

**Workshop on**  
**“Space Cooling Efficiency Enhancement and Demand  
Response”**

**India AC Efficiency Policy  
Opportunities & Current Activities**

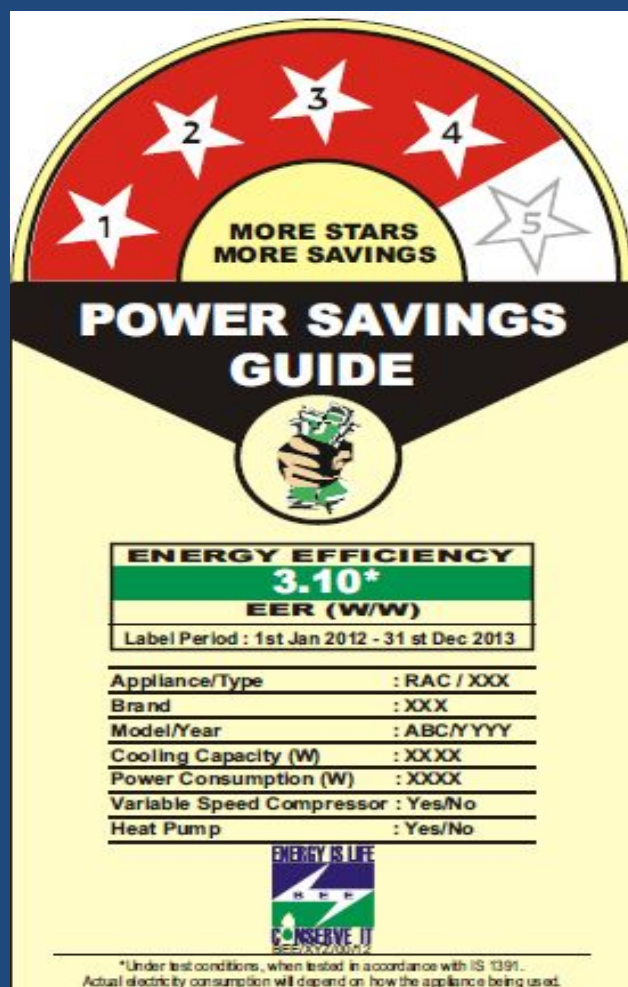
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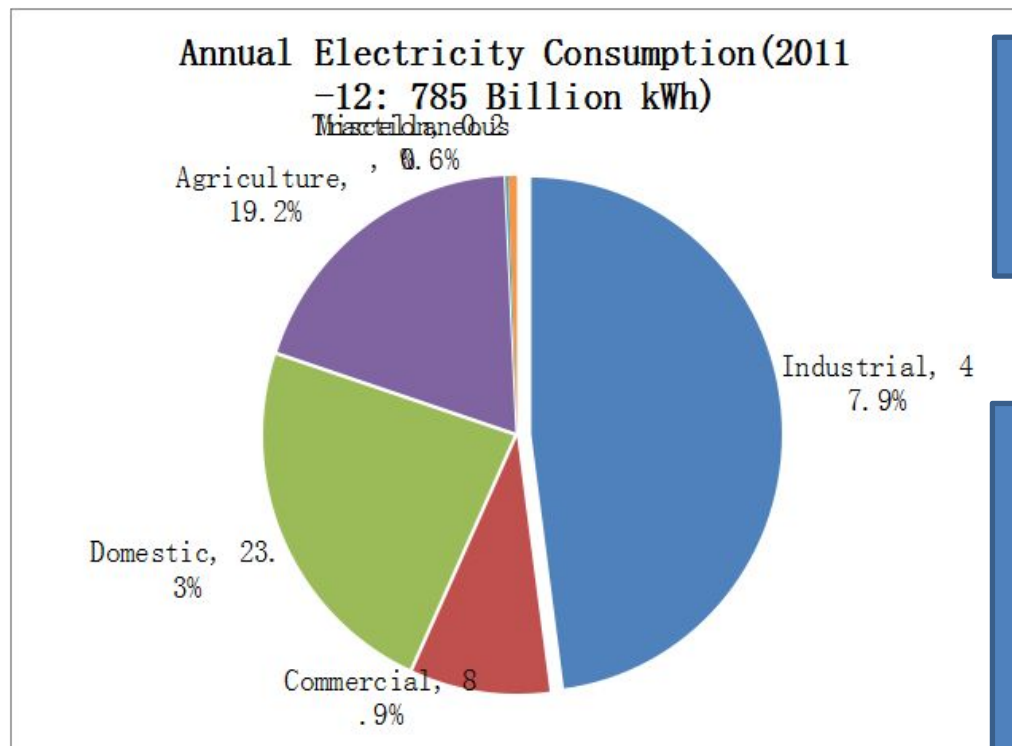
Saurabh Diddi  
Energy Economist  
Bureau of Energy Efficiency

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- Air Conditioners: 3-5 TR
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# Indian Electricity Scenario



Source : Growth of Electricity Sector in India (1947 ~2013), CEA

## Air Conditioner Contribution:

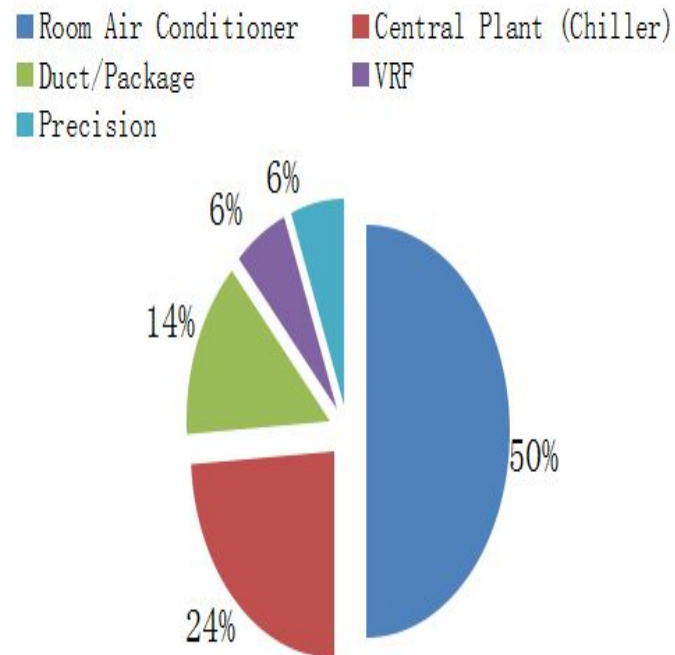
- Household: 20-30%
- Commercial: 40-50%

## Annual Demand due to Air Conditioners:

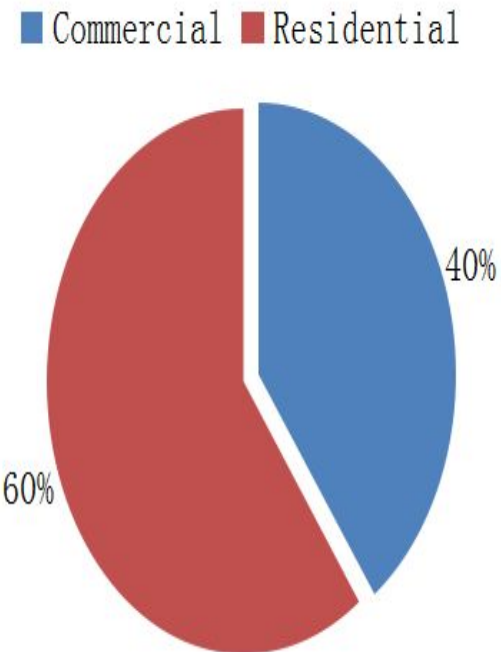
**60-80 Billion kWh**

# Indian Air Conditioner Market

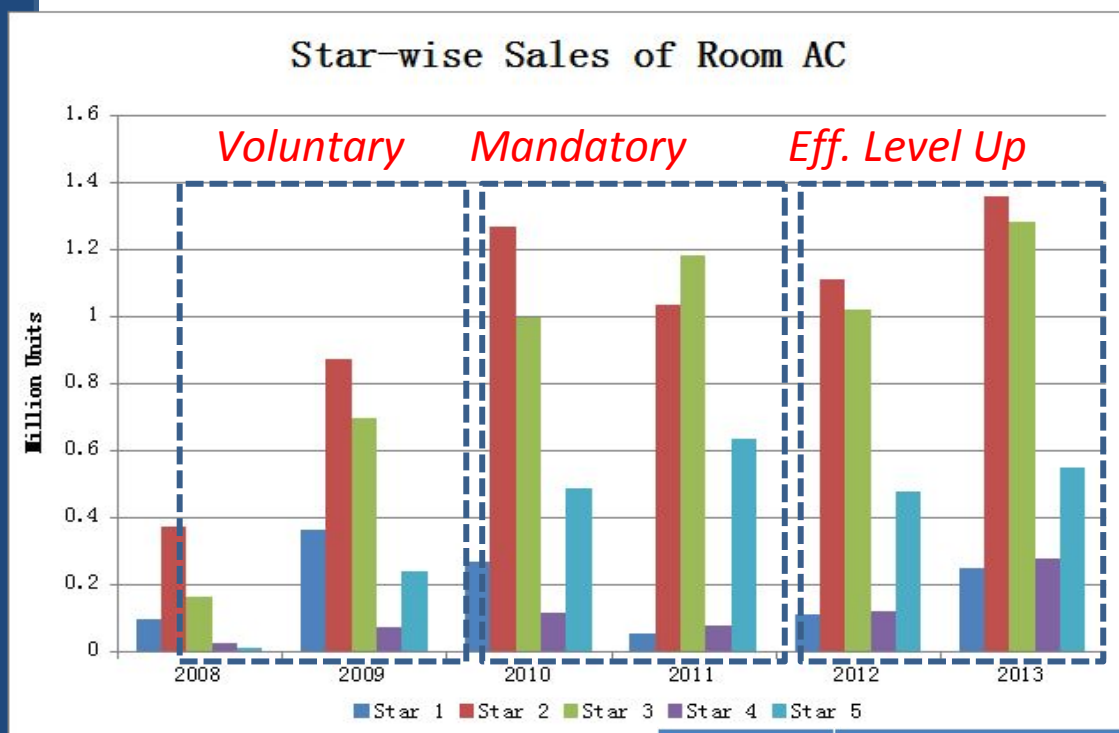
Segment Share of Air Conditioning(2011-12)



Room Air Conditioner Market(2011-12)



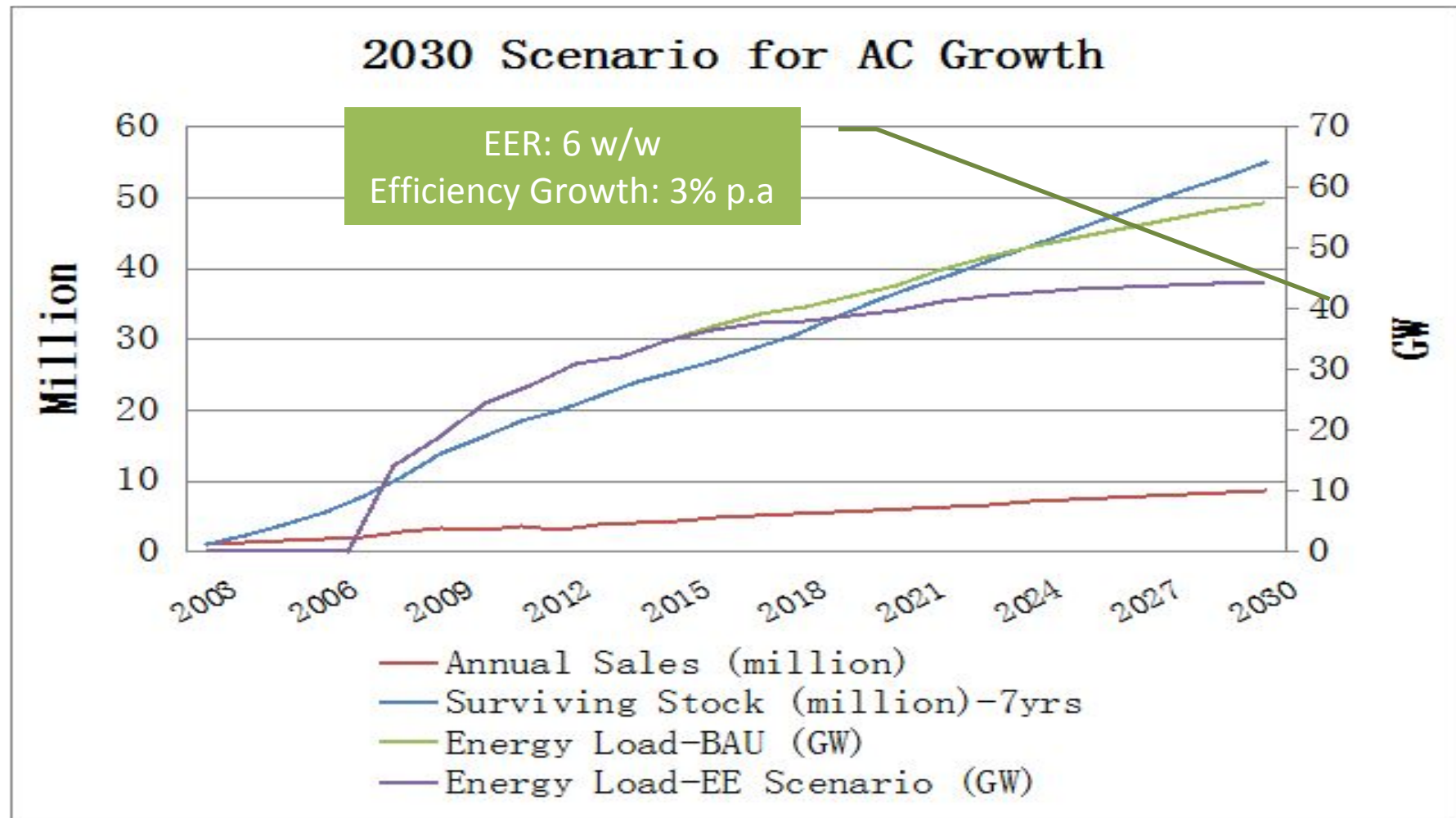
# Room AC: Efficiency & Growth



Manufacture/Imports/Purchase/Sale	Table
<b>Unitary Type Air Conditioner</b>	
(i) 1 <sup>st</sup> January 2012 to 31 <sup>st</sup> Dec 2013	2.1
(ii) 1 <sup>st</sup> January 2014 to 31 <sup>st</sup> Dec 2015	2.4
<b>Spilt Type Air Conditioner</b>	
(i) 1 <sup>st</sup> January 2012 to 31 <sup>st</sup> Dec 2013	2.2
(ii) 1 <sup>st</sup> January 2014 to 31 <sup>st</sup> Dec 2015	2.3

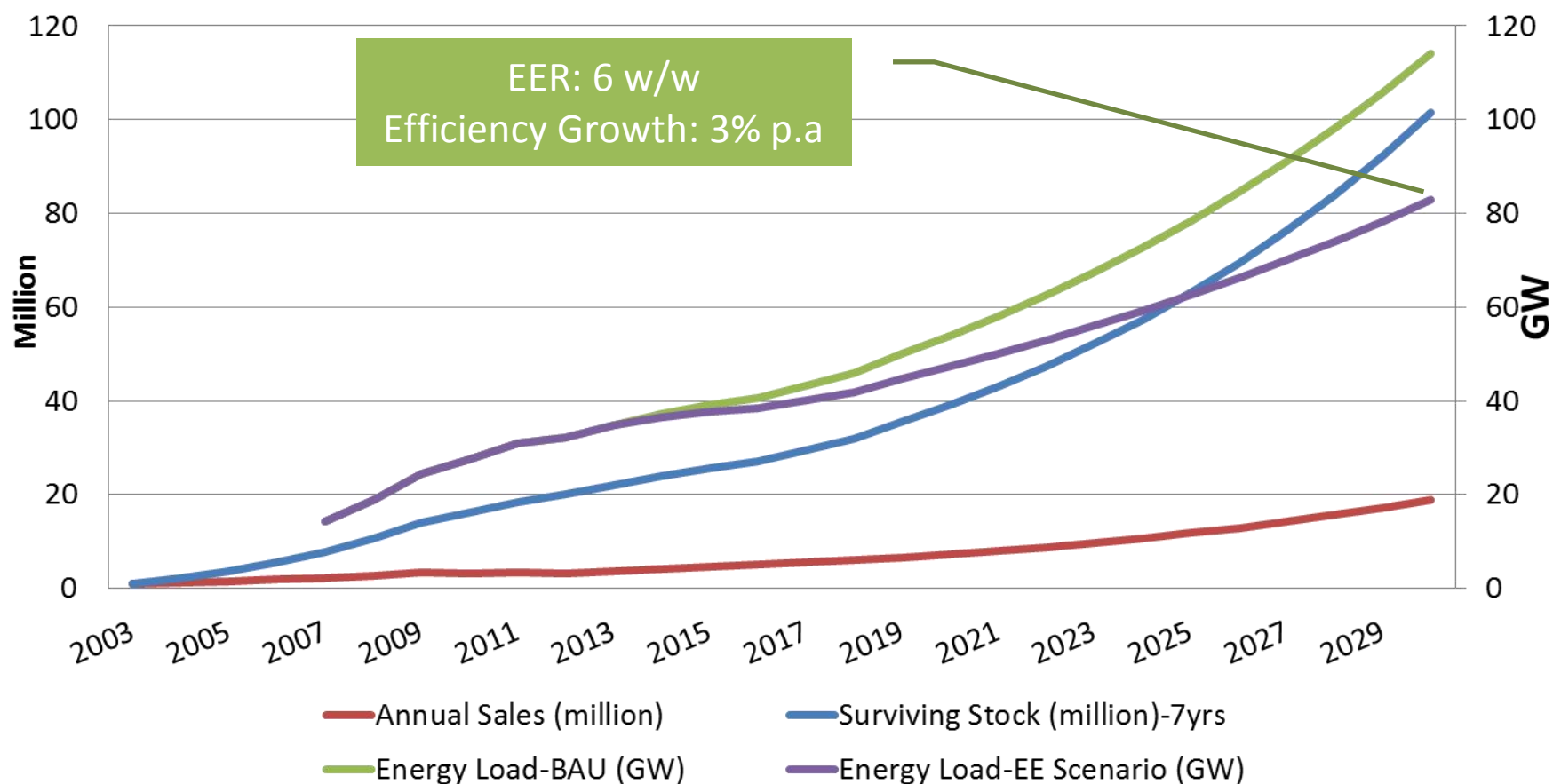
Star Rating	Table 2.1		Table 2.2 / 2.4		Table 2.3	
	EER(W/W)		EER(W/W)		EER(W/W)	
	Min.	Max.	Min.	Max.	Min.	Max.
1 star	2.30	2.49	2.50	2.69	2.70	2.89
2 star	2.50	2.69	2.70	2.89	2.90	3.09
3 star	2.70	2.89	2.90	3.09	3.10	3.29
4 star	2.90	3.09	3.10	3.29	3.30	3.49
5 star	3.10		3.30		3.50	

# Scenario Analysis (Conservative)



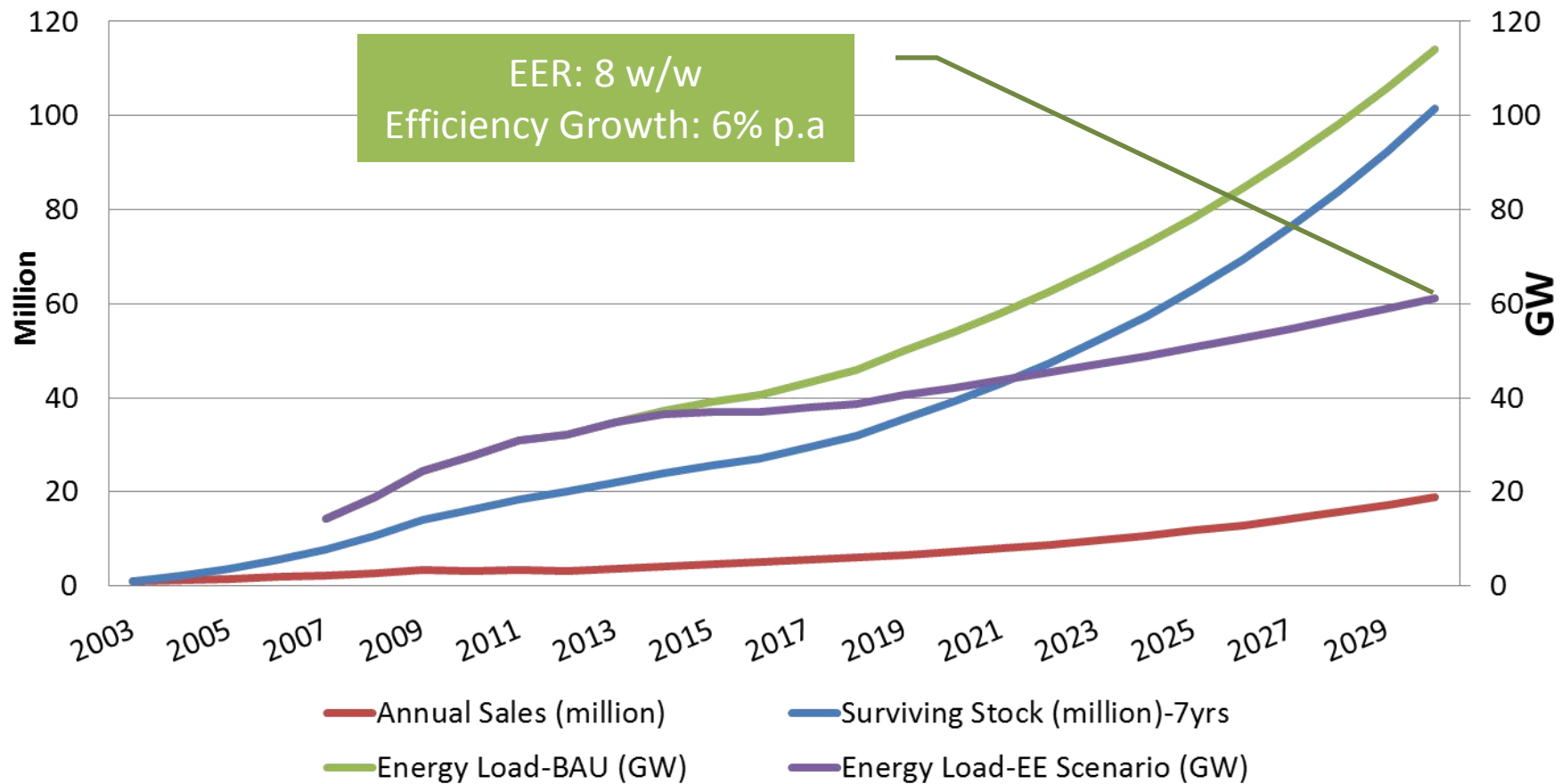
# Scenario Analysis (Aggressive)

## 2030 Scenario for AC Growth



# Scenario Analysis (Aggressive)

2030 Scenario for AC Growth





# Room AC: Current Status

## •Fixed Speed Air Conditioners:

- 3.5 EER and above split AC are 5 star and EER 3.3 and above window AC are 5 star
- Upgraded from January 2014
- Valid up to December 2015

## •Variable Speed Room AC (Inverter Type):

- Inverter AC and fixed speed AC were tested
- ISO 5151 Standard is followed for testing
- Analysis of Indian weather data was done as per Energy Conservation Building Code (ECBC) which considered 58 cities divided into five climatic zones
- Parameters considered :
  - Various temperature bin ( 21-35 Deg C or 24-38 Deg C)
  - Cooling Hours (1200 Hrs or 1817 Hrs)
  - Climatic Zone (National or Hot & Dry)

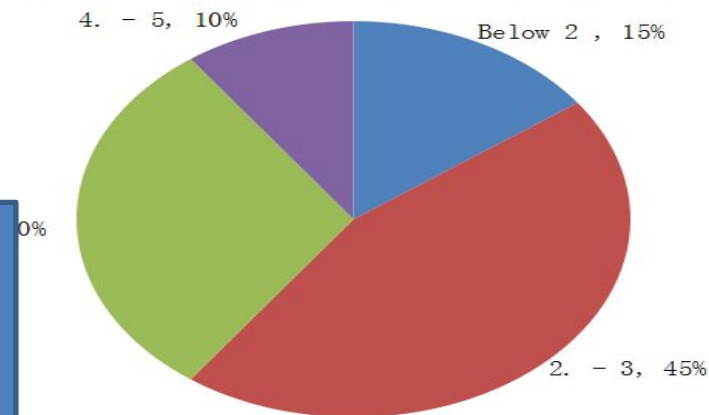
# Room AC: Way Forward

- Fixed Speed Air Conditioners:
  - New testing methodology based on ISO 16358 to be established so that efficiency reflects wide range of temperature variations
- Variable Speed Room AC (Inverter Type):
  - Launch of Inverter labeling program
  - Synchronize with fixed speed AC labeling programme
- Common Metric
  - CSPF based metric will allow common technology & neutral energy efficiency performance evaluation (temperature variations and part load conditions)
  - ISO 16358 is used as a reference

# 3-5TR: Current Market and Growth

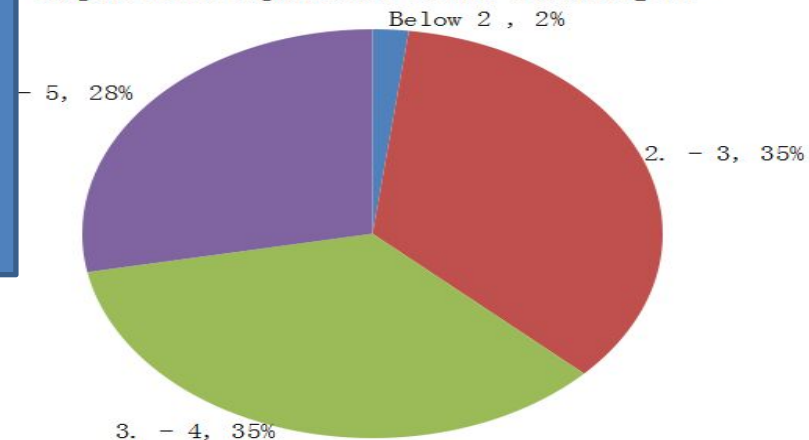
- Current Market : Approx. 1,00,000 Units
- Currently not regulated
- Growing fast from a low base
- Has a great potential for energy savings
- Market is expected to grow @ 10 ~15 % in this segment

**Major Sold Capacities Cassette AC**



*Average EER for Cassette AC : 2.91*

**Major Sold Capacities Floor Standing AC**



*Average EER for Floor standing AC : 2.70*

# 3-5TR: Way Forward

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## Launch of labeling program for 3-5 TR segment

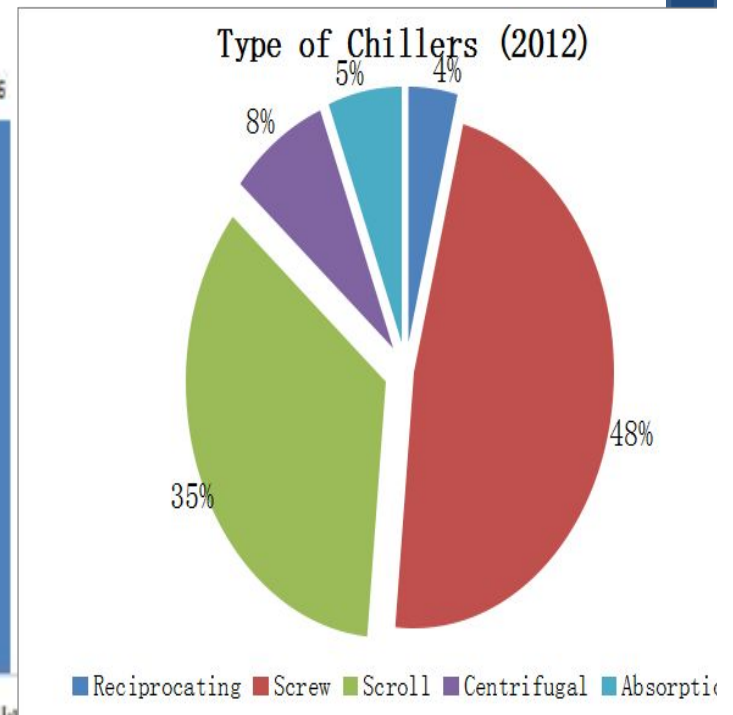
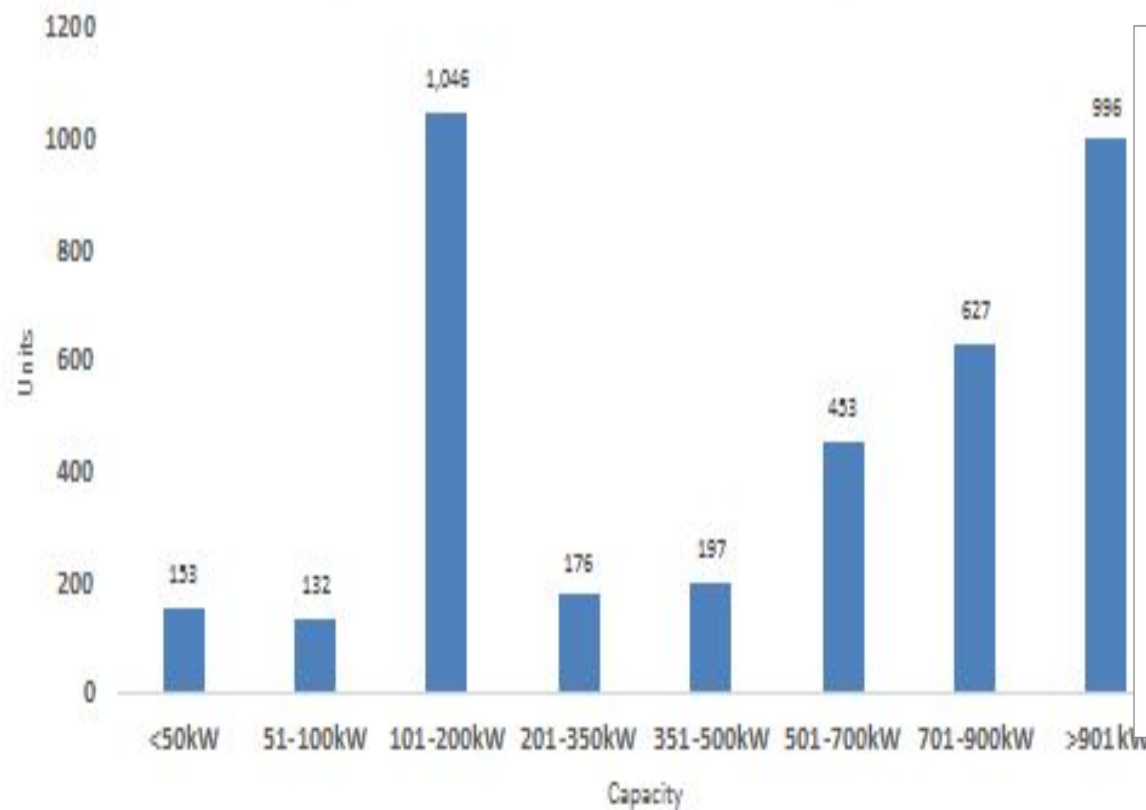
- Review of best available technology.
- Cost benefit analysis
- Review of challenges in implementation of policy initiatives
- Defining future roadmap for market transformation

# VRF: Current Status

- Current Market @ 0.3 Million TR
- Growth trends
  - Expected CAGR – 20 – 25%
  - Commercial and residential sectors contribute in the growth
- Factors aiding market growth
  - More energy efficient VS ductable AC
  - Not regulated
- Way Forward
  - Market Assessment for VRF and Ductable AC's
  - Development of Test Procedure
  - Development of Energy Efficiency Metric and Labeling Scheme

# Chillers: Current Market

*Chiller Sales by cooling capacity (2012)*

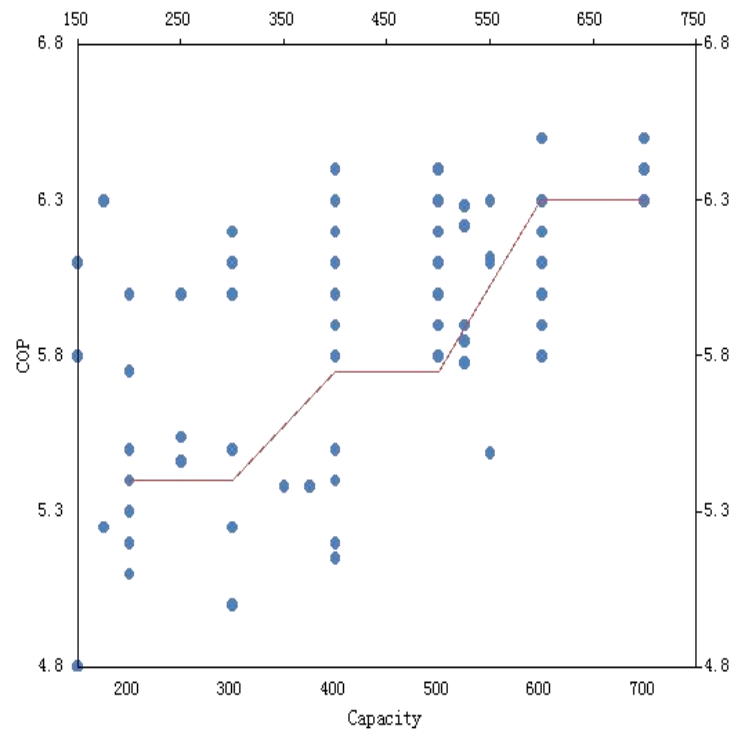


- Market is dominated by Commercial (100 ~200 kW) and Industrial (> 900 kW) Sector
- Absorption chillers do not use refrigerant and may be a upcoming technology in future

Source : CLASP EDS Report

# Chillers: Efficiency Scenario

MEPS Water cooled vs Available Technology



- Energy efficiency metric to be developed on the basis of weighted COP
  - Similar to IPLV (Integrated Part Load Value)
  - Region specific operational conditions considered

Significant potential for efficiency improvement compared to existing policy levels.



Thank you for your kind attention

For any further queries, you may please contact:

Saurabh Diddi, Energy Economist

Bureau of Energy Efficiency

[sdiddi@beenet.in](mailto:sdiddi@beenet.in)

+91-11-26179699, 26104833