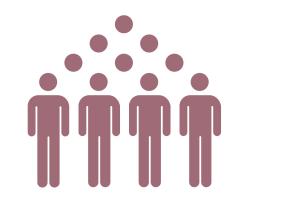
MAKING A CASE FOR ADAPTIVE THERMAL COMFORT



Large **Population**

Increasing

building floor

area

Increasing GHG

emissions

Tropical climate & rising temperature Greater

penetration of

active cooling

Challenge in

attainment of

SDGS

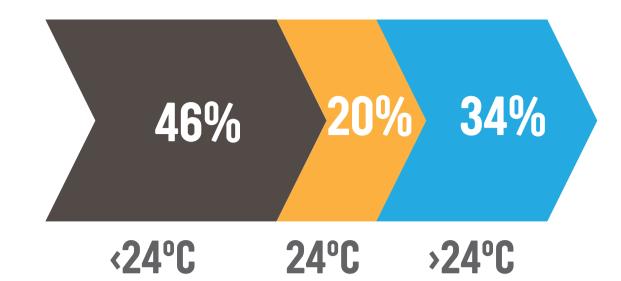
Growing

aspirations

Thermal **Comfort for** All is a social imperative!

Rise in active space cooling needs to be balanced with access to minimum thermal comfort for all sections of the

Room Air Conditioner Usage Patterns in India (AEEE Research)



Majority of the survey population operated RACs at temperatures 24°C or below



Increasing energy

consumption &

peak demand

Rising active

cooling demand

society

34% 66% **Only RAC** RAC + Fan

survey population prefer using a fan in conjunction with air-conditioning

Great Potential for Adaptive **Thermal Comfort** (ATC) based **Energy Savings**

India is poised to become one of the largest RAC markets in the world

International Energy Agency (IEA)

RAC stock could see 10X to 15X growth in the next 2 decades

India Cooling Action Plan (ICAP)

Tropically acclimatised people are comfortable to wider temperature rang

India Model for Adaptive (Thermal) Comfort (IMAC)

Evidence of ATC Assisted Energy Savings-Customised Testing of RACs in a State of the Art

RAC Selection for Testing

Test Specimen	Cooling Capacity at Full Load	Туре	BEE Star Rating	Energy Efficiency	Refrigerant Type
RAC Unit 1 (new)	5.0 kW (~1.4 TR)	Inverter - Split	3 Star (2018)	3.70 ISEER	R-32
RAC Unit 2 (new)	5.3 kW (~1.5 TR)	Inverter - Split	5 Star (2018)	5.20 ISEER	R-290
RAC Unit 3 (used for 3 years)	5.0 kW (~1.4 TR)	Fixed Speed - Split	5 Star (2015)	3.51 EER	R-22

RACS

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CONSUMPTION

ENERGY

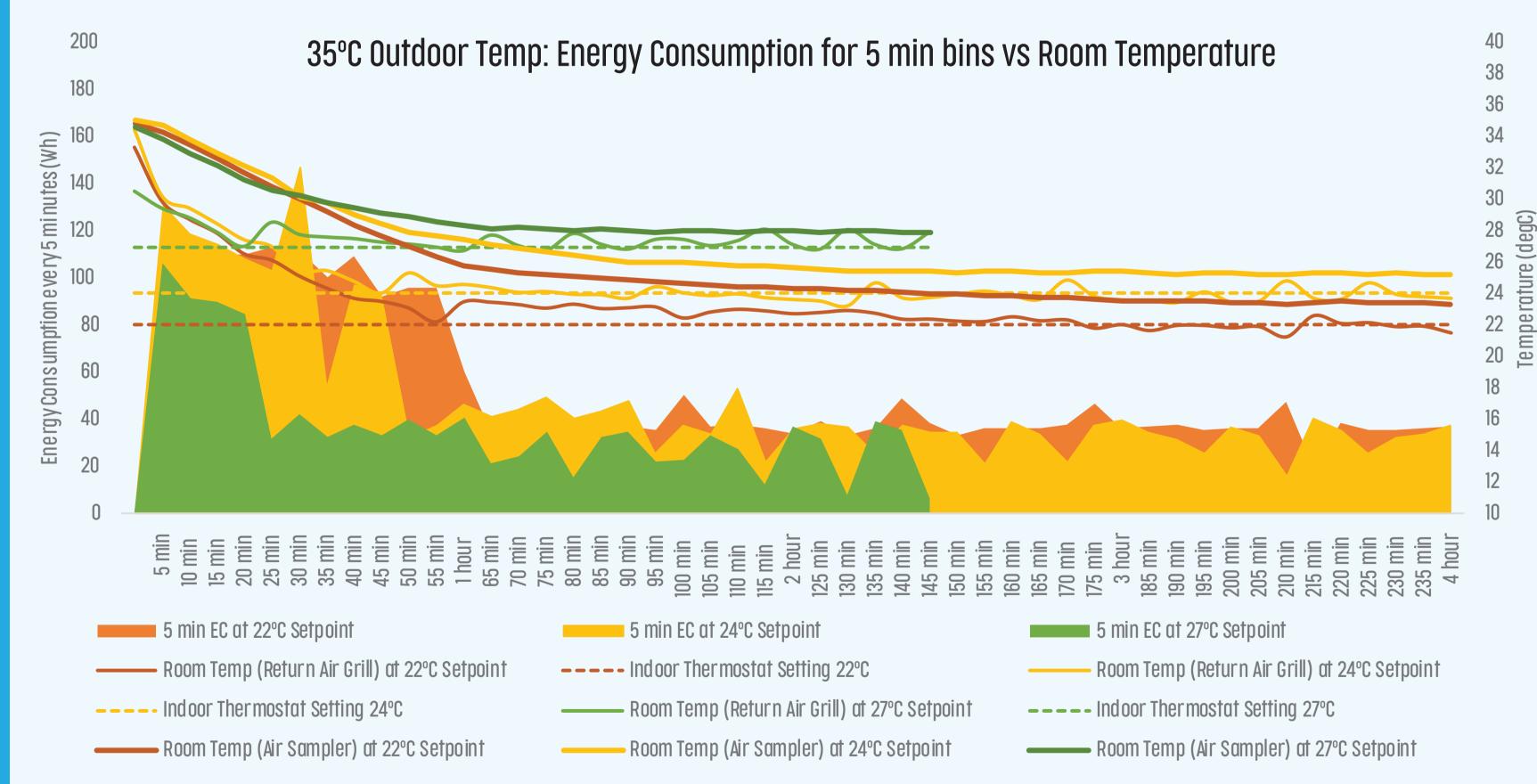
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SUMMARY

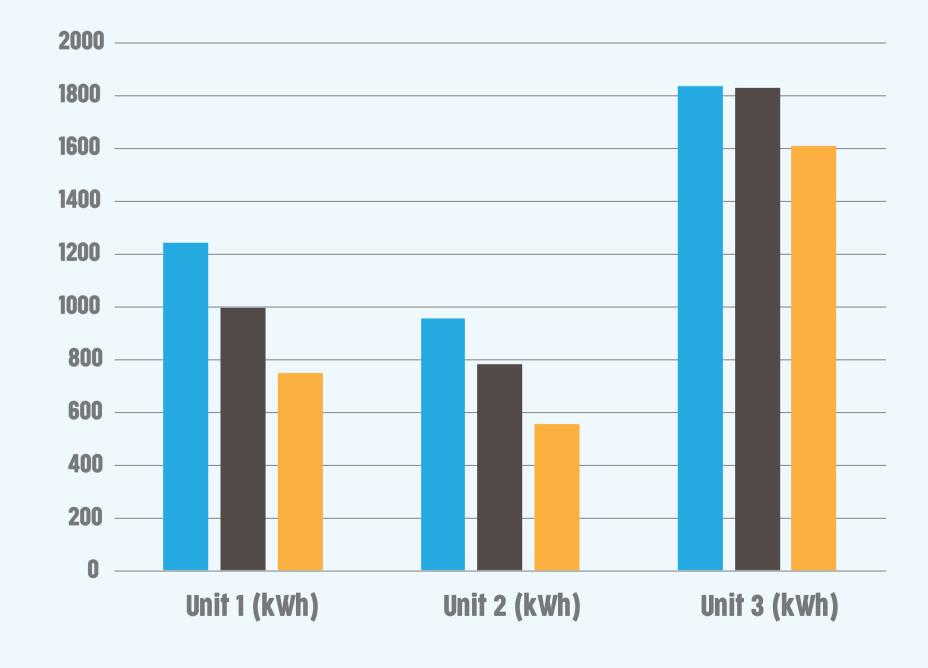
Balanced Ambient Calorimeter Facility

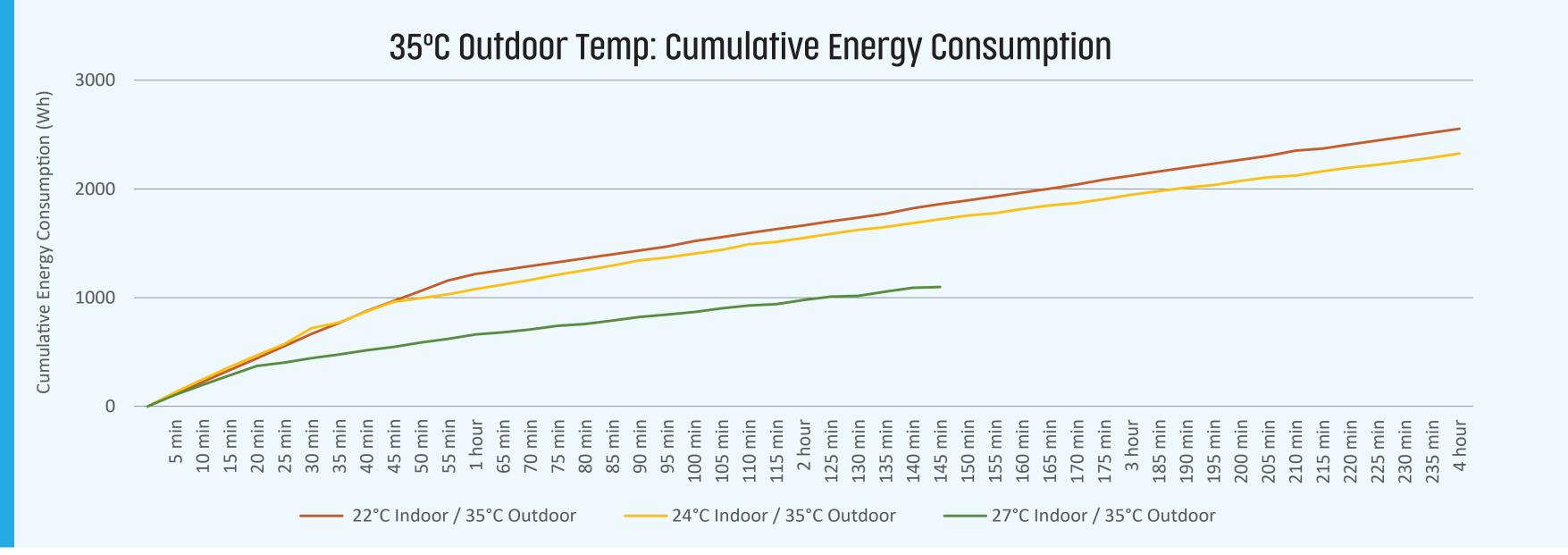


High level findings

Energy Saving potential of 8 to 10% per degree Celsius set-point increase for Inverter RACs Energy Saving potential in case of used Fixed Speed RACs is only one-third to that of inverter RACs

Annual RAC Energy Consumption at different set points





22°C ■ 24°C 27°C

Implications

Apprise climate-responsive policies and O&M practices. Sensitize diverse stakeholders including policy makers, home buyers, facility managers, and AC manufacturers about the potential energy and cost savings

Correlating Room Air Conditioner Energy Consumption with Thermostat Setting to Encourage **Occupant Behavioural Change Towards Enhanced Energy Efficiency and Thermal Comfort**

