



ENERGY EFFICIENCY SERVICES LIMITED

A JV of PSUs under Ministry of Power, Government of India

INNOVATING ENERGY

Building an energy independent India

August 2024



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Editor's Note

By

Mr Nitin Bhatt,
Deputy General Manager,
Sales & PR, EESL



Dear Readers,

As our nation marches on towards the ambitious goal of becoming 'Viksit Bharat' by 2047, the concept of energy independence has taken on new significance. This vision, intertwined with the global push for carbon neutrality, reflects the nation's deep commitment to mitigating the impacts of climate change. Through the innovative use of clean technologies and renewable resources, India has not only advanced in its quest for energy efficiency but has also redefined its energy landscape with the emergence of green buildings. These developments are a testament to the country's relentless drive towards sustainability, balancing economic growth with ecological preservation.

Over the past few decades, India has demonstrated remarkable leadership in crafting a sustainable energy future, supported by visionary policies and cutting-edge technologies. As we celebrate India's Independence Day, this edition of our newsletter, themed "Building an Energy Independent India," explores the multifaceted approaches our nation is adopting to embrace cleaner energy solutions and promote mindful energy consumption.

In our feature article, 'India needs energy-efficient cooling solutions to augment its sustainability

goals', we discuss the critical need for sustainable cooling solutions and the role of innovative business models and public-private partnerships in making energy-efficient cooling appliances widely accessible and affordable. The article 'LEDs illuminate the way to a brighter future for India' highlights how LEDs are paving the way for India's leadership in environmentally and economically sustainable lighting.

In 'EESL's heat pumps: A leap towards carbon neutrality in extreme climates,' we delve into the potential of heat pumps as highly energy-efficient alternatives to traditional heating and cooling methods, offering significant cost savings over their lifetime. Finally, 'Ushering in independence from indoor pollution with electric cooking' explores the benefits of electric stoves in both residential and commercial kitchens, emphasizing their safety, convenience, and eco-friendliness.

Through collective efforts, we can all contribute to a more sustainable future. I hope this edition serves as inspiration for your journey towards a greener, more sustainable world. Let's celebrate the spirit of sustainable independence not just this month, but every day.



Energy efficiency is a key element of India's quest for energy independence



Energy independence is one of the key elements of the Indian Government's goal of a Viksit Bharat by 2047. Presently, India imports a very large percentage of its oil and industrial coal requirements. Efforts towards energy independence should therefore include significant investment in renewable energy, electric vehicles, green hydrogen, and indeed energy efficiency. Energy efficiency can support energy security by reducing energy demand, which in turn will reduce imports. Much of India's infrastructure is yet to be built, and it is essential to ensure that most of it is not only powered by renewable energy but is also energy-efficient. This is the responsibility of not just governments and civic authorities but also industries, institutions, and consumers. At the simplest and most basic level, each of us can contribute to energy independence by using energy-efficient appliances in our daily lives.

Energy efficiency begins at home

Most of the fans used in India – whether in homes or commercial establishments – are not energy-efficient. By simply switching to 3-Star or 5-Star rated fans, one can reduce energy consumption by 40-65 percent. Air conditioners, the other commonly used cooling appliances, too, are available in energy-efficient variants. There is also a government scheme underway that offers super-efficient inverter split air conditioners that yield significantly higher energy savings than other energy-efficient air conditioners available in the market. Using solar-powered cookstoves and induction cooktops in the kitchen can not only make cooking faster but also reduce indoor air pollution and bring down your electricity bills.

Bringing energy efficiency to civic infrastructure and buildings

Lighting is an essential element of almost all constructions. Using LED bulbs instead of compact fluorescent lamp (CFLs) or ordinary ICL bulbs can yield huge energy savings; the Unnat Jyoti by Affordable LEDs for All (UJALA) programme

CEO's Desk

By

Mr. Vishal Kapoor
CEO, EESL



implemented by EESL testifies to this. More than 36 crore LED bulbs have been distributed since 2015 under this scheme, and they have saved 47,88 million kWh of energy annually. Similarly, the 1.338 crore LED streetlights installed under the Streetlight National Programme have reduced CO2 emissions by over 6.19 million tons, and reduced energy consumption by 8989.66 MUs per year. Meanwhile, retrofitting the air conditioning systems in old buildings – which were not designed for high levels of ventilation or filtration anyway – can improve not only energy efficiency but also indoor air quality and thermal comfort. A programme in this direction is already underway across India. Energy audits of thousands of buildings thus retrofitted so far have indicated energy saving potential of 30-50 percent.

How industries and communities can motor towards energy efficiency

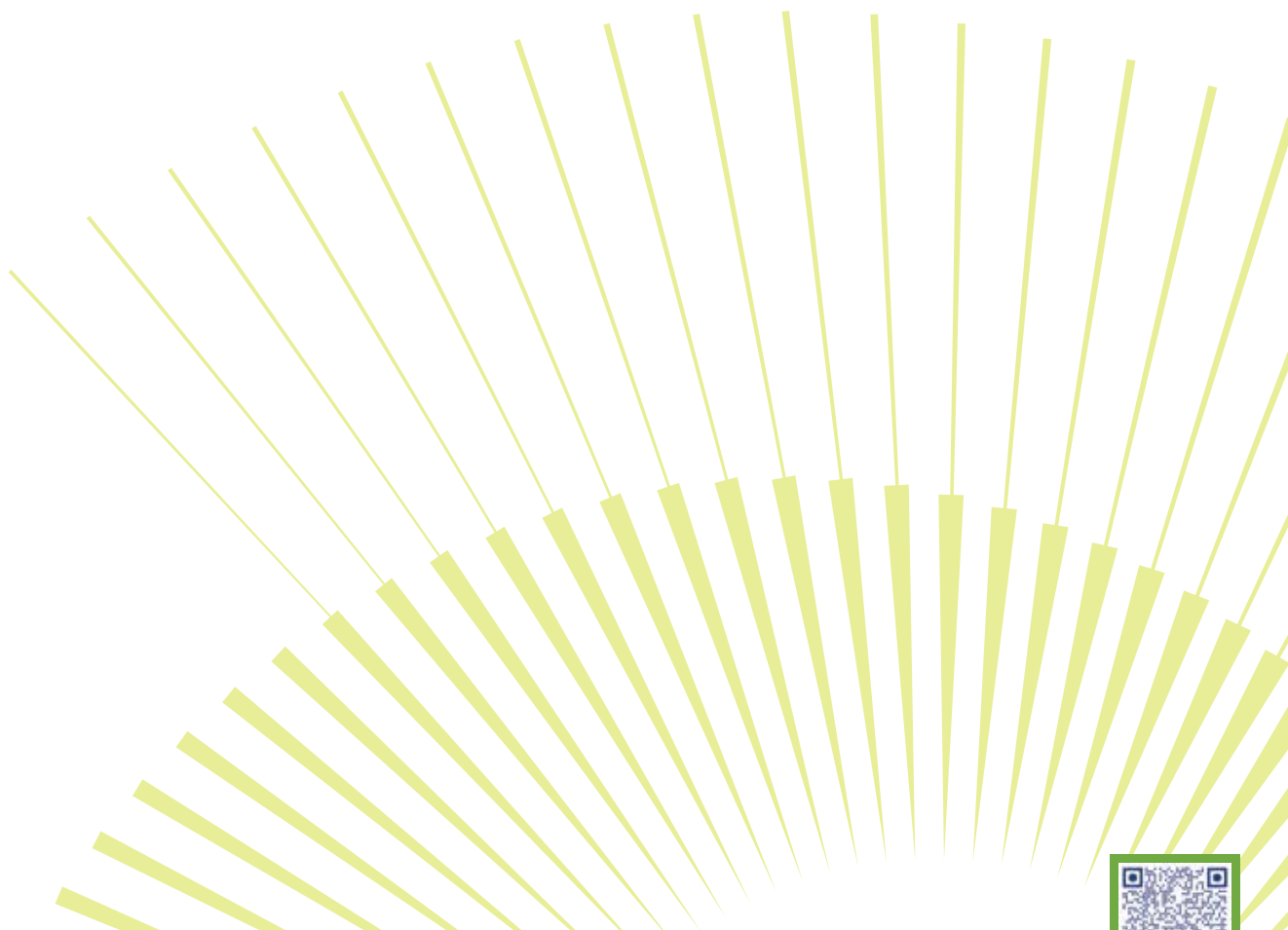
Electric motor systems account for about 28 percent of India's total electricity consumption. Like most electrical appliances that have been used for decades, they too have a low energy efficiency quotient. High-efficiency IE3 motors can not only decrease energy consumption but also improve the

competitiveness of the business. Even farmer communities can join the energy efficiency movement by using BEE 5-star energy-efficient agricultural pumps. Widespread adoption of such motors calls for creating a robust ecosystem, finding innovative financing models, and adopting 'demand aggregation' and 'bulk procurement' approaches – something that EESL has successfully pioneered for LED bulbs.

Digitalization of power supply and distribution

As India digitalizes its energy grid, a combination of Advanced Metering Infrastructure (AMI), and data analytics and Artificial Intelligence tools will enable grid operators to manage the demand side of energy and improve the operational efficiency of discoms. Consumers, on their part, will have greater visibility into, and control over, their energy consumption.

Energy saved is energy gained, and energy efficiency is as important as energy generation. We can, and must, become a part of India's progression towards energy independence. It is a battle wherein each one of us will have to become a climate warrior.



Ushering in independence from indoor pollution with electric cooking

As a home chef, father, husband, and the COO of V-Guard, I am deeply concerned about the persistent issue of indoor air pollution in India. Even as we make rapid advancements on many socioeconomic fronts, indoor air pollution continues to be a worry in many parts of India, where large sections of the population use wood, biomass, and fossil fuels for everyday cooking and heating purposes. This practice not only poses significant health risks but also contributes to our country's greenhouse gas emissions.

The statistics are alarming: household air pollution causes up to 0.8 million premature deaths in India annually. The average pollution level in Indian kitchens is more than $1000 \mu\text{g}/\text{m}^3$, far exceeding the WHO-prescribed acceptable level of less than $15 \mu\text{g}/\text{m}^3$. Even conventional gas stoves, widely used across the country, produce small amounts of carbon monoxide.

At V-Guard, we believe that electric cooking is a powerful solution to this challenge. E-cooking not only reduces indoor air pollution but also aligns with several Sustainable Development Goals (SDGs), including good health and well-being, gender equality, sanitation, affordable and clean energy, and climate action.

Electric stoves are a great option for both home kitchens and commercial food establishments. They are safe to use, easy to clean, and allow for greater control over the cooking temperature. They are also more energy-efficient than gas stoves. Among the available types of electric stoves, the induction range is by far the cleanest and the most energy efficient. The energy efficiency of induction cooktops is around 5-10% more than that of conventional electric stoves and thrice more than that of gas stoves. Induction stoves also heat the food faster, translating to cost savings of 25-30% as compared to conventional cooking methods.

We commend the Government of India's initiatives, such as the Pradhan Mantri Ujjwala Yojana (PMUY) and promoting piped natural gas and electric cooking through the "Go-Electric" campaign. These



By
Mr. Ramachandran Venkataraman,
COO, V-Guard Industries

efforts have laid the groundwork for a cleaner cooking future and at V-Guard we want to now build on these initiatives and help in fulfilling India's "Mission Life".

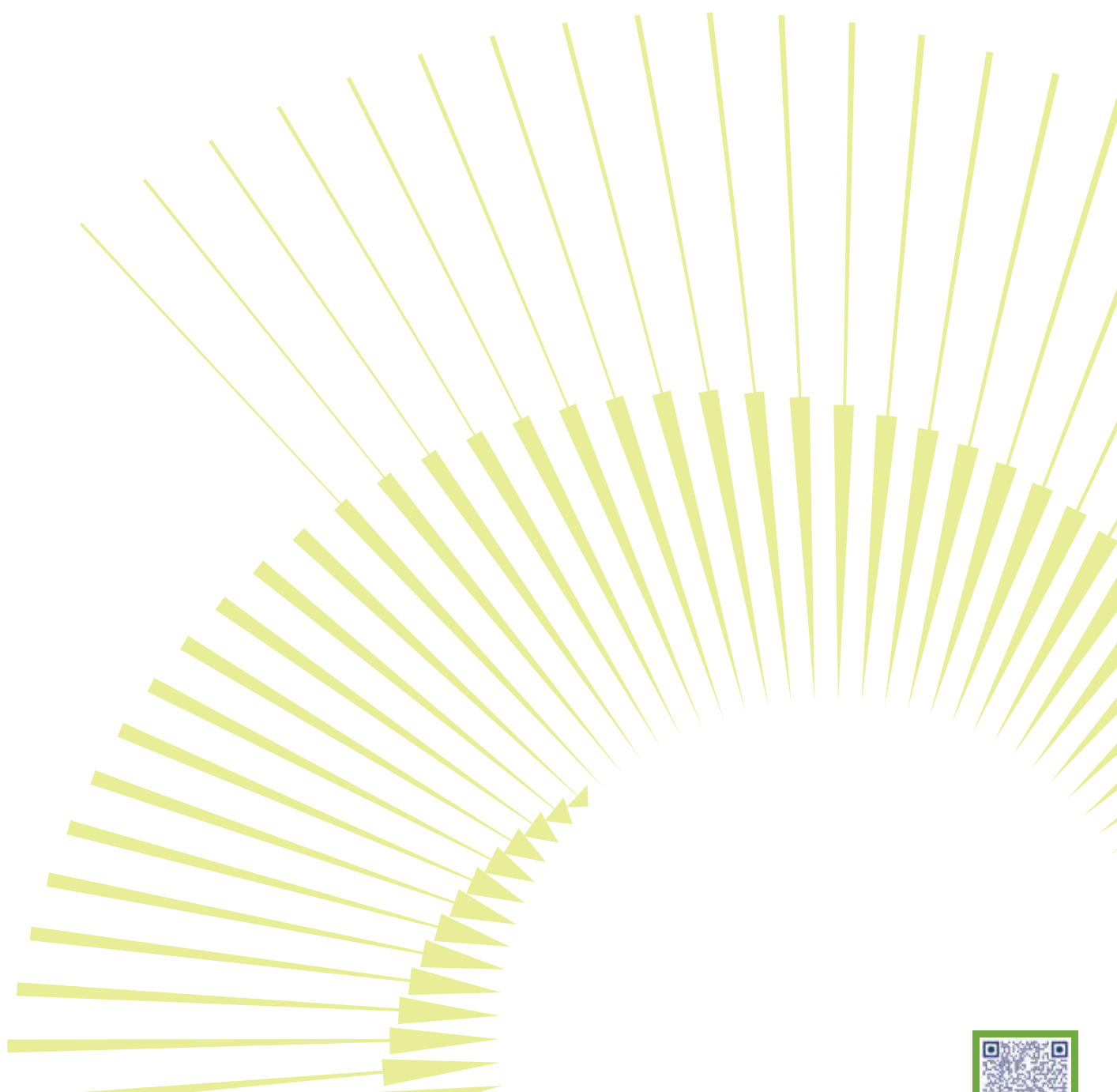
However, with only 3% of rural households and 10% of urban households currently using some form of e-cooking, there is immense potential for growth. To realize this potential, V-Guard is committed to investing in R&D to develop affordable, energy-efficient e-cooking solutions for both rural and urban households. We aim to bridge this accessibility gap by exploring pioneering innovations that make e-cooking solutions widely accessible and cost-effective for all.

We fully support EESL's National Efficient Cooking Programme and their plans to distribute 20 lakh induction cook-stoves across the country. Additionally, we are excited about the potential of solar-based induction cooking solutions for rural and semi-urban areas.



As a leader in the consumer electrical and electronics industry, V-Guard is dedicated to driving the adoption of electric cooking across all socioeconomic strata. We believe that this simple lifestyle change can significantly contribute to reducing indoor pollution, decarbonizing India's energy use, and mitigating the effects of climate change.

Join us in this mission to create a cleaner, healthier future for our nation. Together, we can usher in a new era of independence from indoor pollution through electric cooking.



LEDs illuminate the way to a brighter future for India

High-quality illumination is essential for ensuring safety and livability of all types of human establishments – residential, civic, industrial, and institutional. Reliable, environment-friendly lighting infrastructure should therefore be an integral component of all plans aimed at India's social and economic development. Today, a large part of India's lighting needs is met through light bulbs. In recent years, amidst growing awareness about the need for energy efficiency and smarter power consumption, Light Emitting Diode (LED) lights and bulbs have come to the fore. By virtue of being up to 75% more energy-efficient than incandescent and compact fluorescent (CFL) bulbs, LEDs can enable smarter electricity access while reducing carbon footprint. They are increasingly becoming the preferred choice in many industrial, commercial, and domestic applications.

A 7W LED bulb provides the same amount of light as a 14W CFL or a 60W ICL and saves almost 90% energy as compared to an ICL and 50% as compared to a CFL. A LED bulb consumes one unit of electricity when it is used for 140 hours, as compared to two units by a CFL and nine units by an ICL. In terms of operating cost, this translates to INR 4 for a LED bulb, INR 8 for a CFL, and INR 36 for an ICL, over the same period. The annual cost of ownership of a LED is less than one-third that of a CFL and one-tenth of an ICL.

LEDs can also help in reducing mercury pollution. In 2018, India committed to phasing out mercury-based fluorescent lighting products by 2025. In the five years before that, the market for LED lights in India had grown astronomically, from annual sales of 5 million bulbs in 2014 to about 670 million in 2018. The price of LEDs, meanwhile, dropped from Rs 400 to Rs 70 during this period.

Much of this growth can be credited to the Unnat Jyoti by Affordable LEDs for All (UJALA) scheme, which was launched by the Government of India in 2015. UJALA played a huge role in creating a thriving market for LEDs in India, bringing down the cost of LEDs even further and making them widely and

By
Mr. Mukesh Goel,
Director, HQ Lamps

easily accessible for the masses. The Street Lighting National Programme (SLNP), launched around the same time, started replacing conventional streetlights with smart, energy-efficient LED lights. In the years since, these programmes have enabled large-scale socioeconomic transformation and yielded significant benefits in terms of cost savings and reductions in emissions and peak demand.

The strong promotion and adoption of LEDs has helped India emerge as the world's second largest producer of LEDs. There is growing domestic demand for LEDs, driven as much by government initiatives as by the pro-environment sentiment among industrial, corporate and retail consumers of electricity across urban and rural areas. Furthermore, LEDs have potential to give a boost to India's exports, employment, and economic growth, and make India the global leader in energy-efficient lighting. The Production Linked Incentive (PLI) scheme for white goods, approved by the Government of India, will help in making LED manufacturing globally competitive and creating economies of scale.

Significant opportunities lie ahead for greater adoption of LED lighting across rural as well as urban households in India. LED lights and energy-efficient appliances can also be used in the industrial and corporate sector to improve India's overall energy efficiency quotient. The stage is well set for LEDs to illuminate the way ahead for India towards leadership in environment-and-business-friendly lighting.



India needs energy-efficient cooling solutions to augment its sustainability goals



By
Mr. Anil Kumar Choudhury,
Chief General Manager & Head
Operations, EESL

almost 15 percent.

While fans are the most commonly used cooling appliance in Indian households, air conditioners (ACs) are rapidly growing in numbers, both in homes and in commercial and public establishments. Like in the case of fans, replacing conventional ACs with

Amidst the worrisome rise in global temperatures, large numbers of people from across the world are being impacted by heat waves. It is feared that heat waves could cause 90,000 premature deaths per year by 2030 and up to 255,000 deaths per year by 2050. In India, too, the incidence of heatwaves has been increasing at a rapid pace. Summers have become so hot that cooling solutions are no longer a luxury but a necessity. Unsurprisingly, the India Cooling Action Plan estimates that India's demand for cooling solutions will increase ninefold between the years 2018 and 2037, which will contribute to a fivefold increase in energy consumption. Wide-scale adoption of energy efficiency is therefore essential for meeting India's cooling needs while minimizing the environmental impact.

Nearly 44 million ceiling fans sold every year in India, for use in households as well as several commercial and public spaces. Fans account for almost a fifth of India's residential electricity consumption. However, almost 97% of these fans are not energy-efficient (72 W) and thus lead to high energy consumption. In comparison, BLDC fans and fans with 3-star or 5-star ratings consume significantly less power (28 -32 W) India is projected to have a stock of 700 million ceiling fans by 2037-38. If these fans are energy-efficient, it will reduce the country's energy consumption by

energy-efficient variants can yield significant energy and monetary savings while providing the same levels of cooling and comfort. EESL's 1.5 TR or 1.0 TR super-efficient inverter split ACs (ISEER 5.8 / ISEER 6.2) are available at prices comparable to those of regular BEE 5-star (ISEER 5.0) and 3-star ACs in the market but offer an even further reduction in energy consumption.

At the commercial level, retrofitting old air conditioning systems can improve energy efficiency, air quality, and thermal comfort, all at once. The energy-saving potential in such cases is between 30-50 percent. EESL, under its Building Energy Efficiency Program, conducts energy audits and assessments of commercial and public buildings to identify areas of inefficiency and to provide customized solutions that optimize energy utilization. BEEP has already transformed many commercial and government establishments in India into energy-efficient complexes. A national programme for Efficient Chillers can similarly boost deployment of energy efficient chillers, ancillary equipment and automated control systems, and possibility expedite switch to higher performance standards sooner.

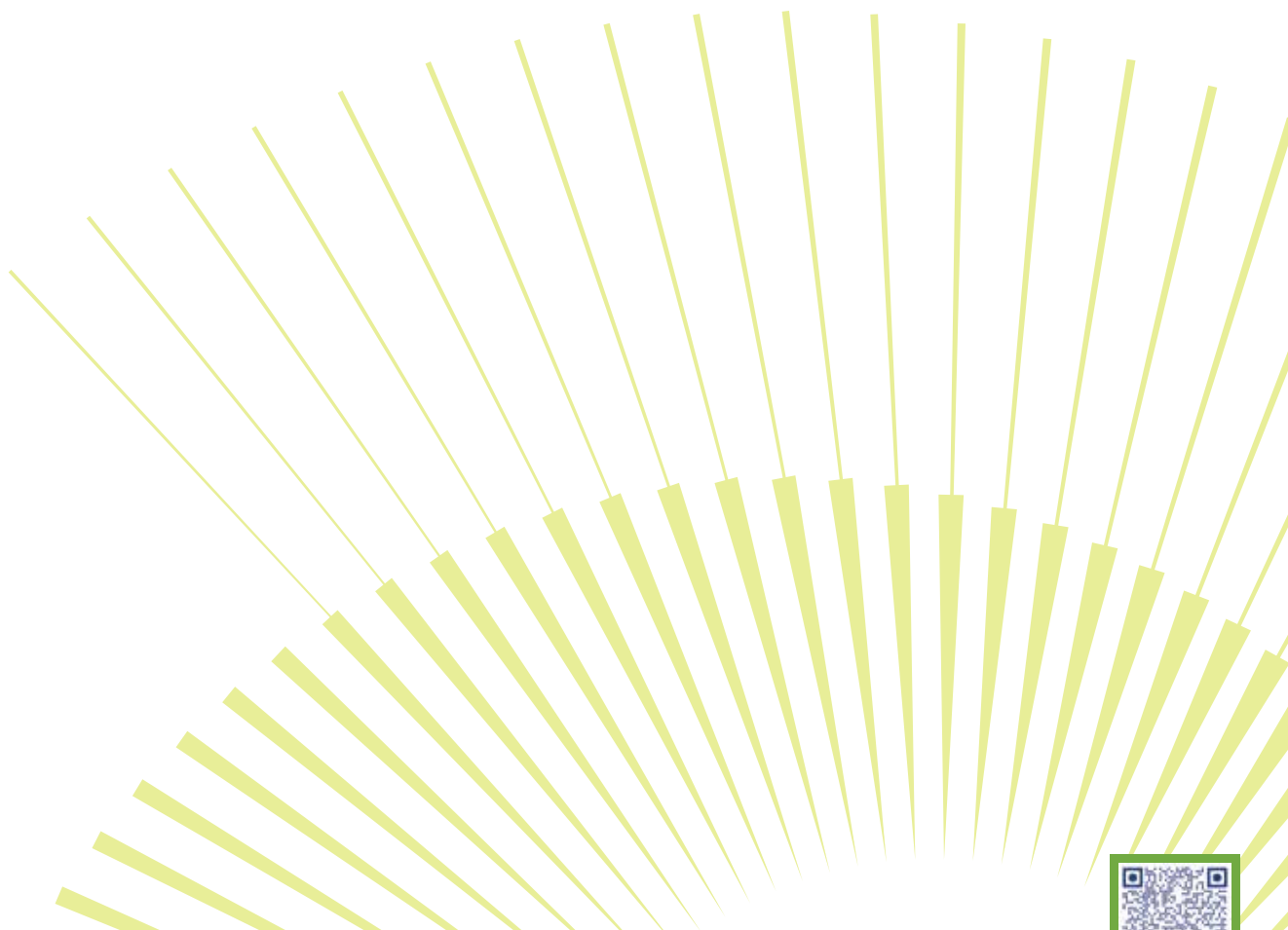
For energy-efficient cooling appliances to deliver the expected results, they should be widely



available across the country, and be affordably priced. This calls for disruptive business strategies and innovative business models based on public-private partnerships. The PPP model can open the doors for widespread development and deployment of cooling infrastructure and cooling solutions. Space cooling in India alone presents a USD 1.5 trillion opportunity by 2040, including USD 1.25 trillion for residential buildings alone.

Besides space cooling Agriculture sector has multifold requirement emanating from Cold Chain development, to arrest post-harvest loss and GHG emission due to decaying of unutilized post-harvest produce. EESL is initially targeting farm gate sector having 50% of the entire post-harvest loss in India. Solar Powered Efficient Micro Cold Storages (5 MT) programme is being launched, with pilots already underway to evolve sustainable business model.

Unlocking the potential of energy efficiency is a crucial part of combating climate change. The government can provide the policy direction and the regulatory framework, allowing the private sector to do what it does so well – innovate rapidly, bring operational efficiencies, and leverage their investment capabilities to build, strengthen, and expand the ecosystem for cooling solutions in the country. Concurrently, there is a need to foster collaboration among the public and private sectors and academia for reducing both the demand for, and the carbon intensity of, cooling. By working together, we can achieve scalability, drive down costs, and encourage innovation in energy-efficient cooling. Last, but not least, the yardsticks by which we define ‘comfort’ in indoor environments, and the ways in which we achieve it, need to be sustainable.



EESL's Heat Pumps: A Leap Towards Carbon Neutrality in Extreme Climates

The heating systems in buildings account for more than a sixth of the global demand for natural gas and a tenth of the total carbon dioxide emissions. In times when environmental considerations take precedence over almost all others, using heat pumps instead of fossil-fuel-based boilers can help us greatly reduce greenhouse gas emissions. A heat pump extracts heat from the surrounding air, geothermal energy, or water; amplifies it; and transfers it where it is needed. As there is little or no generation involved and the heat output is many times more than the energy consumed, heat pumps are much more energy-efficient as compared to boilers or electric heaters. What's more, most heat pumps can also be used for space cooling in summer. Over their lifetime, heat pumps yield significant cost savings for users.

The policies announced by the governments of several countries – especially those that have cold climates – indicate the possibility of a huge expansion in the use of heat pumps across the world. This will have the direct effect of lowering the use of gas, oil, and coal for heating. Even better, heat pumps could well replace air-conditioners for millions of people. Heat pumps thus have the potential to prevent the emission of at least 500 million tonnes of carbon dioxide by the year 2030. There are some concerns that wide-scale use of heat pumps might lead to a greatly increased electricity demand. However, this issue can be addressed through energy efficiency and demand response measures. Indeed, by combining heat pump installations with smart controls and energy

efficiency retrofits of buildings, heat pumps can become a grid asset.

There are mainly three types of heat pumps, categorized by where they draw heat from: air, water, and geothermal.

The Union Territory of Ladakh in India faces extreme cold during the winters.

Ladakh's socioeconomic development has also become one of the focus areas of the central government in recent years. EESL is planning to implement energy efficiency programs in Ladakh to make it a carbon neutral region. Under this program, EESL will provide heat-pump-based energy-efficient space heating solution to the Ladakh administration. Depending on various factors, it could either be air-based heat pumps, operating in the temperature range of in -15 degree Celsius to +10 degree Celsius, for small buildings such as offices and schools, or it could be water-based heat pumps, operating in the temperature range of -30 degree Celsius to +10 degree Celsius, for medium-sized buildings such as hostels, guest houses, and hospitals.



By
Rahul Ghube,
Senior Manager, EESL

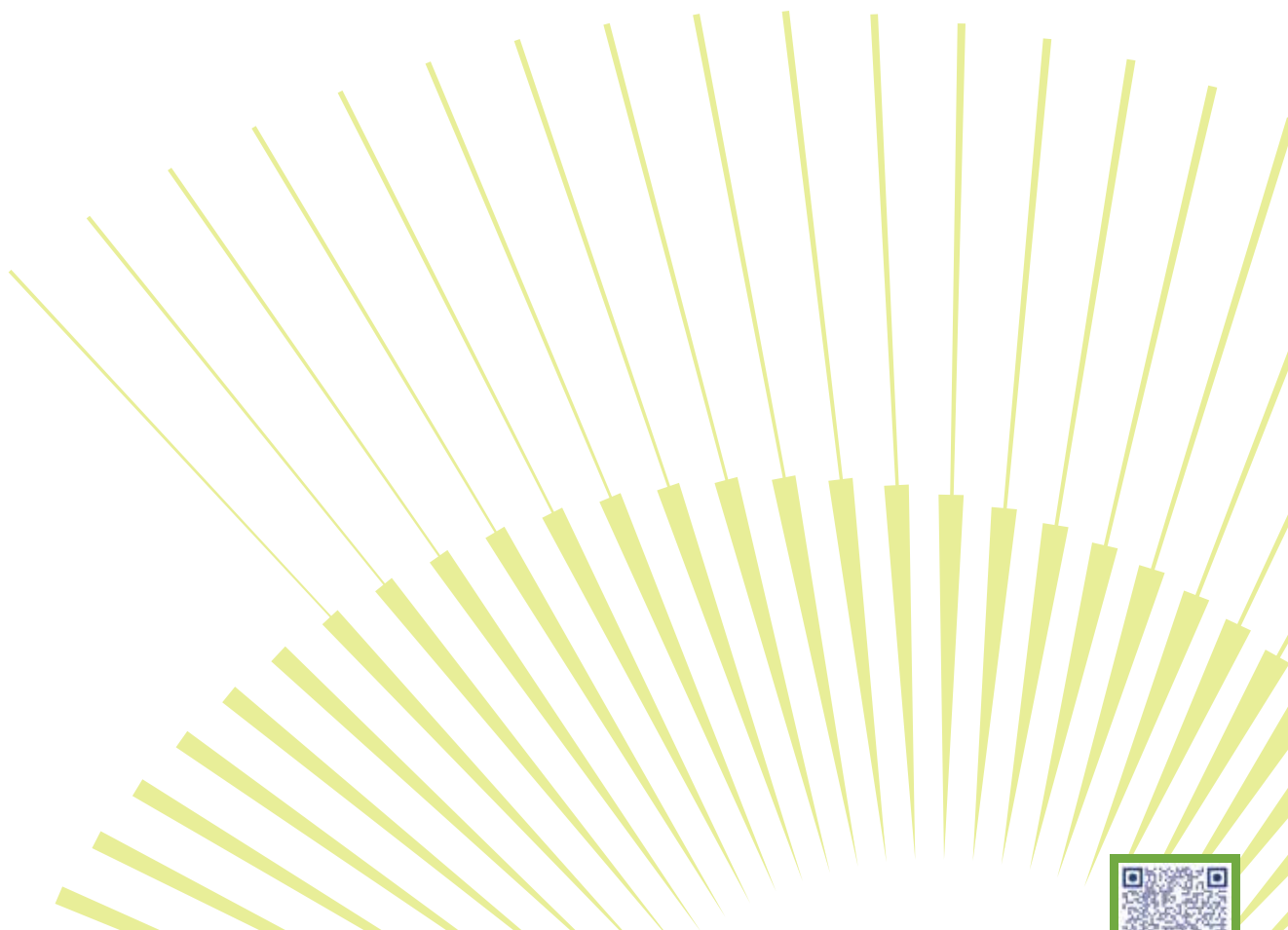
EESL will work with third-party vendors for some elements of the project such as insulation solutions for walls and roofs; hot water storage systems; energy-efficient windows; and building management systems (BMS). As heat-pump-based



space heating solution is a first-of-its-kind program in India, EESL will conduct a pilot demonstration for both the types of heat pump to establish their performance and energy-saving potential. Upscaling will happen subsequently. In June 2024, EESL issued an Invitation for Bids for the supply, erection, testing, and commissioning of a geothermal heat-pump-based space heating system at the primary health centre in Thiksey, Leh, in the Union Territory of Ladakh. EESL has recently

awarded the tender to a successful bidder for implementation of the Geothermal project.

EESL is implementing the world's largest energy efficiency portfolio across sectors like lighting, buildings, industry electric mobility, smart metering, agriculture, etc. at an enormous scale. Heat pumps, if the initial projects yield good results, could well become the latest feather in its cap – a testament to EESL's capabilities in taking India towards an inclusive, innovative, and sustainable future.



Key EESL event highlights

RISL and EESL Sign Agreement to Enhance Energy Access in Rajasthan via E-Mitra Network



EESL Empowers Women for a Sustainable Future, Provides Commercial Driver Training under its Mobility Project



EESL Leaders Speak on the Independence from climate cruelty

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Achieving freedom from the climate crisis requires bold action today. Together, we can create a sustainable future for all.



Mr. Vishal Kapoor
CEO, EESL

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Achieving freedom from the climate crisis requires innovation, determination, and the courage to change. The power of energy efficiency is crucial in this endeavor, as evidenced by our initiatives at EESL.



Mr. Animesh Mishra
Chief General Manager/Head (Sales, CCRP), EESL

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Independence from environmental harm begins with a single choice. Make the right choice for our planet's sake.



Mr. S Gopal
Group Executive Director, Commercial, EESL

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In the fight against climate change, freedom comes through proactive choices. By prioritizing energy efficiency, we pave the way for a world where environmental harmony and human progress coexist.




Mr. Nitin Bhatt
Deputy General Manager, PR & Sales, EESL

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By investing in energy efficiency and sustainability, we can liberate our economy from the chains of environmental degradation and ensure prosperity for all.



Ms. Ritu Singh
Deputy General Manager (Head of E3cycle Programme), EESL

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The power to change the world lies in our hands; let's choose sustainability over convenience.




Mr. Pavan Kumar Nuthalapati
State Head (Growth & Lighting), Andhra Pradesh

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True freedom is living in harmony with nature, not at its expense. Embrace sustainable living for a brighter tomorrow.



Mr. Ashish Malviya
Deputy General Manager, EESL

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Freedom from climate cruelty is not just a dream but our responsibility.





Mr. Aman Meherda
State Head (Growth & Lighting), Rajasthan

EESL Leaders Speak on the Independence from climate cruelty

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In the fight against climate cruelty, every voice matters; let yours be heard. Speak up for the planet and future generations.



Mr. Santosh Kumar Thakur
Head of Corporate Planning, EESL

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Energy efficiency is the foundation upon which we build a future free from climate cruelty.



Mr. Kunal Soni
State Head (Growth & Lighting), Maharashtra

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Our freedom from climate cruelty lies in responsible choices. Embracing energy efficiency is the first step toward mitigating the human impact on our environment.



Mr. Adesh Saxena
General Manager (Technical), EESL

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True independence is not just the absence of oppression; it is the presence of sustainable practices that protect our planet for future generations.



Mr. Abhishek Gupta
Head - International, Strategy, Appliances, Rooftop Solar and P&A

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True freedom from the impact of climate change comes from embracing green technologies and fostering a culture of environmental stewardship



Mr. Abhishek Agarwal
Chief General Manager (Head IT), EESL



Karnataka has the highest number of EV stations in India: Bureau of Energy Efficiency

Around 85% of these EV stations (4,462) are in Bengaluru Urban district with 5,765 charging stations, Karnataka has the highest number of public electric vehicle (EV) charging stations in the country, according to the Bureau of Energy Efficiency (BEE). Around 85% of these stations (4,462) are in Bengaluru Urban district. The data from BEE shows that Karnataka stands ahead of Maharashtra (3,728 stations), Uttara Pradesh (1,989 stations), and Delhi (1,941 stations) in the list. "Karnataka has set a new benchmark in the nation with 5,765 public EV charging stations. This achievement underscores the State's strong commitment to advancing electric mobility. The strategic initiatives and policies implemented by the state reflect a concerted effort to build a robust EV infrastructure and promote sustainable transportation," said Energy Minister K.J. George.



Electric vehicles gain momentum in India, market to reach \$250 billion by 2030

India's electric mobility sector is set to transform into a \$250 billion market by 2030, driven by substantial investments in sustainable transportation. The ELECTRIFY30 report by Praxis Global Alliance forecasts a significant rise in electric vehicle (EV) adoption across various segments, projecting the product opportunity to reach approximately \$94 billion with a penetration of about 23 Percent by FY30. This growth is anchored in both passenger and commercial vehicles, including two-wheelers and four-wheelers. The services segment in the electric mobility sector is also showing robust growth, valued at around \$26 billion in FY24, and expected to surge to \$144 billion by FY30, expanding at a compound annual growth rate of approximately 33 Percent. This includes services like E-Buses, E-Cabs, and E3W.



First in India: Multi-level e-bus depot project to push green drive in Delhi

Delhi govt plans to construct India's most expansive multi-level electric bus depot, spread over five acres, in Vasant Vihar. In addition to its primary purpose of housing and maintaining electric buses, the depot, consisting of ground and four floors, will offer a range of amenities, including charging stations for private vehicles. The project will be launched on Tuesday, said transport minister Kailash Gahlot. "We are taking the first step towards creating India's first, and one of the largest, multi-level electric bus depots at Vasant Vihar. Once completed, this state-of-the-art, smart and sustainable electric bus depot will stand out as a modern-day landmark, both visually and functionally, in the history of India's public transport infrastructure," he said.



India making more efforts in renewable energy than other G20 countries: PM

India has made more efforts in the renewable energy sector compared to other G20 countries, Prime Minister Narendra Modi said on Thursday. Addressing the nation from the ramparts of the Red Fort on the 78th Independence Day, the prime minister said, "India is working to become self-reliant for its energy needs and deal with the global problem of climate change." "We had vowed for renewable energy. India has done more than the (other) countries of G20," he said.



UP govt plans to install solar power plants along 296-km Bundelkhand Expressway

The Uttar Pradesh government plans to install solar power plants along both sides of the 296-km Bundelkhand Expressway. According to GEAPP (Global Energy Alliance for People and Planet)-- a global alliance for green energy transition -- it has conducted a study and found that 450 MW solar power plants can be installed on both sides of the highway. GEAPP said it has also prepared a detailed project report (DPR) which has been approved by the state government. "In the study, we found that 450 MW solar power plants can be installed on both sides. We presented the study to the state government, and they have approved it," Saurabh Kumar, vice-chairman of GEAPP, told PTI on Sunday.





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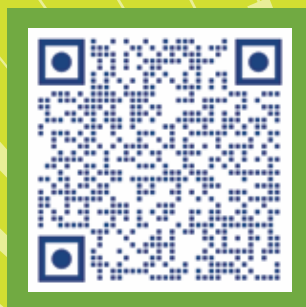
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