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(Energy Conservation : It Doesn't Cost. It saves)

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TNERC rejects plea on surcharges

The Hindhu : March 17, 2018

Open access electricity users had sought retrospective application of lower cross-subsidy surcharges

The Tamil Nadu Electricity Regulatory Commission (TNERC) has rejected a plea by open access consumers (industrial users and commercial buildings) to retrospectively extend the benefits of lower cross-subsidy surcharges.

The concept of open access allows large users of power (typically those who draw one megawatt and more from the grid) to buy cheaper power directly from the private generators rather than depending on the State utility. The move was aimed at increasing the competitiveness and efficiency in the power sector. The loss of revenue to the State utility was made good through the levy of a cross-subsidy surcharge.

In August 2017, the TNERC had cut the cross-subsidy surcharges to the tune of ₹1.6-₹2.5 a unit, in line with the National Tariff Policy 2016, which stipulated that such levies be capped at 20% of the tariff. So far, Tamil Nadu had one of the highest cross-subsidy surcharges ranging between ₹3.38 and ₹3.50 a unit.

The Open Access Users Association, a national body representing the interests of open access consumers, two other private power producers — Ski Carbon Black (India) Pvt. Ltd. and Palladam Hitech Weaving Park — had filed separate petitions with the State regulator, seeking the benefits of lower cross subsidy charges for the year 2016-17 in line with the National Tariff Policy of 2016.

No stipulation

The TNERC said the orders issued by it generally take effect prospectively and not retrospectively.

The tariff orders issued by the Commission normally take effect from the date on which it was issued and not before , it added.

The regulator noted that there was no stipulation in its open access regulations that the provisions in the National Tariff Policy 2016 should be given effect from the date of its notification. Even the tariff policy had no provision to the effect that the same was strictly implemented from the date of its publication, it added.

TNERC suggests 30% lower tariff for wind, solar power

The Hindhu : March 8, 2018

Consultative paper points to positive impact of multiple factors

A consultative paper of the Tamil Nadu Electricity Regulatory Commission (TNERC) has suggested a benchmark tariff of Rs.2.86 per unit for wind energy and Rs. 3.11 per unit for solar energy, an over 30% fall from previously fixed tariffs.

The suggested tariffs are also cheaper than thermal power, whose average cost is Rs.4 per unit.



TNERC, the State regulator, fixes the benchmark tariffs for procurement of wind and solar energy by the Tamil Nadu Generation and Distribution Corporation Ltd (Tangedco), the State distribution company. States are also procuring wind and solar energy through competitive bidding, a process which could drive the prices even lower than the benchmark rates.

The consultative paper has fixed a rate of Rs.2.86 per unit without accelerated depreciation and Rs.2.80 per unit with accelerated depreciation benefits [for wind energy].

In its last order in 2016, the TNERC had fixed the tariff at Rs.4.16 per unit without accelerated depreciation and Rs.3.70 per unit with accelerated depreciation; the tariff will be expiring on March 31, 2018.

“Reports broadly suggest reduction in the prices of wind power turbines to an extent of 20% in the last two years. The recent auctions show that the developers have adopted a combination of various factors that have brought down the per unit price of wind energy,” the TNERC said in the paper.

Solar power at Rs.3.11/unit

For solar energy, it has suggested a tariff of Rs.3.11 per unit without accelerated depreciation and Rs.3.05 per unit with accelerated depreciation.

“A combination of factors – low module prices, loans with cheap rates of interest and location of projects – has led to low tariff rates to the extent of Rs.2.44 per unit, in the auctions held for solar power. Since the issue of the last solar tariff order, prices of solar modules have reduced by 20%. Therefore, there is a need to have a new preferential tariff in place,” TNERC said in its consultative paper

No ‘power’ of choice for consumers

[The Hindhu : March 18, 2018](#)

A decade and a half after the Electricity Act came, consumers still face a monopoly in power supply

Last month, six energy producing companies won rights to set up wind power projects in Gujarat and sell power to the State’s utility firm. In the auctions, where those who offer to sell electricity at the least prices are the winners, four companies quoted Rs. 2.44 a unit of electricity, and two others quoted a paisa more.

Similarly, in the previous auctions, several wind and solar companies have come forward to sell electricity at prices well under Rs. 3.

However, you and I are buying power at upwards of Rs. 6; factories pay even more, even as high as Rs. 12.

It should be a simple matter for the company that owns the factory to tell the wind energy company in Gujarat, “Hey, you are selling power at Rs. 2.44; I’ll pay you (say) Rs. 6, why don’t you sell it to me?” Simple, right?

Then, why isn’t it happening?

Electricity Act, 2003

The push to make such deals possible came in the form of the Electricity Act in 2003. The central idea of the Act, which is still hailed as a ‘landmark legislation’ for the power sector, was the creation of an open market for electricity, where anyone could produce power anywhere and sell it to anyone else at mutually agreed prices.



In developed countries, consumers can switch suppliers over the laptop. But in India, a decade and half after the legislative framework came into being, a free and open market for power, as it exists for instance, for telecom, is still elusive.

The reason is that State governments, through the electricity distribution companies (discoms) owned by them, are still a monopoly, and exhibit monopolistic tendencies — their instinct is to make their customers pay for their inefficiencies.

There again, only some customers pay, while the others have to be subsidised and what better strategy than to make the paying customers pay more to defray the costs of the subsidies?

In an open market, the customers who are thus made to pay more would go to other suppliers if they find them economical. But in a monopoly, the monopolist would not let the customer deal directly with the supplier.

While on paper, there is scope for a large consumer of power to directly purchase power from a supplier, by-passing over the State discom, in practice this has proved to be difficult because the owner of the discom, viz., the State government, has control over such direct transactions.

“State governments use the respective State Load Dispatch Centre (which routes the power) as the instrument of control,” observes Daljit Singh, visiting scholar at Brookings India, who studied the issue for a paper titled ‘Newer Challenges for Open Access’, in April 2017.

Mr. Singh counted at least 239 orders passed by the Central Electricity Regulatory Commission, the federal electricity regulator, pertaining to ‘denial of open access’. Pretty often, the load dispatch centre was not sport.

State governments have often seized upon a certain provision (Section 11) in the Electricity Act, which allows them to force a power producer in that State not to supply outside the borders. The provision was meant for use in rare circumstances of emergency-like power shortage, but many States (Tamil Nadu, Odisha, Andhra Pradesh and Rajasthan, for example) have taken liberties with the interpretation.

Perhaps the clearest case of States putting the kibosh on free market is that of the ‘cross-subsidy surcharge’ (CSS). This is a surcharge that a discom levies on a customer for defraying costs of free or subsidised power to some sections of the society. Ideally, the costs of such subsidies should come from the State government’s own funds, but other customers are made to pay for it.

‘Subsidy must decrease’

The Electricity Act allows CSS, but the idea clearly was that the charge “shall be progressively reduced and eliminated”.

Instead, the CSS is only increasing. Assam, for example, saw CSS rise from 54 paise in 2016-17 to Rs. 1.31 in 2017-18; Bihar 79 paise to Rs. 1.79 and A.P. Rs. 1.61 to Rs. 1.65.

A ‘consultation paper’ on open access produced by the Ministry of Power in August last year sums up the position of the State government, seeking a rise in CSS. This is happening even when there is recognition that CSS is not quite the way to provide free or subsidised power to some sections of society — incidentally, some of whom, such as rich farmers, do not at all deserve the freebie.

The National Tariff Policy of 2016 is clear on that point. In Section 8.3, it says “direct subsidy is a better way to support the poorer categories of consumers than the mechanism of cross subsidising the tariff across the board.”

Add to this the 'additional surcharge' which is meant to compensate discoms for the fixed cost of their long-term contracted capacity, which is stranded as a result of consumers moving to Open Access (OA). For this, the discoms have to "conclusively demonstrate" that the assets are stranded due to consumers moving out, but often this is not done. In some States, additional surcharge has is as high as Rs. 1.60.

These charges, collectively known as 'open access charges' have made a free market economically unviable. In several of its presentations, the Indian Energy Exchange, which is one of the two energy exchanges in the country, speaks of "open access charges being set high in order to restrict open access." "With the rise of renewables, increased market dynamics and tighter grid operation rules, utilities (discoms) have started restricting or tightening rules around open access," says Vishal Pandya, an energy markets experts and co-founder and director, REConnect, a consultancy.

For their part, the discoms have their own defence for why they frown at open access. Customers leaving them has adverse financial implications, at a time when they are hard up on cash. On the flip side, whether they do enough to improve their efficiencies and keep their house in order, is moot.

There are structural issues in improving discom efficiencies. A case in point is the instance in Karnataka, where the unions stopped substation automation because it would render staff surplus, requiring them to be transferred.

'Centre-State mismatch'

At the heart of the the absence of a free market for electricity is the mismatch of perception of the central and State governments. While the Centre wants a vibrant, 24-by-7 market, the States are more concerned about their immediate finances and electoral issues.

"Development of a shared perspective or vision for the sector by the Centre and the States is highly desirable," says Mr. Singh. "However, that would be difficult to achieve in the current political climate."

On top of all this is the proposed New Electricity Act which proposes to separate "carrier and content", meaning the transmission lines will be like tolled highways for use by anybody, while the power itself could be supplied by anybody, so that the consumer will have a choice to switch seamlessly between suppliers. The draft of the legislation is gathering dust in the Parliament.

Allocation to Tangedco brought down: Minister

The Hindhu : March 19, 2018

The State Government allocation to the Tamil Nadu Generation and Distribution Corporation Limited (Tangedco) has been brought down as there is reasonable reduction in the loss suffered by it, said P. Thangamani, Electricity Minister.

The effective steps taken by the government enabled in bringing down the loss of Tangedco, Mr. Thangamani said while speaking to presspersons on the sidelines of Prime Minister Narendra Modi's address at the inaugural of the national conference of Krishi Vigyan Kendras through video conferencing at the KVK here on Saturday.

The Tangedco suffered loss to the tune of Rs. 14,000 crore and it had gradually come down and so the government allocation, he said adding that the cut in the allocation would in no way affect the functioning of the Tangedco.

TN expects green energy corridor to expedite investment worth Rs 110 bn

Business Standard : March 15, 2018



Tamil Nadu is the top state in terms of variable renewables market share and installed renewable energy capacity, according to IEEFA

The Tamil Nadu government is in talks with the central government to set up a dedicated Inter-State Green Energy Corridor to transmit the surplus wind energy to energy deficit states, to expedite the investments of around Rs 110 billion in renewable energy sector in the next three years. The net loss of the State discom TANGEDCO is expected to come down to Rs 29.75 billion in 2017-18, said the State Finance Minister O Panneerselvam in his budget speech on Thursday. The Tamil Nadu Energy Development Agency (TEDA) is expected to enter into a Memorandum of Understanding (MoU) with the Government of India's Energy Efficiency Services Ltd (EESL) in order to develop the green energy corridor. "This step is expected to expedite the investments to the tune of Rs 110 billion (Rs 11,000 crore) in the renewable energy sector over the next three years," he said. The state government is implementing a Green Energy Corridor Project with an aid of German government owned development bank KfW at an estimated cost of Rs 15.93 billion, of which Rs 7.25 billion has already been spent. The government has allocated Rs 2.58 billion for the project for the next fiscal year. Besides, the Tamil Nadu Transmission System Improvement Project is being implemented at a cost of Rs 50.14 billion with the assistance of JICA for upgrading the transmission capacity in the State. With a 14.3 per cent share of India's total wind and solar power generation in 2016-17, Tamil Nadu is the top state in terms of variable renewables market share and installed renewable energy capacity, according to a recent report by the Institute for Energy Economics and Financial Analysis (IEEFA). Of the 97 terawatt hours produced in the year, the state accounted for 13.9 terawatt hours. In terms of installed capacity, of the 30 Gw across Tamil Nadu as of March 2017, variable wind and solar power accounted for 9.6 Gw, or 32 per cent. Firm hydroelectricity added another 2.2 Gw or 7 per cent, nuclear 8 per cent and biomass and run of river three per cent.

As such, zero-emission capacity is 50 per cent of Tamil Nadu's total, added the study. In another report, 'Electricity Sector Transformation in India - A Case Study of Tamil Nadu', published earlier this month, the institute forecast that 67 per cent of the installed capacity and 56 per cent of the generation in Tamil Nadu would be derived from zero-emission technologies. At present, it is 42 per cent of total installed power generation capacity and 18 per cent of generation, making it one of the top states globally, behind only a few provinces in China and Texas in the US. The government has said that the take over of Rs 228.15 billion debt from TANGEDCO in 2016-17 under the Ujjwal Discom Assurance Yojana (UDAY) by the central government has improved the financial position of TANGEDCO. The net loss of the discom is estimated to come down from Rs 43.49 billion in 2016-17 to Rs 29.75 billion in 2017-18. For honouring the interest commitment of the State government, Rs 17.79 billion has been provided in the Budget Estimates 2018-19 and Rs 45.63 billion has been provided as grants for adjusting the loans given to TANGEDCO. As part of the UDAY scheme, the government has to take over 10 per cent of the losses suffered by TANGEDCO in 2017-18 in the ensuing financial year, Rs 2.97 billion has been allocated in the budget estimate. In the budget estimates 2018-19, the state government has allocated an amount of Rs 139.64 billion for the energy sector, including Rs 75.37 billion as power subsidy for agriculture and other purposes.

India likely to fall short of total power capacity addition target in FY18

Business Standard : March 17, 2018



Cost of renewable power generation now is at par or even lesser than the average cost of power production

The country is likely to fall short of its total power capacity addition target of 13171.15 Mw for 2017-18. At the end of December 2017, only 4765 Mw fresh capacity has been added. Annual report of the Union power ministry presents a depressing trend for power capacity addition in this financial year, especially for thermal power. Of the targeted 11366.15 Mw capacity addition, only 4300 Mw fresh capacity in thermal power has been created by the end of December. In thermal power, the performance of Central and state-owned utilities has been lacklustre. It was proposed to add 4800 Mw power in the central sector but an actual achievement is only 910 Mw. Likewise, state utilities have added 660 Mw as against the intended capacity of 3546.15 Mw. Private power producers have fared better, inching close to the assigned target for the financial year. At the end of December 2017, capacity addition in private thermal power was 2730 Mw compared to their targeted figure of 2940 Mw. Nuclear power has drawn a blank as far as capacity addition goes. Through this source, 500 Mw was proposed to be added in FY18. Hydropower capacity addition, too, has been tepid.

Only 465 Mw in hydropower capacity has been added vis-a-vis the target of 1305 Mw. Slow capacity addition in new power is despite a robust monitoring mechanism for capacity addition programme put in place by the Ministry of Power. The monitoring is done at three levels - Central Electricity Authority (CEA), the ministry and Power Project Monitoring Panel. In 2016-17 too, the power capacity addition target had missed its target. New capacity of 16654.5 Mw was targeted against which actual achievement was 14209.8. The target slippage in last financial year was largely due to zero capacity addition in nuclear power where 1500 Mw fresh capacity was supposed to be added. An industry source said the plunging tariffs at solar and wind power auctions and the government's enormous thrust on meeting renewable energy targets have slowed the pace of thermal power generation. Cost of renewable power generation now is at par or even lesser than the average cost of power production by even the most competitive producers like NTPC. Coal-fired thermal power plants across the country are under stress due to recurring hikes in coal prices and revision in railway freight charges. Prices of thermal grade coal since the last notification by Coal India on January 9 this year have moved up by 15-18 per cent. This apart, the levy of evacuation charge of Rs 50 per tonne is estimated to increase the cost of generation for coal-based power plants by 13-15 paise per unit. Plant Load Factors (PLFs) of thermal plants, including the ones operated by NTPC, have been steadily declining over the years due to flagging demand. From 77.5 per cent in 2009-10, the PLF has fallen to 59.88 per cent at the end of 2016-17.

Insolvency norms: Power firms ask for special dispensation

Financial Express : March 19, 2018

Discom dues, regulatory delays swell to Rs 16,100 crore.

The Association of Power Producers (APP) asked the Reserve Bank of India (RBI) for special relaxation for the power sector in its guidelines on when insolvency proceedings would be triggered.

The industry body said the stress in the sector is largely due to irregularity in payment from discoms, regulatory delays, and coal supply constraints, which are beyond the control of power companies.

In a letter written to RBI governor Urjit Patel, the APP said discoms delay regular payments by three-four months, and currently receivables to IPPs stand at about Rs 8,300 crore. Additionally, Rs 7,800 crore is stuck due to various delays in receiving orders from



regulators. The IPPs are not compensated for the extra money they have to shell out to buy coal at higher prices due to insufficient supply (only 60% of requirement) by Coal India.

The RBI recently said even a one-day default in debt servicing for accounts with exposure of more than Rs 2,000 crore would warrant formulation and implementation of a resolution plan. If failed, within three months, the cases will have to go to the NCLT for insolvency and bankruptcy proceedings.

Last week, power minister RK Singh assured power industry representatives that he would speak to the RBI and the finance ministry about the new guidelines, and his ministry would formulate a methodology to promptly compensate the industry for any development which comes under the 'change in law' category.

The APP claims that the three infrastructure sectors – energy, telecom and steel – face different kinds of issues, and thus call for specific solutions according to problems. According to Ashok Khurana, director general of APP, "The system has to be tolerant for genuine difficulties, while coming down heavily on mismanagement and fraud."

Recently, a report by the parliamentary committee on energy (which was invoked in the letter to the RBI) had called for a more pragmatic approach by lenders to private power producers, rather than applying RBI guidelines "mechanically". Stressed assets in the power sector consist of 34 private power plants with an outstanding debt of Rs 1.74 lakh crore.

Though government-owned power generators are paid first, according to a report recently presented to the Lok Sabha by the standing committee on energy, dues of state-owned power supply utilities outstanding for more than 60-days payable to central government-owned power companies stood at `10,712 crore at the end of December 2017. Of this, pending amount to NTPC was Rs 1,756 crore.

India: 7.2% growth in supply of coal to power sector

Business Standard : March 15, 2018

During the current year 2017-18, the growth in supply of coal to power sector is 7.2%, based on the rising demand of coal based generating stations. As estimated by the Ministry of Power, the Pan India growth of coal based generation would be 5.4% to 5.7% in the current year & next four years.

As an alternative energy source, the Government has up-scaled the target of Renewable Energy capacity to 175 GW by the year 2022, which includes 100 GW from solar, 60 GW from wind, 10 GW from Bio-power and 5 GW from Small Hydro power. So far a total of 64.31 GW capacity has been installed through the implementation of various renewable energy schemes/ programmes upto 31st January 2018 which includes 32.88 GW from Wind, 18.45 GW from Solar, 8.53 GW from Bio-power and 4.45 GW from Small Hydro Power. However, coal will continue to remain the major energy source in the short to medium term.

The details of all India import of coal during the last three years is given below:

Import of Coal (in Mte.)	Year	Coking	Non Coking	Total
	2014-15	43.71	174.07	217.78
	2015-16	44.56	159.39	203.95
	2016-17 (Prov.)	41.64	149.31	190.95

Smart meters to rationalise electricity consumption in India

The Economic Times : March 18, 2018

Come May, you can get smarter. You can operate your home appliances remotely by just installing a smart electricity meter. Soon, you would also be able to check which appliance is consuming more electricity and synchronise usage of power-hungry equipment, such as geysers, with off-peak hours, when pricing would be lower.



The Internet of Things (IoT) solution would be made possible for the first time in India by Tata Power Delhi Distribution Ltd (TPDDL), a joint venture of the Delhi government and Tata Power, which is set to install smart meters and also launch a mobile app for Android (to start with). In the first phase, 2.5 lakh smart meters would be installed in north and north-west Delhi. By 2025, 16 lakh smart meters would be operational.

Smart Discom

Consumers need not buy a smart appliance but can use their existing appliances and still automate their homes. With smart meters and the back-end infrastructure of a smart-grid network, even the distribution company would start behaving smartly.

In future, during peak-demand hours, consumers would get a message on their mobile phones offering them incentives to lower unit consumption. During off-peak hours, consumers would get a message incentivising consumption — helping in optimum usage of power-hungry appliances such as geysers or batteries of electric vehicles. The smart model, which could be tied to a dynamic tariff, would help domestic and institutional consumers.

Domestic consumers, as of now, mostly get a flat tariff throughout the day, with no distinction between peak and off-peak prices.

“Right now, there is one-way traffic between us and the consumers. With a smart grid and smart meters, it will be two-way communications,” says Praveer Sinha, managing director of TPDDL, which services 7 million people in Delhi.

As part of the modernisation, linemen would also get a makeover. The days, sometime nights, of linemen arriving on bicycles to figure out why your house is in the dark is already a thing of the past.

TPDDL’s field force automation programme would help the lineman track consumer complaints, do remote diagnosis and find the best solution — all the while keeping the customer constantly updated by an SMS or via the app.

The lineman would also be equipped with a tablet, a global positioning system for better tracking, route optimisation for shorter commute and augmented reality systems for faster identification of the problem. An auto-dispatching system would ensure that the closest lineman is given the job. And he might just pull up in an electric vehicle.

Power theft is a huge challenge in a country like India, where the aggregate technical and commercial losses are over 20%. Pilferage by tampering with meters and distribution lines has been plaguing the sector. But the smart grid would help tackle this. TPDDL, with Omron, has developed a tamper-proof sensor that can withstand high temperature and is water- and fire-proof.

The sensor detects tampering, stores the information on the meter and communicates it to a central server. It also enables the discom to disconnect power supply remotely. Wireless power sensors detect hooking and other such tampering of distribution lines. This move would set the stage for Delhi to move towards the Smart City mission, a project the government has been pushing hard. For this, TPDDL is collaborating with 30 entities, including GE, IBM, Raychem, 3M, EDF, GIZ, USAID and USTDA. It is also working with the Indian Institute of Technology-Bombay, Stanford University, University of Canada, University of California and the University of Finland, to research, pilot and introduce energy efficiency and home automation technologies.

For example, USTDA has given a grant to explore and develop opportunities in the areas of rooftop solar energy, energy storage systems and electric vehicles. Apart from aligning with



the Smart City mission, TPDDL's roll-out of smart meters and a smart-grid backbone would help in managing demand and growth in consumption.

Today, residential consumption accounts for 24% of electricity produced in India, of which 75% is used for lighting and cooling. By 2021, according to the World Bank, residential consumption would surge 260%.

Why India must shift to a sustainable energy future

DNA India : March 19, 2018

As per the BP Statistics Report 2017, India consumed 724 million tons of oil equivalent in 2016 — the third largest consumer of primary energy in the world. During 2005-15, India registered 5.7% growth of primary energy compared to leading global economies like China's (5.3%), Russian Federation (0.5%), Japan (1.6%) and US (-0.3%). Keeping pace with economic development, India is poised to continue as one of the fastest energy consumers in the world. Industrial growth and productivity is largely depend on energy. The transition from a developing nation to a developed nation demands rapid expansion of energy consumption and India's current per capita primary energy consumption of 505 kg of oil equivalent is poised to increase manifold to reach closer to China (2,237 kg of oil equivalent). Both at industry and consumer level; energy consumption would grow exponentially to sustain economic growth above 7% .

Currently, the energy sector faces multiple challenges at various stages of the energy value chain. Let me highlight few areas: availability, accessibility, affordability and sustainability, which need a considerable amount of thoughts and actions related to energy demand, supply and consumption.

Availability: Natural resources like oil, gas, and coal have uneven distribution; therefore, availability remains central concern for energy resource deficient economies. On the contrary, uneven distribution of energy sources opens up ample opportunities for global energy trade.

Accessibility: As the number of energy resource rich nations are less than energy resource deficient nations, accessibility remains critical to energy resource deficient countries including India. Most of the Asian nations like India, China, Japan, and South Korea are energy resource deficient. Over the year's coal, crude oil, liquid fuels, and natural gas trade prospered, which addressed accessibility issues to a greater extent.

Affordability: Economic development of a nation and purchasing power of its citizens and industries are strongly linked with affordability. Ability to purchase energy at a certain price point; essentially affordable price point is a subject of debate. In the context of scarce energy resources constrained by limited availability; affordability assumes paramount importance. For example, Asian crude buyers paying 'Asian Premium' charged by OPEC is a clear cut case of 'Availability' and 'Accessibility' impacting 'Affordability'.

In the recent times, owing to growing concern for global warming and climate change; researchers and policy makers have added the Sustainability component to 3As (Availability, Accessibility, and Affordability). Therefore, dynamics of energy industries are fast changing with the addition of 'Sustainability' component to energy security framework. Today, clean energy like solar and wind has achieved grid parity and higher social acceptability. Energy 'sustainability' component is the 'Game Changer'. Sustainable, reliable, environment friendly, affordable, and clean energy is a challenge for many nations. Energy access, human development, and environmental sustainability are co-related. Therefore, current energy policies across the globe are driven by making clean energy available, accessible, and affordable to all citizens.



Growing industrialisation leading to greater urbanization and environmental pollution creates detrimental effect on climate, human health, and natural environment. Therefore, India is striving hard to find a better path to: lower carbon emission, increase economic growth, push green manufacturing, transport and mobility and it aims to achieve sustainable development by 2035.

Growing affinity for sustainable energy offers multiple opportunities including diversification into petrochemical business, battery manufacturing, electricity charging, and many other ancillary activities. Green field refinery projects are clearly aiming for petrochemical product maximisation—a fundamental change in approach.

Companies like Indian Oil and NTPC are setting up charging stations—which only proves sustainability expanded the scope of business for conventional energy companies. As per NITI Aayog, India would need EV batteries cumulative capacity of 3,500 GWh by 2030, which means the battery market would be \$300 billion worth. It is projected that India's annual battery requirements would touch 800 GWh by 2030 -- equivalent to 23 gigafactories of Tesla. Further, looking at the massive opportunities India's conventional energy companies may get into battery business soon.

There are plenty of risk takers in the energy industry and beyond to convert challenges into opportunities. India's intellectual capital and industry captains will be fully aware of the challenges highlighted and objectively assessing the emerging business opportunities.

Save Energy. Save Money. Save the Planet