WORLD ECONOMIC FORUM

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Industry Agenda

Fuelling India's potential

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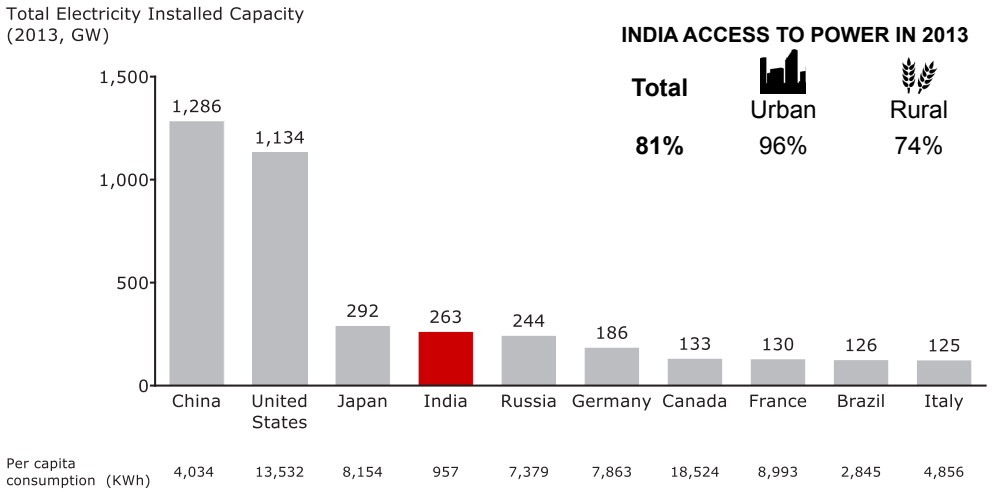
India's rapidly growing economy has fuelled an intensifying demand for electricity with which supply has struggled to keep pace. Where investment in the past has come from government sources, in the future India's policy-makers want to attract the majority of funding from private investors. This means addressing some of the structural issues such as unprofitable distribution companies, along with fuel issues and regulatory obstacles. Recognizing these challenges, the Indian government has embarked on a series of progressive reforms, including integrated policies to ensure even development through the value chain, addressing losses that hinder the viability of the transmission and distribution businesses, nurturing a more favourable investment environment by decreasing finance costs, and recognizing the important role of renewables.

India is now the fourth-largest generator of electricity after Japan, the United States and China – though still comparatively low on a per capita basis and with a relatively low electrification rate of 81% (2013) – leaving about 240 million people without reliable access to power (Figure 1).

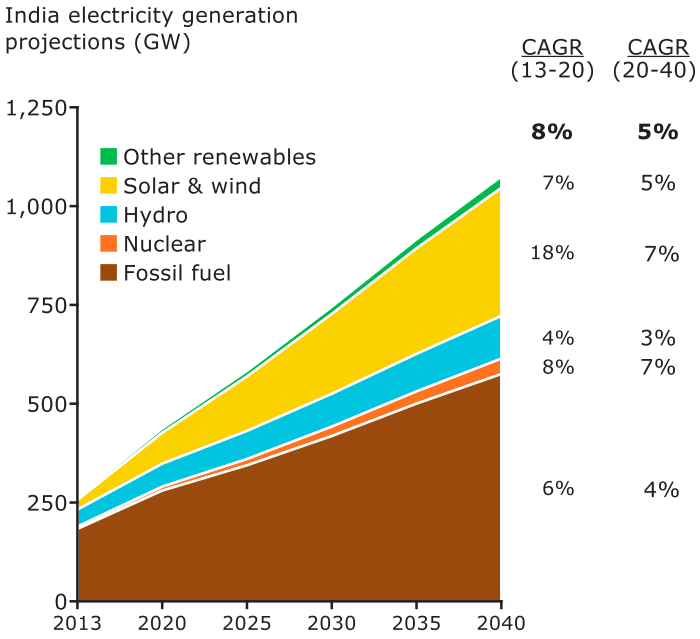
India's real GDP grew at 7% over the past decade, and if it continues to meet its economic goals of 6% to 7% annual GDP growth, it will need nearly 800 gigawatts (GW) of additional capacity by 2040, according to the International Energy Agency (Figure 2).

Figure 1: Total installed capacity in the 10 largest countries by power capacity, installed capacity growth, per capita consumption and access to electricity



Source: Euromonitor; IEA WEO 2015; IEA database

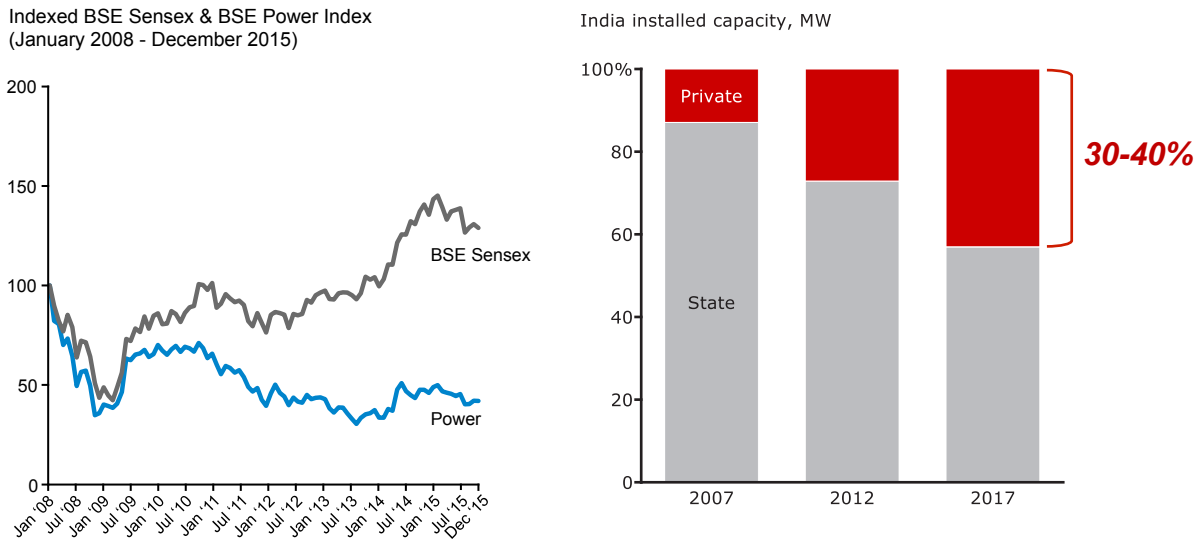
Figure 2: Forecast growth of India's power-generation capacity



Source: IEA WEO 2015

Despite this potential, investors are cautious about India's power sector, which has underperformed the market for the past seven years (Figure 3). A record of false starts – reforms in 1990 and 2003 failed to spark the competition and growth policy-makers wanted – have contributed to their caution. But even so, India increasingly depends on private investors to fuel growth in the electricity sector, with private installed capacity share rising from 13% of total capacity in 2007 up to 30%-40% by 2017.

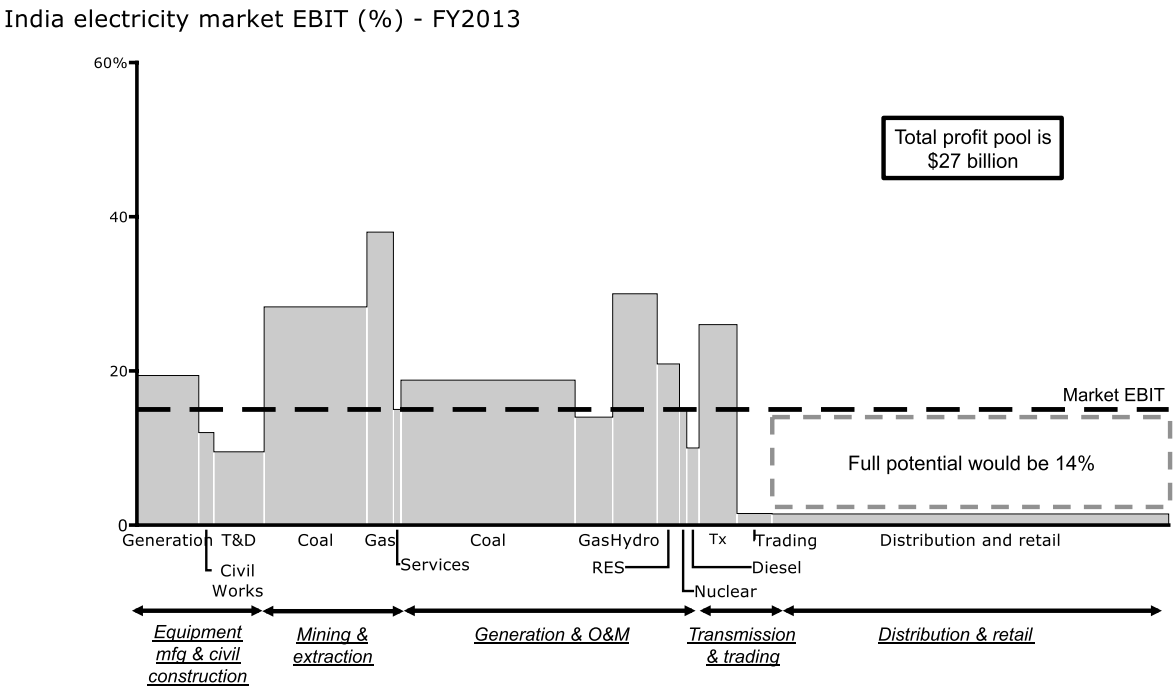
Figure 3: Forecast growth of India's power-generation capacity, and share owned by private sector and state



Note: Data for beginning of corresponding months; The S&P BSE India Power Index is a free float weighted Index, comprised of power companies in the BSE-500 Index. It includes companies such as Tata Power, Reliance Power, Adani Power, CESC Ltd., NTPC, etc.
Source: Bloomberg, BSE

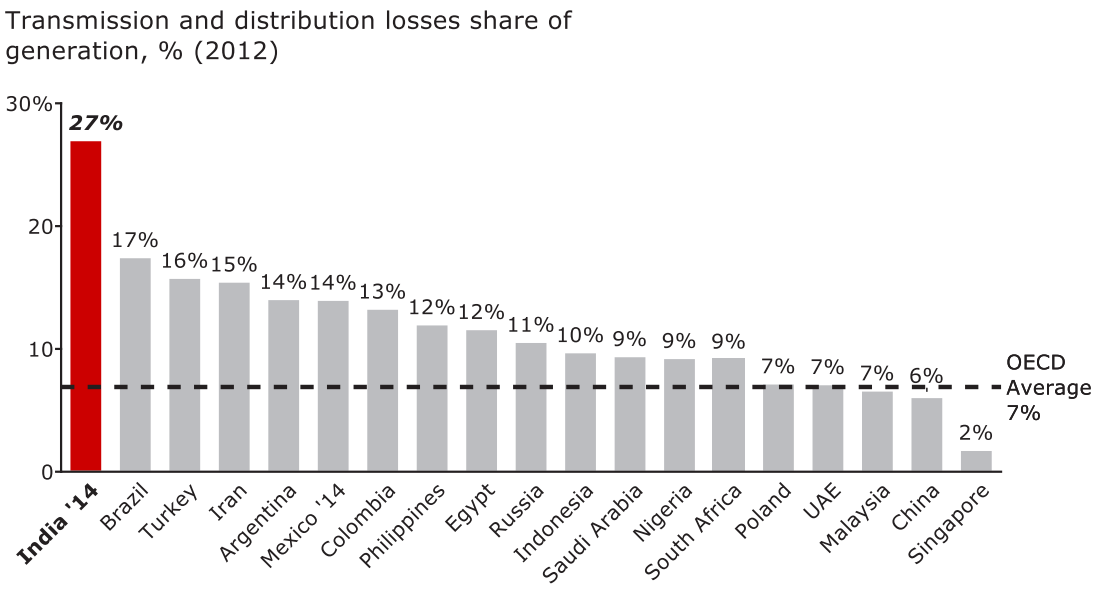
In India, power generation captures most of the sector's $27 billion profit pool (Figure 4), while the transmission and distribution struggle financially due mostly to non-technical losses in distribution – that is, electricity taken off the grid and not paid for. India's distribution losses, estimated at 27% in 2014, are among the highest in the world (Figure 5) and, despite successful programmes in several states, this remains a significant issue requiring urgent attention. Solving the financial viability of distribution companies will help India increase the flow of funds in its power markets, help manage peaks and will create incentives for more efficient consumption.

Figure 4: Non-technical losses limit the potential of India's power sector; even though distribution and retail account for more than a third of India's power market, it has the lowest levels of profitability



Note: EBIT percentage taken from top players in each segment : NTPC, NHDC, CIL, RIL, PTC, BHEL, Full potential arrived using TATA Power's current EBIT margins on distribution (margins high due to min. stipulated ROE/margins by the Govt. on dist. business)
Source: Company report, CapIQ, Bain analysis

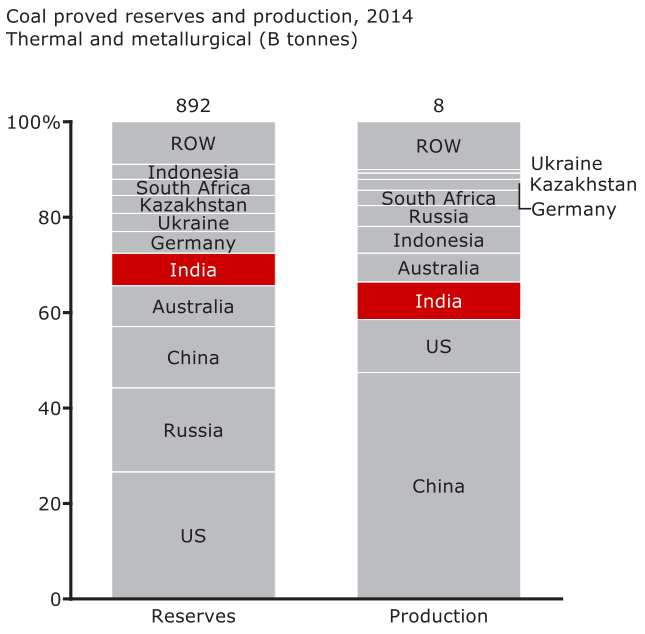
Figure 5: Transmission and distribution losses in largest fast-growing economies

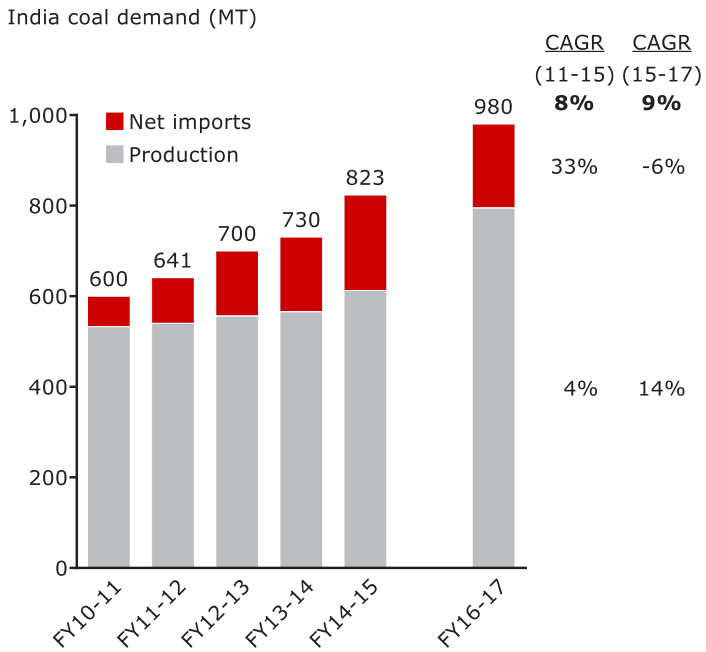


Note: Transmission and distribution losses stand for amount of energy lost during transmission and distribution, chart gives share of T&D losses of total power generated in the country; India losses for 2013-2014 fiscal year which ended on March 31 2014
Source: US EIA; The Economic Times

Coal is an important source of fuel for generating electricity in India, with short-term demand expected to grow at about 9% annually. However, India's coal providers struggle to keep pace with demand and the country has had to rely increasingly on imports (Figure 6).

Figure 6: Coal reserves in India and demand gap



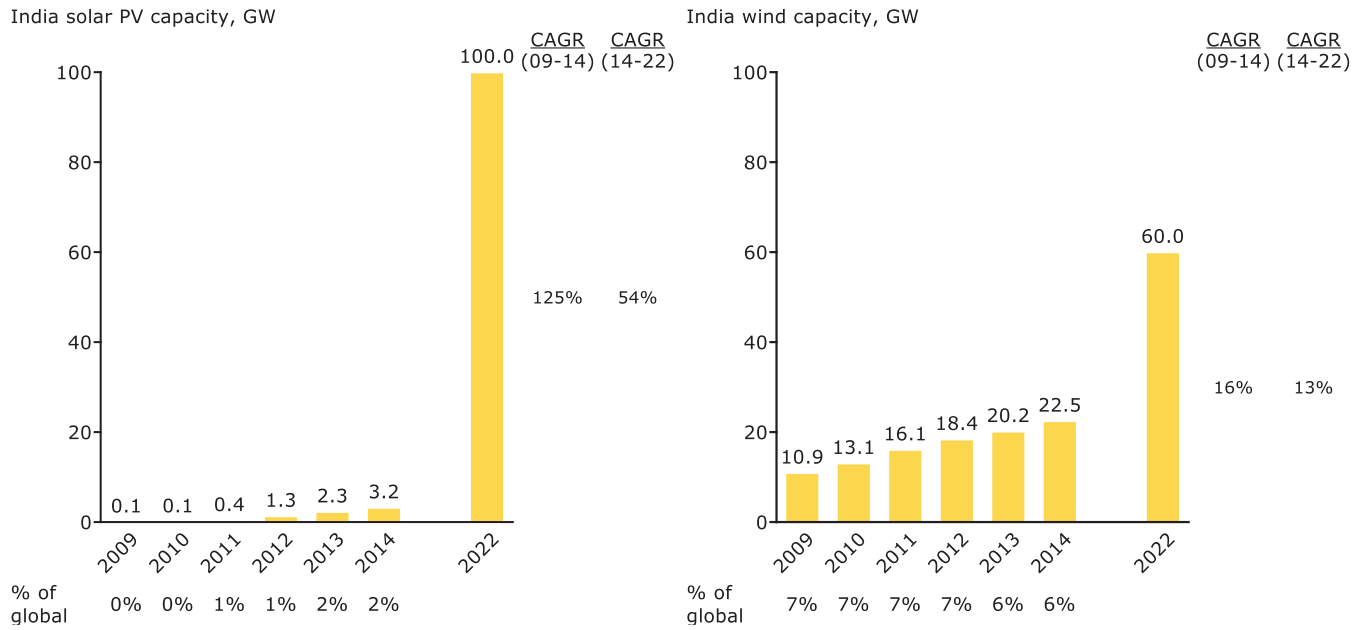


Note: "Proved reserves" include economically attractive coal available using current technology
Source: Ministry of Coal; BP report (2014)

To reduce its reliance on coal imports, India will continue to develop its domestic coal supply, as shown in the aggressive bidding in coal block options in 2015. Private sector participation in coal will help scale up the industry, though the limits of commitment are not yet clear. India will also increase its investment in renewable generation, which represents an important element in the country's goals to become energy self-sufficient. In fact, India aspires to become a global leader for renewable energy and has an ambitious plan to install 175 GW of renewable energy by 2022, including 100 GW of solar and 60 GW from wind (Figure 7). India will need to attract a great deal more private investment in renewables generation to meet these targets.

Despite all this planned growth, India's peak deficit is expected to continue to increase, at least until the country implements reforms that allow transmission and distribution operators to recoup costs and generate profits that allow them to maintain and improve their networks. India's electricity sector has other significant issues, included stranded assets due to either a lack of fuel supply or finance issues.

Figure 7: India wind and solar PV generation-capacity targets



Source: Ministry of Energy; REN21; IEA; GWEC

Key recommendations for India

India's power sector is at an inflection point, given the government's conviction that electricity is a critical enabler for economic growth. India's government recognizes the need for private investment in the power sector and is planning to adopt progressive policies on renewables and the sector overall. Alignment between federal and state government objectives is critical, as India devolves significant power to its states.

Recommendations identified in the best practices section of this report are all relevant for India, but there are also four key imperatives that India can focus on to improve the sector's attractiveness to investors.

1. India needs to fix the viability of its distribution system, and improve the financial health of its distribution companies.

– Policy-makers can help by developing and promoting a framework conducive to public-private partnerships in electricity transmission, distribution and generation. In the short term, basics need to be fixed – for example, separate electricity infrastructure for different industries (feeder segregation), and metering systems and collection systems, all of which require strong political will to execute.

– Regulators can help by ensuring a level playing field for private players that enter the market, and working to stem non-technical losses. They can ensure transparency in overall industry governance and clear separation between policy-makers and regulators. Regulators also can ensure the delivery of open access, which is the ability of large commercial and industrial customers to purchase power from an open market.

– The private players who enter the distribution market will be able to help improve the viability of the distribution network in several ways. They are most likely to introduce new technologies in the grid, such as outage management systems (OMS), distribution management systems (DMS) and demand management systems (including matching power-purchase agreements to demand curves), while also helping to accelerate adoption of smart grid and meter technology. Private players can bring the capabilities to develop integrated regional or national systems that will yield substantial benefits in load and supply forecasting. They can also help establish an integrated peak power capacity to stabilize the grid and a national ultra-high voltage (UHV) network.

2. India needs to address its fuel-supply challenge.

– Policy-makers have an important role to play by moving upstream industries towards the free market and attracting more participation from the private sector. Initiatives such as a streamlined and viable coal-auction process, defined risk-reward frameworks to attract global majors with the right technologies and capabilities, and adopting free market-driven pricing will all help increase supply.

– Indian regulators can also optimize and scale the model of Mine-Develop-Operate by accelerating the MDO award process, adopting single-window clearance through a coordinated approach across ministries.

– Businesses and investors have an important role to play in improving the operational efficiency of Coal India Ltd (CIL) by streamlining processes, improving productivity and implementing more efficient managerial practices. A new long-term strategic model for CIL needs to be adopted with a better capital management and asset strategy, including potentially breaking out parts of CIL. Power infrastructure needs to be optimized with more pithead plants, which generate power from coal at the mines and UHV lines from coastal locations.

– Private players will likely build much of the additional capacity to alleviate bottlenecks in the coal distribution system at the ports and in the railways. Building rail corridors dedicated to coal, dedicated LNG ships, regasification terminals and dredging deeper sea berths for larger ships will also be required.

– With potential government support, private players could help build a world-class technology cell to assess and commercialize new technologies (for example, underground mining), which could help attract more skilled technological talent to the industry.

3. India's plan to add 175 GW of capacity from renewables by 2022 can succeed only if the relevant stakeholders act in ways that encourage investment in this part of the sector.

– Policy-makers should develop the blueprint for the country's renewable energy capacity by 2022 and provide policy support to foster investment in solar power. They can help attract external capital by reducing borrowing costs through strengthening the state electricity boards. They can also boost the solar industry by simplifying rules and regulations of the construction of distributed solar power across many types of infrastructure. Similarly, land-acquisition regulations should be simplified to accelerate growth of wind and solar power generation.

– Regulators should enable distributed generators to feed excess power into the grid and receive payments or discounts for it. Regulators can enforce the mechanisms underlying renewable purchase obligations (RPOs) and renewable generation obligations (RGOs), while also promoting open access for wind power. Critically, they should ensure long-term tariff consistency with no retroactive changes or flip-flops.

– Investors and businesses can contribute in all areas. There are opportunities to set up large solar and wind power plants on idle land through both bilateral and auction routes, promote rooftop PV through solar-leasing models supported by feed-in tariffs and tax benefits, and develop the infrastructure to support new capacity. These will require businesses to incubate new

technologies (for example, for wind, higher-capacity turbines, gearless generators, offshore masts, central and distributed storage technologies and wind generation forecasting tools) and launch training programmes to create the skills base required for the next wave of investment.

4. Even with the huge investments in renewables, most of the electricity consumed in India over the next two decades will be generated by burning fossil fuel and India can do much to improve the efficiency of the existing power infrastructure.

– Policy-makers should develop an integrated outlook for India's energy, including targets for fuel mix, emissions and sector progress, and set a government body to monitor progress. Tariffs and rates for fuel pricing, costs that are passed through to customers, and peak power policies and pricing should all be transparent and consistent across India's states.

– Policy-makers should continue to improve demand-side energy efficiency, extending efforts such as the domestic lighting initiative to include other sectors of the economy.

– Regulators should define clear guidelines for public and private sector participation and develop "single-window clearance" for large projects such as Ultra Mega Power Projects, assigning to developers only those risks that they can control.

– The private sector is best suited to define blueprints for systems that include large coal and gas plants and the coastal infrastructure to import coal and LNG.

– Businesses also play a critical role in promoting efficient new technologies, such as ultra-super critical boilers, particularly as they become more financially viable. They can also help optimize the use of the coal through coal-to-power system efficiency initiatives such as heat-rate optimization, gangue re-use, washed coal and fire minimization. They will also be the training ground for the next generation of skilled workforce for the energy industry.

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