



# DEMAND ANALYSIS FOR COOLING BY SECTOR IN INDIA BY 2027

A project in partnership with



Presentation at:  
**Sub-Group 3 Meeting “Energy Efficiency” of Indo-German  
Energy Forum; November 8, 2017**

- First time in India, a **comprehensive view of nationwide cooling energy needs from various sectors**
- Aggregation of cooling demand by 2027, looking at **Business-as-usual and Improved scenario**

## Improved Scenario

- Technology and R&D eco-system
- Efficient building strategies
- Market interventions
- Operational interventions
- Behavioral changes
- Improved/alternative refrigerants

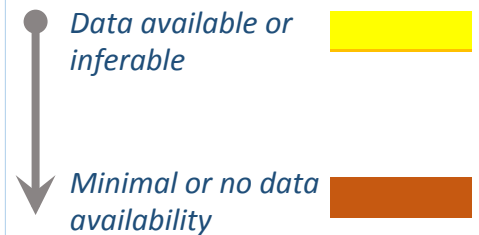
# KEY CONTRIBUTORS TO COOLING DEMAND

SECTOR	CATEGORY	DATA AVAILABILITY	
		COOLING ENERGY	REFRIGERANT
AC in Buildings	RACs	Yellow	Yellow
	Fans	Yellow	NA
	Air coolers	Orange	NA
	Centralised AC	Yellow	Yellow
	Medium to Large DX	Yellow	Yellow
	Advanced low-energy cooling tech.	Orange	Orange
AC in Transportation	Cars	Orange	Orange
	Buses	Orange	Orange
	Trains (including metros)	Orange	Orange
	Aeroplanes	Orange	Orange
	Freight trucks	Orange	Orange
Refrigeration: Residential & Commercial	Standalone type - refrigerators	Yellow	Yellow
	Standalone type - freezers	Yellow	Yellow
	Remote condensing unit - refrigerators	Yellow	Yellow
	Remote condensing unit - freezers	Yellow	Yellow
	Walk in - refrigerators	Orange	Orange
	Walk in - freezers	Orange	Orange
	Water coolers	Orange	Orange
Industrial process cooling	Fertilizer	Orange	Orange
	Ice making	Orange	Orange
	Milk chillers	Orange	Orange
	Pharmaceuticals	Orange	Orange
	Textile	Orange	Orange
	Printing industries	Orange	Orange
	Manufacturing of precision parts	Orange	Orange
	Semi-conductor industries	Orange	Orange
Cold chain	Pack house	Yellow	Yellow
	Reefer vehicles (refrigerated containers)	Yellow	Yellow
	Ripening chamber (controlled atmsp.)	Yellow	Yellow
	Cold storage	Yellow	Yellow

## WHAT IS THE TOTAL MAGNITUDE?

- Relative share of sectors is unknown
- Data in some sectors is not available or still evolving

DATA AVAILABILITY IN PUBLIC DOMAIN OR INDUSTRY LITERATURE





- **MULTIPLE INPUT SOURCES**
- **TOP-DOWN & BOTTOM-UP VALIDATIONS**
- **ASSUMPTIONS BASED ON EXPERT INPUTS**

## Sources of input:

- BEE S&L data
- CEA Nineteenth Electric Power Survey of India- Volume-I (Jan 2017)
- AEEE commercial building database (*pub. Aug 2017*)
- AEEE Resi RAC Survey (*soon to be published*)
- Peer group research: CEEW, LBNL & others
- Industry reports: BSRIA, TECHSCI, 6W
- Sales data
- Industry stakeholder inputs: ISHRAE, RAMA, various manufacturers, subject-matter experts

*This list is indicative, not exhaustive.*

- For each ‘sector’:
  - Total stock in 2017 & 2027
  - Cooling energy consumption in 2017 & 2027
  - **Emissions impact** in CO2 equivalent
- Aggregation of **nationwide cooling demand by 2027**:  
BAU scenario & Improved scenario
- Quantifying potential need for new power plants

- Identify **key challenges** of growth in cooling demand in India,
- Identify **key areas for intervention** that will maximize positive impact
- Propose recommendations about **promising technologies**, possible employment of **renewable energy** technologies, as well as **alternative refrigerants**
- Propose **recommendations for policy makers** geared towards proactive management of India's cooling energy demand and minimize emissions



# Work-in-progress RAC Analysis Summary

	2017	2027 (BAU)	2027 (Proposed)
Annual energy consumption (TWh)	85	148	126
Annual energy consumption (incl. AT&C losses) (TWh)	113	166	142
Energy saving			15%
Indirect emissions (MtCO <sub>2</sub> e)	93 (84%)	128 (83%)	109 (92%)
Direct emissions (MtCO <sub>2</sub> e)	18 (16%)	26 (17%)	9 (8%)
Total emissions (MtCO <sub>2</sub> e)	111	154	118
Carbon saving			24%