PLAKSHA UNIVERSITY

Indorama Ventures Center for Clean Energy

ANNUAL REPORT
FY 2024-25

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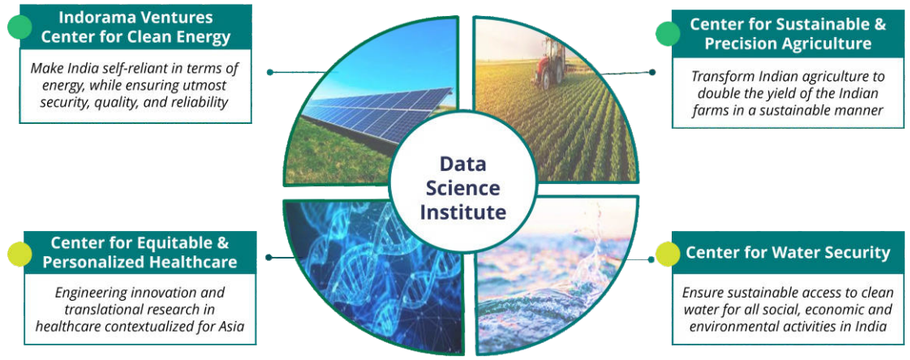
Introduction

Indorama Ventures Center for Clean Energy (IVCCE) at Plaksha was set up to lead the clean energy transition through education and research. The Center aims to operate at the intersection of energy and digitalization to enable scalable, sustainable, and affordable clean energy solutions and develop industry-relevant professionals and entrepreneurs. It is guided by an advisory committee consisting of international experts from academia and industry



Data Science Institute
Collecting and curating massive fine-grained datasets to develop solutions for environment and sustainability.

Vision

Envisioning a future where India's energy sector is characterized by **decarbonization, self-reliance,** and **grid security,** providing **clean and secure energy to all.**

Mission

To support India's transition to a **net zero-carbon, self-reliant, and energy-secure future** and contribute to the global effort in reducing carbon emissions through **interdisciplinary research, industry and government partnerships, and public awareness campaigns** on clean energy.

From the Director's Desk

I am delighted to present the Financial Year 2024-25 report, highlighting the progress, impact, and future vision of the Indorama Ventures Center for Clean Energy (IVCCE) at Plaksha University. This past year has been one of growth, innovation, and deepened commitment to our mission of accelerating the clean energy transition in India.

I extend my sincere gratitude to Indorama Ventures for their continued trust and support in shaping the foundation of IVCCE. Their belief in our vision has enabled us to establish the Center as a hub for interdisciplinary collaboration, where we drive meaningful advancements in energy efficiency and decarbonization.

At IVCCE, we recognize that addressing climate change requires urgent action and a holistic approach. Our research goes beyond technological innovation—it integrates economic viability, cultural adaptability, and policy alignment to ensure real-world impact.

The past year has been a period of steady growth and impactful contributions for the Center. With the addition of three new full-time members to our team, we have strengthened our capacity to drive research and innovation in clean energy solutions.

A significant milestone this year was the establishment of the state-of-the-art Thermal Energy Storage Living Laboratory, integrated with centralized chilled water-based cooling system of Plaksha. This serves as a testbed for real-world applications, fostering collaboration between researchers, industry partners, and policymakers.

Our research efforts continue to progress steadily across four key focus areas, yielding tangible outcomes in the form of publications and support in policy recommendations. Additionally, to strengthen capacity building we offered two courses, equipping the next generation of professionals with the knowledge and skills to advance the clean energy transition.

Beyond research, we actively engaged with the wider community through consultancy projects, podcasts, blog posts, and expert talks, ensuring that insights from our work reach diverse stakeholders. These initiatives have expanded our influence in shaping discourse around sustainable energy solutions.

As we step into another year, we remain steadfast in our commitment to pushing the boundaries of clean energy research and shaping a more sustainable future. Our Center envisions transforming our campus into a living lab with a smart microgrid and a smart home to work on the energy demand side management.

I sincerely thank all our team, collaborators, and supporters. I extend a heartfelt invitation to all stakeholders to join us in our pursuit in transitioning towards clean energy, ensuring an equitable and just transition in every step of the way.

Prof Vishal Garg

University Chair Professor
Dean Research
Director, Indorama Ventures Center for Clean Energy
Plaksha University

Executive Summary

Advancing clean energy through innovation and impact, this year saw the commissioning of the Thermal Energy Storage Living Lab, expansion of our team, and steady progress in four key research areas.

Our impact extended through publications, policy contributions, tool development, consultancy projects, and capacity-building efforts. Additionally, we engaged a broader audience through blogs, podcasts and expert talks.

1. Team

In 2024-25, the Center took significant strides in building a dynamic, multidisciplinary team of experts. The breadth of skills and knowledge within our team reflects our commitment to interdisciplinary research and innovation in clean energy. At Plaksha, faculty members are encouraged to collaborate across disciplines. This approach has allowed us to bring together a diverse group of experts—not only in clean energy but also in complementary fields.

As we move forward in 2025, we are excited to expand our team further, strengthening our culture of collaboration and innovation. With a shared vision for addressing critical challenges in clean energy and sustainable urban living, we remain dedicated to driving meaningful change.

1.1 Faculty

Vishal Garg

Professor & Director

Smart Buildings, UHI Policy, District Cooling

PhD IIT Delhi

Areas of interest: Building energy informatics, smart energy homes, cool surfaces for Urban Heat Island (UHI) mitigation, decarbonizing residential AC energy consumption.

Shashikant Pawar

Assistant Professor

Urban Heat Island and Microclimate Studies

PhD IISc Bangalore

Areas of interest: Urban Microclimate, Buoyancy driven (environmental) turbulent flows, Fluid dynamics and heat transfer of Bio-inspired systems, Light propagation in turbulent media.

Anupam Sobti

Assistant Professor

Geospatial and Embedded Perception

PhD IIT Delhi

Areas of interest: Geospatial Sensing for Urban Planning and Agriculture, Urban microclimate and mobility

Vivek Deulkar

Assistant Professor

Smart Grid Optimization

PhD IIT Bombay

Areas of interest: Energy Informatics, Smart Grid Optimization, Managing renewable uncertainties via battery storage systems, Stochastic modeling, Reinforcement learning, Machine learning, Control & Optimization.

1.2 Researchers

Aviruch Bhatia

Senior Research Scientist

Building Energy Simulation

PhD IIIT Hyderabad

Varchita Lalwani

Research Fellow

Machine Learning and Computer Vision

B.E ADIT Gujarat

Yogendra Kumar

Research Fellow

ML with Remote Sensing, Urban Planning

BS-MS Physics, IISER Mohali

Rohan Awasthi

Research Fellow

EV Routing, Smart Microgrid

BS-MS Physics, IISER Mohali

Kiran Kumar Donthu
Research Consultant
Smart Homes
Faculty, IIT BHU

Sraavani Gundepudi
Research Consultant
Cool Roofs
M. Arch. JNFAU, Hyderabad

Sahil Chilana
Research Associate
SHEMS
MS (R), IIIT Hyderabad

Akhil Goyal
Center Manager
Sustainable Capitalism
MBA, Delhi School of Economics

1.3 Plaksha UG Students

Akshita Shukla
2nd Year
Automatic Parsing of Architectural Maps

Prisha Gupta
2nd Year
Automated Architectural Map Approval System

Mannan Gupta
2nd Year
Automated Architectural Map Approval System

Saumya
2nd Year
AI-driven Architectural Design Parsing

Abhiraaj Sharma
3rd Year
Geospatial Analysis

Pranjal Rastogi
3rd Year
Geospatial Analysis, Urban Water Logging Detection

Utkarsh Agarwal
3rd Year
Deep Learning, Geospatial Data Science, Computer Vision

Amog Rao
3rd Year
Remote Sensing, Medical Image Analysis, Computer Vision

Malhar Bhise
3rd Year
Pipeline for Automated Inventorisation of Urban Street Trees

Prachi Parakh
4th Year
Walkability Index, Deep Learning Computer Vision

Vaishnavi Rathi
4th Year
Scalable assessment, Urban Walkability, Deep Learning

2. Research Updates

At IVCCE, currently the research is centered around four key thrust areas:

- Urban Microclimate
- Decarbonizing Residential Cooling
- Smart Buildings
- Smart Microgrids

This section presents details on the progress and accomplishments in each area, including research publications from the Center.

2.1 Urban Microclimate

2.1.1 Wind Tunnel Setup

The open environmental wind tunnel built in-house, features a 2'×2'×2' test section with two arrays of variable speed DC fans placed at each end, allowing controlled velocity shear profiles to simulate atmospheric conditions. Compared to a single-fan wind tunnel of similar size, this design requires five times less power, making it significantly more energy-efficient.

The tunnel enables studies on urban wind flows, pollutant dispersion, natural ventilation, aerodynamic effects of vegetation, and thermal stratification. Its adaptability makes it a valuable tool for urban sustainability, climate studies, and environmental engineering.

Figure 1 Wind Tunnel Experiment

Figure 2 YTS program students using the wind tunnel

Also, Young Technology Scholars (YTS) students worked on the project 'Weather Information System for Smart Homes' making use of the wind tunnel setup. YTS is a two-week intensive summer program at Plaksha where students are exposed to real-world engineering and problem-solving. Through hands-on learning and interdisciplinary coursework, students learn how to leverage technology to solve complex problems.

2.1.2 Urban Mobility

Walk the talk: As part of our efforts to make urban mobility more sustainable, one of our key initiatives focuses on assessing walkability demand and evaluating the current state of street infrastructure. However, manual methods rely on surveys, which are time-consuming and resource intensive. Here, we are developing an automated pipeline to estimate the demand for walkable infrastructure based on current land use in an area. This is complemented by algorithms that leverage both satellite and street-view imagery to assess the state of infrastructure in various cities. The resulting data enables government departments to identify optimal locations for new infrastructure and evaluate the utility of existing infrastructure across different areas.

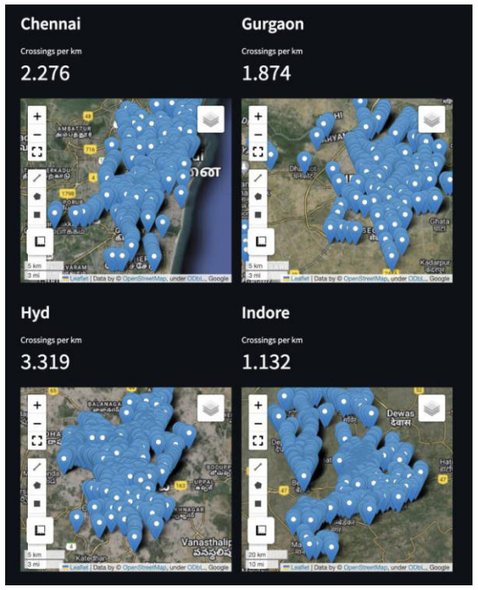


Figure 3 City-Wide Crossings-per-km Comparison

We've created a dashboard for cross-city comparisons of walkable infrastructure to offer an insight into walkable elements in different locations.

Mapping trees: We have also been working on initiatives for tree mapping in the city as a step towards understanding the urban micro-climate as well as walkability comfort. We use both satellite and street view images with computer vision algorithms to map each individual tree.

Finding water: Similar exercise is being done to develop tools for water body analysis in urban areas both within urban locations as well as dense forest locations.

We are further exploring the use of SAR imagery for satellite-based detection of urban waterlogging events.

2.1.3 Urban Cooling

We are advancing on cool roof tracking from satellite imagery and developing a strategy for calibration of the results given by satellite image processing by using the techniques from active learning, a subarea in machine learning, which reduces the

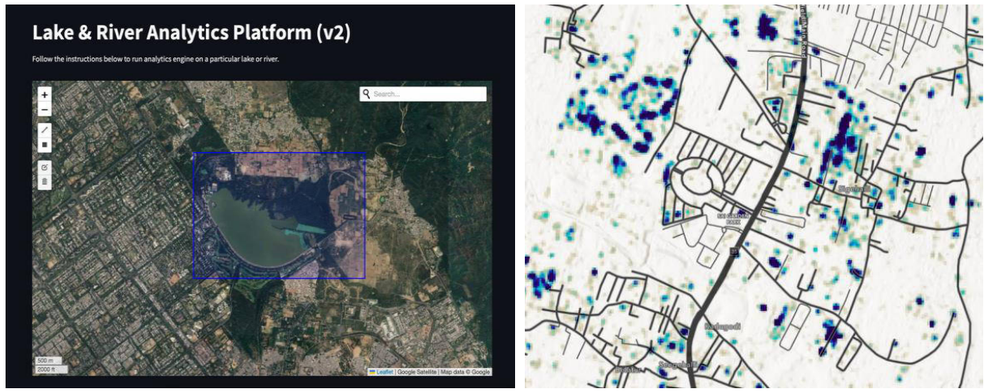


Figure 4 Samples of urban lake monitoring and water logging experiments

number of calibration points needed to adjust the measurements derived from satellite imagery. Further, we are verifying the robustness of our predictions by correlations with Land Surface Temperature observed on the cool roofs in comparison to nearby roofs.

Figure 5 Cool Roofs

Figure 6 Non-Cool Roofs

Figure 7 Tree-level mapping and profiling roof reflectance

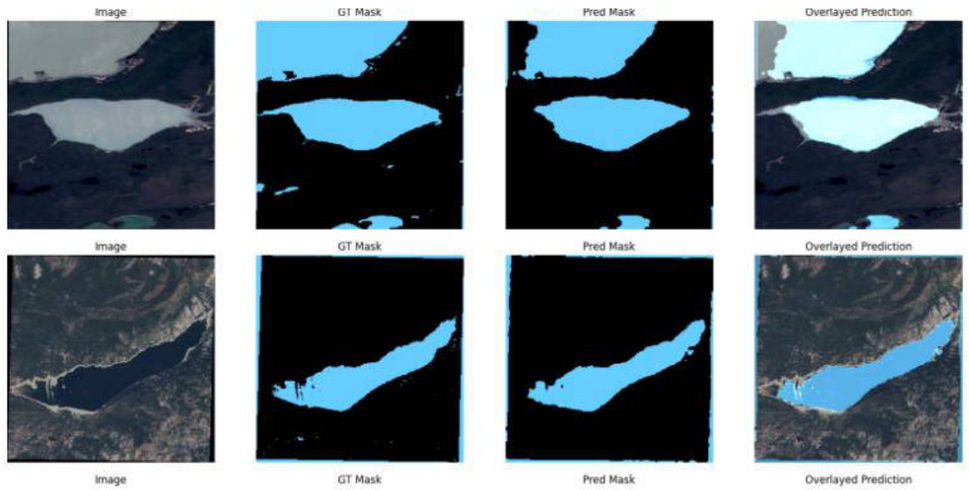


Figure 8 Segmentation algorithms to identify water bodies across time

2.1.3.1 Development of Uttar Pradesh Urban Cooling Policy

IVCCE is actively providing technical support for development of UP' s Urban Cooling Policy. The Uttar Pradesh Urban Cooling Policy aims to cover an area of 800 square kilometres with cool roofs within 10 years of implementation. When implemented, this policy would result in a one-time reduction of 80 million tCO2 and annual energy savings of up to 1600 GWh. Additionally, it is expected to create approximately 3,300 jobs over the 10-year period.

A workshop on Uttar Pradesh Urban Cooling Policy was organised by the Department of Housing and Urban Planning, Department of Environment, Forests and Climate Change in collaboration with Natural Resources Defence Council (NRDC) at Lucknow.

This workshop aimed to bring together all the stakeholders concerned on effectively implementing the Uttar Pradesh Urban Cooling policy in the state, ahead of its formal release in the coming months. Researchers from the Center attended this workshop as technical experts in Lucknow.

Figure 9 Workshop on UP Urban Cooling Policy

2.1.3.2 Cool Roof Calculator

The Cool Roof Calculator, developed earlier by IIIT Hyderabad, has been updated and re-hosted and is now live for use. This tool works on EnergyPlus and does online simulations for Indian cities for which weather data files are available. It also has the capability of simulating an un-conditioned building for which the comfort achieved using cool roof is reported.

2.1.3.3 Workshops, Paper Presentation and Engagement Forums

2.1.3.3.1 Sustainable Cooling in Cities First Development Workshop

Participated in an International Workshop on Cool Roof Research at Lawrence Berkeley National Laboratory, USA. 70+ participants met to plan a five-year international collaboration that will explore the physics, technologies, and policies of urban heat mitigation; how local outdoor climate affects the resilience of buildings to heat waves; and the optimal integration of active cooling systems with urban heat dissipation strategies.

Figure 10 Group photograph from cool roof workshop at LBNL

Figure 11 A session on cool roof at LBNL

2.1.3.3.2 Paper Presentation in ACM Compass 2024

COMPASS is an international forum for the presentation and publication of original research that supports the growth of sustainable societies worldwide, from disciplines including computer and information sciences, social sciences, environmental sciences, and engineering.

IVCCE researcher presented a paper on cool roofs at the ACM conference. The key highlights of the presentation were as follows:

- The land surface temperature of two buildings, one with cool roofing and one without, was calculated, revealing a 4 °C temperature difference.
- An active learning approach was used to improve model performance, and a dashboard was developed to facilitate roof annotation.
- More accurate city-level predictions for Hyderabad were obtained.

Figure 12 Ms. Varchita Lalwani presented paper on cool roofs at ACM conference

2.1.3.3.3 16th GRIHA Summit

Panel discussion on "Time to Cool Off: Managing Urban Heat", at the 16th GRIHA Summit on 4th Dec 2024. This Session was chaired by IVCCE Director.

Figure 13 Summit Panel Members

2.2 Decarbonizing Residential Cooling

Residential air conditioning presents two major challenges: a significant night-time peak in electricity demand and the widespread oversizing of installed cooling capacity in homes. To address this, we conducted a case study last year on a 387-home residential complex in Hyderabad, demonstrating that district cooling can reduce installed cooling capacity by up to 90%. Furthermore, that energy demand too can be met using thermally stored energy, leveraging solar power available during the day.

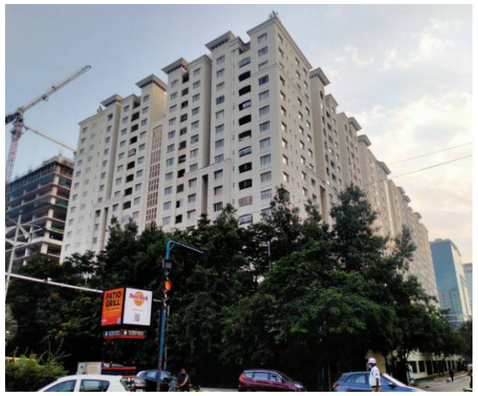


Figure 14 Residential Complex in Hyderabad

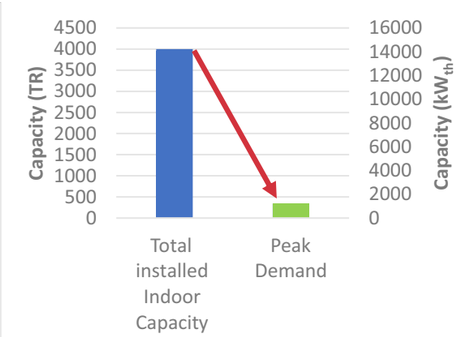


Figure 15 90% reduction in the need of installed cooling capacity

To validate this approach, we have developed a Thermal Energy Storage Living Laboratory at Plaksha, featuring a 5600-kWh thermal storage system coupled with the centralized chilled water-based cooling system. This system is designed to support the air conditioning needs of a 220-room hostel at Plaksha and will be used to conduct a range of innovative experiments. Plaksha intends to offer this living laboratory to startups, manufacturers, and solution providers to evaluate and demonstrate their technologies in a field environment.

2.2.1 District Cooling and Thermal Storage Pilot

The Thermal Energy Storage Living Laboratory, integrated with the district cooling system at Plaksha has been installed and commissioned. This pilot has been undertaken with partial financial support from International Finance Corporation (IFC), a member of the World Bank Group. The system stores thermal energy during the day and release it at night for air-conditioning in Hostel-1 at Plaksha University. We are starting operations from Summer 2025.

Plaksha University's faculty and researchers along with students will undertake interdisciplinary research in collaboration with industry experts to optimize the design and operation of thermal storage-based cooling and heating systems. This would include experiments, modelling and simulations to identify opportunities for improving energy efficiency, load management, and overall system performance. The testbed will support research involving behavioural studies, development of technologies (IoT, thermal storage, etc.), and the application of AI-ML for improving the design and operations of the system. The research team at Plaksha will also work on understanding economic, social, and environmental implications and propose supportive frameworks.

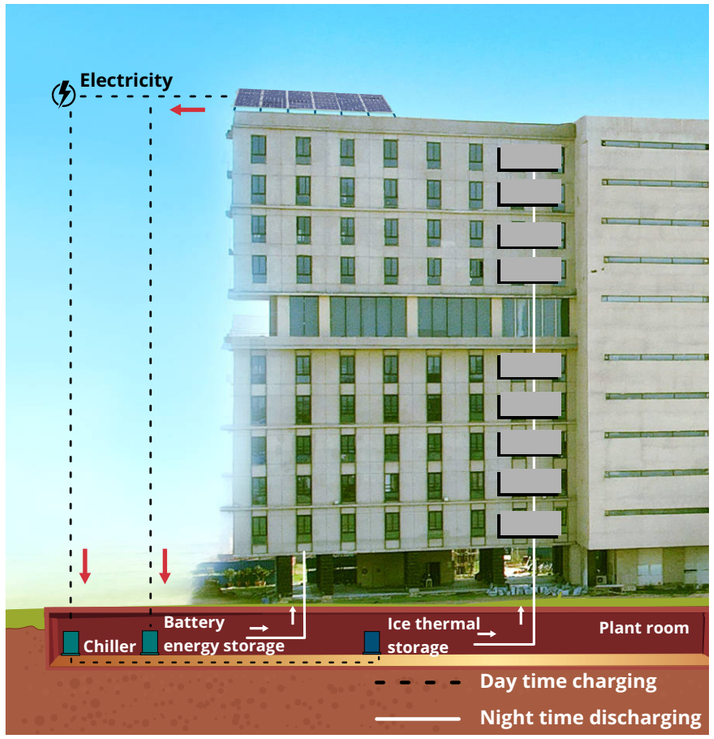


Figure 16 Schematic of thermal storage system

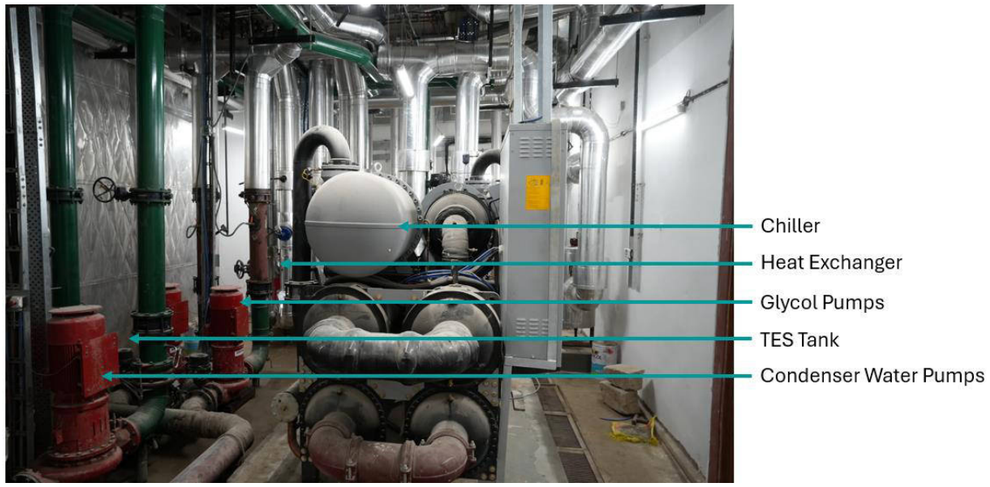


Figure 17 Thermal storage plant major components

Figure 18 Thermal storage plant piping network

2.3 Smart Buildings

2.3.1 Study on Stakeholder Perspectives on Smart Home Technology Adoption

IVCCE researcher conducted a survey in Mumbai, India, to assess stakeholder perspectives on smart home technology adoption, gathering 425 responses. The survey examined user awareness, preferences, and concerns, with a focus on key factors such as security, energy efficiency, cost, and ease of use. The results reveal that security-related and home automation devices are still growing in adoption and smart locks, thermostats, and appliances have relatively lower adoption rates. Through this survey, the key factors influencing their willingness to adopt such technology have also been identified. The findings reveal insights into the perceived benefits, barriers, and demographic influences. Most respondents show a high level of willingness to install smart home technology. More than 40% of respondents consider security their top priority when thinking about smart home features. Data privacy and security are the top concerns among the respondents, as they are worried about their personal data management and device vulnerabilities. The results are valuable for policymakers, advertisers, and developers working to promote smart home technology in the urban areas of India.

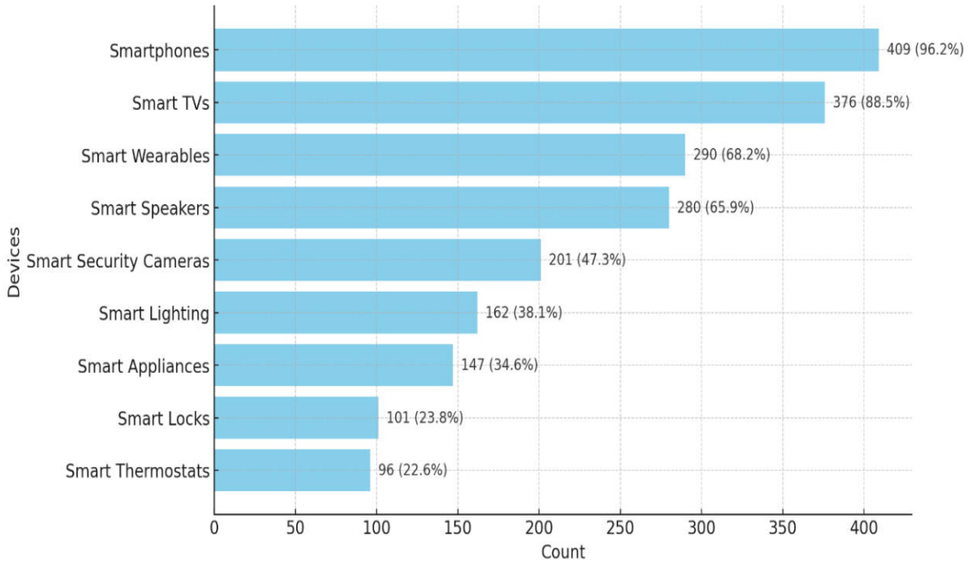


Figure 19 Statistics on adoption of smart devices

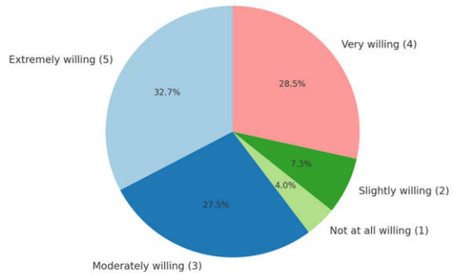


Figure 20 Willingness to adopt smart homes

Concerns	Count	Percentage (%)
Privacy	310	72.94
Security	262	61.64
Reliability	187	44
Cost	177	41.64
Complexity	97	22.82
Loss of Control	95	22.35
Health and Safety	84	19.76
Compatibility	63	14.82

Figure 21 Concerns influencing Smart Home Technology Adoption

2.3.2 Study on behavioural and social economic dimensions of indoor air quality

This ongoing study, conducted on 100+ homes in Delhi-NCR, aims to explore behavioural and economic perspectives on indoor air quality Interventions in India. The study covers three broad aspects:

Awareness: How many people understand the term Air Quality Index (AQI) and how much awareness is present about environment and air quality as a whole in public perception.

Impact on Urban Living Decisions: Explore whether poor air quality affects users' willingness to continue living in cities.

Solutions: To find out what solutions do people employ to mitigate effects

Figure 22 AQI reading in one of the homes in Delhi

2.3.3 Energy Conservation and Sustainable Building Code (revised ECBC)

- ECSBC was released. It can be accessed from the following link.

  https://beeindia.gov.in/sites/default/files/ECSBC-2024.pdf

- Energy Conservation Building Code, developed by the Ministry of Power, Government of India, and Bureau of Energy Efficiency (BEE) defines norms of energy performance for various building components to lower the building's energy requirement without affecting the function, comfort, health, or productivity of the occupants.

- IVCCE Director is the chairperson of the sub-committee responsible for the revision of the chapter on lighting and controls, while IVCCE researcher serves as a member of the sub-committee.

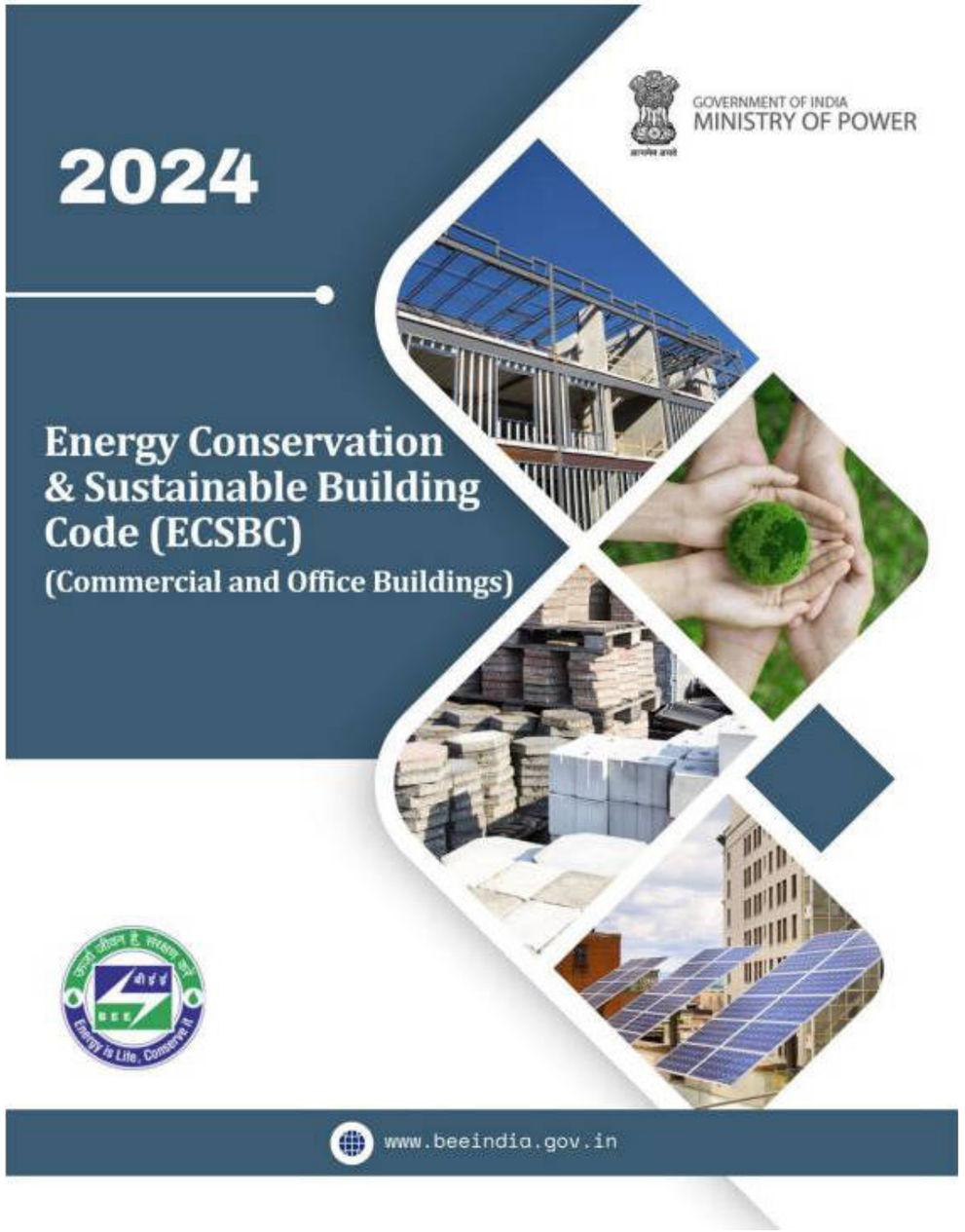
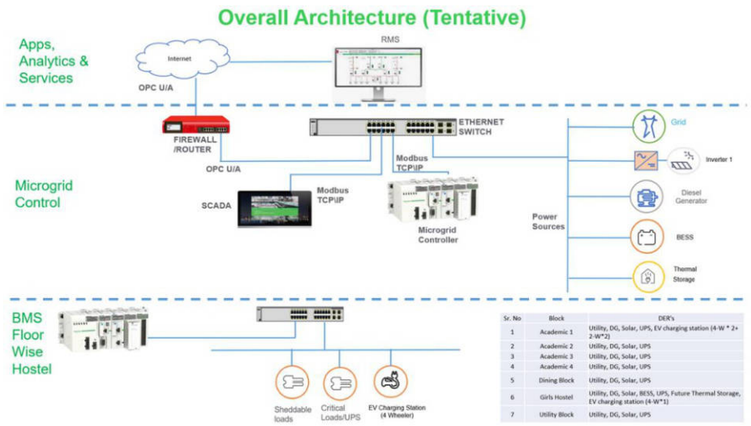


Figure 23 Released Energy Conservation and Sustainable Building Code 2024

2.4 Smart Microgrid



Sr. No	Block	DER's
1	Academic 1	Utility, DG, Solar, UPS, EV charging station (4-W * 2+ 2-W*2)
2	Academic 2	Utility, DG, Solar, UPS
3	Academic 3	Utility, DG, Solar, UPS
4	Academic 4	Utility, DG, Solar, UPS
5	Dining Block	Utility, DG, Solar, UPS
6	Girls Hostel	Utility, DG, Solar, BESS, UPS, Future Thermal Storage, EV charging station (4-W*1)
7	Utility Block	Utility, DG, Solar, UPS

Figure 24 Architecture of smart microgrid

IVCCE researchers are working on concept design for the smart microgrid at the campus. A comprehensive paper on the microgrid design for the Plaksha campus has been drafted. This document elaborates on the architecture, the integration of renewable energy sources, battery storage, and the potential impact of the system on overall energy consumption. A detailed study has been done of the campus's current and future energy requirements, including peak demand and usage patterns. The overall architecture of smart microgrid is shown in Figure 24.

2.5 Research Publications

IVCCE is actively engaged in academic conferences, sharing our findings and contributing to critical discussions on the future of clean energy and urban sustainability. We have published our findings in leading academic journals to further disseminate our work.

Some of the publication highlights are as follows:

- Developed a satellite image based cool roof tracker which provides an eagle eye view to a city administrator on the progress of cool roof implementation in the city. The tracker provides building level information of whether a roof is cool or not, thus indicating if an urban heat island is likely to develop in a region. This information helps policymakers identify the vulnerable regions in a city and track the progress of cool roof implementation in all areas.
- Design of a phase-change-material based thermal-energy-storage to cater to night-time cooling requirements of a university hostel located in Mohali, India, having a subtropical climate with hot summers. The building has a total of 10 floors with 224 rooms.
- A study on the perspectives of the residents of Mumbai on smart home technology adoption, surveying 425 respondents, over a period of 3 months, covering demographics, awareness, preferences, concerns, and willingness to adopt was published. The results are valuable for policymakers, advertisers, and developers working to promote smart home technology in the urban areas of India.
- A detailed study to monitor the electricity consumption of a hybrid ventilated single-family household over one year, focusing on seasonal variations, peak load consumption and the impact of specific appliances on total energy use was published. An ICT-based sensor network was utilised to monitor the total electricity consumption and consumption from twelve different categories of appliances at 1-min intervals. The findings offer insights into the seasonal and annual contribution of appliances in the household electricity consumption.

International Journals: 04

International Conference: 04

3. Infrastructure

Over the past year, our research infrastructure has expanded with the addition of a Thermal Storage Living Laboratory and progress in the Urban Microclimate Lab, including the development of a wind tunnel. Additionally, a new laboratory is under construction to enable DC Ceiling Tiles, aiming to eliminate conventional wiring by enabling direct use of DC energy without conversion to AC.

Alongside these advancements, we continue to strengthen our existing facilities, which include studio areas for interactive and collaborative design and simulation, setups for urban microclimate studies, and non-intrusive load monitoring of devices.

3.1 Thermal Energy Storage Living Lab

This state-of-the-art research facility is a first-of-its-kind in India and features a 5600-kWh thermal energy storage system, coupled with the centralized chilled water-based cooling system. This system is designed to support the air conditioning needs of a 220-room hostel at Plaksha and will be used to conduct a range of innovative experiments. Plaksha intends to offer this living laboratory to startups, manufacturers, and solution providers to evaluate and demonstrate their technologies in a field environment.

Figure 25 Thermal Energy Storage Lab

Figure 26 Thermal Energy Storage Lab

3.2 DC devices into Ceiling Tiles

A facility has been created to investigate the integration of DC devices into ceiling tiles, powered by ceiling rails. As shown in Figure 27, this setup eliminates the need for traditional wiring and switches, allowing for adaptability in various locations. Bluetooth Low-Energy (BLE) switches are used to control the equipment mounted on the ceiling tiles. Accurate prediction of switch location is achieved using trilateration techniques and machine learning algorithms. This research seeks to enhance energy efficiency and integration with renewable power sources.

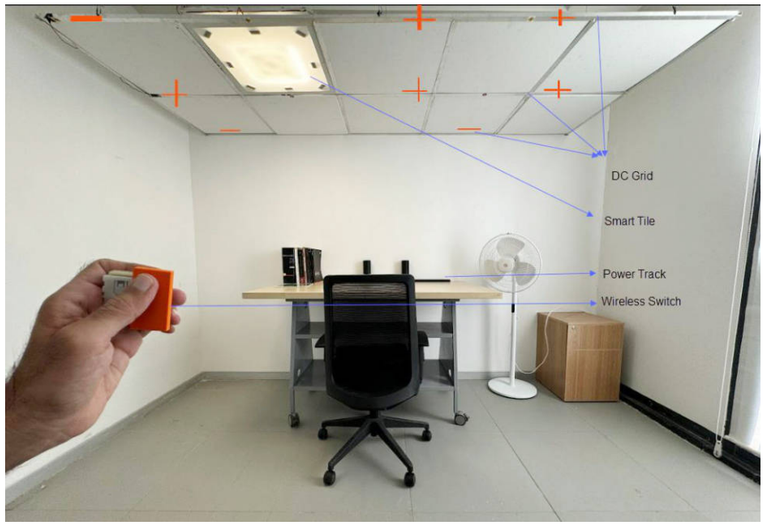


Figure 27 DC ceiling grid setup - DC LED powered by ceiling rails

4. Capacity Building

4.1 Course on Global Food, Energy, and Water Nexus

A course titled "Global Food, Energy, and Water Nexus – Engage the US, China, and India for Sustainable Future" offered by six departments at Cornell University was extended for undergraduate students at Plaksha University.

Important issues related to the food, energy, and water nexus and its implications for nutrition security, one health, environmental sustainability, climate change, and economic development in the US and these two countries were described. The course served as a platform for students from Cornell, China, and India to learn from and interact with each other in the same class, and to share their thinking, creativity, and perspectives on these issues.

No. of Students enrolled – 16

Mode of Teaching – Online

4.2 Course on Building Energy and Daylight Simulation

This course was offered to students and professionals, the objective was to model, simulate, and analyse building performance, enabling them to optimize energy efficiency, occupant comfort, and sustainability in their designs. Energy simulation is important in building design, enabling architects, engineers, and stakeholders to understand and optimize a building's energy use over its lifespan. Through energy consumption estimates, designers can make informed decisions that can lead to significant long-term operational energy and cost savings.

No. of Students – 25

Mode of Teaching – Physical

Figure 28 Course Poster

5. Growth and Awareness

Alongside research advancements and infrastructure development, the Center has actively undertaken initiatives to expand its outreach and impact. Notable figures have visited the Center, and we actively engaged with the wider community through podcasts, blog posts, consultancy projects and expert talks, ensuring that insights from our work reach diverse stakeholders. Additionally, the Advisory Committee Meeting provided valuable strategic insights, guiding our future direction and reinforcing our commitment to innovation and collaboration.

5.1 Advisory Committee

The Advisory Committee meeting was held on 26th February 2025. Our Advisory Committee hosts a span of institutional and industry leaders who bring invaluable expertise, deep industry insights, and strategic guidance, shaping our vision and driving impactful advancements in clean energy innovation.

Ajay Mathur
DG at International Solar Alliance, Ex-DG at TERI, Ex-DG at BEE

Amit Bhatt
MD India at International Council on Clean Transportation, Ex-ED at WRI India

Anjan Bose
Regents Professor in Power at Washington State University

Anthony Watanabe
Chief Sustainability Officer @ Indorama Ventures PCL, Chair of Circular Economy Taskforce

Bharat Bhargava
Ex-DG at ONGC Energy Centre, Ex-Director at Ministry of New and Renewable Energy

Deepali Khanna
VP at The Rockefeller Foundation, Ex-Director for Youth Learning at Mastercard Foundation

Deepesh Nanda
MD & CEO at Tata Power Renewable Energy Limited, Ex-CEO at GE Gas Power South Asia

Devarajan Srinivasan
CTO at Poundra LLC, Faculty Associate at Arizona State University

James Abraham
Founder and Director at Mynzo Carbon, Ex-Founding Partner at BCG India

Padu Padmanabhan
International Consultant, Energy & Water Productivity, Ex-Program Director of SARI/EI & Sr Energy Advisor at USAID

Praveer Sinha
CEO & MD at The Tata Power Company Limited

Preeti Bajaj
CEO & MD at Luminous Power Technologies Ltd, Ex-CEO at The Adecco Group ANZ

Rahul Tongia
Adjunct Professor at CMU, Senior Fellow at Centre for Social and Economic Progress

Satish Kumar
Founder & President at AEEE, Ex-Berkeley Lab Scientist, LEED and ASHRAE Fellow

Saurabh Kumar
VP India at The Global Energy Alliance for People and Planet (GEAPP), Ex-Executive Vice Chairperson at EESL Group

Seema Paul
Program Director at Sequoia Climate Foundation, Ex-MD The Nature Conservancy

Shalini Sarin
Advisor, Executive Coach, Independent Director Schneider, Nagarro, Kirloskar, Saglity & Linde

Shashi Buluswar
CEO at Institute for Transformative Technologies, Ex-Partner at Dalberg Global Development Advisors

Venkat Garimella
VP Strategy & Sustainability at Schneider Electric

Figure 29 Advisory Committee Members of IVCCE

5.2 Consultancy Project

5.2.1 Dashboard & AI-based Predictive Analytics for Transformers

Plaksha University collaborated with IIIT Hyderabad, IIT Hyderabad, and Deloitte Touche Tohmatsu India LLP to develop a substation dashboard and AI-based predictive analytics for transformers.

This design and development of the transformer health monitoring dashboard is completed for BESS Yamuna Power Limited. This dashboard helps in making informed, reliable and cost-effective decisions about the fleet of transformer equipment via the presentation of important data, flagging the abnormal behaviour, prioritizing maintenance tasks and taking control of long-term reliability in a single window. This was a consultancy project funded by Gesellschaft für Internationale Zusammenarbeit (GIZ). Team led by IIITH has developed a design of the dashboard as shown in Figure 30.

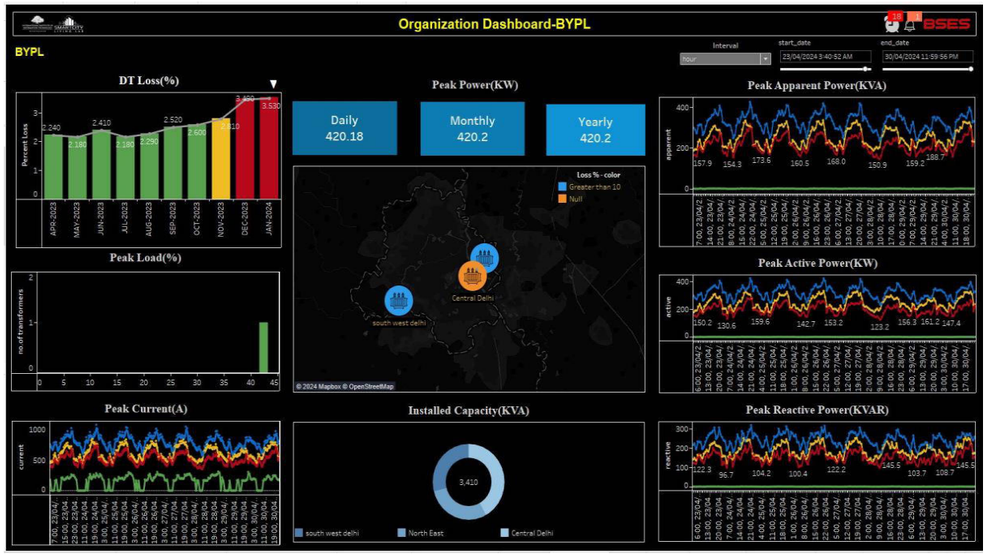


Figure 30 Design of dashboard developed by the project team led by IIITH

5.3 Podcast on Lighting

We have commenced recording a new podcast series focused on lighting. The episodes featured engaging conversations with Mr. Sarvdeep Basur, Principal at Lucent Worldwide, renowned for his innovative lighting design—especially in city beautification; Ms. Sudeshna Mukhopadhyay, Vice President of Havells India Ltd. and Dr. Amandeep Duggar, Founding Principal – Lighting Research & Design.

Figure 31 Podcast recording at Plaksha Studio, from left to right: Mr. Sarvdeep Basur, Ms. Sudeshna Mukhopadhyay and Dr. Vishal Garg

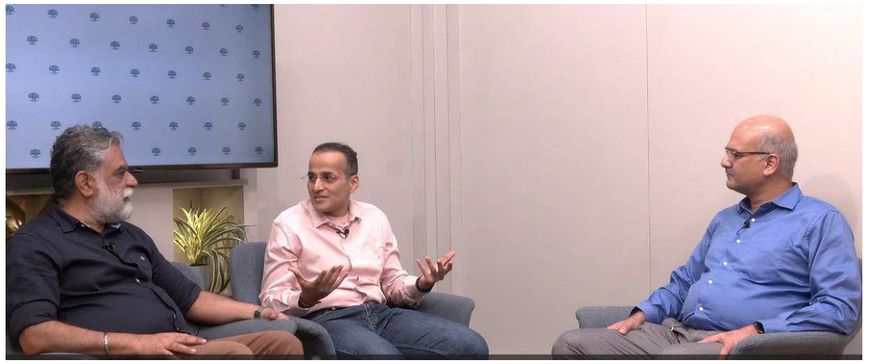


Figure 32 Podcast recording at Plaksha Studio, from left to right: Mr. Sarvdeep Basur, Dr. Amardeep Duggar and Dr. Vishal Garg

5.4 Invited Talks

5.4.1 Charging Infrastructure Planning for Electric Vehicles

Dr. Sanchari Deb from Newcastle University, United Kingdom, delivered a talk on 5th September 2024. The presentation focused on the planning and operation of charging infrastructure for electric vehicles (EVs), providing valuable insights into key research areas, including the impact of EV charging on the power grid, models for optimal charger placement, and intelligent algorithms for optimizing charger locations.

Figure 33 Talk on "Charging Infrastructure Planning for Electric Vehicles"

5.4.2 Integration of Lighting and Architecture

Dr. Amardeep M. Duggar, Founding Principal – Lighting Research & Design delivered a talk on "Integration of Lighting and Architecture" on 15 Sep 2024. The lecture provided an overview of how the architectural lighting design of built environments can simultaneously allow people to function comfortably, feel safe, and appreciate the aesthetic components. Well-designed lighting can effectively narrate the story of architecture by enhancing its communication. The lecture explored how to achieve seamless integration between architecture and lighting.

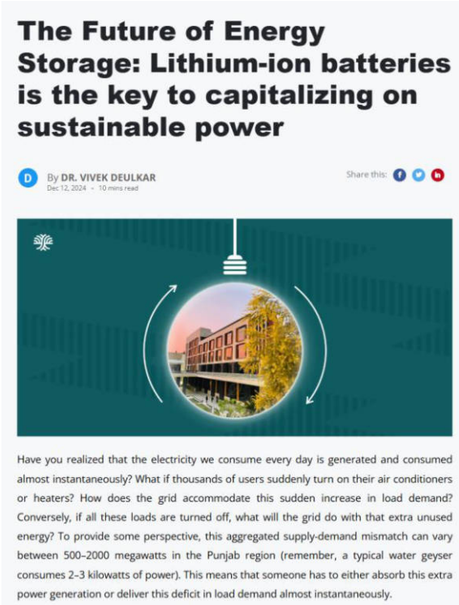
Figure 34 Talk on "Integration of Lighting and Architecture"

5.4.3 Emerging Trends in Lighting Design and Technology

Ms. Sudeshna Mukhopadhyay, Vice President Havells India Ltd., delivered a talk on 17th October 2024. The presentation focused on integration of IOT and emerging technologies in lighting design, providing valuable insights into key research areas and progress happening in the field.

Figure 35 Talk on "Emerging Trends in Lighting Design and Technology"

5.5 Blog Posts by Faculty



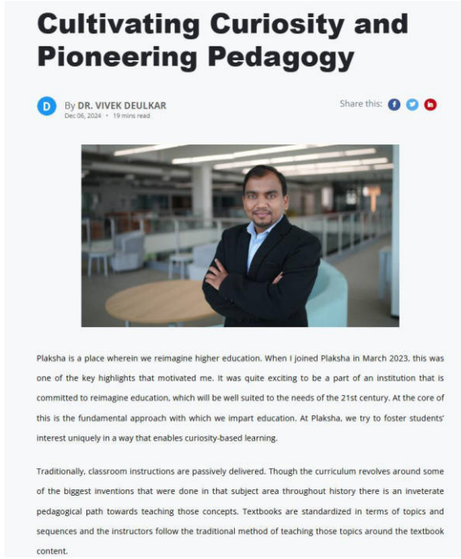
The Future of Energy Storage: Lithium-ion batteries is the key to capitalizing on sustainable power

By DR. VIVEK DEULKAR
Dec 12, 2024 · 10 mins read

Share this:

Have you realized that the electricity we consume every day is generated and consumed almost instantaneously? What if thousands of users suddenly turn on their air conditioners or heaters? How does the grid accommodate this sudden increase in load demand? Conversely, if all these loads are turned off, what will the grid do with that extra unused energy? To provide some perspective, this aggregated supply-demand mismatch can vary between 500–2000 megawatts in the Punjab region (remember, a typical water geyser consumes 2–3 kilowatts of power). This means that someone has to either absorb this extra power generation or deliver this deficit in load demand almost instantaneously.

Figure 36 Article on The Future of Energy Storage



Cultivating Curiosity and Pioneering Pedagogy

By DR. VIVEK DEULKAR
Dec 06, 2024 · 19 mins read

Share this:

Plaksha is a place wherein we reimagine higher education. When I joined Plaksha in March 2023, this was one of the key highlights that motivated me. It was quite exciting to be a part of an institution that is committed to reimagine education, which will be well suited to the needs of the 21st century. At the core of this is the fundamental approach with which we impart education. At Plaksha, we try to foster students' interest uniquely in a way that enables curiosity-based learning.

Traditionally, classroom instructions are passively delivered. Though the curriculum revolves around some of the biggest inventions that were done in that subject area throughout history there is an inveterate pedagogical path towards teaching those concepts. Textbooks are standardized in terms of topics and sequences and the instructors follow the traditional method of teaching those topics around the textbook content.

Figure 36 Article on Cultivating Curiosity and Pioneering Pedagogy

6. Plans for 2025

The Center aims to continue the following activities in the next year:

6.1 Research

- Enhancing predictions for cool roofs using temporal and multimodal active learning approaches, potentially validating findings in Chandigarh and improving the existing dashboard.
- Validation of active learning algorithms for low-sample calibration.
- Integrated tools for walkability and urban heat analysis.
- Micro-climate modeling and climate-action plans.
- Advancing the development of flow visualization techniques for wind tunnel experiments.
- Developing the energy nudging system for field trials.
- Interdisciplinary research in collaboration with industry experts to optimize the design and operation of thermal storage-based cooling and heating systems, involving behavioural studies, application of AI-ML, understanding economic, social, and environmental implications.
- Impact of full EV transition for two-wheelers in Chandigarh.
- EV Routing central recommendation system.

6.2 Capacity Building

- Second Edition of Building Energy and Daylight Simulation Course to be offered in May 2025.

6.3 Infrastructure

6.3.1 Campus as Smart Micro-Grid Testbed

As we plan to implement a campus-wide microgrid at Plaksha, the architecture is now finalized, and the next phase will focus on procurement and phased deployment. This smart microgrid is designed to integrate advanced technologies, ensuring an efficient, resilient, and sustainable energy ecosystem. Beyond powering our campus sustainably, it aims to serve as a dynamic testbed for research and innovation providing real-world insights into the future of decentralized energy systems.

This will encompass diverse elements, including battery storage to optimize energy usage, smart building solutions to intelligently manage energy consumption, solar hot water systems for renewable thermal energy, thermal storage for load balancing, co-generation to maximize energy output, a DC grid for improved efficiency, and the incorporation of solar power and wind energy sources, a Vehicle-to-Grid (V2G) system for integration of EV into the grid.

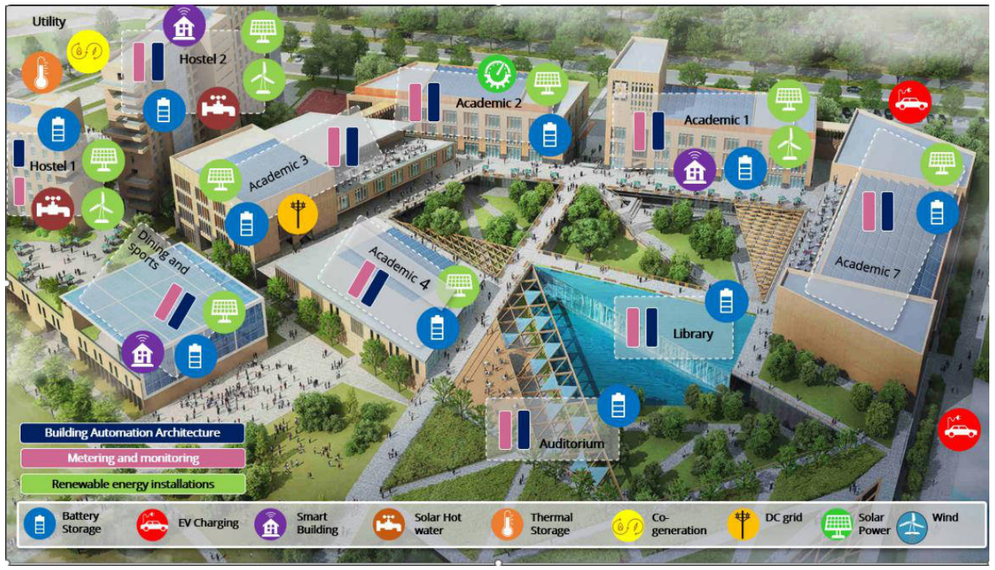


Figure 38 Plaksha Campus as Smart Micro-Grid Testbed

6.3.2 Smart Home Living Lab

The design planning is in process for establishment of a Smart Home Living Lab dedicated to advancing the capabilities and integration of smart technologies in the living environment.

This facility will be developed as fully functional residential units equipped with automation and sensors to test the performance of various building products and technologies. The design will allow flexibility for future technologies to be incorporated such as envelope systems (including roof, wall, window, shading), lighting, air conditioning and any other energy/water systems. It will be a complete integrated design including architectural, mechanical, electrical, plumbing, structural, and automation systems.

This living lab aims to serve as a collaborative space for industry experts, researchers, and technology enthusiasts to explore and develop creative solutions for improving efficiency, security, and overall well-being of individuals in their homes. Through real-world simulations and practical experiments, our goal is to test and refine the latest smart home devices, sensors, and automation systems. The Smart Home Living Lab will not only provide valuable insights into user experience but also encourage partnerships across different disciplines that will speed up the development of smart home technologies. By creating a dynamic environment for experimentation and collaboration, we envision this lab becoming a center for driving forward the next generation of intelligent and interconnected living spaces.

Figure 39 Smart Home cum Living Lab