Ministry of Environment, Forest and Climate Change
Government of India

INDIA COOLING ACTION PLAN

OPERATIONALIZING SPACE COOLING RECOMMENDATIONS

Overview of ICAP

Cooling is an essential part for economic growth and development in Article 5 countries. The Refrigeration and Air-conditioning sector is a major consumer of electricity. The direct and indirect emissions of the RAC Sector relate to use of refrigerants and energy consumed by the equipment. It is a widely known fact that about 90% of the total emissions from refrigeration and air conditioning equipment is because of energy consumption. The Kigali Amendment to the Montreal Protocol, for the first time, has recognized linkages between maintaining and/or improving energy efficiency of the RAC equipment with refrigerant transition under the Montreal Protocol.

Energy efficiency is a major driver for technology choice under the Kigali Amendment and considering the need for an integrated view to be taken with respect to cooling for maximization of climate benefits under the Kigali amendment.

Against this backdrop, the Ozone Cell of the Ministry of Environment, Forest, and Climate Change, Government of India proactively led the development of the India Cooling Action Plan (ICAP) 2019 – an essential macro-level policy tool to manage India's cooling growth while neutralizing the potential harmful impacts and securing critical socio-economic benefits for the population. ICAP is the firstof-its-kind initiative of its scale in the cooling sector to be taken by any country in the world that exemplifies integrated policymaking and underscores the urgency of proactively and collaboratively addressing its cooling growth.

The ICAP development process demonstrated high inter-ministerial and cross-sectoral collaboration in laying out actionable pathways to provide sustainable cooling over the next 20 years (2017-18 to 2037-38) to meet cooling needs while neutralizing its negative impacts. It strikes a balanced approach to goal-setting by establishing high-level nationwide targets but allowing the line ministries flexibility in setting their own targets within a directional framework of recommendations.

ICAP's goals are:

Reduction of cooling demand across sectors by **20-25%,** by 2037-38

Reduction of refrigerant demand by **25-30%,** by 2037-38

Reduction of cooling energy requirements by **25-40%,** by 2037-38

Training and certification of **1,00,000** service technicians by 2022-23

Recognizing **"cooling and related areas"** as a thrust area of research under the national science and technology programme

Development of ICAP

Developement Framework

For the development of the ICAP, following thematic working groups were constituted: a) space cooling in buildings, air-conditioning technology, b) Cold-Chain and refrigeration, c) transport air-conditioning, refrigeration and d) air-conditioning service sector, indigenous production of refrigerants, and research and development.

The development of the ICAP involved extensive stakeholder interaction with government organizations/Departments, experts, representatives of industry associations, and think tanks.

For each of the thematic areas, the thematic groups explored two scenarios of growth in cooling demand: the Reference Scenario which assumes that the current policies and level of effort will move forward per established revision cycles (or historical trends, as applicable), and the Intervention Scenario which factors in the positive impacts of accelerated and new interventions driven by policy, technology and market-drivers.

Inter-ministerial coordination

A Steering Committee with representatives of various ministries was constituted for guiding and reviewing the documentation, reports, and recommendations developed by the ICAP thematic working groups.

An Inter-ministerial committee comprising subject matter experts, eminent representatives of think tanks, and industry representatives was also formed under the chairmanship of the Secretary, EF&CC to oversee the development process. These Committees helped dovetail the recommendations of the ICAP with ongoing and planned policies and programmes residing with different ministries.

Dovetailing existing policies and priorities

At the high level, the ICAP recommendations were deeply embedded within the context of the Kigali Amendment to the Montreal Protocol, i.e., harmonizing the energy efficiency of cooling appliances with the refrigerant transition towards more climate-friendly refrigerants. At the more in-depth level, the ICAP cross-referred and forged synergies with ongoing and planned government policies and programmes residing with different ministries, such as Nationwide adoption and implementation of Bureau of Energy Efficiency's (BEE's) Energy Conservation Building Code 2017 for commercial building, BEE's Standards & Labelling (S&L) programme already covers Room and Split Air-Conditioners, Chillers and Fans and can be expanded to include evaporative air-coolers and fast-growing Variable Refrigerant Flow air-conditioners, ensuring thermal comfort in houses constructed under Pradhan Mantri Awas Yojna-Urban (PMAY-U) and many other schemes.

Overview of Space Cooling

Growth in space cooling demand has been rising steadily over the last decade due to a combination of factors, such as rising population living mainly in the tropical climate, with growing aspirational needs fueled by sustained economic growth over the last two decades. As per ICAP[1], the building sector's cooling demand shows the most significant growth at nearly 11 times by 2037-38 from the 2017-18 baseline. Also, the energy consumption from space cooling in buildings is estimated to be ~135 TWh in 2017-18. Projections show that this will increase up to 4-times (~584 TWh) in the next two decades. The pertinent reasons behind this growth in cooling demand and energy consumption in buildings are:

In 2017, approximately 272 million households were estimated in India and were expected to increase to 328 and 386 million by 2027 and 2037, respectively.

In 2017, approximately 8% of the current households were estimated to have room air conditioners which are anticipated to rise to 21% and 40% by 2027-28 and 2037-38, respectively.

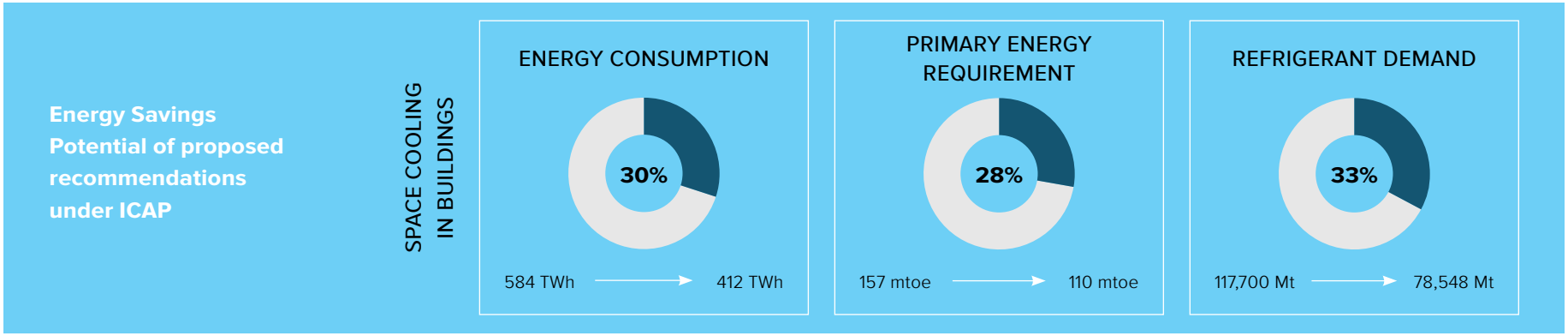
In 2017, the estimated commercial floor was around 1.2 million sqft and was expected to grow about 1.5 to 2 times by 2027-2028 and 2.5 to 3 times by 2037-38, respectively.

The requirement for comfort cooling is increasingly recognized as a development needs worldwide and linkages between cooling and Sustainable Development Goals (SDGs) such as **Good Health and Wellbeing (SDG 3)**, **Decent Work and Economic Growth (SDG 8)**, **Sustainable Cities and Communities (SDG 11)**, and **Climate Action (SDG 13)** are well established. Compounding the factors mentioned above, addressing the overwhelming need for space cooling became a necessity for India. Moreover, the growth in cooling demand also has an impact on electricity consumption and is thus linked to taking action towards ensuring achievement of **SDG 7 on Affordable and Clean Energy** which also directly contributes towards urgent action for combatting climate change and achieving **SDG 13 on Climate Action**. The criticality of addressing India's space cooling challenge thus becomes more apparent against the backdrop of international climate change agreements such as the Paris Agreement, wherein India, through its Nationally Determined Contribution (NDC), has committed to reducing its emissions intensity of GDP significantly.

1 Ministry of Environment, Forest & Climate Change, Government of India. 2019. "India Cooling Action Plan". New Delhi. http://ozonecell.nic.in/wp-content/uploads/2019/03/INDIA-COOLING-ACTION-PLAN-e-circulation-version080319.pdf

Saving Potential of ICAP's Recommendations

The projected saving potential in energy consumption, primary energy requirement and refrigerant demand through the identified set of recommendations is around 30%, 28% and 33%, respectively, by 2037.



Operationalization of Recommendations

To operationalize the recommendations of ICAP, MoEF&CC has decided to constitute six thematic working groups.

Towards operationalizing the recommendations for each thematic area, thematic working groups comprising representatives from line ministries/ departments, industry and industry associations, think tanks and experts have been constituted by the Ministry to develop an implementation framework for the recommendations given in the ICAP for each thematic area. A Steering Committee under the Chairmanship of Additional Secretary (Ozone Cell), MoEF&CC has also been constituted to guide and oversee the implementation framework and finalize the action points identified by the Thematic Working for operationalizing the recommendations.

Space cooling in buildings

The thematic working group on space cooling in buildings during its six meetings has identified with a list of action points for operationalizing the recommendations of the ICAP. The action points have been identified after mapping of the recommendations given in the ICAP with the on-going government programmes/schemes handled by different ministries/departments/ agencies of the Government and inputs provided by the members during the meeting.

Further, the action points were discussed in the meeting of the Steering Committee and were adopted during the meeting, which are tabulated in Table-1.

Table-1

Action points for operationalizing the recommendations of India Cooling Action Plan (ICAP) for the thematic area on space cooling in buildings

S.No.	Recommendations on Space Cooling as per ICAP	Synergies with existing Framework / Governmental schemes/ programmes/	Agreed Action	Agency / Department	Highlights
1.	Enforcing efficient building envelope guidelines in the construction of commercial and residential buildings **(a) Framework**	(i) Energy Conservation Building Code (Commercial)	• ECBC to be notified in all States /UTs	BEE	• 20 States/ UTs have notified ECBC. • 5 states/UTs are in the final leg of notification • Remaining States/UTs to be notified. • All 20 states and UTs have amended the Code to suit climatic conditions. • Implementation of ECBC depends upon incorporation of these codes in Municipal Bye Laws. • 48 ULBs in 8 States have already notified ECBC in their Municipal Building Bye Laws. • Minister of Power has already written to all the Chief Ministers in this regard, so that ECBC can be notified by all States.
		(ii) Eco Niwas Samhita (ENS) for Residential	• Energy Conservation Act to be amended to include Eco Niwas Samhita (ENS) for Residential • ENS to be notified in all States/ UTs.	BEE	• EC Act being amended to include ENS. Thereafter, states/UTs may begin the process of notification with support from ENS/ECBC cells • Amendment is yet to happen. • ENS Part I was launched in 2019, which covers only the building envelope. As per the recent development, ENS Part II has been launched in July, 2021 which majorly includes electromagnetic systems.

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		(iii) Model Building Bye Laws, 2016 (iv) Urban Development Plan Formulation Guidelines (URDPFI), 2014	• Provisions for building envelope to enhance energy efficiency should be incorporated in the Model Building Bye Laws, 2016. • "Passive cooling related infrastructure" may be incorporated in URDPFI Guidelines. • State/UT TCPOs should be encouraged to adopt ECBC & ENS	TCPO, MoHUA	• Model Building Bye Laws, 2016 and Urban Development Plan Formulation Guidelines (URDPFI), 2014 are advisory documents and meant for the guidance to State/ UT Governments for preparation of Master Plans and Regional Plans. • Para 6.2.1 of URDPFI Guidelines states about Green Building. Under energy efficiency, passive cooling related infrastructure to be included. • Draft section w.r.t provisions for building envelope to enhance energy efficiency has been prepared by TCPO, which is to be incorporated in URDPFI Guidelines. • Addendum 5 in Model Building Bye Laws including site adaptation, orientation has been made by TCPO on the basis on recommendation of ICAP.

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2.	Enforcing efficient building envelope guidelines in the construction of commercial and residential buildings **(b) Government Schemes** Wider adoption of ECBC and ECBC-R in various infrastructure scheme of Government	• Pradhan Mantri Awas Yojana – Urban (PMAY-U) addresses urban housing shortage among the EWS/LIG and MIG categories. - 'In-situ Slum Redevelopment (ISSR) - Affordable Housing in Partnership (AHP) - Affordable Rental Housing Complexes (ARHCs) for Migrant Workers/ Urban Poor - Demonstration Housing Projects (DHPS) • Smart Cities Mission focused on sustainable and inclusive development - Retrofitting of the existing built up space more than 500 acre	• ECBC norms to be incorporated in the commercial building having electric load equal to or greater than 100 KVA. • Eco Niwas Samhita (ENS) norms to be incorporated in the Residential building projects. • Advisory to be issued to industry associations of real estate developers (CREDAI) regarding compliance of ECBC/ ENS norms.	CPWD/ MoHUA MoHUA MoHUA	• Implementing agency shall incorporate ECBC/ENS norms in the feasibility report/ tender document of the building construction projects. • CPWD is following GRIHA Star rating and ECBC is being implemented in all the Commercial government construction.

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		- Redevelopment of the more than 50 acre area. - Greenfield development. • Development of metro rail project under Urban Transport Policy of MoHUA.		MoHUA	• Green building initiatives of DMRC "In order to develop a rating system applicable to all metros, DMRC and IGBC joined hands and came up with a Green Certification norm for the very first time in the world, for rating a MRTS to Green Standards. This MRTS Rating System was launched by IGBC on 4th September 2014 exclusively for Green certification of Metro System"
		Establishment and Development of Special Economic Zones by Ministry of Commerce and Industry	ECBC norms to be incorporated in the commercial buildings having electric load equal to or greater than 100 KVA.	Department of Promotion of Industry and internal trade/ Ministry of Commerce and Industry	SEZ Division, Department of Commerce vide letter no. D-12/30/2009-SEZ dated 27.10.2010 has issued guidelines on energy conservation in SEZs.
		Industrial Development Scheme (IDS), 2017 to boost the industrialization by Department of Promotion of Industry and internal trade.	ECBC norms to be incorporated in the commercial buildings having electric load equal to or greater than 100 KVA.	Department of Promotion of Industry and internal trade	

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		• Creation and establishment of Central Universities/ Institutes of Higher Learning (IITs/NITs) by Ministry of HRD. - Construction of new Buildings for Universities/ Technical institutions	• ECBC norms to be incorporated in the commercial building having electric load equal to or greater than 100 KVA. • Eco Niwas Samhita (ENS) norms to be incorporated in the Residential building projects.	Ministry of Education	
		• Setting up of Greenfield Airport and modernization of existing airport and Regional Connectivity scheme (UDAAN) by Ministry of Civil Aviation.	• ECBC norms to be incorporated in the commercial building having electric load equal to or greater than 100 KVA. • Eco Niwas Samhita (ENS) norms to be incorporated in the Residential building projects.	Ministry of Civil Aviation	Airport Authority of India (AAI) is incorporating GRIHA in all their contracts and ECBC Norms in all Electricals equipment.

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		• Port Modernization and new Port Development Schemes including township and commercial buildings under port area by Ministry of Shipping, Ports and Waterways.	• ECBC norms to be incorporated in the commercial building having electric load equal to or greater than 100 KVA. • Eco Niwas Samhita (ENS) norms to be incorporated in the Residential building projects.	Ministry of Shipping	• The Ministry of Shipping, as a part of its 'Green Port Initiative' has been emphasizing on use of renewable sources of energy to power Major Ports across the nation. • '12 Major Ports have been adopting various steps to ensure efficient energy utilization and avoid environment degradation. • The New Port Development at Vadhavan in Maharashtra and Paradip Outer Harbour are under taken to improve the capacity and to minimize the energy requirements for the Ports. • Major Ports have been advised by Ministry of Shipping to study the India Cooling Action Plan (ICAP) of MOEFCC for addressing the cooling demand over a period of 20 years (upto 2038) so as to minimize the energy consumption.

S.No.	Recommendations on Space Cooling as per ICAP	Synergies with existing Framework / Governmental schemes/ programmes/	Agreed Action	Agency / Department	Highlights
		• Construction of residential and office buildings including hospitals etc in Defence area by Military Engineering Services.	ECBC norms to be incorporated in the office building having electric load equal to or greater that 100 KVA. Eco Niwas Samhita (ENS) norms to be incorporated in the Residential building projects.	MES	Directorate of Works, MES vide letter no A/39398/GRIHA/PoI/E2W(PPC) dated 5th October, 2018 has issued guidelines for implementation of Green Building Norms.
		• Development of new/ redevelopment of existing railway station by Indian Railway Stations Development Corporation Limited, Ministry of Railways	ECBC norms to be incorporated in the commercial building having electric load equal to or greater than 100 KVA.		• Railway Board, Ministry of Railways vide order no 2016/Elect(G)/150/9 dated 08.03.2018 has issued advisory for incorporation of energy efficiency guidelines for development of railway stations and other buildings. • Ministry of Railways published a "Guidelines on Sustainable Development of New & Transformation of Existing Building to Green Building On Indian Railway"
		• Infrastructure development under National Rural and Urban Health Mission Schemes, Ministry of Health - Construction of new Hospitals including Residential Buildings	ECBC norms to be incorporated in the commercial building having electric load equal to or greater than 100 KVA. Eco Niwas Samhita (ENS) norms to be incorporated in the Residential buildings projects.	Ministry of Health and Family Welfare	

S.No.	Recommendations on Space Cooling as per ICAP	Synergies with existing Framework / Governmental schemes/ programmes/	Agreed Action	Agency / Department	Highlights
3.	To incorporate relevant provisions of energy efficient building design stated in ECBC to minimize active cooling needs by using passive design elements for all commercial (non-residential) buildings in statutory environment clearance,	Building project having built up area equal to or more than 20, 000 sqmts. are required to obtain Environment Clearance under EIA Notification, 2016.	Conditions are being stipulated in environment clearance letter.	MoEF&CC/ SEIAA	Statutory compliances were laid in Office Memorandum (F. No. 22-34/2-18-IA.III) dated 4th January 2019: Project proponent shall follow the ECBC/ ECBC-R prescribed by BEE, MoP strictly.

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4.	Awareness campaign to sensitize both the construction community and users regarding efficient buildings		"Energy efficient building design by using passive design element" to be incorporated in the curriculum of civil engineering/ architecture / degree courses/ Mechanical Engineering.	Ministry of Education	
		• BEE is currently doing 10-15 training programmes in a year for Architects/ Civil Engineers/Govt. Officials on ECBC and every programme will have 40-50 participants. • 25 ECBC Cells established for all states and UTs are each conducting 19 training programmes annually. • Capacity Building Under PMAY(U) by MoHUA	Training programmes to be conducted should include "Energy efficient building design by using passive design element" Short term certification programme on ECBC.	BEE/MoHUA/ CPWD BEE/Ministry of Power	• By August, 2022, BEE to train 7500 Architects, Civil Engineers, Govt. officials on ECBC. • Target proposed to be completed as per Amrut Mahotsav Training Calendar

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5.	Mandatory disclosures and Third-Party verification of building cooling requirement and energy use for all commercial (non-residential) buildings that have a connected load of 100 kW or higher	Energy audit program of BEE/ Ministry of Power for hotels consuming more than 500 TOE of oil equivalent.	• Mandatory Energy Audit Report should also highlight the energy consumption for cooling in the existing hotel building. • To include new sub sectors i.e. data centres under the commercial building sector of PAT scheme for energy audit.	BEE & Ministry of Power	• BEE has scheme for energy audit under Perform Achieve and Trade (PAT) scheme including hotels which are consuming more than 500 TOE of oil equivalent. • In future, BEE is trying to include new sub sector i.e data centres under the commercial building sector of the PAT scheme.
6.	Mandatory BEE Star labelling of ceiling fans and launch of voluntary labelling program for evaporative Air-coolers	• Revision of the MEPS for ceiling fans by BEE. • S&L program of BEE for other types of fans	Mandatory S&L for all types of fans and launch of voluntary labelling program for evaporative coolers.	BEE & Ministry of Power	• After approval of MoP on Proposal for changeover of star labelling program for Ceiling Fans from Voluntary to Mandatory regime, the draft notification was uploaded in public domain for seeking comments of manufacturers/ permittee on the same. • The comments received have been incorporated in the draft notification and the same is under submission in MoP. • Launch of Voluntary star labelling program for evaporative Air coolers sent to Ministry of Power on 6th October, 2020.

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7.	Ratchet up Minimum Energy Performance (MEPs) for room ACs	Star and Labeling (S&L) program of BEE.	Ratchet up of MEPs to be implemented for room air conditioners periodically as per BEE Programs.	BEE	• The revised energy performance standards of Room Air Conditioners would be applicable from 1st January, 2022 in accordance with amendment notification dated 10th December, 2020. • RAMA informed that extension of one year has been sought from BEE for implementation of (MEPs) for room Air conditioners.
8.	Mandatory minimum indoor temperature settings (adaptive thermal comfort standards)	BEE vide dated 30.08.2019 notified new energy performance standards for all room ACs covered under BEE S&L to have default temperature setting of 24^{o}C from 1st January, 2020.	Create public awareness on Guidelines for default temperature setting of 24^{o}C issued by BEE for the commercial buildings viz. hotels, malls, offices, multiplex etc.	BEE/ Ministry of Power	• Advisory issued by BEE on 25th June, 2018. • All consumers of commercial buildings are suggested to maintain the internal temperature between 24-25^{o}C with appropriate humidity and airflow to conserve energy and for the health benefits of occupants, subject to operational and functional requirement. • These guidelines are mostly applicable for large premises such as Airports, Hotels, Shopping Malls, Offices and Government Buildings (Ministries & attached offices, State Government, and Public Sector Undertakings), having huge potential for savings.

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9.	Procurement guidelines for highest star labelled super-efficient ACs, fans, chillers etc. with low GWP options, wherever feasible	General Financial Rules (GFR) OM No. 26/6/12-PPD regarding procurement of energy efficient electrical appliances Ministries/ Dept./ States/ UTs	• Separate category for the Green RAC has been made available on GeM portal for promoting energy efficient and climate friendly ACs. • Finalisation of Study by TERI on public procurement	GEM Ozone Cell, MoEF&CC	Public procurement is through GEM (Government E market Place)
10.	Retrofitting and retro commissioning of existing building to reduce cooling requirement and energy consumption	(i) Retrofitting of the existing Government Buildings to enhance the energy efficiency by CPWD (ii) Central scheme of MNRE for Grid connected Rooftop solar programme for achieving 40 GW by the year 2022.Scheme is for residential.	(a) Retrofitting of the existing Government Buildings to enhance the energy efficiency by CPWD (b) Installation of solar panel on the roof top of new / existing residential building under rooftop solar program of MNRE.	MoHUA, CPWD CPWD / MNRE	• Around 500 buildings have been retrofitted to enhance the energy efficiency/ reduce the cooling demand. • Central scheme of MNRE for Grid connected Rooftop solar programme for achieving 40 GW by the year 2022. • This initiative can reduce solar radiation impact thereby reducing cooling load as well as energy consumption in the residential buildings but will also help in achieving net-zero energy consumption

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11.	Promote use of not-in kind technologies DCS, solar Vapour absorption chiller (VAM), trigeneration etc and Solar assisted systems.	EESL has associated with Overseas Environmental Cooperation Centre (OECC), Japan and ADB for training and capacity building of few smart cities on DCS.	• EESL to carry out training and capacity building on DCS for smart cities namely, Pune, Rajkot, Chennai etc. • BEE is conducting a feasibility study exploring the possibility of DCS in one of the upcoming projects of CPWD / NBCC	EESL BEE	• EESL has organized first of such training program (online master class) for Pune between 19th August to 25th August 2021 for around 40 participants. This program is also being supported by UNEP, NIUA, ISHRAE, etc. Training programmes for other cities would be planned and implementation in consultation with concerned stakeholders. • EESL has conducted the market assessment study on DCS through UNEP in India. • EESL has successfully implemented 800kW Tr-gen plant in Mahindra & Mahindra as a commercial project. • BEE has signed an implementation agreement with GIZ for DCS projects.

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12.	Institutionalise Demand Side Management programmes with DIS¬COMS to replace inefficient ACs with EE ACs.	Bulk procurement programme i. "Super-efficient AC programme (SEAC)" by EESL ii. DISCOM programme "5-star AC scheme" in association with DERC	"Super-efficient AC programme (SEAC)" by EESL may be implemented by the Discoms of Jharkhand, Odisha and Telangana.	EESL, CERC, Ministry of Power	• EESL has carried out Utility Based Demand Side Management (DSM) studies in the three states of Jharkhand, Odisha and Telangana in association with DISCOMS for promotion of various EE appliances including SEAC. Subsequent to these studies, EESL has signed MoUs with DISCOMs of Odisha and is in advanced stage of discussions with Telangana DISCOMs. Through these MoUs, EESL envisages to utilize the DISCOMs as channels of demand aggregation among other support. • EESL has completed bidding of 150,000 SEACs with low GWP in two phases since 2017-18. About 20,000 ACs have been deployed so far in institutional and domestic consumers and another 10,000 AC's are in pipeline to be delivered in this FY.

WHOM TO CONTACT TO LEARN MORE ABOUT OZONE

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