through 2050 on the back of its fast growing economy, and will account for over 12 per cent of the global energy market, BP chief economist Spencer Dale said recently. India is the world's third-largest oil importing and consuming nation, and fourth-largest LNG importer.

Its oil demand is projected to grow from 5.4 million barrels per day to 9.1 million bpd by 2050 while natural gas consumption more than doubles to 153 billion cubic meters from 63 bcm.

At a conservative 5 per cent economic growth rate per year between 2023 to 2050 - double the rate of growth of the global economy - the country's primary energy consumption grows strong. By 2050, India

will account for 12 per cent of the world's demand, up from 7 per cent in 2023, he said.

"When we look ahead, India is the fastest-growing energy market in the world," he said unveiling BP's Energy Outlook 2025. "So when we think about what's driving global energy, India is at the heart of that process."

"Energy demand increases in all scenarios driven by robust economic growth and rising prosperity," he said.

The Outlook projects renewables growing strongly driven by solar and wind but coal remaining dominant. "In current trajectory, coal remains India's largest source of energy, with its share in the energy mix staying above 40 per cent in 2050. However, in Below 2-Degrees, coal's share drops sharply to 16 per cent."

India's consumption of natural gas increases in both scenarios, growing on average by 1-3 per cent per year to 2050. India's oil demand would make up for 10 per cent of global oil consumption.

Electricity plays an increasingly important role in meeting India's energy needs. In 2023 around 20 per cent of energy was consumed in the form of electricity. By 2050, this grows to over 30 per cent in Current Trajectory and to below 50 per cent in Below 2-Degrees.

On India targeting 500 gigawatts of non-fossil electricity capacity by 2030, he said, "In our Current Trajectory, it (capacity) is just a little bit shy of that, but it meets it within the year or two after that." The achievements by 2030 too are "quite remarkable", he said. Asked about geopolitics and increasing trend of weaponization of energy, he said increased geopolitical fragmentation will lead to greater energy differentiation and how countries react will vary. For countries like India which are heavily reliant on imports to meet its energy needs, the focus would be on reducing imports and increasing domestic production. Asked about peak demand, he said, "India's oil demand continues to grow all the way out to 2050... natural gas demand also increases substantially, almost doubling by 2050."

In a world wanting to do a rapid, deep decarbonisation, oil and natural demand across the world would need to start to fall. "In India, oil continues to grow (in such a scenario) through the early part of the 2030s and it plateaus around six and a half million barrels a day and then starts to decline," he said adding natural gas also continues to grow through this decade and then starts to decline. He hastened to add that this was a "sort of very hypothetical scenario" of the world wanting to decarbonise quickly. India's import dependence remains "pretty high" in both of these scenarios, he said. This because domestic production grows, it doesn't grow sufficiently quickly to meet the growth in demand.

GAIL to establish compressed biogas plant in Bengaluru

GAIL (India) Ltd. has signed a Tripartite Concession Agreement with the Greater Bengaluru Authority (GBA) and Bengaluru Solid Waste Management Ltd. (BSWML) to set up a Compressed Bio-Gas (CBG) plant in the KCDC area of Haralakunte Village, Bengaluru South Taluk.

The agreement was signed in the presence of Karnataka Deputy Chief Minister D.K. Shivakumar, GAIL said in a statement.

Under the terms of the agreement, the GBA will provide 18 acres of land for the project on a permissive-use basis, while BSWML will supply 300 tons of segregated municipal solid waste per day.

The waste will be processed to produce around 12.6 tons of CBG daily.

The plant is also expected to generate about 22 tons of Fermented Organic Manure (FOM) each day, supporting sustainable agriculture and promoting a circular economy.

The concession agreement will be valid for 25 years from the date the project is commissioned.

GAIL described the project as a significant step towards sustainable waste management and green energy production in Bengaluru.

India's nuclear roadmap banks on 50 GW PHWR fleet to anchor 100 GW target for 2047

The Roadmap for Achieving 100 GW of Nuclear Power Capacity by 2047, finalised in June 2025, marks the most detailed plan yet to realise the target first announced by Prime Minister Narendra Modi as part of India's broader clean energy and energy security vision for the country's centenary year of Independence. It aims to expand India's current capacity of just over 9 GW nearly eleven-fold, building a diversified and resilient reactor fleet that can provide dependable baseload power in a decarbonised system.

The roadmap envisions 50 GW coming from pressurised heavy-water reactors (PHWRs), 20 GW from light-water reactors (LWRs) through global collaborations, 5 GW from fast breeder reactors (FBRs), and another 5 GW from small modular reactors (SMRs). The remaining capacity would be met through the life-extension of existing plants and next-generation advanced reactor designs.

According to the document, this technology segmentation is designed to balance near-term scalability with long-term innovation. The government intends to prioritise PHWRs over the next decade, leveraging existing designs and manufacturing capability to accelerate deployment. In parallel, it will pursue international cooperation to source and co-develop LWRs, while fast breeder and SMR projects mature toward commercial readiness in the 2030s and 2040s.

Massive scale-up needed
Reaching 100 GW by 2047 will require India to commission around 3.5–4 GW of nuclear capacity every year—a tenfold increase over its current build rate. The roadmap acknowledges that such a scale-up will demand not just capital and construction efficiency but also deep reforms in governance, project financing, and the legal framework for nuclear power generation.

It calls for the establishment of a National Nuclear Energy Mission, which would define decadal milestones, ensure coordinated implementation, and monitor progress. The mission would function under the supervision of a proposed Nuclear Energy Development Board (NEDB) housed within NITI Aayog, responsible for inter-ministerial coordination, project approval, and investment facilitation.

Opening the sector to private investment
One of the most significant policy shifts in the roadmap is its recommendation to amend the Atomic Energy Act, 1962, to allow private participation in nuclear power generation. At present, the operation of nuclear reactors is reserved for government-owned entities such as the Nuclear Power Corporation of India Ltd (NPCIL).

The proposed amendment would enable private players to own and operate reactors under a regulated licensing framework, bringing India's nuclear sector closer to global practice. It also recommends revisiting the Civil Liability for Nuclear Damage Act to address insurance and indemnity challenges that currently deter investors and equipment suppliers.

These changes, the document notes, are essential for building a hybrid public–private model that can unlock financing, accelerate project execution, and develop a competitive manufacturing ecosystem.

Financing and green taxonomy inclusion
To mobilise the capital required for such large-scale expansion, the roadmap proposes classifying nuclear power as "green" within India's sustainable finance taxonomy, bringing it on par with renewables and low-carbon technologies in terms of access to concessional funding.

This would allow the government and project developers to tap sovereign green bonds, viability gap funding, and long-term power purchase agreements (PPAs) structured for stable revenue visibility. The document also explores the use of infrastructure investment trusts (InvITs) and public–private partnerships (PPPs) to finance new projects and retrofit existing ones.

By integrating nuclear energy into the green finance framework, the government expects to attract institutional investors, sovereign wealth funds, and climate-aligned private capital — marking a shift from the earlier reliance on public equity and government-guaranteed loans.

Focus on SMRs and indigenous manufacturing
A distinct section of the roadmap focuses on small modular reactors (SMRs), which it describes as "a critical pathway for distributed, flexible, and industrial-scale nuclear generation". The document proposes launching a public–private demonstration project within five years and sets a target of 4–5 GW of SMR capacity by 2040.

It identifies coastal brownfield sites and industrial corridors as preferred locations and recommends that the Department of Atomic Energy (DAE) lead a national SMR programme in coordination with NITI Aayog and the Ministry of Power.

In parallel, the roadmap calls for an indigenous "Make in India for Nuclear" initiative to localise reactor manufacturing. It names BHEL, Larsen & Toubro, and Hindustan Shipyard among potential anchor manufacturers for reactor components and heavy engineering. The plan also includes scaling up uranium mining and reprocessing facilities and accelerating thorium research for long-term energy independence.

International cooperation and export potential
The document underscores the importance of international partnerships, particularly with France, Russia, and the United States, for advanced reactor technology and fuel cycle collaboration. It also envisions India becoming a global supplier of SMR and thorium reactor technology by 2040, positioning the domestic industry for exports to emerging markets in Asia and Africa.

India developing 200MW nuclear power reactors

India is developing 200 MW nuclear power reactors, compact in size that can be deployed on commercial ships. "Nuclear power is generated by causing nuclear fission to create heat that leads to electricity production. You can put the reactor wherever you want, even on a ship," a senior official said here. He said scientists at the Bhabha Atomic Research Centre (BARC) are developing two nuclear power reactors of 55 MW and 200 MW that could be deployed at captive power plants used by energy-intensive companies such as cement manufacturers.

"These nuclear reactors are very safe and can even be used to power merchant navy ships," the official said, sidestepping questions of their use to power nuclear submarines. He said these Bharat Small Modular Reactors (BSMR) will be the mainstay in the expansion of the share of nuclear power in India's energy mix. Currently, India operates two home-built nuclear submarines — INS Arihant and INS Arighaat — which are powered by 83 MW reactors. A third nuclear-powered submarine, INS Aridhaman, is undergoing trials. The government has also announced that it would amend the Atomic Energy Act (AEA), 1962, to allow the entry of private players in the civil nuclear sector.

According to the plans, the government may allow private players to operate nuclear power plants and also handle the front-end of the nuclear fuel cycle. As per the discussions on the amendments to the AEA, the government may also allow private companies to procure fuel from foreign countries for the nuclear power plants, with a provision to take back the spent fuel to the country of origin. The amendments to the Civil Liability for Nuclear Damage Act (CLND) also seek to cap the liability of suppliers of nuclear equipment, as mentioned in the contract between the supplier and operator. The amendments under discussion also seek to define 'supplier' as the provider of critical equipment.
Prime Minister Narendra Modi has set a target of achieving 100 GW nuclear power capacity by 2047, from the current 8.8 GW.

Bharat Small Modular Reactors: A Leap Toward a 100 GW Nuclear Energy Future for Bharat

Bharat is about to create a new chapter in nuclear revolution with the construction of 200 MW, a compact nuclear reactor that are likely to redefine the way the country produces and distributes electricity. The scientists at the Bhabha Atomic Research Centre (BARC) are leading the innovation by creating Bharat Small Modular Reactors (BSMR) that are safe and

efficient and also capable of being used on land and even in the ocean.

These reactors are milestone in the quest to increase the share of nuclear power in the national energy basket, by minimizing carbon dependence and providing reliable baseload power. “Nuclear power is produced by inducing nuclear fission to generate heat leading to electricity generation. This reactor can be relocated wherever you like even on an oceanic vessel,” explained senior government officials. It can also work as a compact powerhouse for Industry and Maritime.

The BARC design team is developing two small modular reactors (SMRs) one of them is 55 MW and another is of 200 MW capacity. The smaller reactors will serve energy-intensive industries like cement and steel production with dedicated captive power solutions that operate cleanly and continuously.

The huge traditional nuclear power plants need larges cooling systems and space, these tiny SMRs can be fabricated in modular forms and installed near consumption centers. Authorities have even suggested their possible application for powering merchant navy ships, quoting their high degree of safety and small size.

Though Bharat already has nuclear-powered submarines INS Arihant and INS Arighaat, both are powered with 83 MW reactors. The BSMRs are a step towards civilian and commercial applications of nuclear energy. INS Aridhaman a third submarine is in trials, with its steady development in indigenous nuclear propulsion capabilities.

Why Small Modular Reactors Matter

Small Modular Reactors are coming to be regarded as the nuclear energy frontier of the future around globe. They are safer, quicker to construct and more versatile than conventional gigawatt-sized reactors. More than 80 SMR designs are being worked on around the globe in United States to Russia and China, according to the International Atomic Energy Agency (IAEA).

As the country moves toward Net Zero emissions by 2070 it needs a reliable with clean energy source to complement solar and wind power. Nuclear energy with a capacity factor above 90% provides that stability. Bharat’s entry into this domain is timely

BARC modular concept also allows for rapid assembly of future plants and scaling up or down as required by energy demand. It’s a technology that is not only for Bharat, but perhaps for export to friendly developing countries that want cheap and safe nuclear power.

Policy Reforms Powering Nuclear Expansion

The government is set to modify the Atomic Energy Act (AEA), 1962 to facilitate private sector involvement in the civil nuclear energy space. This historic step would allow private players to run nuclear plants, invest in supply chains and manage the front end of the fuel cycle from procurement of uranium to running reactors. According to the proposed amendments, foreign sources of nuclear fuel could also be sourced by private players under clear return agreements for spent fuel management.

Parallel discussions are ongoing to streamline the Civil Liability for Nuclear Damage Act to provide a balanced regime for operators and suppliers. The revised draft is likely to limit supplier liability against mutually agreed contracts and define unequivocally what constitutes a “supplier” generally the person who supplies key reactor equipment.

These regulatory reforms can bring international partnerships and provide confidence to local players like Larsen & Toubro, Tata Projects and Hindustan Construction Company which all have experience in nuclear infrastructure in the past.

Road to 100 GW Nuclear Capacity by 2047

Prime Minister Narendra Modi has given an ambitious goal of raising Bharat nuclear power generation potential from the existing 8.8 GW to 100 GW by 2047, the year the country marks its centenary of independence.

To achieve that objective Bharat is working on a multi-layered approach increasing conventional reactors, fast breeder reactors and now the modular reactors. This longterm plan is being synchronized by the Department of Atomic Energy (DAE) in the Prime Minister’s Office, with the Nuclear Power

Corporation of Bharat Limited (NPCIL), BARC and other research centers.

Bharat has 23 working nuclear reactors at seven sites, namely Tarapur, Kakrapar, Kalpakkam, Kaiga, Rawatbhata and Kudankulam with more in the pipeline. The 700 MW Pressurised Heavy Water Reactor (PHWR) project at Kakrapar and the 1,000 MW Russian-helmed units at Kudankulam are landmarks in indigenous as well as foreign collaboration.

The planned BSMR units would introduce a new form of distributed nuclear energy. They may be installed in clusters of smaller sizes along industrial corridors, providing scalability and safety. The government hopes these reactors will curtail the dependence on coal-based captive power plants by minimizing emissions and enhancing energy security.

BARC officials have emphasized that safety is the top concern in the design of BSMR. The involvement of reactors will utilize passive safety systems, which automatically halt operations in case of anomalies without requiring human action. They will also utilize low-enriched uranium fuel, which improves safety while meeting international standards.

Bharat nuclear programme from its start under Dr Homi Bhabha, has been based on the three-stage approach employing natural uranium, breeding plutonium and finally using thorium, for which Bharat possesses one of the world's largest endowments. The BSMR plan is well within this vision of Aatmanirbhar Bharat (self-reliant India) by integrating local research with international collaboration.

A Global Vision in Nuclear Mission
According to the Ministry of Power and New & Renewable Energy, Bharat electricity need is expected to double by 2040. This will be met by expanding renewable and nuclear sources. Solar and wind will still be leaders but nuclear gives the stability required in a decarbonized grid.

In 2023 nuclear power contributed about 3% of Bharat electricity, but experts estimate that the BSMR rollout could triple that share within the next decade. Unlike large projects that require thousands of acres, these modular units will have minimal land footprints through allowing faster environmental clearances and local employment.

Bharat's nuclear policy also has a significant diplomatic component. Through the Indo-US Civil Nuclear Agreement (2008) and other international safeguards, Bharat is able to participate in international nuclear trade. Small modular reactors make the country a possible exporter of secure, low-cost nuclear technology to energy-hungry countries in Asia and Africa.

Through the blending of innovation, policy renewal and strategic foresight, Bharat is constructing not only power stations but also a secure and sustainable energy future. The next 200 MW small reactors in BARC laboratories and fostered by national vision, may soon illuminate factories, power ships and drive Bharat green growth narrative for decades to come.

50 MW from Kudankulam nuclear power plant approved for commissioning of two more units

In a significant move to accelerate the commissioning of new reactors at Kudankulam, the Central Electricity Authority (CEA) has approved the allocation of 50 megawatts (MW) of unallocated power from Unit 1 of the Kudankulam Nuclear Power Plant (KKNPP) to support start-up and commissioning activities for Units 3 and 4.

According to the Southern Regional Power Committee (SRPC), the revised allocation took effect from midnight on October 19, 2025, and will remain valid until further notice.

The approval comes in response to a request by the Nuclear Power Corporation of India Limited (NPCIL), which is executing the twin 1,000 MW Light Water Reactors (LWRs) at the Kudankulam site in Tirunelveli district.

As per the Union Ministry of Power's order dated September 2, 2024, NPCIL has been permitted to draw up to 50 MW from Units 1 and 2 strictly for start-up purposes in line with the Indian Electricity Grid Code (IEGC) Regulations, 2023.

Webinar on "Price it Right: Reforming InSTS Pricing, Building on ISTS Experience"

11th October 2025

IEF T&D Sectoral Group organized a Webinar on "Price it Right: Reforming InSTS Pricing, Building on ISTS Experience" on 11.10.2025. Presentation was given by Shri Ashwin Gambhir, Fellow, Prayas (Energy Group). Shri I S Jha, Chairman T&D Group, IEF welcomed all dignitaries, speaker and participants followed by the presidential address by Shri R V Shahi, President, IEF. Shri Shahi highlighted that Transmission Pricing as such is not a big challenge. Major issue is the planning and utilization of transmission system as well as how to allocate the transmission cost to different beneficiaries in an equitable and balanced manner. This task is becoming more and more complex day by day with integration of variable renewable energy resources.

Shri Ashwin Gambhir presented that pricing and sharing of ISTS charges methodology have recently modified as PoC with GNA along with National, Regional, Transformer and AC-balance components. Present sharing mechanism is about 25% linked with usage and balance 75% as other components. The ISTS charges are to be shared by the drawee entity only. Short-term ISTS charges i.e, for T-GNA is higher than above long-term charges with denomination as Rs/MW/Block.

It was presented that practice of InSTS Long-term Pricing is based on Pooled ARR and Transmission capacity while Short-term pricing on Pooled ARRs and Energy transmitted/annual energy based on contracted capacity/average demand. In certain states, LT charges are same as ST charges, whereas in some States, ST charges are lower than LT charges. Achieving a more effective pricing framework will require the development of improved cost allocation mechanisms and some level of standardization of methodologies across States. Following suggestions were made:

i) Enhance Regulatory oversight of Transmission Planning: SERC may consider developing regulations for State level Transmission planning under Section 86(1) of Electricity Act 2003 to bring transparency and process discipline into STU-led planning.

ii) States should restructure STUs into functionally distinct entities for SLDC, STU and Transmission Asset Owner/Operator, mirroring the Central-level structure.

iii) Rationalise and Standardise InSTS Pricing methodologies to remove disparities in formulas (in regulations & orders), parameters used (contracted or average capacity vs. energy), led to 38% variation in LT charges and 127% variation in ST charges across states.

iv) Tariff methodology should link pricing to peak demand, ensure consistency between regulations and tariff orders. Forum of Regulator(FoR) may coordinate a model regulations for InSTS tariff design to ensure alignment across states.

v) Transition from postage stamp to usage-based: State should transition to a PoC-like framework based on load flow studies wherein pricing is linked to system utilization. This transition will require state-level institutional capacity building- particularly for SLDCs, and SERCs in area of data management, load flow analysis, tariff modeling etc.

vi) Ensure InSTS short-term charges are higher than long-term charges to reflect the premium for flexibility and discourage gaming by shifting from LT to repeated ST access.

It emerged that co-ordinated transmission planning is required, as differing pricing principles make it difficult to harmonise network development strategies across jurisdictions. Further, pancaking of charges and losses takes place when the transaction involves the use of both ISTS and InSTS networks.

Key takeaway:

- STUs and SERCs may pro-actively evolve the methodology (connected load, peak demand, average demand etc.) and guiding principles for determination of pricing of InSTS charges for power transfer from one state to another.

- Waiver of Transmission charges is affecting efficient Transmission Planning. Waiver of Transmission charges may be relooked.

- InSTS pricing needs to facilitate integration of decentralized Distributed Energy Resources into state network.

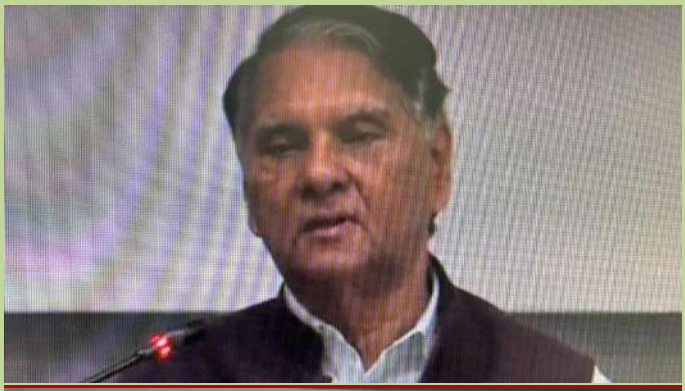
India Energy Debate on "MEETING POWER DEMAND OR ACCELERATING POWER DEMAND GROWTH: Which is more Challenging?" 15th October 2025, IIC New Delhi

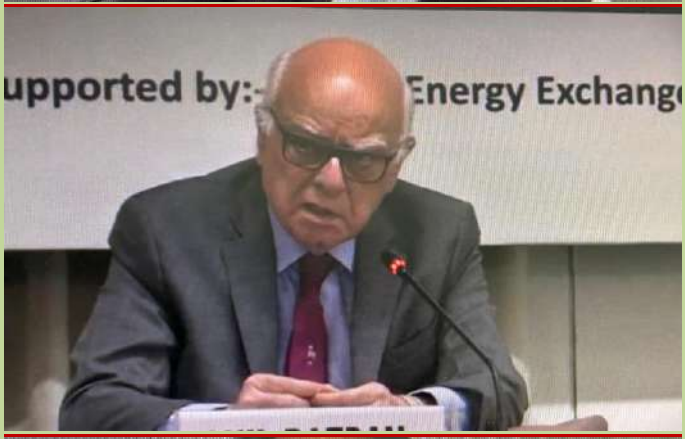
India Energy Forum started a monthly series to debate the critical issues of India's energy sector called "India Energy Debate. This month's debate was on "Meeting Power Demand or Accelerating Power Demand Growth: Which is more challenging?" on 30th June 2025 at India International Centre, New Delhi.

Shri R V Shahi, President, India Energy Forum and Former Secretary, Ministry of Power welcomed all the Distinguished Speakers and participants, introduced the topic, shared his views and moderated the Debate. The other distinguished Speakers who shared their views were: **Shri Anil Razdan**, Former Secretary, GoI; and **Shri Alok Kumar**, Former Secretary, Ministry of Power;

The debate was largely attended by members of the IEF and had an interesting and meaningful discussion.

Full report of the Debate will be published in the next issue of TOTAL ENERGY and Glimpses of the Debate are given here:





FUTURE PROGRAMME

24th National Power Conference
to be held on 23rd December 2025

Theme: "Towards Net-Zero: Ensuring Reliability and Resilience in a high Renewable Power System"

India's commitments under the Paris Agreement, which it updated in 2022 and 2025, include reaching net-zero emissions by 2070, achieving 50% non-fossil fuel-based electricity capacity by 2030. India has already achieved its non-fossil fuel capacity target in 2024 – five years ahead of schedule (2030). Integration of a large share of Renewable based capacity specially the wind and solar, into the Electricity Grid poses a formidable challenge due to the inherent nature of variability and intermittency of this power.

In the absence of large grid scale storage facilities including the Battery Storage and Pumped Hydro Storage Schemes and others, Thermal plants; which are conventionally designed to run as base load stations; will have to bear the brunt of variable load operations as well as fast ramping up ramping down due to variable and intermittent nature of the Renewable based power. This requires technical interventions for enhancing the capability of fossil fired plants as well to make them suitable for high ramping up and ramp down rates in the range of 3 to 5% as well as by reducing their minimum load to about 30% levels for grid reliability and stability. Regular two shift operation of thermal plants has also to be explored. Any design and material modifications required would need to be identified and implemented at least on new plants.

Driven by the need for energy security, reducing fossil fuel dependency, and achieving net-zero emissions by 2070, India has set an ambitious goal to reach 100 GW of nuclear power capacity by 2047 as part of its Nuclear Energy Mission for Viksit Bharat. For our upcoming nuclear plants, we need to deploy advance reactors capable of low and variable load operations.

For enabling growth of Renewable Energy (RE) capacity, areas which have high solar and wind energy potential, needs to be connected to Inter-State Transmission System (ISTS), so that the power generated could be evacuated to the load centres without hassles. Since the gestation period of wind and solar based electricity generation projects is much less than the gestation period of transmission system, the transmission system needs to be planned much in advance. As a major step towards achievement of the goal of 500 GW RE capacity, ISTS network has been planned by CEA for the projected RE capacity addition by the year 2030.

However, transitioning to net-zero involves complex challenges requiring coordinated efforts across all sectors. To discuss all such issues, conference will have presentations from Central Electricity Authority besides BHEL, L&T, Siemens, NTPC, GRID India, Greenko, IREDA, Power Grid, NHPC, THDC, Essar Power, Adani, BSES Rajdhani, and other Transmission and Distribution companies.

Keeping this in mind, the FORUM is organizing its prestigious event; 24th National Power Conference on the theme "Towards Net-Zero: Ensuring Reliability and Resilience in a high Renewable Power System" on 23rd December 2025 at Hotel Le Meridien, Janpath, New Delhi. Such Conferences have had patronage and support of the Ministry of Power, and power sector organizations. The event is a large meeting of top level energy professionals. Last year the Conference was attended by the more than 150 professionals.

IEF requests its members to pencil the date in their Diary to attend the programme.

Edited & e-printed by **Mr S M Mahajan, Secretary General, IEF**

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