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

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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

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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

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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.