MAINSTREAMING
SUPER-EFFICIENT APPLIANCES

CEILING FAN | REFRIGERATOR | TV

The appliance and consumer electronics market in India was pegged at INR 2050 billion in 2017 and is projected to grow to INR 3150 billion in 2022 (PwC, 2017). Growth in appliance ownership, while improving the quality of life and standard of living for a growing and aspirational Indian middle class, will significantly increase energy demand. By how much is a crucial question.

Electricity consumption in the residential sector is projected to grow from 259 TWh in 2016-2017 (MoSPI, 2018) to 533 TWh in 2027 (CEA, 2017), increasing pressure on energy supply and the environment due to increased GHG emissions. However, there is a cleaner and more energy-efficient path. A case in point is the UJALA programme for LED bulbs by Energy Efficiency Services Limited (EESL), which completely transformed the lighting sector. Ceiling fans, refrigerators and televisions, which are among the top four appliances in energy consumption, could make a similar step change in energy efficiency by mainstreaming some of the most energy-efficient technologies.

Total Annual Energy Consumption in India (TWh)

Appliance	Total Annual Energy Consumption in India (TWh)			Energy Savings Potential 2027 (TWh)	Energy Savings Potential 2027 (%)
	2017	2027 (BAU)	2027 (Improved EE)		
Fans	41	52	46	6	12%
Refrigerators	51	87	73	14	16%
Colour TVs	23.6[1]	46.1[2]	36.2[2]	9.9	21.5%[2]

Source: Demand Analysis for Cooling by Sector in India in 2027 (AEEE, 2018); The Future of Indian Electricity Demand (Brookings India, 2018); [1]Year 2015, [2]Year 2030

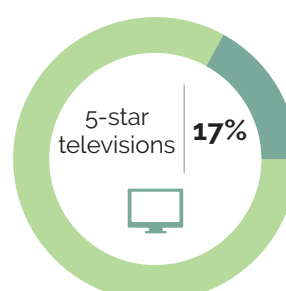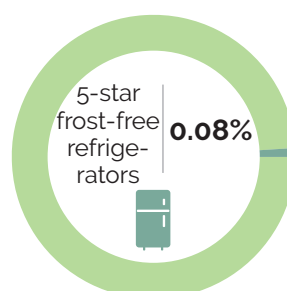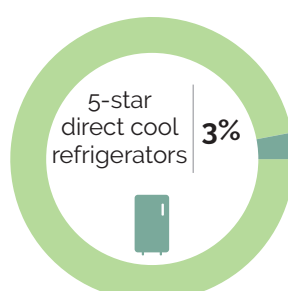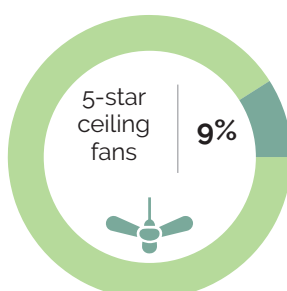### Super-efficient appliances are already available...

Ceiling fans with Brushless DC (BLDC) motors consume on average 32 watts, 36% less than 5-star fans with AC induction motors

5-star refrigerators consume 30-35% less energy compared to 3-star refrigerators

5-star TVs consume 25-30% less than 3-star TVs

...but these appliances have very low market share

market share for the year 2017-2018

5-star ceiling fans **9%**

5-star direct cool refrigerators **3%**

5-star frost-free refrigerators **0.08%**

5-star televisions **17%**

Alliance for an Energy Efficient Economy (AEEE) partnered with the American Council for an Energy-Efficient Economy (ACEEE) to study:

- The most energy-efficient product models in the market
- Analyse appliance energy performance vis-à-vis the technologies used in the appliance
- Seek inputs from manufacturers and recommend pathways to mainstream the most energy-efficient technologies in India for ceiling fans, refrigerators and TVs
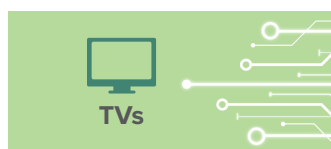
Technology differentiators in the most energy-efficient appliances

Ceiling Fans

- Brushless DC (BLDC) motors

Refrigerators

- Compressors in 5-star models are 10-25% more efficient than in 3-star models
- Variable speed drive
- Vacuum insulation panels (VIP)
- High-efficiency fan motors
- Dual evaporator

TVs

- Automatic Brightness Control (ABC)
- Backlight Dimming
- Optimised design of "smart" features

Barriers

- High cost of super-efficient appliances
  - BLDC ceiling fans are about 80% more expensive than 5-star ceiling fans with AC induction motors
  - 5-star refrigerators are about 15-25% more expensive than 3-star refrigerators
- Lack of a robust local ecosystem for critical super-efficient components
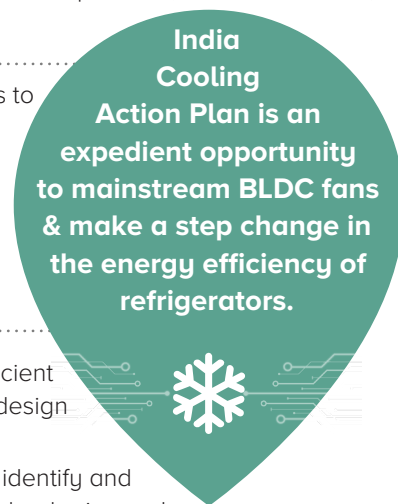 - BLDC motors
  - High-efficiency compressors

RECOMMENDATIONS
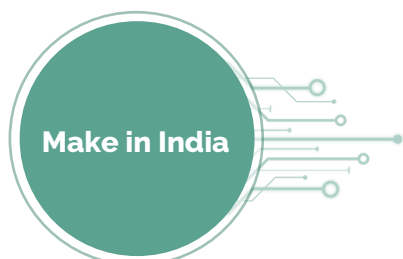
Make in India

- Develop a robust 'Make in India' ecosystem for BLDC motors to reduce the cost of BLDC ceiling fans and other consumer appliances that use BLDC motors.
  Bulk procurement or bulk import, preferential tax or duty for imported components such as magnets and control circuits would bring down costs.
- Develop a 'Make in India' eco-system for super-efficient technologies and components used in refrigeration — highly efficient compressors, BLDC fan motors, vacuum insulation panels.

Standards and Labelling

- Mandate standards and labelling for ceiling fans to differentiate and promote energy-efficient fans.
- Include UHD TVs in BEE's Standards and Labelling
- Mandate TV manufacturers to set a TV's "energy-saving" mode as the default setting

Research, development & innovation

- Invest in R&D for the development of energy-efficient heat exchanger technology and super-efficient design technology for small compressors and motors
- Conduct comprehensive testing and analysis to identify and mainstream the most energy-efficient display technologies and power management features in TV's and other electronic devices such as laptops, tablets, desktop monitors and mobiles.

India Cooling Action Plan is an expedient opportunity to mainstream BLDC fans & make a step change in the energy efficiency of refrigerators.