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INNOVATING ENERGY

Smart Cities: A vital component of India's efforts for a sustainable future.

Inside Stories

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Top energy trends from India & across the globe

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Editor's Note

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Dear Reader,

India's efforts in energy conservation have been commended globally and the world is acknowledging the leadership India is demonstrating in energy efficiency through its simple, transformative, and cost-effective solutions. India's Smart Cities Mission is one such solution which aims to promote cities that provide core infrastructure and give a quality life to its citizens, while enabling a clean and sustainable environment and application of 'Smart' Solutions."

Smart Cities require an integration of all energy uses, as well as a robust, reliable, and secure communication infrastructure to track and collaborate in time and space across the energy value chain. Smart meters play a key role in enabling this transformation. Smart meters are the first step towards the creation of a smart grid, as they enable a two-way communication between the DISCOM and its consumer. A smart grid provides the requisite infrastructure for enabling new energy business models for smart cities. Electric mobility is another major aspect of smart, efficient, and low-carbon transportation that will be crucial for Smart City aspirations. While the Indian Government has announced financial support for EVs and the charging infrastructure which is the hitherto-missing link, now being addressed. There are other key aspects to the smart cities mission – such as scalable sustainable cooling solutions and smart LED lighting infrastructure. This edition of EESL's newsletter, themed '**Smart Cities: A vital component of India's efforts for a sustainable future**' seeks to deep dive into all of these aspects of smart cities.

In '***Digitalisation along with smart metering programme is a critical solution for turning around the utilities***' we delve into how a digitalisation drive, supported by large scale adoption of smart metering can enable transformation for the power utilities in the country. In the article '***Robust EV charging infrastructure will drive India's progress towards sustainable mobility***,' we shine the spotlight on how the combined efforts of the government, the private sector, and start-ups can help India in figuring out a holistic approach for ushering its people into an era of sustainable, electric mobility. '***Smart LED Lighting: The time is right for widespread adoption***' talks about improved energy efficiency in existing buildings and the need for swift implementation of the smart LED lighting in India. "***District cooling systems: A viable solution to make cooling more sustainable***" explores the potential of District Cooling as a modern and efficient way to provide air-conditioning to clusters of buildings in cities and on campuses having high cooling density.

EESL always recommends of deploying EVs for public transport and availability of public charging stations as crucial identity pointer for Smart Cities. In similar view, encouraging use of Energy Efficient Equipment will be a formative step for facilitating at least 20% of generation from local renewable sources of energy will complete the energy ask for smart city. Another step for achieving environmental sustainability is promoting Energy Efficient and Green Buildings – up to the momentum of at least 80% – in order to meet or exceed our NDC targets. We also believe that India's startup ecosystem is an integral part of its socio-economic development. Therefore, EESL has proposed availability of adequate social infrastructure in the form of incubation centers, the objective of which will be to support and encourage effective functioning of startups.

The smart cities of the future have to be extensively interconnected and technologically enabled for end user collaboration. Smart, IoT backed solutions, across sectors such as cooling, power generation, transportation and lighting will be integral for smart cities. The amalgamation of technology and energy has potential to drive India's smart city mission as shining example of sustainable development, when supported by congruence of all stakeholder's goal.

Digitalisation along with smart metering programme is a critical solution for turning around the utilities

Anil Rawal
MD & CEO
IntelliSmart

Digitalisation provides viable solution for improving Discom efficiency in at least four ways: next level of operational control through informed decision making and remote operations; improving network efficiency through better forecasting and planning of resources; delivering new level of experience to consumers; and extending the operational lifetime of assets. As per IEA estimates, overall savings from these digitally enabled measures could be in the order of USD 80 billion per year over 2016-40, globally. Such digital technologies that drive efficiencies at Discom level include but are not limited to smart grid, Advanced Metering Infrastructure (AMI), substation automation, Internet of Things (IOT) based interventions, advanced data analytics through Artificial Intelligence/Machine Learning for better operational and commercial efficiencies.

Conventionally, some private entities/utilities have been entrusted with the responsibility of undertaking digitalisation for improving performance of area under their control. However, since privatisation has seen limited success in the past, the digitalisation also has not moved much in India. Hence, need of the hour is to enable digitalisation as a supplementary initiative along with smart metering across all utilities in the sector.

Smart Metering forms the backbone of digitalisation

The smart combination of IT and operational technology has enabled fast-paced implementation under smart meters program of RDSS. Smart meters combine the benefits of real time 2-way data communication for better decision making with remote operations through connect/disconnect capabilities. Realising the plethora of advanced capabilities that smart meters provide, Power Ministry targeted to install 250 million smart meters across the country. The DBFOOT model provides value proposition to the Discoms and consumers by ensuring benefits of scalability, reliability, efficient control, and economies of scale resulting in cost-effective implementation.

While large scale bidding is underway, the Power Ministry's vision needs to be realised by the Discoms in its true spirit as many states that have recently launched tenders have chosen to make serious deviations from the SBDs. Such deviations include but are not limited to restriction to participation by large-scale developers, structuring of contracts with one-sided provisions such as complete absence of Discom Event of Default clause, absence of provision of appropriate payment security mechanism, no assurance on timely payments, Discoms' failure to make payment or non-maintenance of payment security not provisioned as Event of Termination, irrational termination payments, etc. Furthermore, there are many Discoms that still prefer capex mode with small-scale projects risking digital islanding through small pockets of differential smart metering solutions. This jeopardises all efforts of implementing seamless smart metering solutions. Hence there is an imminent need to guide the Discoms for implementing smart metering solutions in BOOT model under the aegis of SBDs.

Need to co-opt the data analytics and artificial intelligence with the RDSS programme

Smart meters provide humongous quantum of invaluable data related to various insights about consumption patterns to the utilities. The deeper analysis of the data through applications of Artificial Intelligence and Machine Language can draw various operational and consumer-oriented conclusions, having potential for enhanced revenue profiles for utilities and various value-added services for consumers. Data Analytics can enable flexible and efficient consumption of electricity, improved visibility of network use, and enhanced control of power systems.

The other critical application of Data Analytics is in predictive and reactive theft detection of electricity by errant consumers. The application of data analytics includes more efficient and cost-effective network asset management, billing insights and demand forecasting. Digitalisation and Data Analytics are complimentary to each other and collectively offer significant upside to the utilities while implementing smart metering program under RDSS programme. For realizing the gains of digitalisation, a parallel programme needs be run along with RDSS on data analytics and artificial intelligence applications. This apparently is under active consideration by the government and can hoped to be implemented soon. Smart metering along with digitalisation drive would be a complete package of transformation for the power utilities in the country.

Robust EV charging infrastructure will drive India's progress towards sustainable mobility

N. Mohan
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Convergence Energy Services Limited (CESL)

Electric mobility is widely acknowledged across the world as an important solution for addressing the issue of climate change. India supports the Global EV30@30 campaign, which aims to increase electric vehicle (EV) sales to account for at least 30% of the total vehicle sales by 2030. The Indian Government is eyeing EV penetration of 30% for private cars, 70% for commercial vehicles, and 80% for two-wheelers and three-wheelers by that time. These are commendable goals because, as per a report by the State of Global Air (SoGA) initiative, India, the world's fourth-largest automobile market, is home to 18 of the 20 cities that recorded the highest increase in PM2.5 pollution between 2010 and 2019. A sizeable percentage of this pollution is caused by vehicular exhaust from India's large and growing transportation sector.

Discouraging the use of personal vehicles and promoting maximum use of public transportation is one of the ways to curb air pollution. This should be accompanied by the electrification of public transport vehicles such as buses. Many states have formulated EV strategies and set targets for themselves along these lines. Bihar, for instance, is aiming for 100% e-mobility by 2030. Uttar Pradesh is looking at 100% electrification of public transport on green routes. Haryana seeks to convert 100% of its buses into e-buses by 2029, while Uttarakhand is aiming to electrify its entire public transport by 2030. Convergence Energy Services Limited (CESL) plans to deploy 50,000 electric buses in phased manner in India in partnership with the State Transport Undertakings and has already concluded tenders for as many as 5,450 electric buses through demand aggregation, wherein 5 participating cities subscribed to 5450 e-buses under Grand Challenge. Discovered prices in the Grand Challenge are 27% lower than diesel (without subsidy) and 23% less than CNG.

Electrifying public transportation is, however, only one part of the solution. The other, bigger, and more challenging part is to drive adoption of private electric vehicles among citizens. Lack of adequate EV charging infrastructure is perhaps the biggest impediment that deters EV adoption by consumers. Presently, EV charge point operators are unwilling to install charging points unless there is large-scale demand for it, whereas consumers are reluctant to buy EVs unless there is widespread availability of professionally operated and well-maintained charging stations. Policymakers and the industry need to work together to break this deadlock.

Although the government has already introduced several schemes and programs to promote the development and establishment of EV charging infrastructure, more can be done to achieve results at the desired scale and pace. Existing gas stations can, for instance, be modified to include EV charging points. Fast-chargers can also be set up in the parking lots of malls, cinemas, restaurants, hotels, and public parking lots. A positive step in this direction, the central government is working to amend FAME-II policy to offer a subsidy for private companies looking to set up EV charging hubs in India. CESL, meanwhile, aims to set up 810 EV charging stations across 16 highways and expressways covering 10,275 kilometres across the country, through a service procurement model, wherein private companies will invest in and operate these charging stations.

Indeed, public-private-partnerships can prove highly effective in building out a robust, nationwide network of public EV charging stations. In a move that should give a boost to interested private players, it has already been clarified that EV charging stations will not require separate license for electricity transmission, distribution, or trading under Electricity Act 2003. As EV usage grows in India, we will need smart charging solutions that can adapt to the different power capacities that are available in buildings and support the power grid as it includes an increasing percentage of renewable energy in the coming years. EV charging infrastructure must be interoperable and standardized and should have transparent pricing and payment mechanisms. There is a huge opportunity for established players and startups alike to come up with innovate products, services, and solutions to address such aspects. With the combined efforts of the government, the private sector, and startups, India will be able to figure out a holistic approach for ushering its people into an era of sustainable, electric mobility.

Smart LED Lighting: The time is nigh for widespread adoption

Soumya Prasad Garnaik
Lead (EE) & Green Investment Specialist
GGGI

With the COP 26 concluding last October, the conversations around energy efficiency and emission reduction gained even more significance. Ahead of COP 26, the International Energy Agency was working with the UK Government through the Super-Efficient Equipment and Appliance Deployment (SEAD) initiative, with the aim to coordinate and improve international action on product energy efficiency. The UK is also spearheading the COP26 Product Efficiency Call to Action, which seeks to double the efficiency of key global products by 2030, with a focus on four major energy-consuming products: air conditioners, refrigerators, lighting and industrial motors systems. The invent of LED technology has revolutionized the lighting market since last 5 years. More promising roads lie ahead in this space. Energy Efficiency Services Limited's massive programme on domestic LED lighting (UJALA) and Street Light National Programme (SLNP) are not only the testimony of true market transformation, but also changed the lives of millions of people in India.

The automation of devices and systems are changing the lives of ordinary people gradually. Present devices and systems are smarter than their previous counterparts, nowadays smart LED systems employ the recent advancement of modern technologies. The importance of smartphones and other mobile devices undoubtedly have grown over time. These technologies have already become the control hub for our everyday lives, enabling us to work on the go and manage our daily lives through social media. Lighting has become just one other part of our lives which we can now control through smart devices. With just the touch of a button, we can automate our home lighting, control lights with app or voice, or set routines to make it look we're at home even when we're not. A smart LED lighting system is an essential part of a smart building - "The main goal of a smart LED lighting system is to achieve energy saving without sacrificing the visual comfort of the occupants."

Energy efficiency has to be considered as a continuous process that does not include only one-time actions to avoid excessive use of energy and to minimise energy losses, but also includes monitoring and controlling energy consumption with the aim of achieving minimal energy consumption level. Coming to Lighting efficiency, smart LED lighting can be considered as the advanced energy efficiency technique. We all want to spend less money, use clean energy, and safeguard our planet. Smart LED lights saves money by reducing energy consumption and will improve the comfort and convenience of our homes. Therefore, improved energy efficiency in the existing buildings need to be promoted more and implementation of the smart LED lighting can be considered as a need of the hour for achieving additional carbon reductions.

With all this positivity around smart LED lighting, the major concern still lies with affordability. Rapid deployment of smart LED lighting system will create critical mass in the market that may help lower technology costs. Apart from this, the indigenous manufacturing of smart LED lighting may also play a crucial role in cost reduction. But we need a good business model to link it with the monetized energy savings so that more and more energy servicing companies come forward to invest. No doubt, the smart LED market is very large and promising in India – what we need now is concerted efforts to create demand through promotional policy, awareness and deployment mechanism. And, super-ESCOs like EESL would have to play a vital role in this endeavor!

District cooling systems: A viable solution to make cooling more sustainable

Arijit Sengupta
Director
BEE

District cooling is the modern and efficient way to provide air-conditioning to clusters of buildings in cities and on campuses having high cooling density. District cooling is one of the three main systems for air-conditioning. The most localized of them is conventional window units or split systems. These provide air-conditioning at the level of a single room, apartment unit, or small building. Large buildings use another system, central air cooling or water-cooled chillers. These tend to be placed on a building's roof or in the basement. The least localized system is district cooling, in which a central plant supplies chilled water through a network of pipes to multiple buildings within a local area. District cooling features two significant differences when compared to more localized systems. First, the network of pipes that circulate chilled water from the central plant to buildings is an important additional cost. Second, district cooling consumes water. Though the amount of water consumed is relatively small because of closed-loop operation, there is a possibility of using treated sewage effluents as water supply which can limit the building's fresh water usage.

District cooling offers the following benefits:

- Low energy requirements: District cooling typically consumes 40-50% less energy for every refrigeration tonne hour (TR-h) than conventional in-building technologies. This advantage stems partly from the more efficient chiller technology used in district cooling. It also comes from district cooling plants' ability to maintain a steady level of efficiency over time, because of their specialized operations and maintenance. By contrast, conventional cooling units tend to undergo marked efficiency degradation.

- More efficient capacity use: District cooling typically needs around 15% less capacity for the same cooling loads than distributed cooling systems at the unit level. Unlike conventional air-conditioning, district cooling has two advantages that make it more efficient in capacity deployment: First, a district cooling system tends to serve diverse loads—such as residences, offices, and commercial establishments—that do not require simultaneous cooling. District cooling is more efficient because it aggregates peak demand from these diverse loads. By contrast, single-building systems have to be designed to meet each building's peak energy needs. The difference is substantial. Aggregated peak loads can be up to 25% less than the sum of all individual peak loads. Second, district cooling is also flexible in its capacity design and installation. The central cooling plant can incrementally increase its capacity to match growing loads. By contrast, the capacity of single-building cooling systems is rarely adjusted once the building has been constructed. Given this lack of flexibility, property developers are usually generous in determining the capacity of in-building systems, allowing a broad margin of error. As a result, it is common for single-building cooling systems to have an excess capacity of 30-50%.

- Peak-period saving potential: District cooling offers a thermal storage capability that can smooth out power requirements over the course of a day, thereby reducing the strain on the power system at peak hours and providing the much-needed grid flexibility. District cooling systems can store up to 30% of potential output by holding ice or chilled water in tanks. By contrast, in-building systems impose their full load on power systems at peak times.
- Other benefits: District cooling systems are quieter than conventional cooling. It is also more visually appealing because it is located remotely rather than on the roof of a building. The allows property developers to have more flexibility in the use of space. They can, for instance, install rooftop pools or penthouses in place of unappealing chilling equipment.

Despite these advantages, non-aggregated development decisions constitute a significant barrier to greater adoption of district cooling systems. District cooling should be made an essential element of urban planning. A systematic approach needs to be taken to assess the suitability of district cooling in all new developments, simultaneously with urban planning.

TOP ENERGY TRENDS FROM INDIA & ACROSS THE GLOBE

Amazon announces first utility-scale renewable energy projects in India

Amazon has announced three new solar farms in India with a combined energy capacity of 420 megawatts (MW) as it aims to use 100% renewable energy across its business by 2025. Globally, the company had announced 71 new renewable energy projects bringing an additional 2.7 gigawatts (GW) of clean energy capacity. The three Indian projects include a 210 MW project to be developed by ReNew Power, a 100MW project to be developed by Amp Energy India, and a 110MW project to be developed by Brookfield Renewable.

Govt working to develop electric highways powered by solar energy: Nitin Gadkari

Union road transport and highways minister, Shri Nitin Gadkari said the government is working on developing electric highways, which will be powered by solar energy, that will facilitate the charging of heavy-duty trucks and buses. While addressing an event organised by the Indo-American Chamber of Commerce (IACC), the Union Minister emphasised that a well-developed infrastructure enhances economic activities, creates new businesses, and promotes job creation, noting, "we are constructing 26 greenfield expressways."

Investment of $1tn a year needed for 2030 climate goals; Report finds

Annual investments of about $1tn in renewable power and up to $130bn in hydrogen by 2030 are needed to avoid the catastrophic effects of climate change, according to the research jointly published by the International Energy Agency, the International Renewable Energy Agency and the UN, ahead of the COP27 climate summit in November. The report calculated the world would need to add four times the amount of renewable energy that was deployed in 2021 every year by 2030, and drastically scale up hydrogen production to reach net zero emissions and stem global warming from burning fossil fuels.

Reliance to acquire majority stake in this US-based solar energy software maker SenseHawk

Reliance Industries has signed agreements to acquire a majority stake of 79.4 per cent in SenseHawk, a service provider for the solar energy generation industry. Founded in 2018, SenseHawk is an early-stage California-based developer of software-based management tools for the solar energy generation industry. SenseHawk helps accelerate solar projects from planning to production by helping companies streamline processes and use automation. SenseHawk has helped over 140 customers in 15 countries adopt new technology for their over 600 sites and assets totaling over 100 gigawatts.

India plans to become green hydrogen giant to cut energy imports

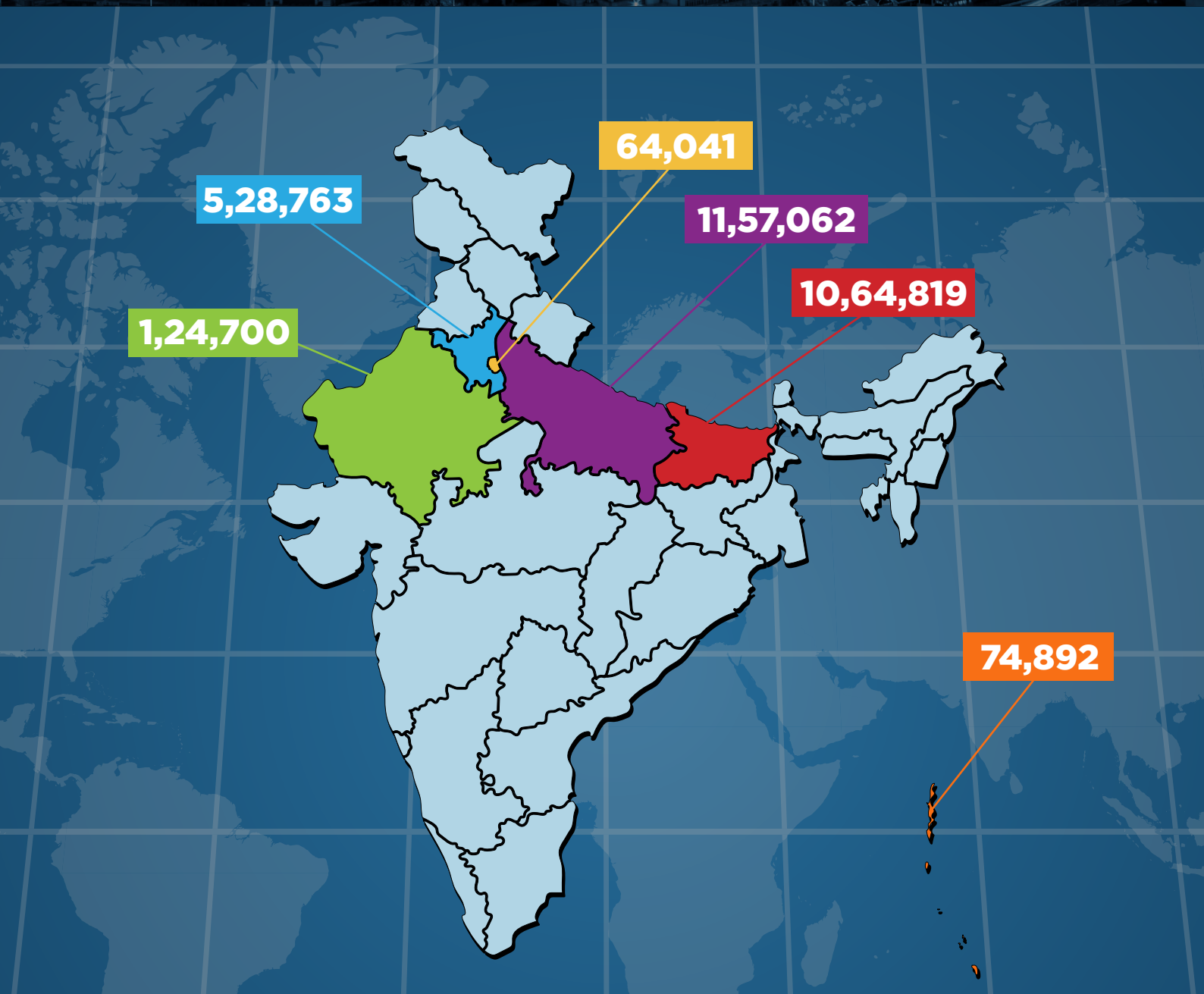
India is planning a massive expansion of green hydrogen production to curb its dependence on energy imports and to wean the economy off fossil fuels to meet climate targets. New Delhi is aiming for an annual production capacity of 25 million tons by 2047, according to people familiar with the plans who didn't want to be named as the information is not yet public. However, the number could change going forward, depending on technology and the country's demand outlook. Green hydrogen is widely expected to play a major role in decarbonizing heavy industries, including oil refineries, steel mills and fertilizer plants. India's current output of the fuel is very low and comes from a handful of pilot projects.

Adani Transmission rolls out a first-of-its-kind initiative to become net-zero by 2050

Adani Transmission Ltd (ATL), the country's private power distribution company and the transmission arm of Adani Group, has rolled out a first-of-its-kind initiative to achieve a net-zero target by 2050. The company has also committed to reducing its absolute scope 1 and scope 2 Green House Gases (GHG) emissions by 72.7% by FY2032. Scope 1 emissions are direct greenhouse emissions that occur from sources that are controlled or owned by an organisation such as emissions associated with fuel combustion in boilers, furnaces, and vehicles. Scope 2 emissions are indirect emissions associated with the purchase of electricity, steam, heat, or cooling.

Milestone

Successfully installed 3 million smart meters!

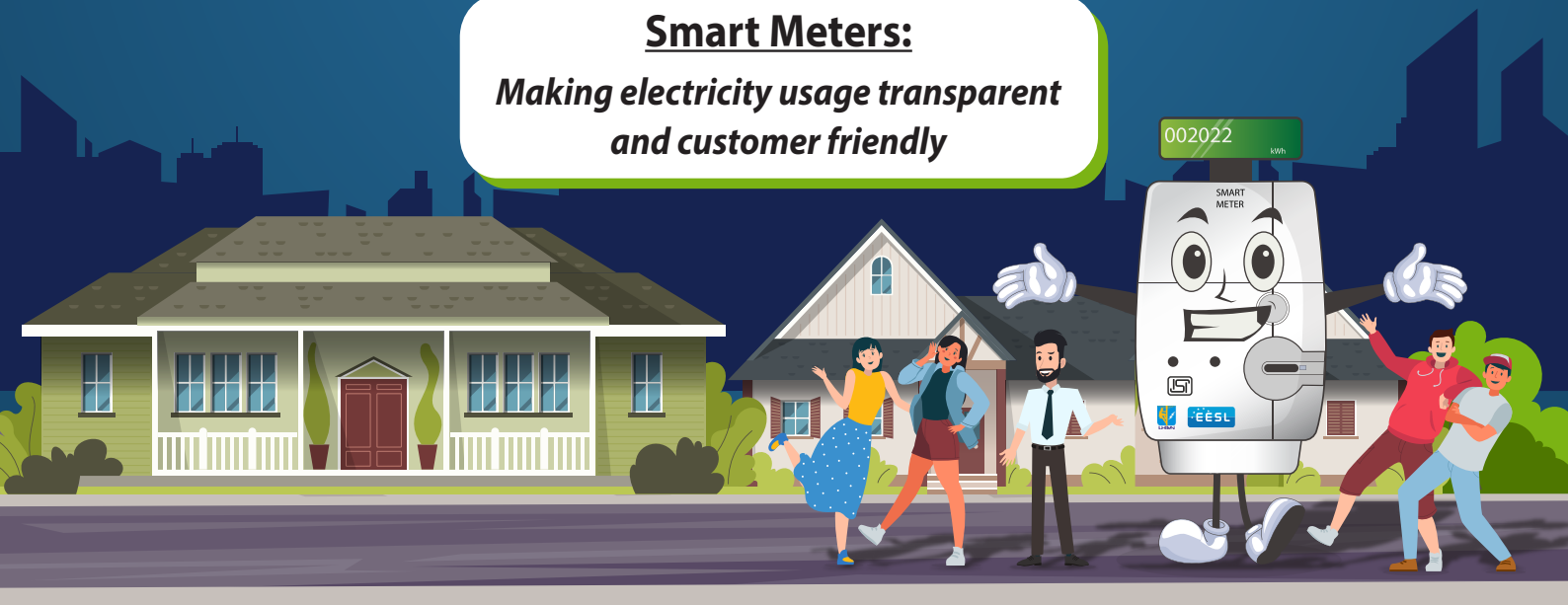


Workshop on an 'Evidence-Based Cooling Strategy' for India

Modern Energy Cooking Forum 2022

Smart Meters:

Making electricity usage transparent and customer friendly



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