

# FORUM ON ENERGY EFFICIENCY & DECARBONISATION (FEED 2022)

*Transitioning Towards Carbon Neutral  
Bharat using Energy Efficiency as  
a First Fuel of Choice*



**01-02 February 2022**

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# OVERVIEW

India's economy has steadily grown at the rate of ~6.5% over the last two decades, and as our economy grows, so does our need for energy. An expanding economy, population, urbanisation and industrialisation mean that India's energy demand will continue to rise.

It is estimated that about 270 million people will be added to India's urban population, increasing from 35% to 50% by 2050. This will lead to rapid growth in the building stock and other infrastructure, resulting in a surge in demand for a range of construction materials, notably steel and cement.

Over the next two decades, India's building space will increase from 16.7 billion m<sup>2</sup> to 50 billion m<sup>2</sup>, shaping our energy use for years to come. Buoyed by rising appliance ownership and demand for cooling, the share of electricity in residential energy will nearly triple by 2050.

## Road to 'net zero' goes from India

All roads to successful clean energy transitions go through India. As we seek ways to accelerate the pace of energy transition, India is in a unique position to pioneer a new model for low-carbon, inclusive growth. The aim is to reduce the carbon intensity of India's economy to less than 45 per cent by 2030.

Forum for Energy Efficiency and Decarbonisation (FEED) is a platform that brings together thought leaders and industry experts to build a dialogue towards enabling India to become an energy-efficient economy.

This year's event focuses on decarbonising India's economy through sectoral collaboration and cooperation, with particular focus on construction sector, power sector, transportation, digitalisation of energy systems, and sustainable cooling solutions.

FEED will serve as a platform to hear from eminent industry experts and will have participation from decision-makers across different energy end-use segments, who will initiate discourse on positioning energy efficiency as one of the key differentiators for business competitiveness in the emerging market landscape, and present opportunities to network with energy efficiency experts from across the globe.

The forum will serve as platform for important deliberations and discussions, which will shape India's energy efficiency landscape. The hybrid event will provide an opportunity to network with peers and potential clients.

The two-day event is designed to meet the needs of a range of stakeholders of the energy efficiency ecosystem such as energy consumers, energy efficiency service providers, energy service companies, original equipment manufacturers, system integrators, utilities and DISCOMs, financing community, industry associations, civil society organisations, and research and academia.

The event will bring together various stakeholders to engage in a constructive dialogue to influence effective and impactful policies, which will help in building a robust ecosystem for effective implementation.



## Thematic Areas



**Decarbonisation of  
Construction Sector**



**Decarbonisation of  
Power Sector**



**Sustainable and Smart  
Cooling Solutions**



**Decarbonisation of  
Transportation**



**Digitalisation of  
Energy Systems**



**Innovators Connect:  
Strengthening & Scaling  
Market-Based Solutions**





# 2

## STEERING COMMITTEE



**Anshu Bharadwaj**

*CEO, Shakti Sustainable Energy Foundation*



**Dhiraj Wadhwa**

*Director, Commercial HVAC - India, Carrier*



**Mahua Acharya**

*MD and CEO, Convergence Energy Services Limited*



**Mayur Karmarkar**

*Sustainable Energy Team Leader of Copper Alliance, and Managing Director of the International Copper Association India*



**Melanie Slade**

*Senior Programme Manager, Energy Efficiency in Emerging Economies, International Energy Agency*



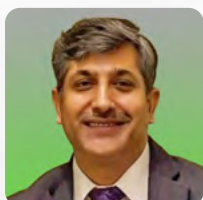
**Peter duPont**

*Co-founder and Managing Partner, Asia Clean Energy Partners*



**Satish Kumar**

*President and Executive Director, Alliance for an Energy Efficient Economy*



**Upendra Bhatt**

*Co-founder and Managing Director, cKinetics; Member of the Board, cKers Finance and Smart Joules*





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# AGENDA



## DAY 01 - 01 February 2022

Time	Session Title	
14:00-14:30	Welcome Address and Opening Remarks on The Role and Importance of Energy Efficiency and Decarbonisation <i>by AEEE</i>	
14:30-14:45	Keynote Address <i>by Brian Motherway, Head of the Energy Efficiency Division at the International Energy Agency</i>	
14:45-15:00	Virtual Exhibition Area Launch + Break	
15:00-16:00	Executive Dialogue 1: Uptake of carbon pricing by businesses in India - Opportunities and Challenges	Special Session: Promoting Domestic Manufacturing Ecosystem for Appliance industry in India: Perspectives from ICAP and Make in India
16:00-17:00	Fireside Chat-Triple Sector Approach to Achieve Decarbonisation Goals <i>by Gauri Singh, Deputy Director-General, International Renewable Energy Agency (IRENA)</i>	
17:00-19:00	Structured Expert Dialogue: Role and Importance of Multilateral/Bilateral Organisations and Foundations in India's Decarbonisation Journey	

## DAY 02 (02 February 2022)

Time	Session Title	
10:00-10:30	Business at the bottom of the pyramid: A Barefoot Journey to Tilonia <i>by Dr Sanjit 'Bunker' Roy</i>	
10:30-11:30	Executive Dialogue 2: Decarbonising the building construction sector in India	Executive Dialogue 3: Leveraging demand flexibility to make Indian power grid resilient, reliable and cost-effective
11:30-11:40	Break	
11:40-12:40	Executive Dialogue 4: Transforming the Experience of Indian energy consumers Through Digital Technologies	Executive Dialogue 5: Mainstreaming Energy Efficient and Low Energy Cooling Appliances to Achieve Thermal Comfort for a Billion Lives <i>(Powered by CIFE)</i>
12:40-13:10	Special Address: How to De-Risk Energy Efficient Investments in a World of Uncertainties <i>(Powered by Eurovent Certita)</i>	
13:10-14:00	Lunch	
14:00-15:00	Executive Dialogue 6: Can District Cooling Solutions Help Cool Indian Cities and Neighbourhoods more Sustainably?	Executive Dialogue 7: Decarbonising the transportation sector in India
15:00-16:00	Decarbonisation of Indian Industries <i>(Powered by Danfoss)</i>	
16:00-16:30	Special Session: Sustainable Urbanisation for Healthier Tomorrow <i>by Dhiraj Wadhwa (Director, Carrier India)</i>	
16:30-16:40	Valedictory Session	
17:00-18:30	Exclusive Executive Roundtable: Net Zero Pathways - How India Inc can plan and achieve decarbonisation goals (by invitation only)	





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# LIST OF SPEAKERS





**Abhas Jha**

*Practice Manager, Climate Change and Disaster Risk Management, South Asia Region, World Bank*



**Abhishek Ranjan**

*Senior VP – Strategy (Utilities & Retail), ReNew Power Private Limited*



**Amit Jain**

*Head – ESCO Business, Tata Power Trading Company Limited*



**Amitabh Sur**

*National President, ISHRAE*



**Anil Kumar Jain**

*Coal Secretary and, Former MoEFCC Additional Secretary, Initiator of India Cooling Action Plan, Former Energy Advisor, NITI Aayog, Initiator of India Energy Security Scenarios and National Energy Policy*



**Anjan Ray**

*Director - Indian Institute of Petroleum and Head - HRDG at CSIR*



**Anupam Shrivastava**

*Head Business Development & Policy, Intellismart Infrastructure Private Limited*



**Arijit Sengupta**

*Director at Bureau of Energy Efficiency*



**Atul Bagai**

*Head of Country Office, United Nations Environment Programme (UNEP)*



**Awadhesh Kumar Jha**

*Executive Director, Fortum Charge & Drive India Pvt. Ltd.*



**Brian Motherway**

*Head of the Energy Efficiency Division, International Energy Agency*



**Chirag Baijal**

*Managing Director- HVAC, Carrier*



**Daljit Singh**

*Managing Director, Amber Group*



**David Yeo**

*Partner - Corporate Solutions, Asia Clean Energy Partners*



**Eric Foucherot**

*Head of International Affairs & Partnerships, Eurovent Certita Certification*



**Falgun Shah**

*CEO - International Subsidiaries at Symphony Limited*





**Gaurang Dabholkar**  
Head - Sales & Execution  
at Kirtoskar Chillers  
Private Limited



**Gaurav Burman**  
APAC President at 75F



**Gauri Singh**  
Deputy Director-General,  
International Renewable  
Energy Agency



**Guruprakash Sastry**  
Regional Head -  
Infrastructure/Green  
Initiatives at Infosys



**John Smith-Sreen**  
Director of the Indo-  
Pacific Office for USAID/  
India



**Kanwaljeet Jawa**  
President, Refrigeration  
and Air-conditioning  
Manufacturers Association  
(RAMA) & MD and Chief  
Executive Officer, Daikin  
Airconditioning India Pvt. Ltd.



**Kiran Ananth**  
Principal Counsellor,  
Confederation of Indian  
Industry



**L Nagahari Krishna**  
Director – Industry  
Affairs & Regional  
Hotspots, Danfoss



**M K Mehta**  
Director, Refrigeration  
and Air Conditioning  
Trades Association Ltd.  
(RATA), and MD, Mercure  
Metals and Alloys Pvt Ltd  
(INDIGO)



**Madhur Sehgal**  
Head of Climate  
Solutions Sales, Danfoss  
Industries Pvt Ltd



**Mahesh Patankar**  
Founder and Managing  
Director, MP Ensystems  
Advisory Pvt. Ltd.



**Manish Dabkara**  
MD & CEO, EKI Energy  
Services Ltd



**Manish Pant**  
Zone President East Asia  
& Japan at Schneider  
Electric



**Markus Wypior**  
Deputy Programme  
Coordinator, GIZ India



**Mayur Karmarkar**  
Sustainable Energy  
Team Leader of  
Copper Alliance, and  
Managing Director of  
the International Copper  
Association India



**Mayur Sundararajan**  
Business Head- Superfan  
at Versa Drives Private  
Limited



**Moutushi Sengupta**

Director India Office,  
John D and Catherine T  
MacArthur Foundation



**N Mohan**

DGM (Head-EVCI),  
Convergence Energy  
Services Limited



**Padu Padmanabhan**

Author of 'FIRST FUEL:  
India's Energy Efficiency  
Journey & a Radical  
Vision for Sustainability';  
International Consultant,  
Energy & Water Productivity



**Peter Graham**

CEO & Executive  
Director, GBPN & A.Prof  
Architecture Monash  
University, Melbourne  
Australia



**Ponnuswami M**

Chairman & Managing  
Director, Pon Pure  
Chemicals Group



**Pranav Shrivastava**

General Manager - R&D,  
Denso International India  
Pvt Ltd



**Prashant K Banerjee**

Executive Director,  
Society of Indian  
Automobile  
Manufacturers



**Rahul Tongia**

Senior Fellow, Centre  
for Social and Economic  
Progress (CSEP)



**Rajan Rawal**

Senior Advisor, CARBSE,  
CEPT Research and  
Development Foundation



**Rajeev Sharma**

Vice President,  
Engineering &  
Construction, Gujarat  
International Finance  
Tec-City



**Raju Goyal**

Chief Technical Officer,  
UltraTech Cement Ltd,  
Aditya Birla Group  
Company



**Rupa Nandy**

Head of UITP  
(International Association  
of Public Transport) India



**S K Soonee**

Former Advisor, CEO  
POSOCO, Power System  
Operation Corporation  
Ltd



**Sabyasachi  
Pattanaik**

Director, Regulatory  
Affairs & Market  
Development (OPower-  
Oracle Utilities)



**Sameer Maithel**

Director, Greentech  
Knowledge Solutions  
Pvt Ltd



**Sandeep Karnati**

Co-Founder, and CTO,  
KIOT Innovations





**Sanjeev Kumar**

*Chairman, Airports  
Authority of India*



**Sanjit 'Bunker' Roy**

*Founder of Barefoot  
College Tilonia*



**Shirish Sinha**

*Acting Executive  
Director, India & Director,  
Climate at the Children's  
Investment Fund  
Foundation (CIFF)*



**Sudheer Perla**

*Country Manager, India-  
Tabreed*



**Sunita Purushottam**

*Head of Sustainability  
at Mahindra Lifespace  
Developers Ltd.*



**Sushanta Chatterjee**

*Chief (Regulatory Affairs),  
Central Electricity  
Regulatory Commission*



**Suvojoy Sengupta**

*Partner - McKinsey,  
Gurgaon*



**Thomas Lützkendorf**

*Head of Chair, Karlsruhe  
Institute of Technology  
(KIT)/ University of  
Karlsruhe (TH)*



**Tobias Winter**

*Director at Indo-German  
Energy Forum SO,  
Deutsche Gesellschaft  
für Internationale  
Zusammenarbeit (GIZ)  
GmbH*



**Umesh Bhutoria**

*Chief Executive  
Officer, Xempla- Asset  
Performance Analytics  
for Facility Management  
Teams*



**Vanshaj Kaul**

*India Representative,  
Eurovent Certita  
Certification*



**Vinod K Kala**

*Founder, Director at  
Emergent Ventures India  
Pvt Ltd*



**Viraj Srivastava**

*Principal Data Scientist,  
Connected Plant,  
Honeywell Technology  
Solutions Lab*



**Vishal Garg**

*Professor and Head,  
the Center for IT in  
Building Science at IIIT  
Hyderabad*





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PROCEEDINGS



## DAY 01

### 15:00-16:00 Executive Dialogue 1: Uptake of carbon pricing by businesses in India - Opportunities and Challenges

#### Session Brief

As companies embark on decarbonization pathways, putting a price on carbon pollution is an efficient strategy to manage carbon risk, reduce carbon emissions, and combat climate change. Rather than tackling emissions at the project level, a sector-level understanding could enable companies to assess better its impacts on businesses and the risks and opportunities that a low-carbon economy presents. This session will delve into the challenges and opportunities that lay ahead for India Inc to understand the 'How' piece of implementing carbon pricing in India.

#### Session Moderator & Speaker(s)

- Mr Suvojoy Sengupta, Partner, McKinsey
- Vinod Kala, Founder, Emergent Ventures India Pvt Ltd
- Mr David Yeo, Partner, Asia Clean Energy Partners Limited
- Mr Manish Dabkara, Managing Director, EnKing

#### Panel Discussion

##### Suvojoy Sengupta

- India needs to develop a structured policy framework for the domestic carbon market.
- Independent assessment standards and certification of carbon reducing projects needs to be developed with recognized methodology set against real, quantifiable, traceable criteria.
- The pain points must be addressed to scale up the market in India to full potential & build trust in overseas markets.

##### Vinod Kala

- There is clear commitment from investors, customers, suppliers trying to move on a path of carbon neutrality.
- Standardization of various carbon credits must be developed.
- Linkages across various carbon markets must be developed to avoid duplication.
- Aggregation of EE projects for carbon credits must be done with standard methodology.

##### David Yeo

- Cross border trading has huge potential to scale up carbon markets.
- Growing interest from international companies in carbon credits will influence supply chain partners to move towards carbon neutrality.

**Manish Dobkara**

- New & fresh workforce in the carbon market need to be properly trained & imparted knowledge.
- Proper policy on domestic markets with minimum interference from the Indian Govt is desired to clear doubts among Indian project developers & owners.
- Nature based solutions should be given traction in the market.

**3 Key Takeaways of the session**

- Growing interest in carbon market which is gathering pace & is reflected in increasing demand and prices.
- Policy framework for operation of domestic market, international market, compliance market, regional market, voluntary market must be established by the Govt, stand on Article 6 of Paris Agreement negotiated in COP 26 must be made clear.
- Standardization across various markets for trading of different carbon credits & a common registry for interlinking of different carbon credits to avoid duplication is needed.

**10:30-11:30 Executive Dialogue 2: Decarbonising the building construction sector in India**
**Session Brief**

Building materials such as cement, steel, glass, bricks among others, contribute approximately 16% to the total GHG emissions in India. Moreover, the floor area in India is projected to increase by 264% by 2050 than the 2015 level. Additionally, embodied carbon plays a much bigger role in India than in the developed countries because of lower appliance penetration. Hence, both design and material substitution/innovation strategies to mitigate embodied emissions from building construction are critical to make the built environment a net-zero carbon emitter.

**Session Moderator & Speaker(s)**

**Expert Speakers:** Prof. Dr. Thomas Lützkendorf

**Moderator:** Dr. Rajan Rawal

**Speakers**

- Dr. Peter Graham
- Dr. Sunita Purushottam
- Dr. Sameer Maithel
- Mr. Guruprakash Sastry

**Panel Discussion****Prof. Dr. Thomas Lützkendorf**

- Formulate legal requirements to limit the use of non-renewable primary energy and GHG emissions in the life cycle of buildings by 2025 or before.
- Advance laws on energy saving and climate protection to laws for environmental protection and resource conservation in the construction sector
- Publish data on energy consumption and GHG emissions associated with the public building stock as part of the sustainability reporting of national and/ or regional governments



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**Dr. Peter Graham**

- To restrict temperature, rise up to 1.5 degrees, emissions from built environment should half by 2030. Further by 2050, all new and existing assets must be net zero across the whole life cycle
- There is need to introduce carbon pricing to accelerate the adoption of carbon neutral solutions.
- There is a strong need for open source life cycle assessment (LCA) tools for the industry to make informed choices.

**Dr. Sunita Purushottam**

- Challenges for decarbonizing the building sector includes, no policies to address embodied carbon, lack of investment options, C&D waste management, lack in climate responsive design awareness.
- There is need to look at this sector from the lens of GHG emissions rather than only talking about net-zero energy.

**Dr. Sameer Maithel**

- Net Zero Energy Buildings  $\neq$  Net Zero Carbon Buildings
- Need to develop better understanding of upfront embodied carbon (Phase 1) and End of Life carbon (Phase 3) for different building typology in the Indian context
- Preliminary analysis suggests there is a large potential for reduction in upfront embodied carbon in low-rise residential construction through available technologies and materials.

**Mr. Guruprakash Sastry**

- It a general practice that during the design phase building equipments are oversized by 2-3 times.
- Through retrofits and operational excellence, Infosys has reduced the connected load demand by 35MW over past 10 years across campuses.
- Infosys has pledged to remain carbon neutral by 2030. While defining the ESG vision we should look for first energy efficiency, then Renewable energy and lastly look for carbon offsets.

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**Key Takeaways of the session**

- Climate responsive design is the region-specific architecture and design which can contribute to significant reduction in Building energy consumption and embodied carbon. However, we are still witnessing lack of climate response design knowledge and implementation.
- There is need to introduce carbon pricing to accelerate the adoption of carbon neutral solutions.
- Need to publish data on energy consumption and GHG emissions associated with the public building stock as part of the sustainability reporting of national and/ or regional governments

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**Way forward**

If we aim to decarbonize the building sector, then there is need to look at the sector in a holistic manner, covering GHG emissions (operational and embodied) and the impacts on water and air.

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**10:30-11:30 Executive Dialogue 3: Leveraging demand flexibility to make Indian power grid resilient, reliable and cost-effective**
**Session Brief**

Rising share of variable RE, along with rapid increase in peak power demand, provides a unique opportunity to adopt cost-effective and reliable flexible demand-side solutions for maintaining flexibility and resiliency of the grid even as India becomes power adequate. The collection of distributed energy resources (DERs) like flexible appliances, battery electric vehicles, energy storage, grid-interactive buildings and microgrids will further widen the canvas of Demand Response (DR) programs. The session will act as a forum to gather the views of key stakeholders and identify opportunities and challenges to help develop an ancillary market around dispatchable demand resource in India.

**Session Moderator & Speaker(s)**
**Expert Speakers**

- S.K. Soonee, Former Advisor, CEO POSOCO, Power System Operation Corporation Ltd
- Sushanta K Chatterjee, Chief (Regulatory Affairs, Central Electricity Regulatory Commission

**Executive Speakers**

- Mahesh Patankar, Founder and Managing Director, MP Ensystems Advisory Pvt. Ltd.
- Abhishek Ranjan, Senior VP – Strategy (Utilities & Retail), ReNew Power Private Limited
- Anupam Shrivastava, Head Business Development & Policy, Intellismart Infrastructure Private Limited
- Sabyasachi Pattanaik, Director, Regulatory Affairs & Market Development Power-Oracle Utilities

**Panel Discussion**
**S.K. Soonee (Former Advisor, CEO POSOCO, Power System Operation Corporation Ltd)**

- Flexibility is the second tool, in the entire value chain as seen in generation, transmission as well as market-side. Regulations are also flexible. There is a need to make contracts flexible in generation and demand side. Most important part is flexibility in demand.
- There is a need for data analytics, distribution management centres, and distribution system operators to identify where to get relief from and the nature of support needed
- Ecosystem needs to be prepared for this and the time has come to work on the demand side to make it smart, flexible and grid-interactive. Work needs to be done on creating support systems, proper regulations, policies, advocacy for demand response and making demand dispatchable and devising ancillary services around it.

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**Sushanta K Chatterjee (Chief (Regulatory Affairs), Central Electricity Regulatory Commission)**

- Flexible resources are required from both supply and demand side.
- There is a need for proper resource adequacy requirement to meet demand at all times, scientific load forecasting is required. Work being done to address the resource adequacy framework in National electricity policy.
- Regulatory framework is there for supply side. However, constraints of supply side flexibility make demand side more important further strengthening the electricity market is important in India power market journey and important for RE integration

**Executive Speakers****Mahesh Patankar (Founder and Managing Director, MP Ensystems Advisory Pvt. Ltd.)**

- Technologies are available to facilitate demand flexibility – AC, water heating systems, and water pumping in residential buildings. Commercial buildings as well have HVAC, lighting, elevators
- Small, medium and large industries have immense opportunities as well
- Regulatory and policy push are required to ensure the sector can develop
- State-level action is also needed to increase and support Energy efficiency portfolios

**Abhishek Ranjan (Senior VP – Strategy (Utilities & Retail), ReNew Power Private Limited)**

- Regulations required are in place
- Demand resources can be supply side resource and load modifier
- There is a need to recognized DER as integral part of RA plan of DISCOM or be allowed as a dispatchable resource which can participate in wholesale markets
- Financial signals in terms of Time of Use Tariff Rates can be introduced for residential consumers

**Anupam Shrivastava (Head Business Development & Policy, Intellismart Infrastructure Private Limited)**

- Major Challenge facing the industry today is the lack of real time data
  - In India there are multiple phases of system integration. Some states Karnataka, Tamil Nadu, Rajasthan, etc. are in 3rd phase – 30% RE integration – different challenges in RE integration
  - Flexibility options on the demand side by retail pricing on smart metering, Agriculture load shifting, storage options also exist
  - The fourth Phase has much more complication due to digitalization requirement which are the backbone of smart meters
  - Sabyasachi Pattanaik (Director, Regulatory Affairs & Market Development (OPower-Oracle Utilities))
  - Factors in demand response and renewable energy are extreme weather changes, retirement of fossil fuels
-



- Demand side approach is required: 2 core capabilities of utilities– reduce peak load, shift customer usage, align usage with period of high renewable energy generation.
- Influence consumer action through AI and behavioural science principles leading to behavior change, flattening demand and saving money

### 3 Key Takeaways of the session

- Time is ripe to work on the demand side – make it smart, flexible and grid-interactive. Work needs to be done on creating support systems, proper regulations, policies, advocacy for demand response and make demand dispatchable and devise ancillary services around it.
- Need to implement 1000MW “big” regulator approved demand flexibility pilots to support the discussion on enabling demand side as valuable grid resource

## 11:40-12:40 Executive Dialogue 4: Transforming the Experience of Indian energy consumers Through Digital Technologies

### Session Brief

Digitalisation is an integral part of the ensuing energy transition and decarbonisation. Digital innovations have empowered consumers to emerge as active players in the energy transition, capable of monitoring and controlling their energy consumption on one hand and enhancing the comfort of consumers on the other. With shifting consumer behaviour, energy products and services companies must meet the expectations of a seamless customer experience regardless of channel or place while also warranting data privacy protocols. This session aims to explore the synergy between digitalisation of energy systems and consumer expectations on the value addition of digitalization and explore answers to pertinent queries like “Are consumers willing to grab digital technologies to manage their energy use while enhancing their indoor environment?”

### Session Moderator & Speaker(s)

- Mr Manish Pant, EVP, Schneider Electric (Expert Speak)
- Mr Rahul Tongia, Senior Fellow, CSEP (Chair)
- Mr Umesh Bhutoria, CEO, Xempla
- Prof Vishal Garg, Professor, IIT Hyderabad
- Mr Viraj Srivastava, principal Data Scientist, Honeywell Technology Solutions Lab

### Panel Discussion

#### Mr Manish Pant

- There are many technological solutions available that would help prosumers to evolve and digital technology to drive the way coupled with electricity 4.0 to move along the path of carbon reduction targets.
- In the residential space, homes are transitioning to a more electrical and digital space. More residential homes could be brought in to participate. Home energy management system coupled with smart energy centres and smart meters are becoming prevalent for managing demand

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**Dr Rahul Tongia**

- Grid has to match demand with supply due to variability of RE load, Time of use
- Consumers want to retain control; they don't want the utility to control their appliances and utility does not want to be liable for the operation of consumers' appliances and if anything goes wrong except a few niche bulk specialized contracts.
- Possible reasons for less adoption of energy management - Lack of use cases, lack of price points, complex system, uncertainty – technology is moving too fast and data privacy.

**Mr Gaurav Burman**

- Customers are outcome focussed and need reporting and dashboards that are highly customizable
- Systems should be easy to operate, pick and choose, plug in and play
- Digital technology has to much cheaper to mainstream energy management.

**Mr Viraj Srivastava**

- What we do depends on the classification types of loads – essential or non-essential, deferrable or non-deferrable and linked to the load, what is the technique for control – manual, semi-automatic, or digital control point?
- Policy work on time of day pricing is needed, make it attractive for consumers, and make it easy to follow for consumers.

**Dr Vishal Garg**

- Human -aspect is critical because there should be ability, buy in, incentives -all in one.
- Smart home energy management should be a service industry.

**Mr Umesh Bhutoria**

- Outcome for consumers is necessary to scale up the market.
- Greater potential of energy management market among C&I consumers.

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**Takeaways of the session**

- Electricity equipped with digital solutions is critical for decarbonisation and achieving net-zero. Consumers have and will evolve into prosumers by participating in production, consumption and controlling electricity and its usage.
- The human aspect is critical. There is a need for incentive, willingness to buy as well as the ability to buy. Ease of usage can drive consumers to adopt smart energy-saving technologies.
- The market can grow more in a service-based set -up rather than technology driven with more features. Integration with entertainment business is an option

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**Way forward**

- The scope for energy saving and energy shifting should be explored through policy
  - Pre-work is required to gauge the size of the use-cases for digital technologies for consumers in the Indian contexts to identify which assets are being targeted.
  - As a path forward, we need to look at whether we can integrate with the smart city initiatives
-



- Apart from technology, the end outcomes must also be taken into consideration. The customers care more about the latter than the former, especially in case of cost reduction.
- A combination of carbon consciousness, interest in something new and convenience need to align.
- Ensuring that standardized certification is in place for upskilling of facility workers, we'll be able to see more people driving a change. There will also be more employment opportunities. It is not just a demand-side, but also a supply-side change.

## Closing Remarks

### Prof. Vishal Garg

Smart home is not a design-time intervention as much as an operation-time intervention. It should be continuously operated and not just static.

# DAY 02

## 11:40-12:40 Executive Dialogue 5: Mainstreaming Energy Efficient and Low Energy Cooling Appliances to Achieve Thermal Comfort for a Billion Lives (TCBL)

### Session Brief

The energy consumption by space cooling appliances outweighs the energy consumption by other appliances in India's building sector cumulatively. It is no surprise then that India is one of the first countries to come out with a comprehensive and ambitious India Cooling Action Plan. At present, the Government of India bestows various opportunities such as the Atmanirbhar Bharat Initiative, Super-Efficient Equipment Programme (SEEP), S&L program, PLI schemes that could enable self-reliance in the supply chain, job creation, reduction in manufacturing cost, economies of scale, reduction in cost to the consumer increased access to affordable and energy-efficient appliances. This session aims to bring forward the private sector role and technology potential in expediting the transition towards super energy-efficient appliances (SEEA) for reducing the space cooling appliances' energy consumption in India's building sector.

### Session Moderator & Speakers

**Expert Speaker:** Mr Chirag Baijal, Managing Director- HVAC, Carrier.

**Chair:** Mr Kanwaljeet Jawa, President, Refrigeration and Air-conditioning Manufacturers Association (RAMA) & Managing Director and Chief Executive Officer, Daikin Airconditioning India Pvt. Ltd.

### Executive Speakers

- Dr Mayur Sundararajan, Business Head- Superfan at Versa Drives Private Ltd.
- Mr Amitabha Sur, President, Indian Society of Heating, Refrigerating and Air Conditioning Engineers (ISHRAE).
- Mr Falgun Shah, CEO - International Subsidiaries at Symphony Ltd.
- Mr Gaurang Dabholkar, Head - Sales & Execution at Kirloskar Chillers Private Ltd.

## Panel Discussion

### Mr Chirag Bajjal

*“We need to ensure thermal comfort for all in entirety, irrespective of people’s economic conditions.”*

- Thermal Comfort for Billion Lives (TCBL) is a national imperative.
- India is facing unprecedented heat distress due to climate change, and climate change is going to impact all aspects of life.
- The thermal comfort objective is central to the three international commitments:
  - a) Sustainable Development Goals (SDGs)
  - b) Paris agreement and Glasgow climate commitments
  - c) Kigali Amendment to the Montreal Protocol
- Memorandum of Understanding (MoU) to be established between AEEE and RAMA in the near future, which will focus on working together on key areas related to cooling, thermal comfort and refrigerant transition, etc.
- India Cooling Action Plan (ICAP) 2019 is a forward-looking policy document with a set of progressive actions in terms of recommendations.

### Mr Kanwaljeet Jawa

*“Need to give huge impetus to the economy and make the coming decade a decade of sustainable manufacturing in India.”*

- As highlighted during India’s 2022 budget speech, India is ready for transformation and has various growth opportunities in terms of foreign direct investment (FDI), increasing disposable income, policies and schemes which could support India becoming a global leader in exports and manufacturing hub.
- The government of India bestows various policies and schemes like the S&L program, Production Linked Incentive Scheme (PLI) scheme, Gati Shakti and AtmaNirbhar Bharat initiative and other initiatives for providing a boost to India’s appliance and manufacturing sector. This would result in making India self-reliant in the supply chain and becoming a leading manufacturer of affordable and energy-efficient appliances.
- The Quality Control Order is another major step for regularising the sub-standard products being locally produced or imported. This would support meeting the energy efficiency requirements as per Indian standards.
- India’s green construction sector in India currently lacks the technical expertise and funding to execute the projects and hence, require a regulatory approach. India’s growth has to be green by mainstreaming super energy-efficient fans, evaporative air coolers, RACs and chillers.
- India’s GDP will rise by USD 406 billion by 2050, and more than 43 million jobs will be created as we move close to India’s target to become NetZero.

*Mr Kanwaljeet Jawa, the session chair, requested responses from each session speaker towards the selected questions, as follows:*

### Dr Mayur Sundararajan

*“The S&L program of fans is still in its voluntary regime and should be more aligned as per the Indian context.”*



**Q. How can fans manufacturers increase the penetration of Super Energy-Efficient fans in India? and what could be the strategies for bringing down the cost, enabling penetration of Super Energy-Efficient fans in middle-income groups (MIG) and lower-income groups (LIG) communities of India?**

- Fans are a go-to thermal comfort appliance in India for all communities, specifically the middle-income groups (MIG) and lower-income groups (LIG) and for any electrified community.
- The penetration of super energy-efficient BLDC fans is very low in the Indian market due to its high cost.
- The S&L of fans is still in its voluntary regime and will get mandatory in June 2022. After these standards have been mandated, the focus should be made on the check-testing, which is currently not being done. Stringent check testing for fans will ensure the fan manufacturers adhere to these standards.
- In the long term, GST on these super energy efficient fans could also be lowered for reducing the cost to the consumer and increasing their penetration in India.
- One of the major challenges in the sector is the lack of authentic data: The policymakers should independently collect and validate data related to the fan sector in India. Currently, the data collection related to new and innovative technology and data validation depends on manufacturers. Hence, there lies a huge gap between what does government wants to enforce and what manufacturers provide.
- Most importantly, by taking the learnings from the LED market and supply chain where there are only a few leading Indian brands left, as the market is now being led by international brands; steps should be taken to save the Indian Fan market by supporting the Indian fan manufacturers for being the market leaders and reducing the dependency on foreign brands.

**Mr Amitabha Sur**

*“We must install super energy-efficient appliances, but along with that, skilling our engineers and developing expertise to operate and maintain the appliances is also important.”*

**Q. What do you think are the RAC industry’s challenges in accelerating Minimum Energy Performance Standards (MEPS) for RACs? and Is there an issue with the non-availability of cost-effective, high-quality new energy-saving components crucial to achieving overall energy savings?**

- ISHRAE is working towards improving product efficiency throughout its life cycle. Also, ISHRAE is playing a vital role in aligning and bringing together the fragmented institutions for creating an ecosystem for appliances.
- The important action and the need of the hour are creating awareness and skilling people working in the cooling and HVAC industry.
  - There is a need to skill the field engineers about super energy-efficient appliances and their usage.
  - It is important that we install super energy-efficient appliances, but it is equally important that we gain expertise on how to operate and maintain them to sustain their energy efficiency.
- There is a need to bring regulations for increasing the lifespan of RACs.
- Establishing strong collaboration with key actors in this industry and government bodies is also crucial.

**Mr Falgun Shah**

*“Policies should be aligned to thermal comfort, for the working masses, which could be a mixture of evaporative air coolers, fans, and other space cooling appliances.”*

**Q. What kind of market transformation are we looking at in evaporative air coolers in India? and What is the role of development and adoption of standards for evaporative air coolers that will allow for the consumers to get quality evaporative air coolers?**

- It has been observed that there is a lack of focus on and access to thermal comfort for the workers especially working in factories, warehouses and agricultural fields.
- Policies should be aligned and incorporate thermal comfort as a key component, especially for the better health and well-being of the working masses.
- Access to thermal comfort for the workplaces could be achieved by focusing on a set of space cooling appliances such as a fan, evaporative air conditions, etc., as and when required by a workplace.
- Standardization of the evaporative air cooler market will help consumers to opt for energy-efficient evaporative air coolers.
- Currently, ISHRAE, with support from BEE, BIS and other key stakeholders, is developing the standard for evaporative air coolers (EACs) for India, in which Symphony and AEEE are playing a key role. Once this standard is in place, it will help end-consumers to compare evaporative air coolers on the basis of key performance parameters, i.e. energy efficiency and aid the industry to grow.
- Also, awareness generation is one of the most important components while we target to provide TCBL.

**Mr Gaurang Dabholkar**

*“The focus is on new chillers, but there are old chillers that are running from 15-20 years. There is a need to replace these chillers, and the industry needs to shift their focus on the same.”*

**Q. How can ratcheting up chillers energy efficiency levels and specifying a fixed life span for chillers will help in reducing energy consumption at the building level? and what is the role of low Global Warming Potential (GWP) and Zero Ozone Depletion Potential (ODP) refrigerants in improving the efficiency of Chillers?**

- The HVAC system is the largest contributor to the energy footprint of air-conditioned buildings and central air-conditioning plants, where chillers are one of the highest energy-consuming HVAC technologies.
- Chillers also contribute to global warming because of the use of GWP based refrigerants. Hence, it's the responsibility of the chillers Industry to lead this effort to make them energy efficient.
- Chiller efficiency could be improved by using energy-efficient technologies - a) low energy compression technologies such as magnetic and ceramic bearings, rolling out variable frequency drive for all applications, multi-stage compression, use of permanent magnetic motors over induction motors and economizers and b) heat transfers, i.e. moving from Dx chillers to flooded and air-cooled chillers, other hybrid technologies and adiabatic cooling.
- Chiller's S&L program could be mandated as, at present, it is at the voluntary stage. This will allow Indian chiller manufacturers to compete better in the international market.



- Incentivization on the use of star labelled chillers could be implemented for mainstreaming the use of super energy-efficient chillers.

### Key Takeaways of the session

- The stakeholders in the appliance industry need to approach the right people with the right intent as the government of India is readily receptive to all new ideas.
- Collaborative and collective efforts can create a new horizon for achieving TCBL through super energy-efficient appliances. Strong collaboration with government bodies can support industries in achieving this common goal.
- Generating awareness and training & capacity building of the experts, technicians, and other key actors working in the industry along with end-users about the super energy-efficient technologies and their usage is the most important factor towards the narrative of achieving TCBL.

### Way forward

#### *Switching from competition to cooperation is the key!*

Appliance industry is now being considered as the sunrise industry and getting due attention from the government bodies. Hence, this is the right time for the industry/associations, manufactures and civil societies/policy think tanks to come together to collaborate and synergize efforts for mainstreaming super energy efficient and low energy cooling space cooling technologies to achieve TCBL.

## 14:00-15:00 Executive Dialogue 6: Can District Cooling Solutions Help Cool Indian Cities and Neighbourhoods more Sustainably?

### Session Brief

District Cooling Systems (DCS) can help meet India's cooling demand at city and neighborhood level where there is an expectation of significant cooling demand for both residential and commercial/retail sectors. DCS provides triple sector benefits, as it would create a new business industry leading to job creation and economic growth, provide thermal comfort and social wellbeing and reduce the energy demand by around 40% than conventional systems while using environmentally friendly refrigerants. While the technology is fairly well understood, what are the challenges and the opportunities in deploying this technology from a business model and regulatory/policy perspective will be discussed in this session.

### Session Moderator & Speaker(s)

**Context Setting:** Mr. Atul Bagai Head of Country Office, UNEP, India

**Moderator:** Mr. Markus Wypior, Deputy Programme Coordinator, GIZ

#### Speakers

- Mr. Rajeev Sharma, Vice President, Gift City
- Mr. Sudheer Perla, Country Head – India, Tabreed
- Mr. Amit Kumar Jain, Tata Power Trading
- Mr. Arijit Sengupta, Director at Bureau of Energy Efficiency

## Panel Discussion

### Mr. Atul Bagai

- India will become much hotter in the coming years and a large population of Indians will be exposed to conditions that will cross the workability and survivability threshold by 2030, as a result nearly 200 million people will be exposed to lethal heat waves which might lead to 34 million job loss and close to 2% of GDP loss.
- UNEP has taken significant steps to tackle these upcoming challenges, UNEP has launched the “Beating the heat” handbook during cop26 which lays out guidelines for cities to fulfill their cooling demands.
- UNEP has also partnered with Rocky Mountain Institute (RMI), National Institute of Urban Affairs (NIUA), and the Danish government to develop a program that will provide technical assistance and concrete solutions for the cooling needs of Indian cities.

### Mr. Arijit Sengupta

**What role do you think DCS can play in India’s net-zero and decarbonisation journey?  
How is BEE trying to support the uptake of DCS in India?**

According to Mr. Arijit Sengupta, there will be a huge growth in space cooling in India and the work of the BEE will be to make sure that the cooling needs of India are fulfilled by adopting sustainable cooling technologies like District cooling.

- The BEE & GIZ have commenced an initiative for Energy-efficient and environment-friendly DC solutions in India. Under the initiative, BEE & GIZ will demonstrate the benefits of DCS by executing a few pilot projects.
- BEE has also formed a technical committee that will lay out the guidelines for DCS by consulting local, national and international stakeholders.
- BEE will share knowledge and build capacity of the local urban bodies and municipalities to have an informed opinion on the DCS technology during its implementation.

### Mr. Rajeev Sharma

**GIFT City is a successful DC project but did you face any challenges, if so what were those challenges while commissioning the project and now during the operation cycle?  
How did you overcome those challenges and what are the challenges in the new upcoming project of DC in India?**

According to Mr. Rajeev, there are Five-P for the technical challenges in implementing DCS in India:

1. **Power:** Power constitutes about 80% of the entire cost of DCS being the primary raw material in DCS. It’s difficult for the service provider to get power at a commercial rate and then deliver the cooling at a nominal rate to the residential block.

The solution,

- Govt. needs to reduce the power tariff for DCS during the initial 5 to 10 years of DCS operations.



- Power suppliers need to reduce the fixed cost at the beginning of any DCS project.
  - DC service providers should be allowed to purchase power directly from the grid.
2. **Protection:** Protection against the risk of providing inaccurate data on initial cooling loads and demand as it leads to over assessment of tonnage of cooling requirements. It should be made mandatory to check the feasibility and calculate the heat loads of the project accurately. Further, a contractual agreement should be put in place that should limit the cooling demand adjustment that can be done during the operational phase of the project for certain years at least.
  3. **Policy development:** laying out the right policies and guidelines is a challenge but recently, BEE has started working on developing the policies for DCS.
  4. **Provider:** There is a lack of suppliers for the DCS components in India, the components are typically imported. So, there is a need to facilitate the manufacturing of DCS components in India.
  5. **Positioning:** Positioning of the DC plant in the city is the key to the success of any DCS project, the project needs the support of the urban bodies and municipalities to be a success.

**Mr. Sudheer Perla,**

**Tabreed, as we know, is one of the biggest system integrators that has been working in the middle east. What do you think have been the success factors in other countries in terms of administration and What do you think can be learned for India?**

- Tabreed is present in 25 countries and provides DC cooling or heating in regulated and non-regulated markets. Tabreed established its 1st plant in the middle east in 1998, which was in line with the rapid expansion of the real estate sector in the middle east during the early 2000s. This created a rapid demand for cooling and easier adaptation of DCS in the middle east.
- Developer to developer engagement and subsequently planning DCS was the strategy in place. Once the industry started growing, policies were introduced by the government.
- Drawing parallels with India, it was never the regulation that facilitated the DCS, it was always the pilot project that helped the ecosystem grow and create a sustainable market.
- There is a market gap in India and Indian developers don't analyze the long-term view of any project, therefore don't consider DCS as a viable option.

**Tabreed has also partnered with IFC for DC. What are Tabreed plans with the IFC to take up DC in India?**

- Tabreed has committed to invest 400 million US dollars in the next 5 years to develop an ecosystem within India for DCS. First, 3year Tabreed will try to create the market and shape it, while engaging in B2B conversation with big private players.
- The commitment will lead to 50 million sq ft coverage of DCS which will save 120 to 150 MW of energy and reduction of 5million tons of CO<sub>2</sub>.

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**Mr. Amit Kumar Jain, Tata Power Trading**

**Learning from the experiences by GIFT City and Tabreed, what role do you think DISCOMs can play in making CaaS a reality and what are the challenges you foresee in its implementation?**

- According to Mr. Amit Kumar in DCS projects, DISCOM can play a major role by providing the energy consumption data, the growth of the city, and the forecast of the benefits DCS can bring if implemented.
- DISCOM can provide the input while designing the pre-feasibility of the DCS project which will account for a lower CAPEX in system infra.
- DISCOM can be a part of the consortium in developing the project, it can act as a service agent for the last mile connectivity for the cooling meters similar to electric meters.
- After the approval of the regulator, a cheaper and dedicated reliable power can be provided to the DCS projects.
- DCS needs certain successful use cases by SEZ or land developers with large-scale adoption among local municipalities.

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**Key Takeaways of the session**

- Policy and regulatory measures such as district cooling codes, demand protection norms, and enabling mechanisms such as special power and water tariffs for DC operators are essential for making DCS a reality in India.
- More examples like GIFT City needs to be put in place as these case studies play an important role in getting confidence in the DCS technology
- Cooling as a Service (CaaS) can play a crucial role in how we cool the Indian cities and communities and can be a way forward if India wishes to substantially reduce the space cooling energy consumption and achieve the net zero targets.

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**Way forward**

The demand for space cooling in India will nearly grow to 11 times by 2037. By 2050, India will be the largest consumer of space cooling in the world. The implications of this increase in demand will be the energy security & reliability issues in the coming future. This calls for a robust and sustainable District Cooling System to allow the economy to derive maximum dividends from its resources in a sustainable manner. Aligning the goal of India advocated at the CoP 26 event, DCS needs a priority at the policy formulation front.

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**14:00-15:00 Executive Dialogue 7: Decarbonising the transportation sector in India**
**Session Brief**

The transportation sector is the fastest-growing source of carbon emissions in India due to its dependence on oil combustion. While the focus has been on road transport, a comprehensive strategy needs to look at rail, air, and maritime transport as well. Deep decarbonisation of the transport sector is receiving significant attention now, with a particular focus on electrification. The session will look at the technology trends for deep decarbonisation of the transport sector, critical challenges ahead for clean mobility in India as it is also one of the primary reasons for the degraded air quality in many parts of India, strategies to decarbonisation freight and heavy transportation and plans for reducing the carbon footprint for railway, aviation and maritime shipping sectors.

**Session Moderator & Speaker(s)**

**Expert Speak:** Sanjeev Kumar (Chairman, Airports Authority of India)

**Chair:** Anjan Ray (Director - Indian Institute of Petroleum and Head - HRDG at CSIR)

**Executive Speakers**

- Pranav Shrivastava (General Manager - R&D, Denso International India Pvt Ltd)
- Rupa Nandy (Head of UITP (International Association of Public Transport) India)
- Awadhesh Kumar Jha (Executive Director, Fortum Charge & Drive India Pvt Ltd)
- N Mohan (DGM (Head-EVCI), Convergence Energy Services Limited)
- Prashant K Banerjee (Executive Director, Society of Indian Automobile Manufacturers)

**Panel Discussion**

**Expert Speak: Sanjeev Kumar (Chairman, Airports Authority of India)**

- Transport specifically civil aviation and airports. Civil aviation sector decarbonization has to be aligned with India's Panchamrit climate commitments at COP26. Transport sectors contribution to 17% India's energy consumption and domestic civil aviation is growing very fast in India – 3rd largest civil aviation market with 13.5% CAGR for domestic.
- Enabling frameworks are being developed by the ministry and civil aviation industry – National civil aviation policy, Whitepaper on green aviation policy, DGCA's Civil aviation requirements published. The advantage of being an emerging civil aviation market and while adding new airport and aircrafts used designing, operations, technology-related learning from other countries. Need energy efficient equipment, integration of renewable energy, reduce energy intensity of airports and airlines. Example of Leh airport – Net zero carbon emission.
- AAI's vision by 2024 – to install capacity of 93 MWp from current 35 MWp
- Developments - Created environment cells, solid waste management, recycling of waste paper, central air traffic management (to reduce waiting time in the air to save oil), performance-based navigation procedures for arrival and departure, fuel efficient path for aircraft, management of airline slots.

**Chair: Anjan Ray (Director - Indian Institute of Petroleum and Head - HRDG at CSIR)**

- The simplest way to decarbonize is to travel less. Other aspects include lower emission intensity, greening of individual platform and tech, greening of the grid and reducing the carbon intensity of fuels.
- Main question to the panel - Where do you see the path for transportation and the pace of the path?

**Executive Speakers**

Pranav Shrivastava (General Manager - R&D, Denso International India Pvt Ltd)

- Climate change is significant threat to Indian economy but it also presents various opportunities. India needs to decouple growth from emissions to walk the low carbon pathway.
- Various technologies being worked upon such as 2W and 3W EV and electric city buses. Also look at hybrid for long-haul vehicles, and alternate fuel pathways. Consider suitable solution and not stick to one technology.
- Policy and regulatory ecosystem favorable for batteries and EVs as seen through - manufacturing, localization, battery storage factories.
- Energy required to produce this vehicle – RE as input needs to increase.
- Readiness of technology, clear policies and guidelines, good roadmaps with milestones (5-year intervals), consumer behavior.

**Rupa Nandy (Head of UITP (International Association of Public Transport) India)**
**Additional Q by chair - Public transport view on decarbonization?**

- Cities are going societal, economic and technological changes. They account for 70% of carbon emissions with transport being a major contributor.
- Policy focusing on reduction of car journeys and modal shift to public transport is needed right now.
- Traffic congestion impact on health, economic health of city and country, so, need to view public transport as a mode of economic growth.
- Focus on sustainable solutions and not just displace the emissions. Invest in research, technological development.
- The biggest way to decarbonize is by switching to public transport more specifically to cleaner modes of transport.

**Awadhesh Kumar Jha (Executive Director, Fortum Charge & Drive India Pvt Ltd)**

- Electrifying road transport will serve two things – decarbonizing transport and decarbonizing power generation itself. Increase in renewable energy integration requires storage capacities through use of batteries.
- What type of public transportation needs to be prioritized? Case for strengthening bus transport. Assign priority depending on financial cost and purpose of the transport. Increasing capacity and assets for transport might not work– example of costs of Lucknow metro for 8kms vs electrifying entire bus fleet of Delhi. Priority – buses serve better purpose rather than metro.
- Also, develop consumer friendly infrastructure and need to align consumer behavior. Drivers for shifting consumers to public transport – government and behavioural scientists need to work on this area.



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**N Mohan (DGM (Head-EVCI), Convergence Energy Services Limited)**

- Pathway involves shift from Fossil fuel based to RE sources. Innovation in infrastructure, technology required.
  - EV will play an important role in decarbonizing transport. In addition, it will also play a role in storage solutions and in dispensing energy back to grid, especially as number of EVs increase.
  - EVs as a resource for the grid.
  - Q: RE sources and generation targets in India and battery storage will be a critical technology. Mobility is only of the elements. Need a complete ecosystem around energy solutions such as data analytics.
  - Recent MoP charging policy which addresses challenges related to land (partnerships announces at Rs 1/kWh basis), distribution infrastructure through scheme, provide single power tariff structure.
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**Way forward**

- Biofuels need to be discussed further, including in the case of aviation.
  - Concerted effort across all aspects of decarbonization is seen.
  - Consistent policies for investment.
  - Consumer behavior needs focus.
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**15:00-16:00 Special Session: Promoting Domestic Manufacturing Ecosystem for Appliance industry in India: Perspectives from ICAP and Make in India**

**Session Moderator & Speaker(s)**

- Mr. Mayur Karmarkar, Sustainable Energy Team Leader of Copper Alliance, and Managing Director of the International Copper Association India
  - Mr. Madhur Sehgal, Head of Climate Solutions Sales at Danfoss Industries Pvt Ltd
  - Mr. Daljit Singh, Managing Director, Amber Group
  - Mr. M K Mehta, Director, Refrigeration and Air Conditioning Trades Association Ltd (RATA) and Managing Director, Mercure Metals and Alloys Pvt. Ltd (INDIGO)
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**Panel Discussion**
**Chair: Mr. Mayur Karmarkar**

1. To discuss the present scenario (policies, initiatives), challenges, and potential pathways for promotion of the appliance industry for entailing socio-economic and environmental gains.
    - a) Present Scenario
      - The Indian Appliance Industry is growing rapidly, with this there is a responsibility and challenge of Energy Management
      - The Make in India initiative is helping India transform into an export hub with an impetus to the development of indigenisation and localisation of manufacturing.
      - The PLI (Production Linked Incentive) scheme is attracting a lot of Investments in the development of MSME Sector which is catalysing job creation.
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b) Challenges

- The Indian appliance market has a prominent presence of fans in the total share but there is also a high churn rate due to the lack of technology. The trend is contrasting with the emergent and recovering market of China and South-East Asia.
- The cumulative value added of the industry is lacking, there is a need for sustained efforts in this domain.

**2. Role of Research and Development in India for accelerating indigenous innovations in cooling technologies.**

- a) The Indian appliance industry's R&D base needs strengthening with widespread consultation of various academia institutions.
- b) India needs to learn from the Chinese Industrial Alliance which engages various institutions to find solutions and absorb technology.

**Context Setting: Mr. Tarun Garg**

- **ICAP has set forth certain cooling-specific goals for India. How do you think the recommendations for the cooling appliance industry align with broader policy objectives of PLI and Make in India?**

ICAP has a long term vision for India. The PLI scheme is in alignment with these objectives in a way that it promotes the development and transition to new generation coolants and the indigenous development of AC's. The Make in India initiative too, is in alignment as it advocates for the imposition of high Import duties of finished goods along with the quality control of the Imports.

**Executive Speaker I: Mr. Madhur Sehgal**

**1. What are the initiatives taken by Danfoss for promoting the desired innovations in the cooling appliance industry?**

- a) Danfoss has taken Energy Efficiency to the next level by building the foundation of R&D setup and the application development center.
- b) It has an active university engagement programme under which various training centres have been set up for building future talent.
- c) The Ammonia Test Lab has been set up to bring automation for efficiency and human safety.
- d) *"The exploration of EV(Electric Vehicle) space and Data Centre Cooling is next on Danfoss focus area".*

**2. What are the prospects for the industry to attain self-reliance and serve the export markets in the coming years?**

- a) Future is bright for self-reliant industries. The Government is to be credited for expanding the export base through
  - Standards development of various appliances.(BIS)
  - Strong quality control culture. (DPIT's Quality Control Order)
  - Labelling Programme of BEE(Bureau of Energy Efficiency)



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**Executive Speaker II: Mr. Daljit Singh**

1. To discuss the existing and potential markets for the backward integration industry, highlighting key measures to promote technology and skills.
  - a) *“It’s the right time for deliberating the goal of India being global hub for manufacturing.”*
  - b) If India seeks to reach the top of the value chain, it needs favourable and concrete policies in the Technology and skill development space.
  - c) *“Government should make it mandatory to set up R&D plant for the manufacturers and brands”*
  - d) Finding the right skill set is the biggest challenge of this industry.
  - e) Amalgamation of sector skill council, industry and government to bring about change in the course curriculum of students and incorporate skill development.
2. Can the existing policy measures such as PLI and Make in India pave the way for technological and skill upgradation for entailing component-level efficiency gains?
  - a) The Global giants did not invest much aggressively in India despite its profound presence.
  - b) The Indian environment is different and requires different appliances for its consumer demand satisfaction.
  - c) Government’s role includes R&D development, incentivising the manufacturers to invest at the component level and not just at the finished goods level.

**Executive Speaker III: Mr. M K Mehta**

- To discuss the domestic trading trends and policy initiatives for expanding indigenous development of energy-efficient appliances and technologies.
  - a) The present Trade policy is discouraging: Copper tube and Aluminium industry faces challenges because of the various FTA’s (Free Trade Agreements) in place.
  - b) The PLI Scheme encouraged and incentivised the production of copper tube and aluminium metals.
  - c) “The growth of metal industry should be aligned with the growth of the appliance Industry”

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**Key Takeaways of the session**

- The government needs to enhance the base for R&D in the country. This has to be collaborative efforts from stakeholders like manufacturers, academia, and industry.
  - Indigenisation of products as per Indian consumer demand is a must.
  - Policies should be made to promote private investment in the sector. One of the way to achieve this by encouraging trade of products like Copper tube and Aluminium by amending Free Trade Agreements.
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### Way forward

- ***Government should make it mandatory for brands to set up R&D plants*** with widespread consultations with various academia institutions. Further, ***R&D development needs incentivisation at the component level and not just at the finished goods level.***
  - Policy makers need to set up a framework for monitoring and verification mechanism that can help in improving the energy efficiency market in cooling appliances.
  - Regulations are needed to be setup for service sector as well as they have a huge role to play in operation and maintenance.
  - Labelling program for refrigeration can be initiated.
  - Auxiliary policy action is needed to promote Fans as a cooling device.
  - Adoption of CO2 as refrigerant in India is the next big step.
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**FEED OUTCOMES**



AEEE has conceived a forum on Energy Efficiency and Decarbonization (FEED) to encourage executive discussions, dialogs, conversations, plenary, and keynote addresses against COP26 and the Panchamrita commitments. Alliance for an Energy Efficient Economy curated Forum for Energy Efficiency and Decarbonisation (FEED) as a platform to bring together thought leaders, industry experts, senior policymakers, and agents of change to build a dialogue towards enabling India to become an energy-efficient economy. India significantly upped the ante by making ambitious and specific commitments and setting targets to decarbonize the Indian economy while ensuring a just and sustainable energy transition. It is quite evident that India's energy intensity will be significantly lower compared to major world economies, even as India wants to secure as much carbon budget as possible based on the principles of Common but Differentiated Responsibilities (CBDR). As we seek ways to accelerate the pace of energy transition, India is in a unique position to pioneer a new model for low-carbon, inclusive growth. The aim is to reduce the carbon intensity of India's economy to less than 45% by 2030.

This year's event focused on decarbonising India's economy through sectoral collaboration and cooperation, focusing on construction, power, and transportation sectors and digitalisation of energy systems and sustainable cooling solutions. It reiterated the basic tenet of energy efficiency as the First Fuel and as the Cleanest, Cheapest, and Fastest energy resource to bring about sustainable energy transition and address the negative impact of climate change.

## Top trends in Energy Efficiency for the coming decade will be:

1. Globally, companies will rapidly move towards net-zero carbon. Energy Efficiency will play a big role in accelerating and catalyzing this.
2. Digitalisation of the energy system throughout the entire value chain of power generation, transmission, and distribution will remain a top priority for both governments and companies while enhancing business productivity and consumer experience.
3. People-centered clean energy transition enhancing social and economic benefits to ensure equality, social inclusion, and fairness will become powerful levers of change.
4. While energy efficiency of end-use (buildings, transport, and appliances) will continue to make significant inroads, there will be substantial growth on the decarbonization of energy systems through electrification of transport and hard to abate sector with uptake and deployment of green hydrogen-powered by renewables, adoption of bioenergy and market schemes on carbon capture.






## Major Challenges that energy efficiency upscaling faces

1. **Financial Bottlenecks:** Financial bottlenecks hindering investments in India need stronger policy intervention and risk management to ensure energy efficiency markets in India can attract more investment.
2. **Lack of Private Players:** Latest technologies and successful market mechanisms/interventions in energy efficiency from other countries need to be brought to India. Favorable Policies with well-crafted incentives

should be instituted to ensure the private sector is a critical player in implementing progressive policies with particular emphasis on large-scale (GW) interventions.

3. **National Energy Policy:** Coordinated National Energy efficiency policy is needed to ensure more robust mandates and energy reduction targets covering all sectors. The nation needs to move from ad-hoc solutions and piecemeal approaches to integrated policymaking and implementation across various ministries to ensure a cohesive approach for interventions and development of the sector.
4. **Scaling and Speeding up energy efficiency interventions:** Energy Efficiency needs to take a leaf out of renewables' success to set large and ambitious national targets in the near term to give clear signals to the private sector and create a business-friendly investment environment.

## Sector-wise challenges to adopt and upscale energy efficient solutions in India

Construction sector		<ul style="list-style-type: none"> <li>• Lack of awareness on climate-responsive building design knowledge and implementation;</li> <li>• Lack of data on energy consumptions and GHG emissions associated with public building stock</li> <li>• Lack of alternative building materials with low embodied carbon content to reduce the use of cement, steel, bricks in Indian building sector</li> </ul>
Carbon Markets		<ul style="list-style-type: none"> <li>• Absence of carbon pricing, which is key to accelerating adoption of carbon neutral solutions;</li> <li>• Absence of policy framework for operation in different markets;</li> <li>• Absence of standardisation across various markets for carbon credit trading;</li> <li>• Absence of common registry for interlinking different carbon credits to avoid duplication</li> </ul>
Transportation sector		<ul style="list-style-type: none"> <li>• Absence of progress tracking mechanisms for policies related to EVs;</li> <li>• Inadequate focus and efforts towards moving the economy towards public transport through increased investments;</li> <li>• Lack of support to EV start ups to facilitate the shift to public and shared transportation</li> </ul>
Digitilisation of energy systems		<ul style="list-style-type: none"> <li>• Absence of electricity mechanisms equipped with digital solutions for decarbonisation;</li> <li>• Lack of incentive and push for consumers to adopt smart energy-saving technologies;</li> <li>• Absence of a service-based market set up</li> <li>• Encourage policy related to data disclosure on energy consumption and GHG emissions for energy-intensive buildings</li> </ul>
Sustainable cooling		<ul style="list-style-type: none"> <li>• Lack of exploration of Cooling as a Service to solve the cooling crisis in India;</li> <li>• Absence of mechanisms to accelerate awareness and implementation of DCS;</li> <li>• Lack of awareness, training, and capacity building to facilitate transition towards super energy efficient technologies</li> </ul>

## Policy Intervention Required

Clean energy momentum can easily enable India to outperform its Paris pledges. The emissions intensity of India's economy must be improved by 40% from 2005 to 2030, above the 33-35% set out in its existing NDC through a combination of both demand and supply-side interventions. The share of non-fossil fuels in electricity generation capacity can reach almost 60%, well above the 40% that India pledged, if India develops a culture of energy efficiency and builds an energy-efficient economy.

1. **Cooling needs to be viewed as a necessity and not a luxury** if India has to counter the ill-effects of climate change and heat stress and enable Thermal Comfort for a Billion Lives through better building design and all kinds of cooling appliances.



2. **Policy framework needs to be strengthened for District Cooling adoption**, including appropriate power tariff for initial years of operation. It is also essential to promote and create awareness about DCS and its impact on energy and thermal comfort.
3. Appliance manufacturers, industry associations, civil societies, and policy think tanks must work together to **collaborate and synergize efforts for mainstreaming super energy efficient and low energy cooling space** cooling technologies
4. **Demand Flexibility** needs to be a high priority area for electricity regulators, system operators, and DISCOMs – make it smart, flexible, and grid-interactive. There is an urgent need to implement 1000 MW “big bang” regulator approved demand flexibility pilots to support the discussion on enabling the demand side as a valuable grid resource.
5. **Enhance Research and Development** in the country from collaborative research between academia and industry needs to become a priority if we want to compete with the western world and China.
6. **Set clear energy savings targets through the ESCO route** with PSUs leading the way and in alignment with the Panchamrita proclamation by honourable PM.
7. **Structured Policy Framework for Carbon Trading** in India needs to be evolved to ensure that the carbon market can grow. Independent assessment standards and certification of carbon-reducing projects need to be developed with the recognized methodology set against real, quantifiable, traceable criteria.
8. **Incentivise stakeholders for biomass utilization** and promote alternate fuel utilization.
9. **Electricity equipped with digital solutions is critical for decarbonisation and achieving net-zero**; integration with Smart Cities for catalysing the same can be explored.

## Conclusion

An expanding economy, population, urbanization, and industrialisation mean that India sees one of the most significant increases in energy demand across all of our scenarios to 2040.

The pace of change in the electricity sector puts a significant premium on energy efficiency and other renewable energy sources, with India becoming a global leader in catalyzing carbon markets and decarbonizing the transport, construction, and power sector. Mainstreaming energy efficiency and renewable energy investments at the local and state level can produce significant benefits, including lower fuel and electricity costs, increased grid reliability, better air quality, public health, and more job opportunities. Urgent efforts are needed to craft supporting regulations and policies to create a market for energy efficiency as a resource and ancillary services to enable auto and behavioral demand response programmes.

FEED functioned as a platform to hear from eminent industry experts and participate from decision-makers across different energy end-use segments. These leaders will initiate discourse followed by actions to position energy efficiency as one of the key differentiators for business competitiveness in the emerging market landscape in line with AEEE's Triple Sector Approach. The forum served as a platform for important deliberations and discussions, with the potential to shape India's energy efficiency landscape through concrete actions.

An aerial photograph of a two-lane asphalt road that curves through a dense, lush green forest. The road has a white dashed center line and solid edge lines. Several vehicles are visible on the road, including a white car, a dark car, and a white van. The image is overlaid with a gradient that transitions from a vibrant green at the top to a deep purple at the bottom. The text '7' is prominently displayed in the center of the image.

7

# EVENT GALLERY



# FEED DAY 1

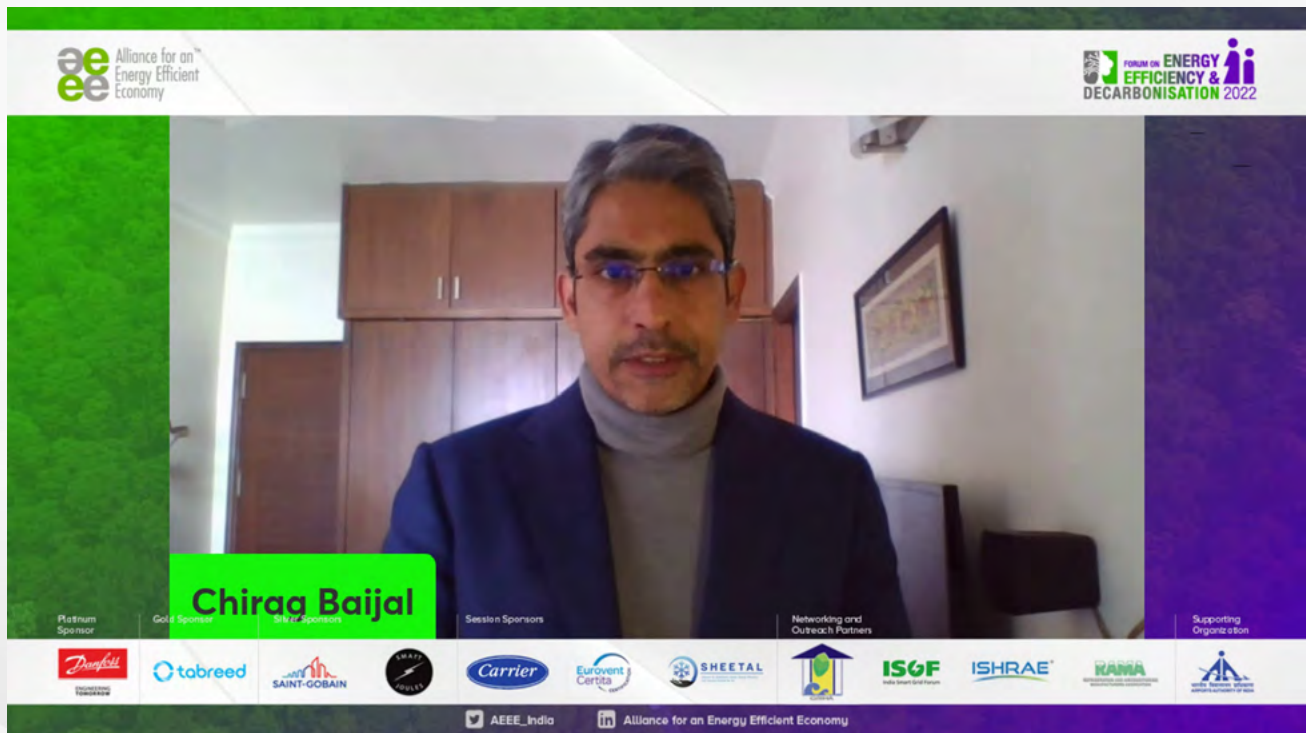


Figure 1: Welcome Address and Opening Remarks on The Role and Importance of Energy Efficiency and Decarbonisation by AEEE

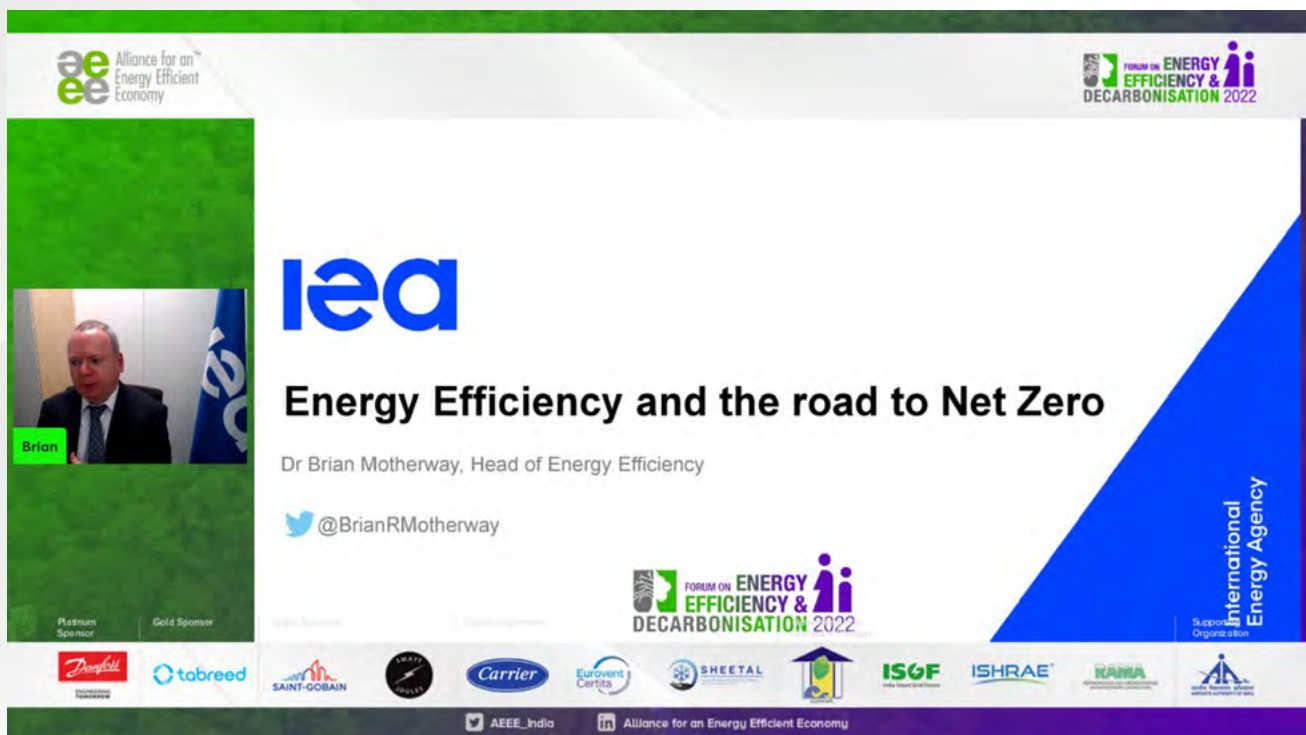
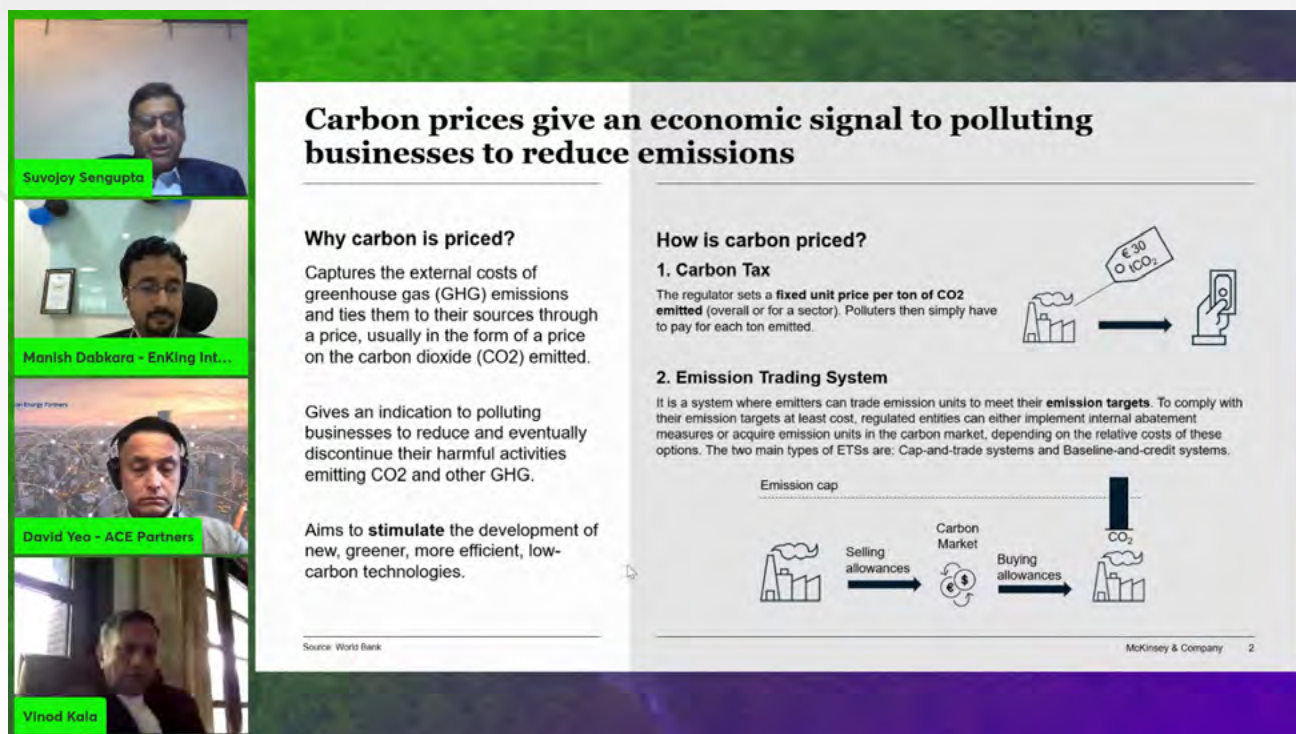


Figure 2: Keynote Address by Brian Motherway, Head of the Energy Efficiency Division at the International Energy Agency





## Carbon prices give an economic signal to polluting businesses to reduce emissions

### Why carbon is priced?

Captures the external costs of greenhouse gas (GHG) emissions and ties them to their sources through a price, usually in the form of a price on the carbon dioxide (CO<sub>2</sub>) emitted.

Gives an indication to polluting businesses to reduce and eventually discontinue their harmful activities emitting CO<sub>2</sub> and other GHG.

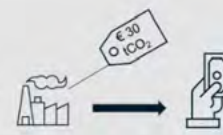
Aims to **stimulate** the development of new, greener, more efficient, low-carbon technologies.

Source: World Bank

### How is carbon priced?

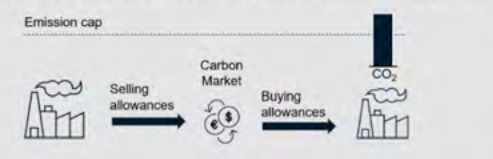
#### 1. Carbon Tax

The regulator sets a **fixed unit price per ton of CO<sub>2</sub> emitted** (overall or for a sector). Polluters then simply have to pay for each ton emitted.



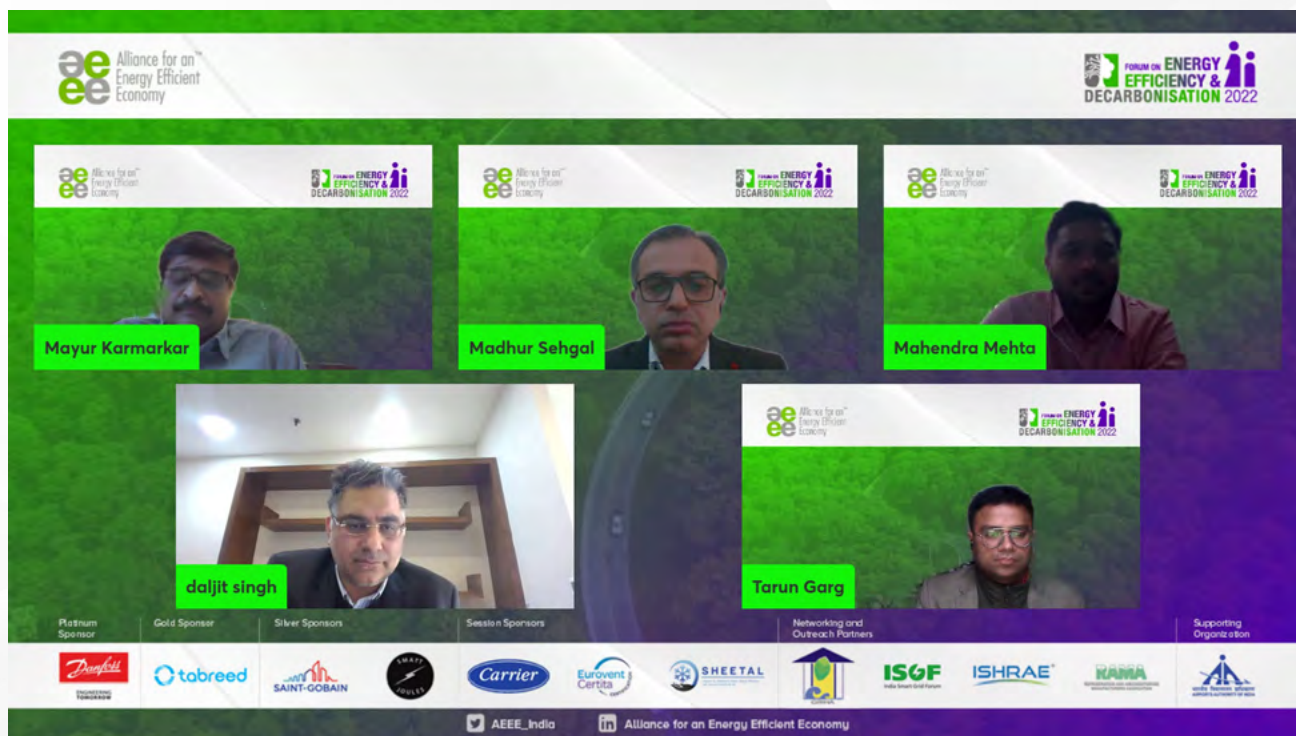
#### 2. Emission Trading System

It is a system where emitters can trade emission units to meet their **emission targets**. To comply with their emission targets at least cost, regulated entities can either implement internal abatement measures or acquire emission units in the carbon market, depending on the relative costs of these options. The two main types of ETSs are: Cap-and-trade systems and Baseline-and-credit systems.



McKinsey & Company 2

Figure 3: Executive Dialogue 1: Uptake of carbon pricing by businesses in India - Opportunities and Challenges



ae Alliance for an Energy Efficient Economy

FORUM ON ENERGY EFFICIENCY & DECARBONISATION 2022

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Figure 4: Special Session: Promoting Domestic Manufacturing Ecosystem for Appliance industry in India: Perspectives from ICAP and Make in India

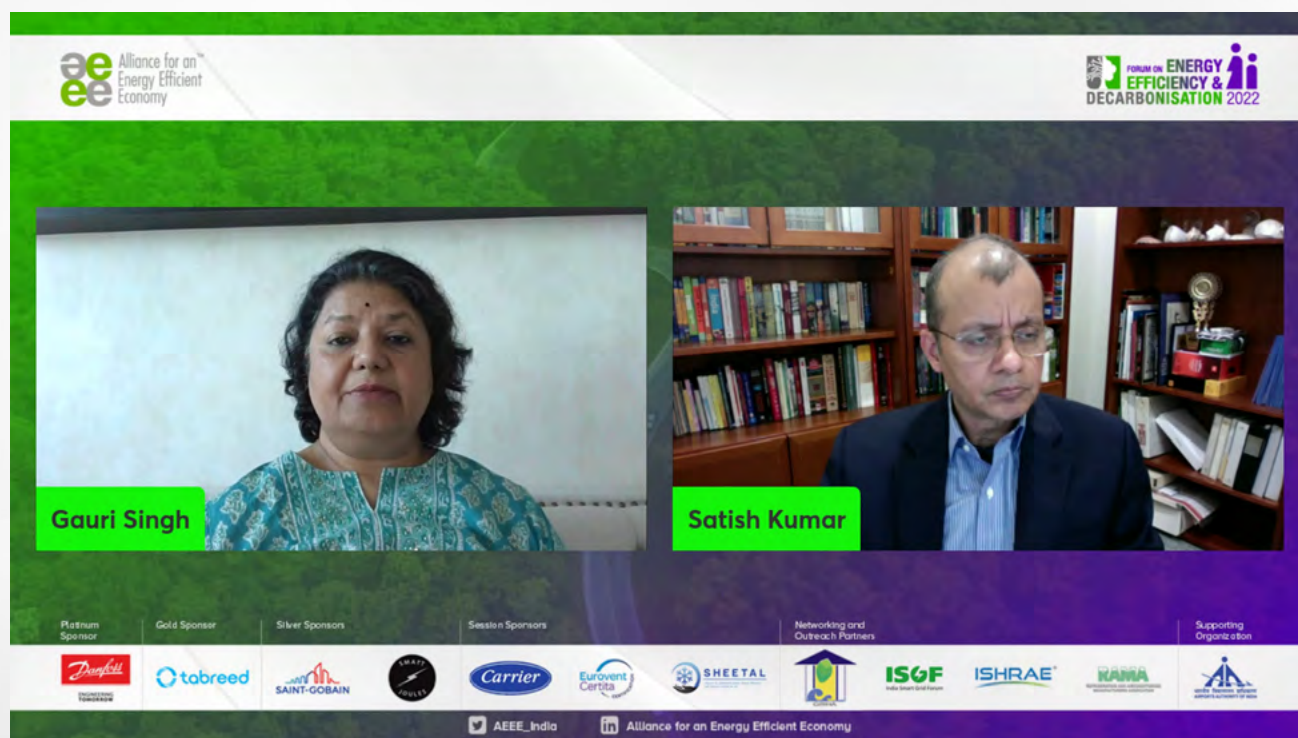


Figure 5: Fireside Chat-Triple Sector Approach to Achieve Decarbonisation Goals by Gauri Singh, Deputy Director-General, International Renewable Energy Agency (IRENA)



Figure 6: Structured Expert Dialogue: Role and Importance of Multilateral/Bilateral Organisations and Foundations in India's Decarbonisation Journey



## FEED DAY 2



Figure 7: Business at the bottom of the pyramid: A Barefoot Journey to Tilonia by Dr Sanjit 'Bunker' Roy

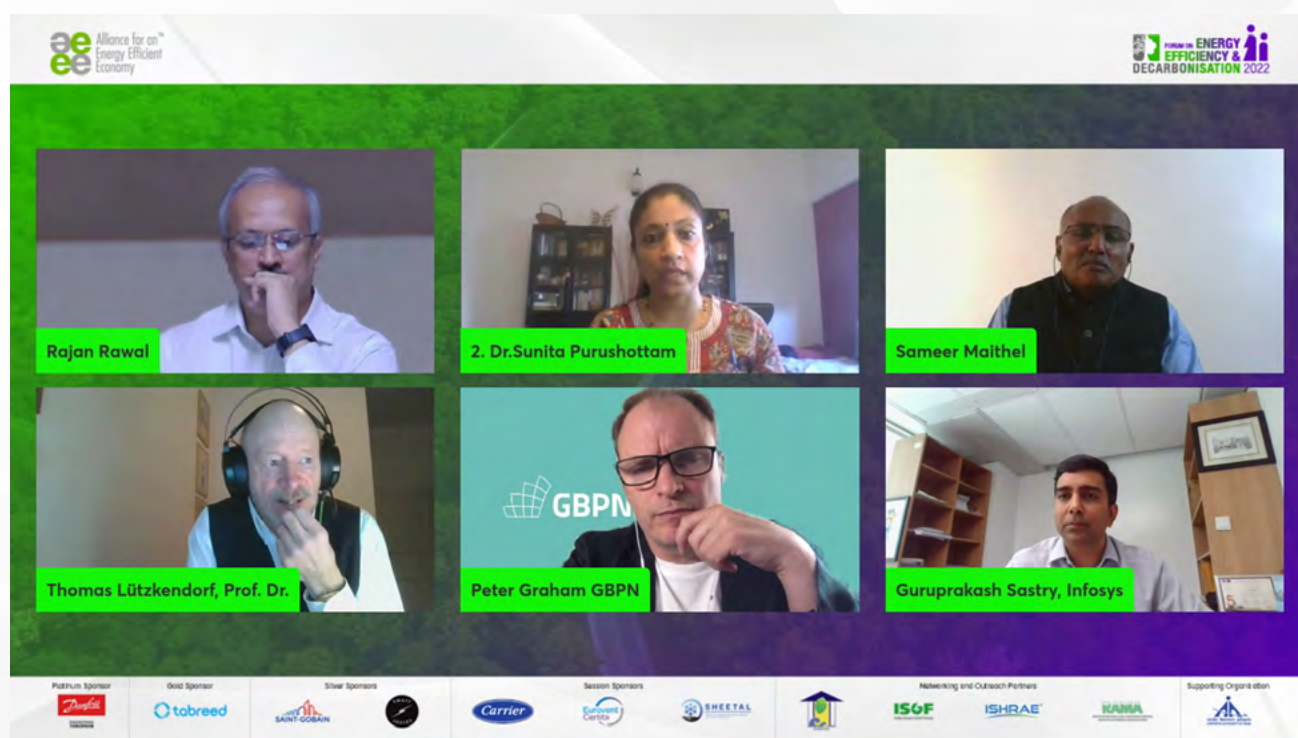


Figure 8: Executive Dialogue 2: Decarbonising the building construction sector in India



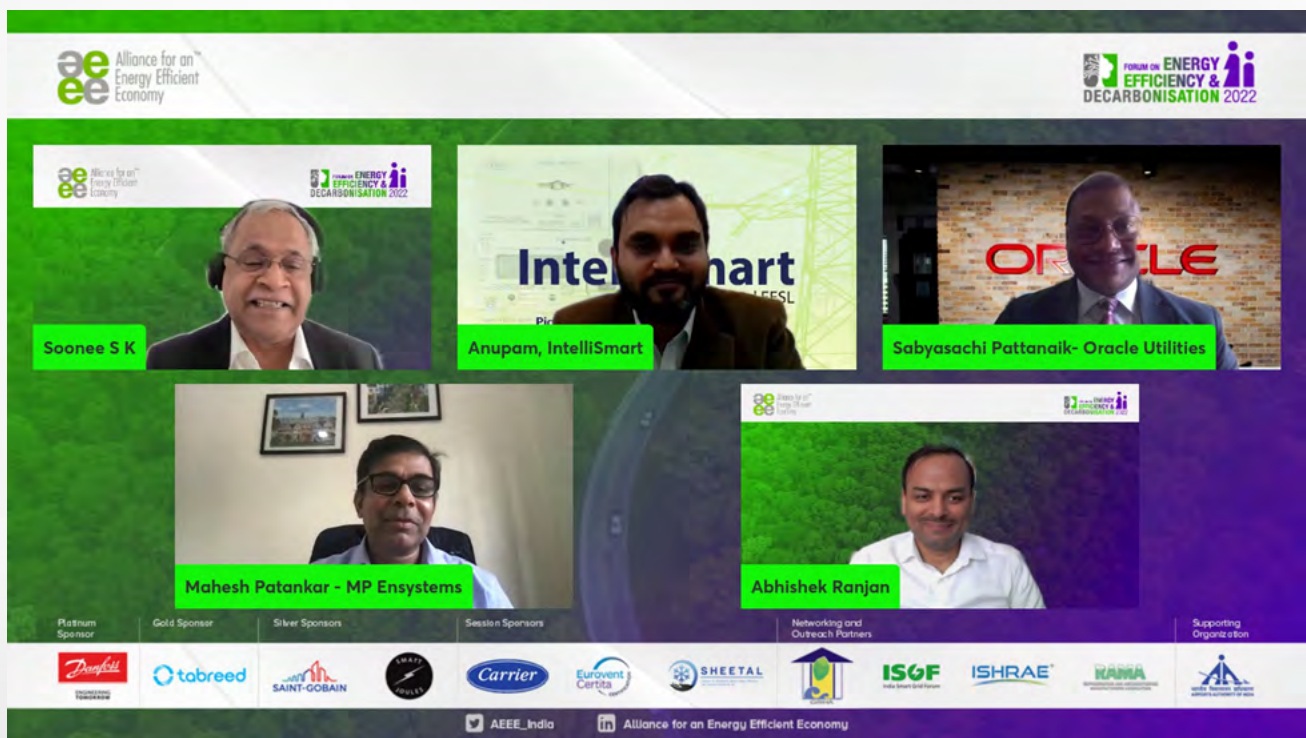


Figure 9: Executive Dialogue 3: Leveraging demand flexibility to make Indian power grid resilient, reliable and cost-effective

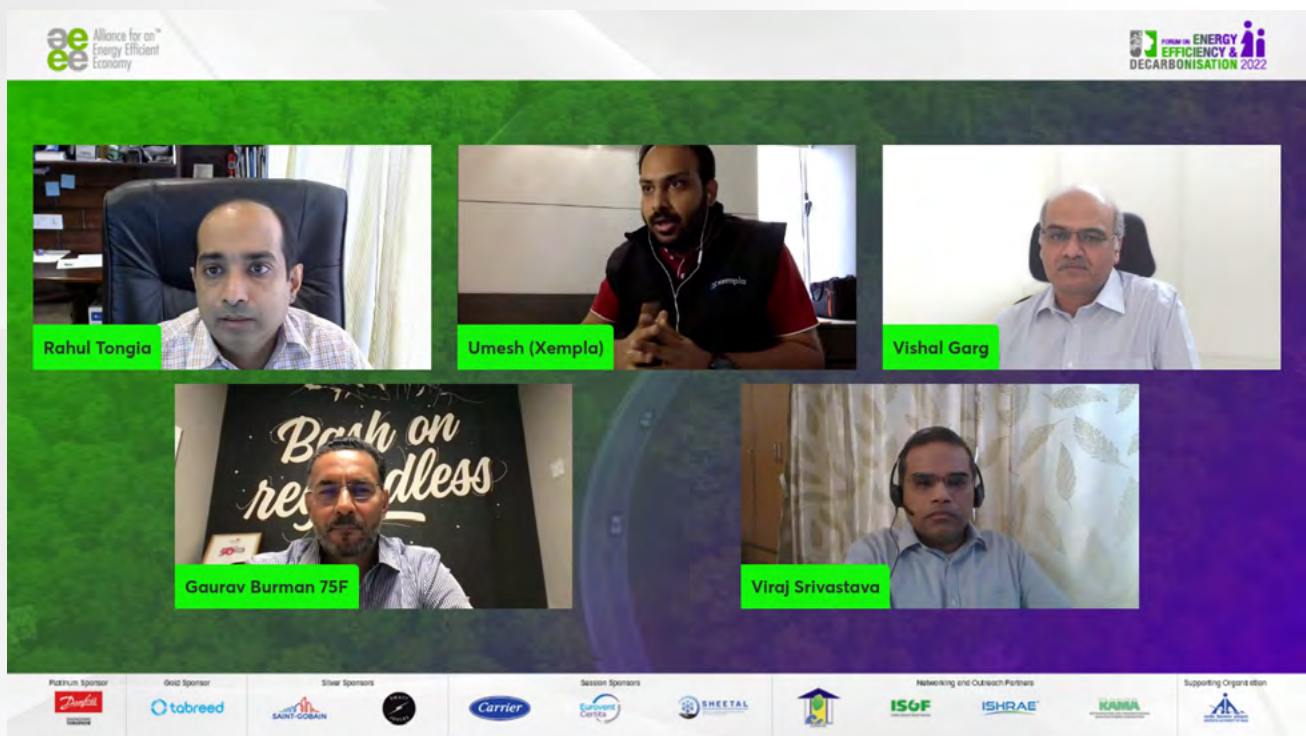


Figure 10: Executive Dialogue 4: Transforming the Experience of Indian energy consumers Through Digital Technologies

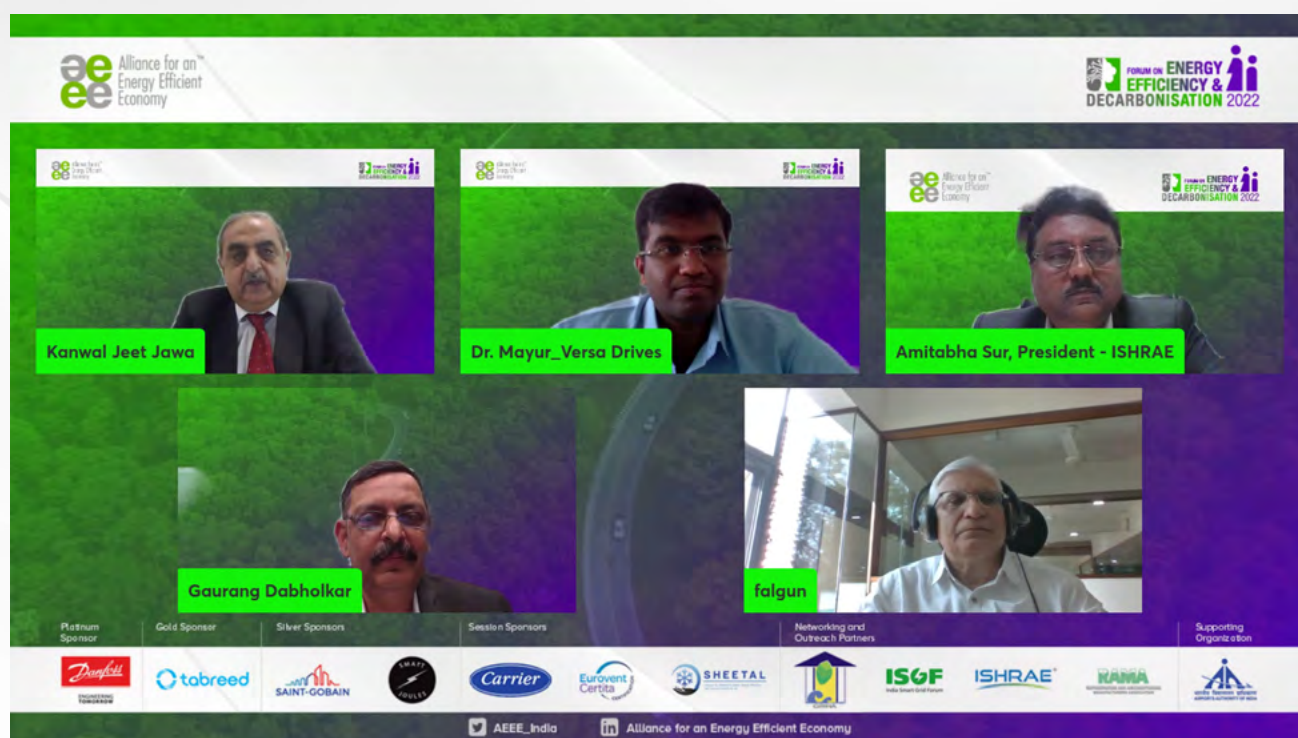


Figure 11: Executive Dialogue 5: Mainstreaming Energy Efficient and Low Energy Cooling Appliances to Achieve Thermal Comfort for a Billion Lives (Powered by SHEETAL)

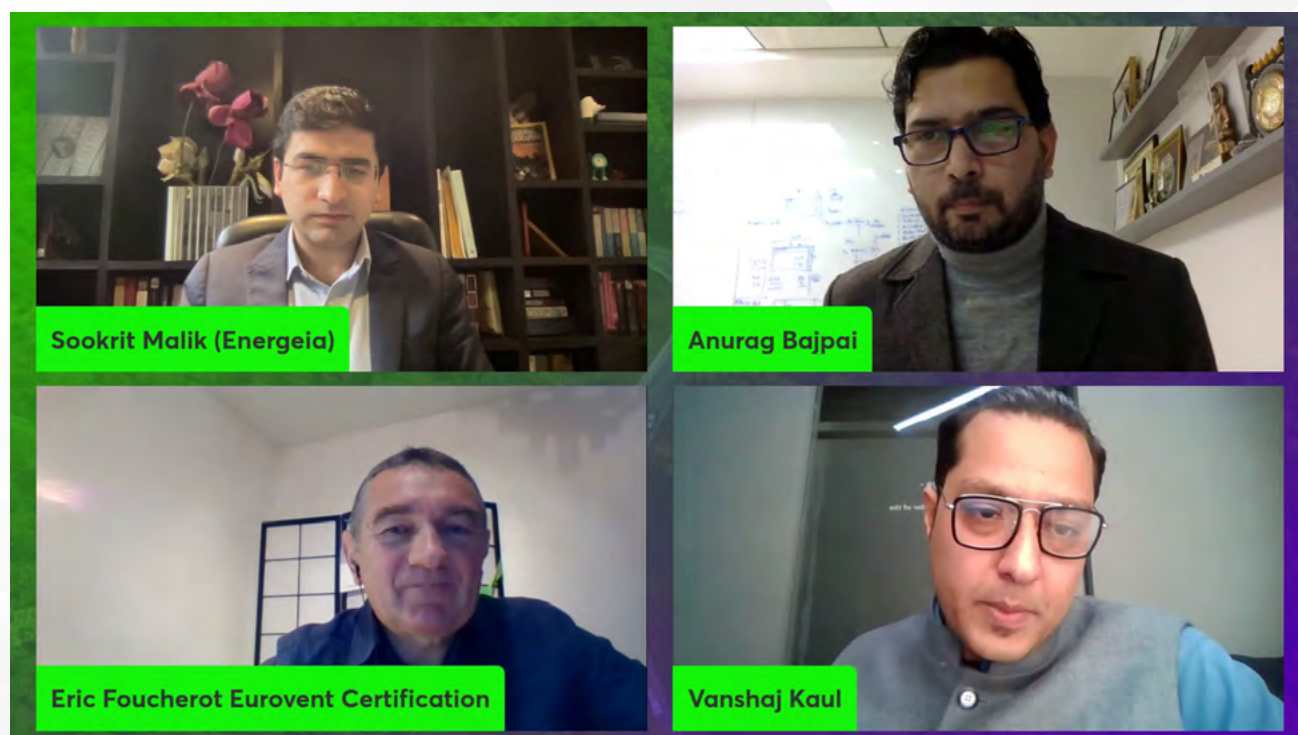


Figure 12: Special Address: How to De-Risk Energy Efficient Investments in a World of Uncertainties (Powered by Eurovent Certita)





Figure 13: Executive Dialogue 6: Can District Cooling Solutions Help Cool Indian Cities and Neighbourhoods more Sustainably?

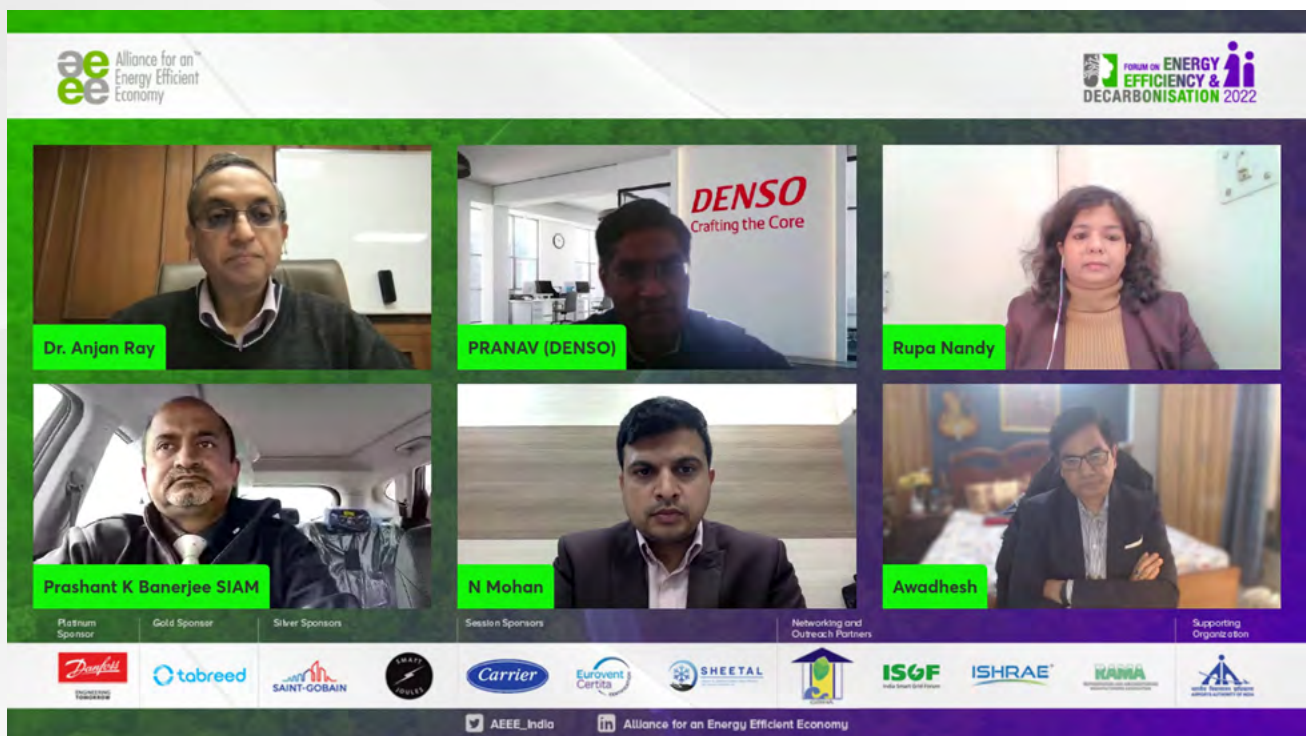


Figure 14: Executive Dialogue 7: Decarbonising the transportation sector in India



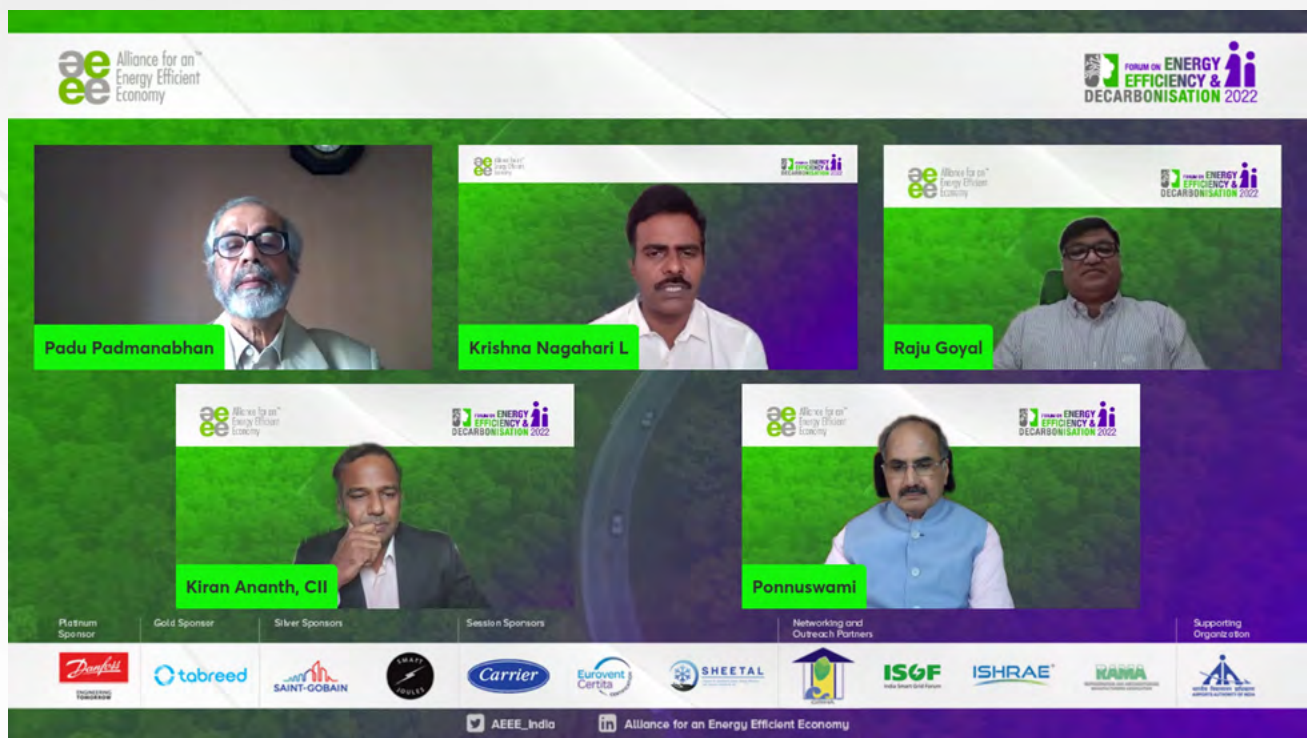
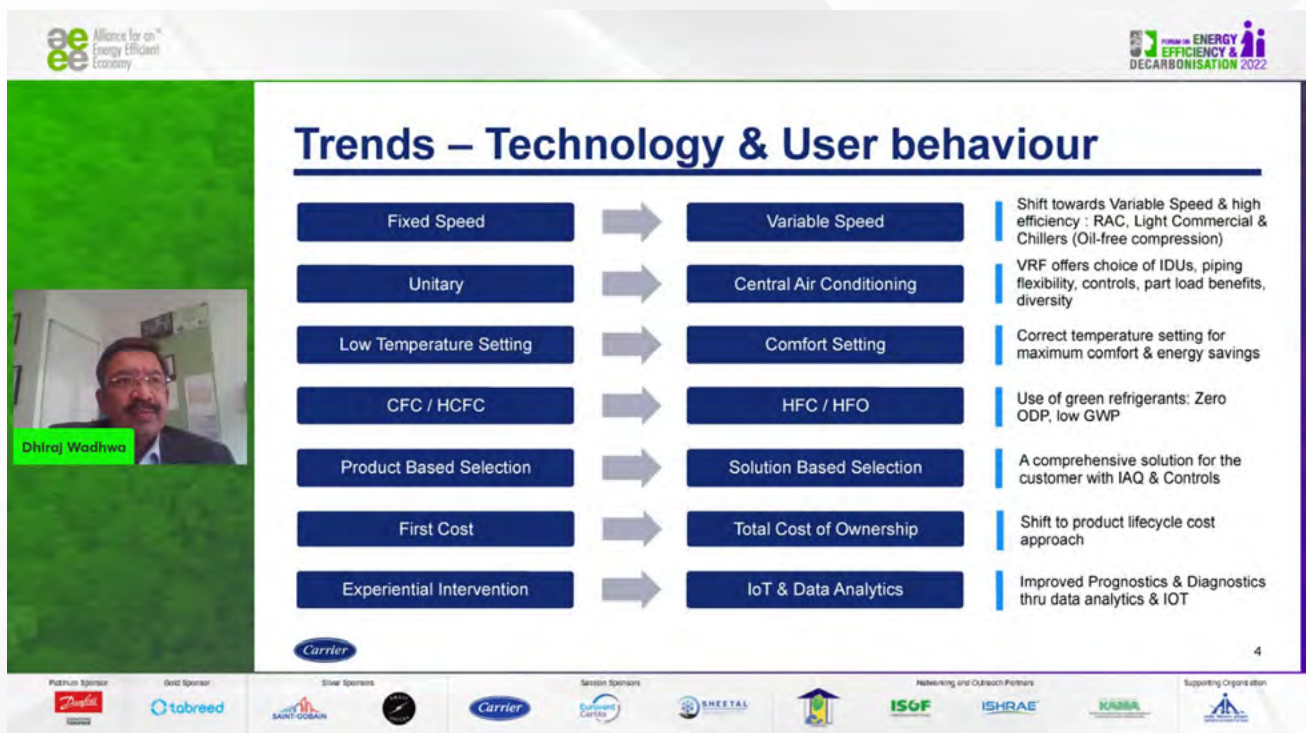


Figure 15: Decarbonisation of Indian Industries (Powered by Danfoss)



## Trends – Technology & User behaviour

Fixed Speed	→	Variable Speed	Shift towards Variable Speed & high efficiency : RAC, Light Commercial & Chillers (Oil-free compression)
Unitary	→	Central Air Conditioning	VRF offers choice of IDUs, piping flexibility, controls, part load benefits, diversity
Low Temperature Setting	→	Comfort Setting	Correct temperature setting for maximum comfort & energy savings
CFC / HCFC	→	HFC / HFO	Use of green refrigerants: Zero ODP, low GWP
Product Based Selection	→	Solution Based Selection	A comprehensive solution for the customer with IAQ & Controls
First Cost	→	Total Cost of Ownership	Shift to product lifecycle cost approach
Experiential Intervention	→	IoT & Data Analytics	Improved Prognostics & Diagnostics thru data analytics & IOT

4

Figure 16: Special Session: Sustainable Urbanisation for Healthier Tomorrow by Dhiraj Wadhwa (Director, Carrier India)

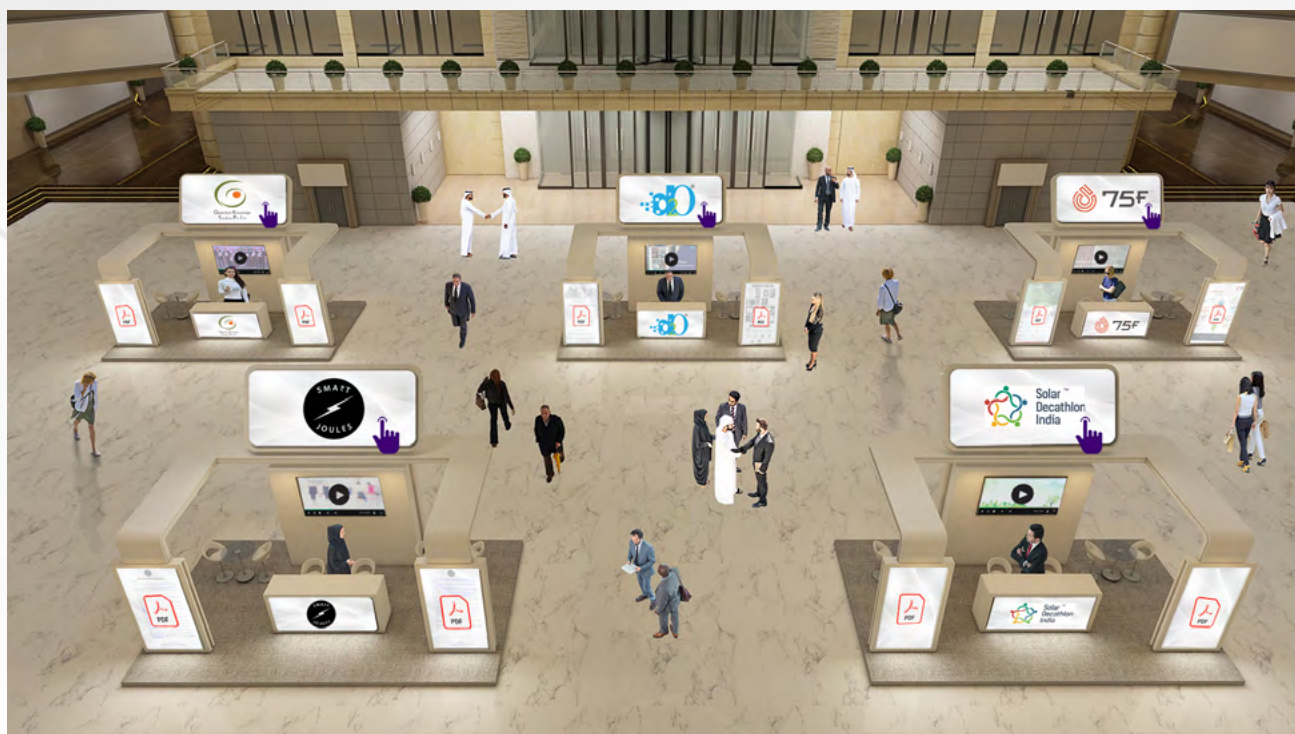




# 8

## EXHIBITION





## Smart Joules Pvt Ltd



Smart Joules is the first company in India to design and produce a complete building energy management system consisting of IoT hardware, interactive and user-friendly software, and an artificial intelligence platform to continuously optimize energy consumption in commercial buildings.

This technology – called DeJoule – provides sustainable and recurring energy savings at scale by minimizing operator interventions in running major equipment such as central air conditioning and pumping, and leveraging real time data to keep these systems optimized in light of changing weather and occupancy conditions. DeJoule combines the latest IoT and artificial intelligence technologies and has been carefully designed to be widely affordable for Indian buildings. For existing buildings, DeJoule is sold under a Pay-As-You-Save business model called JoulePAYS, along-with other energy efficiency retrofits in all areas such as air conditioning, pumping, ventilation, lighting, etc. The savings achieved under JoulePAYS are calculated on a bill to bill basis against the baseline year. JoulePAYS has been successful in generating significant savings at multiple leading hospitals, which has been verified by the Ministry of Power, who awarded Smart Joules the first prize in the 2016 National Energy Conservation Awards.

[Read More](#)

## Solar Decathlon India



The Solar Decathlon India is a challenge among postgraduate and undergraduate students from Indian institutions to learn and design net-zero-energy-water, affordable, and resilient design solutions for real, live projects to combat Climate Change through the buildings sector.

Student teams develop affordable and industry-ready solutions for real projects with the help of online Self-Learning Modules and expert mentorship provided during this year-long challenge. It is a hands-on, practical, innovation-based challenge that moves the construction and real estate industry towards implementing net-zero solutions developed by students.

[Read More](#)

## Greentech Knowledge Solutions Pvt. Ltd.



Established in 2006, Greentech Knowledge Solutions is a research based advisory and consulting firm offering energy and resource efficient solutions for the Built Environment.

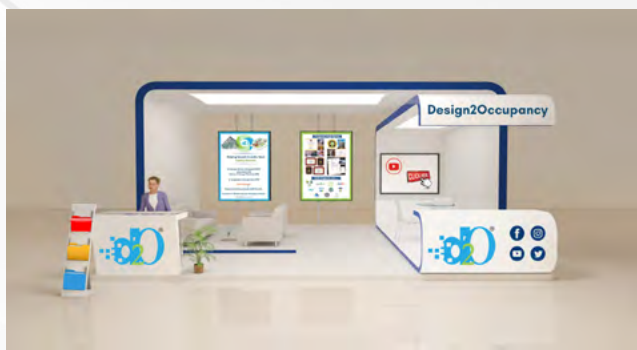
The spectrum of services ranges from climate responsive building design, energy performance monitoring, certification, policy advisory, outreach & capacity building. GKSPL uses state-of-the-art building energy simulation tools for research and for the design energy-efficient/green buildings. GKSPL manages the Indo-Swiss Building Energy Efficiency Project (BEEP) (<https://www.beepindia.org/>). Under BEEP technical assistance, the first energy conservation building code for residential buildings in India, Eco-Niwas Samhita (Part 1: Building Envelope) was conceptualised and developed. BEEP has provided technical support to around 50 building projects and trained more than 3000 building sector professionals.

GKSPL is a leading organisation in developing countries on technological know-how on production and application of resource-efficient building materials, especially bricks and blocks. Its policy advocacy and extension activities has contributed to the adoption of energy-efficient zigzag kiln technology in around 10,000 brick enterprises in India.

GKSPL has worked for a variety clientele and government partners, including GIZ, SDC, Shakti Sustainable Energy Foundation, The World Bank, UNDP-GEF, BEE, MNRE, MoP, MoEFCC, apart from private builders / developers/ enterprises. GKSPL is collaborating with many leading Indian and international academic and research organisations. GKSPL has project experience in India, Nepal, Bangladesh, Vietnam, Rwanda and South Africa.

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**Design2Occupancy****75F India**

D2O is a leading consulting organization providing a wide range of services in green building certification facilitation, energy and daylight simulation, CFD analysis, energy, water and fire audits, MEP design services, capacity building and related domains.

Team D2O is having some of the most valued credentials in the industry such as LEED AP, LEED GA, GEM CP, IGBC AP, GRIHA Trainer & Evaluator, PQP Professional, WELL AP, EDGE Expert, EDGE Auditor, ICP, CWEP, ECBC Master Trainers, Certified Energy Auditors and Managers etc. D2O is equipped to handle projects of all sizes. Our dedicated and experienced team work across the globe and deliver our mission.

We passionately serve our clients in various areas like Renewable, Sustainability Reporting, IAQ Consulting, Energy Audits & Commissioning and Several others. We have experience in consulting projects as diverse as residential spaces, office buildings, mall, hotels, schools, colleges, factories & government buildings.

D2O is a DPIIT recognized startup and was a finalist of National Startup Awards 2020 under Energy Category. We have been the runner up for SIDBI-ET MSE Awards for the year 2019-20. Also, we have been awarded “Employer Recognition Award” by ISHRAE in year 2020-21.

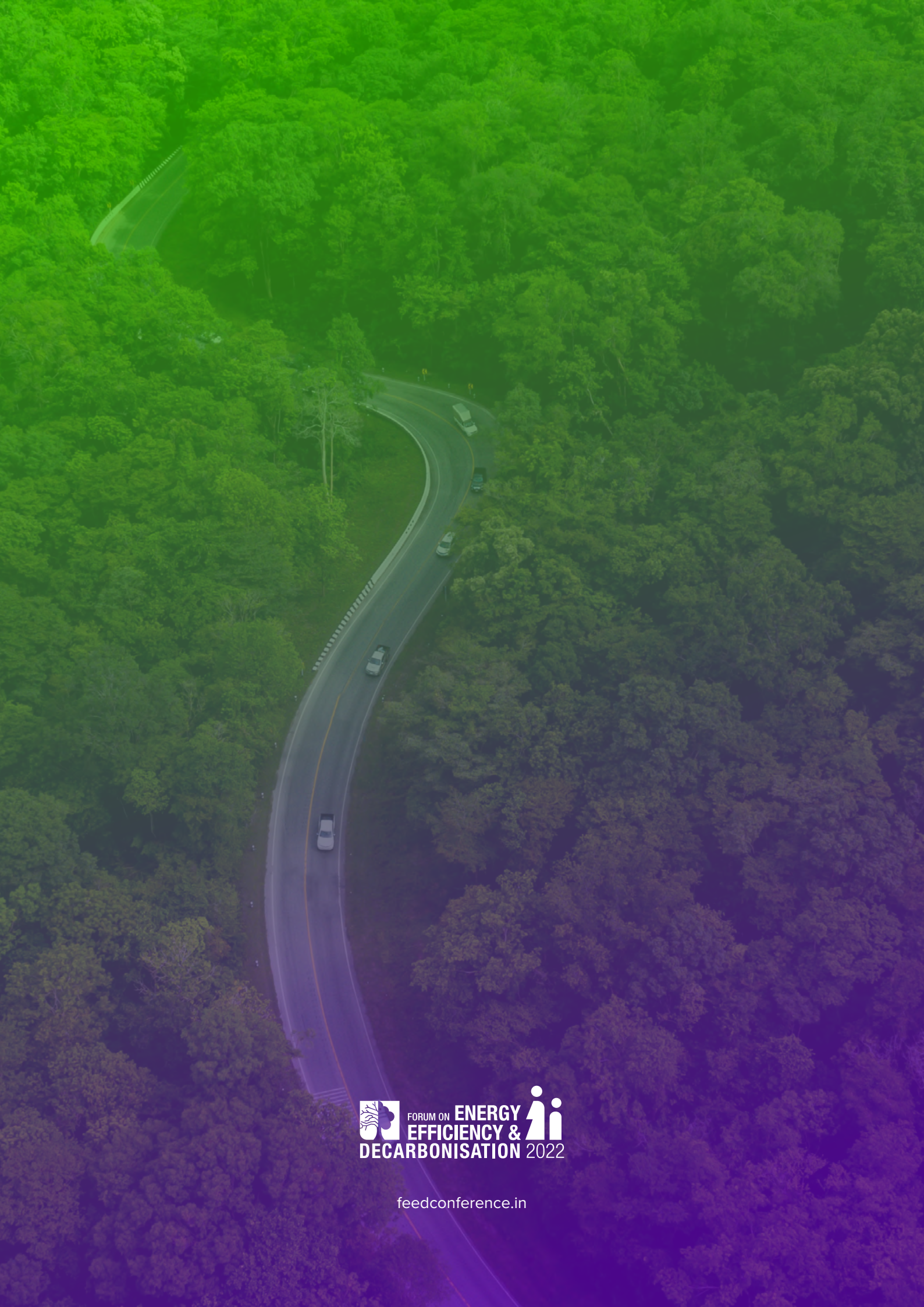
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75F is an award-winning, IoT Building Management Solution taking a fresh approach to HVAC, lighting and controls in commercial buildings. Founded in 2012, 75F delivers unparalleled operational efficiency and occupant experience saving up to 30- 50% energy with data-driven, proactive, predictive building intelligence and controls. 75F is backed by investment groups like Breakthrough Energy Ventures , Oil & Gas Climate Initiative and Clean Energy Trust.

The system can save 564 trillion BTUs per year -the energy equivalent to shutting down 29 coal power plants. Currently, 75F globally manages over 300 facilities covering approximately 18 million square feet.

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