

Energy Efficiency Standards and Labeling in India

“Current Situation and Challenges”

Alvin Jose
Research Associate /Consultant
TERI/BEE

Legal Framework for Energy Efficiency

- **Energy Conservation Act enacted in 2001**
- **Bureau of Energy Efficiency set up as the nodal central agency**
- **State Designated Agencies at the state level created for implementation of the Act.**

Energy Conservation Act

- **Act empowers Bureau and Central Government to specify Energy Consumption Standards.**
- **Prohibit manufacture or sale or import of equipments and appliances that do not meet standards.**
- **Require display of Energy performance labels on equipments and appliances.**

Bureau of Energy Efficiency

- **Established in 2002, under the Energy Conservation Act, 2001.**
- **Improve energy efficiency through various regulatory and promotional instruments**
 - **Plan, manage and implement provisions under the EC Act**
 - **Appliance standards and labeling**
 - **Industrial energy benchmarks**
 - **Energy Conservation Building Codes**
 - **Monitor energy use in high energy-consumption units**
 - **Certify and accredit energy auditors and energy managers**
 - **Provide a policy framework and direction to national energy conservation activities**
 - **Disseminate information and knowledge, and facilitate pilot and demonstration projects**

Institutional frame work for regulation for Energy Efficiency

- **BIS – National Standards Body**
 - Formulation & Implementation of National Standards
 - Production certification, Quality system certification, EMS certification etc.
- **Bureau of Energy Efficiency (BEE)**
 - BEE is established to implement & monitor the Energy Conservation Act, 2001
 - One of the key thrust areas of EC Act, 2001 is Standards & Labeling Programme
 - Formulation of Energy Efficiency Standards.
- **Laboratories accredited by National Accreditation Board of Laboratories**
- **Educational Institutions.**
- **Manufacturers and Manufacturing Associations**
- **Consumer Organizations**
- **Ministries and key stakeholders.**

Mission – S & L Programme

- **To reduce overall energy consumption by use of Energy Efficient equipments/ appliances 18 BU by 2012 (~3000 MW).**
- **Targeted an avoided capacity addition of over 3000 MW during XI plan of Govt. of India.**

S&L Methodology

Step 1: Decide whether and how to implement Energy Efficiency Labels and Standards.

- **The potential impact of the standards by quantifying their predicted environmental and monetary benefits shall be addressed.**
- **Screening and selecting which types of products are the highest priorities.**
- **Assessment of the data needs for the program.**
- **Backing up with the test procedures and testing facilities adopted in other countries.**

Step 2: Develop a testing Capability.

All manufacturers' product must be evaluated in a same way which requires a standard testing facility, test procedure and a process for assuring compliance with testing requirements.

Step 3 & 4: Design and implement a Labeling program and analyze and set Standards.

From consumers' perspective, the energy label is the most important element of the program. Label design can be established involving consumer research as an important element.

A Standard can be set to:

- eliminate inefficient models currently in the market.**
- avoid import of inefficient products.**
- encourage local manufacturers to develop more economically efficient products.**

Several types of analyses such as technical, market, national impact etc are conducted to ensure that a standard achieve its purpose.

Step 5: Design and implement a communication campaign.

Effective S&L program require a communication campaign to support acceptance and use of new standards and labels.

Step 6: Ensure program integrity.

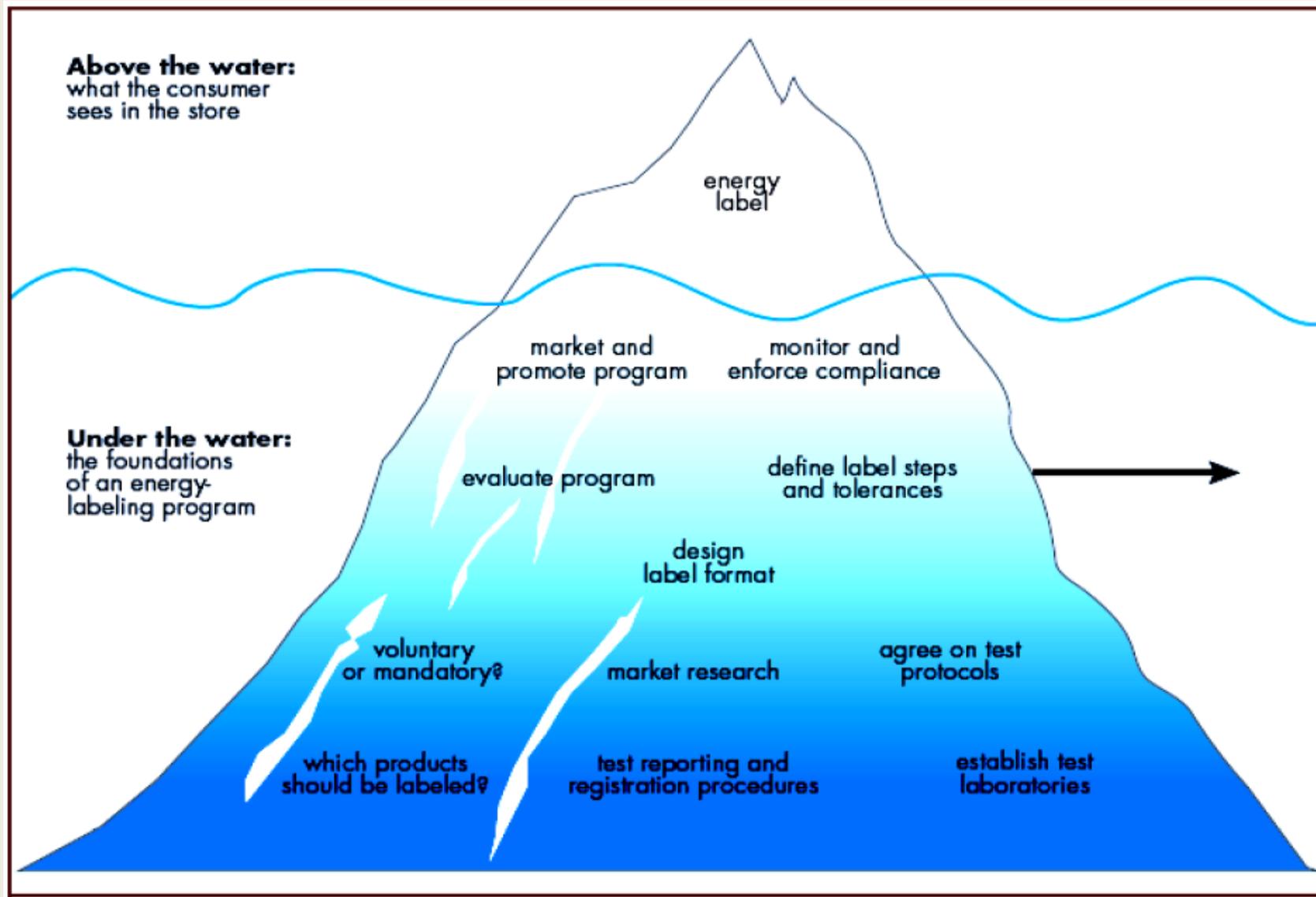
After the program initiation, a verification regime (to determine the product energy performance compliance to the program) is needed to ensure program's integrity.

Step 7: Evaluate the program.

To maintain the program over the long run, the government shall monitor the program's performance to gather information to guide adaptation to changing circumstances and to clearly demonstrate the public that the expected benefits are actually being achieved.

Good program require periodic revision and update. Review cycle can typically range from 2 to 12 years.

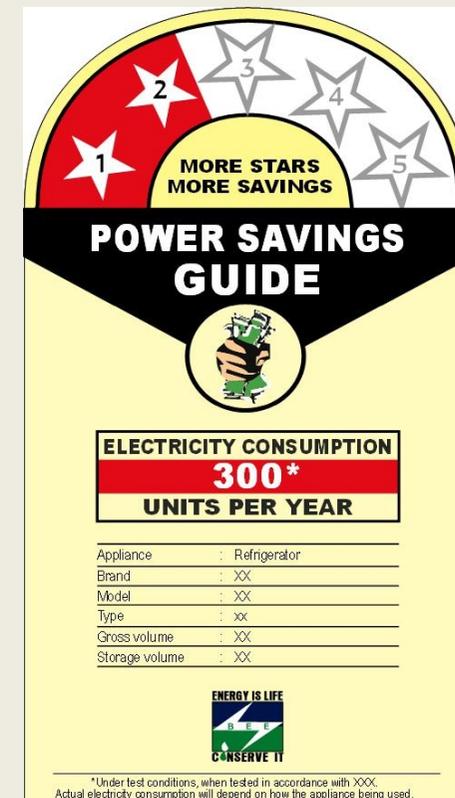
The Energy Labeling Program



Products covered under Indian S&L Program

Current List

1. Frost-free Refrigerators
2. Tubular Fluorescent Lamps (TFL)
3. Air-conditioners
4. Direct cool /Frost Free Refrigerators
5. Distribution Transformers
6. Motors
7. Pump sets
8. Ceiling fans
9. LPG Stoves
10. Colour TVs
11. Storage Water Geysers
12. Washing Machines



***Launched on 18th May
2006 , for 4 products by
BEE***

Future - Equipments / appliances for S&L Program

Home Appliances

- ✓ Electronic Ballast
- ✓ Computer Monitors
- ✓ Kerosene Stoves
- ✓ Consumer Electronics

Industrial Equipments

- ✓ Industrial Fans & Blowers
- ✓ Diesel Generating sets
- ✓ Boilers
- ✓ Compressors

Other Appliances

- ✓ Uninterrupted Power Supply (UPS)
- ✓ External Power Supplies (EPS)
- ✓ Battery Chargers (BCs)
- ✓ Standby Power equipments
- ✓ Vehicles

Refrigerator & AC Systems

- ✓ Adaptive Defrost
- ✓ Commercial Freezers
- ✓ Visi Coolers
- ✓ Chocolate Coolers
- ✓ Chest Coolers
- ✓ Heat Pumps
- ✓ Multi Split Systems

BEE Star Labels

POWER SAVINGS GUIDE

ENERGY EFFICIENCY
2.90
EER (W/W)

Appliance/Type : RAC / XXX
Brand : XXX
Model/Year : ABC/YYYY
Cooling Capacity (W) : XXXX
Power Consumption (W) : XXXX
Variable Speed Compressor : Yes/No
Heat Pump : Yes/No

*Under test conditions, when tested in accordance with IS 1391. Actual electricity consumption will depend on how the appliance is being used.

POWER SAVINGS GUIDE

ELECTRICITY CONSUMPTION
700*
UNITS PER YEAR

Appliance : Refrigerator
Brand : XX
Model / Year : XX / YYYY
Type : XX
Gross Volume : XX Liters
Storage Volume : XX Liters

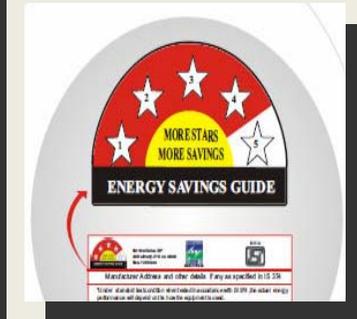
*Under test conditions, when tested in accordance with relevant standards. Actual electricity consumption will depend on how the appliance is being used.

POWER SAVINGS GUIDE

Standing Loss (kWh / 24hr)
0.832*

Equipment : Storage Electrical Water Heater
Brand : XX
Model / Year : ABC / 2009
Rated Capacity : 25 Liters
Rated Power : 2000 Watts

*Under test conditions, when tested in accordance with relevant standards. Actual electricity consumption will depend on how the appliance is being used.



ENERGY SAVINGS GUIDE

Annual Energy Consumption (kWh/Year)
152*

Brand : XX
Model No. / Year : ABC / XXXX
Equipment Type : CRT / LCD / Plasma TV
Screen Size : Inches / cm

*Under test Conditions when tested in accordance to IEC 62301 and 62087 Actual energy consumption will depend on how the equipment is used.

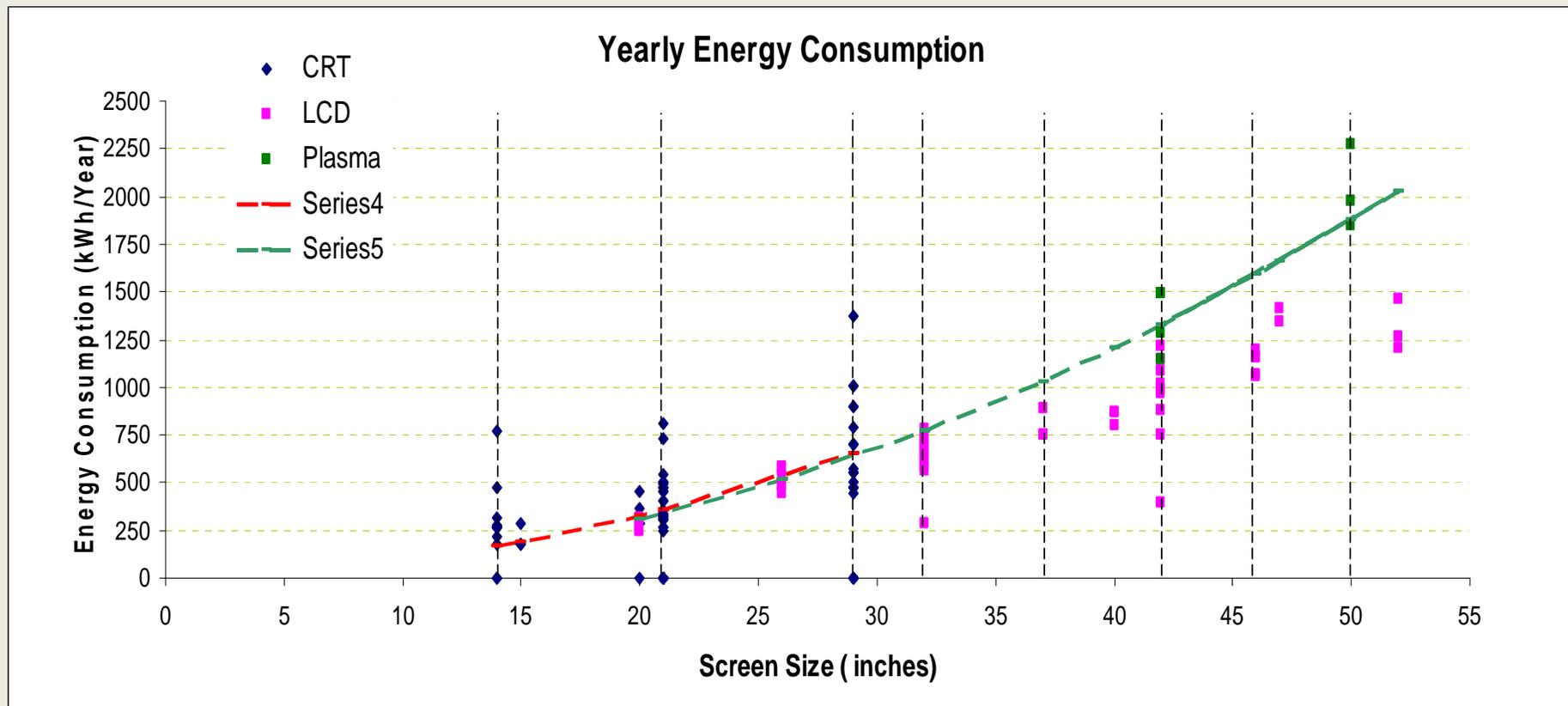
POWER SAVINGS GUIDE

BEE STAR RATING PLAN					
STAR RATING	*	**	***	****	*****
Lumens per Watt at 0100 hrs of use	<61	>=61 & <67	>=67 & <86	>=86 & <92	>=92
Lumens per Watt at 2000 hrs of use	<52	>=52 & <57	>=57 & <77	>=77 & <83	>=83
Lumens per Watt at 3500 hrs of use	<49	>=49 & <54	>=54 & <73	>=73 & <78	>=78

Under test conditions when tested in accordance to IS 2418. Actual efficiency will vary as per site conditions.

Market Transformation Potential : CTV, LCD and Plasma

20% improvement in efficiency in CRT and 5% in LCD/ Plasma targeted



Addressing both Active and Standby Power Consumption , with an Growth rate of 7 % for CRT , 10 % for LCD and 2 % for Plasma.

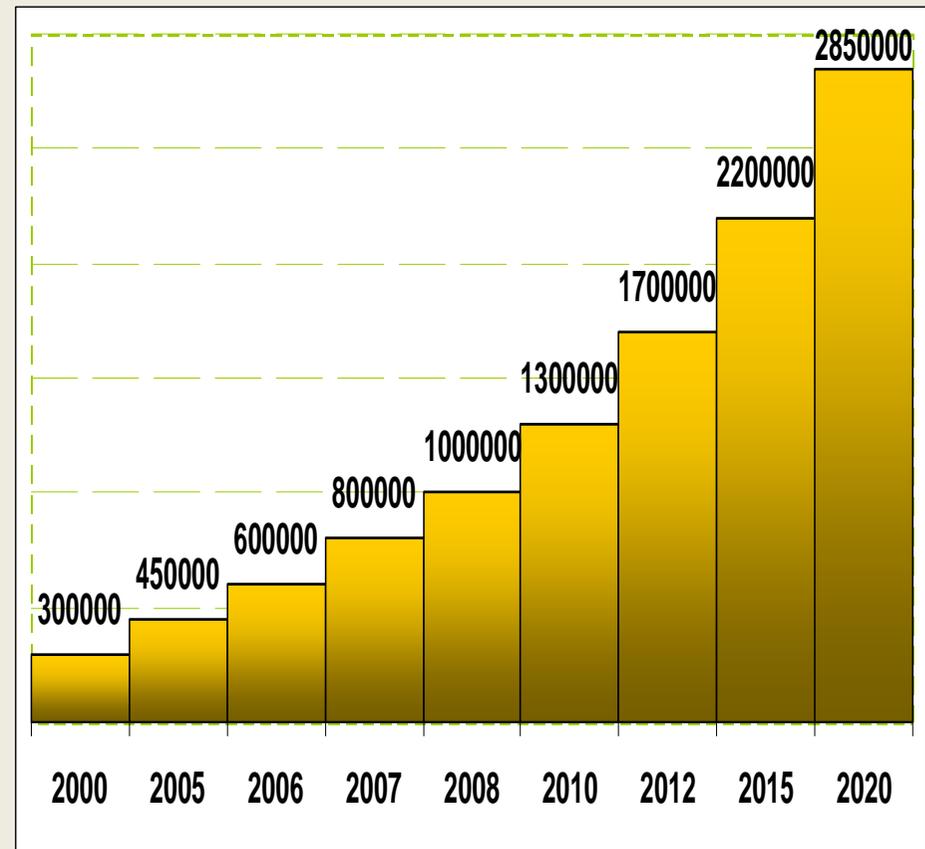
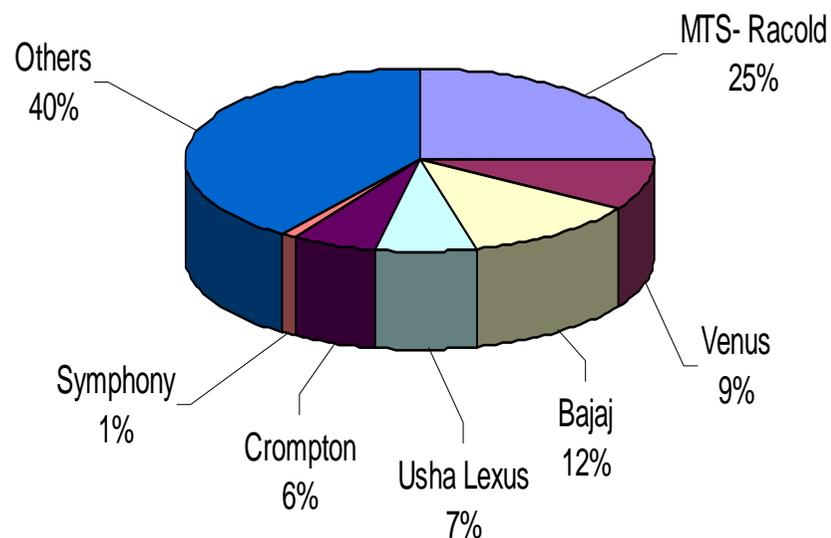
Market Transformation Potential : Storage Water Heaters

IEEJ: February 2011

30% reduction in standby losses

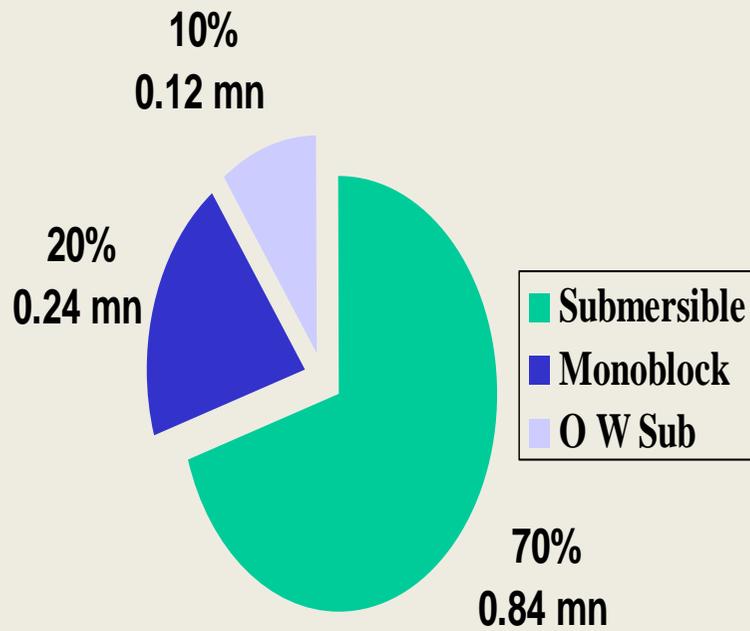
Market Future

Market Share of Various Water Heater Manufacturers



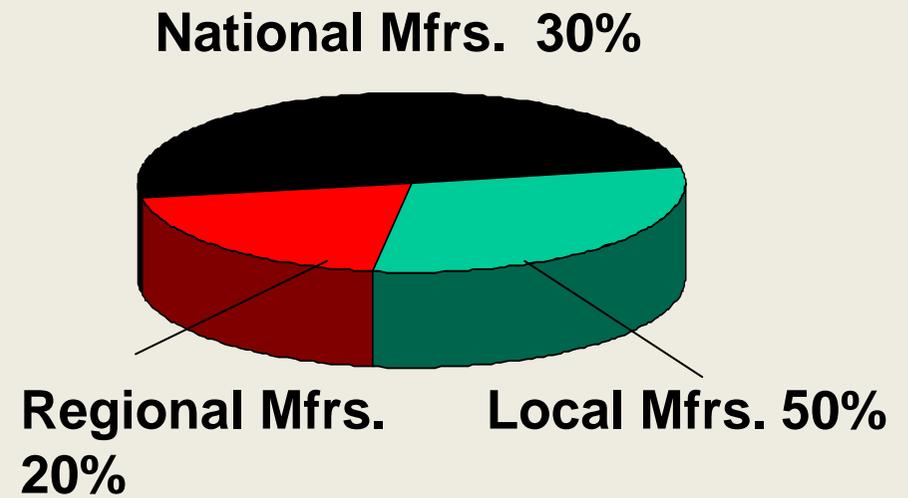
Market Transformation Potential: Pump sets

15% improvement in efficiency targeted



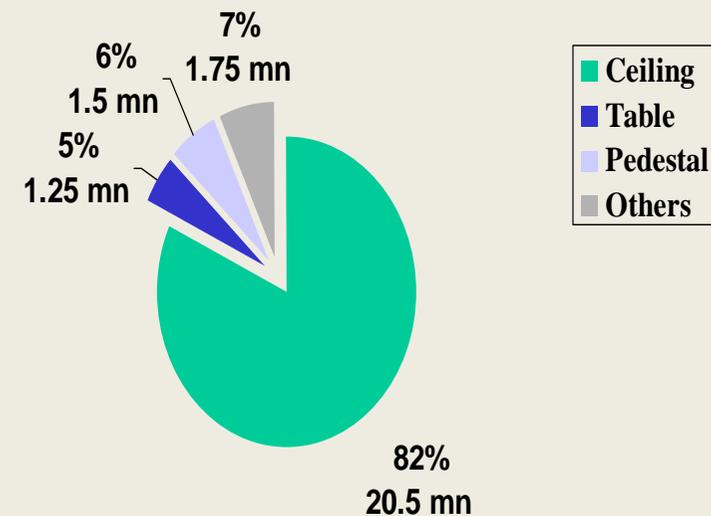
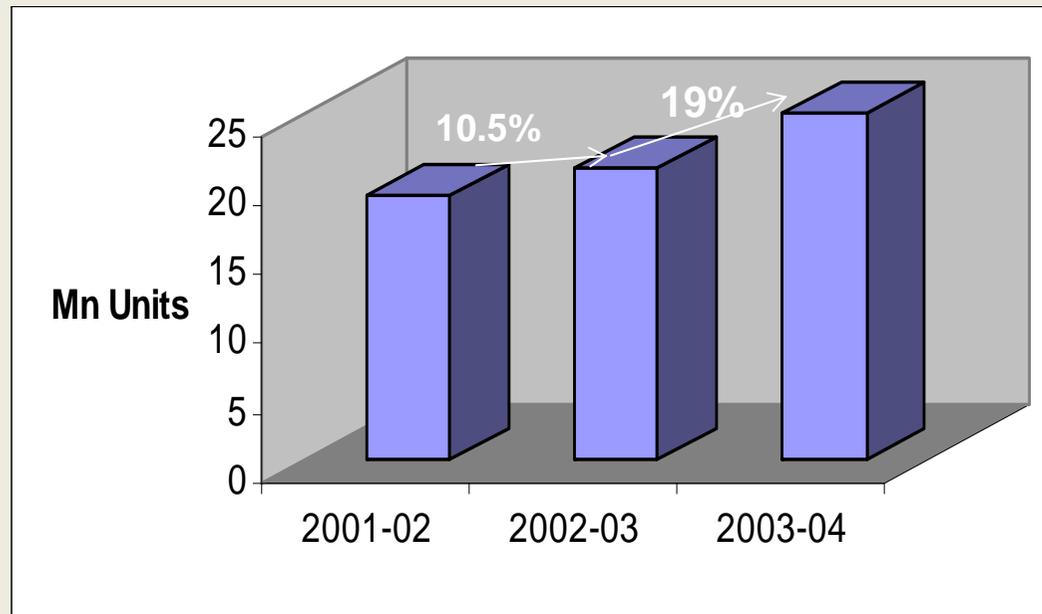
Total 1.2 mn Units(2003-04)
Pumps < 7.5 kW- 3 Phase

Growth rate over last two years - **5-8%**
v Negligible imports



Market Transformation Potential : Ceiling Fans

- **Estimated market size(2003-04) - 25 mn. Units**
- **55%⇒45% Share among Regional/Local-National**

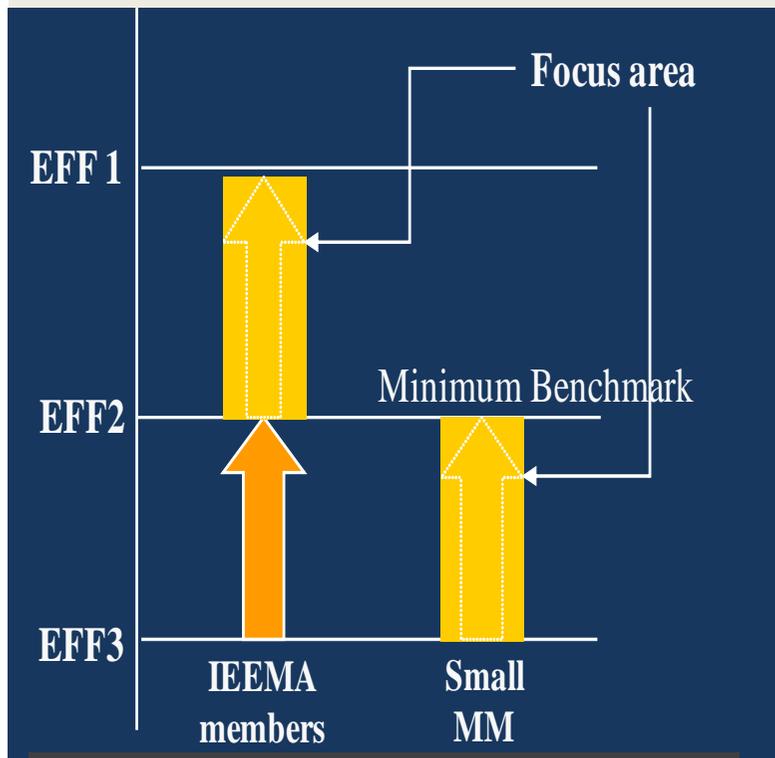


Source: IFMA Annual Report 2003-04

12% improvement in efficiency targeted

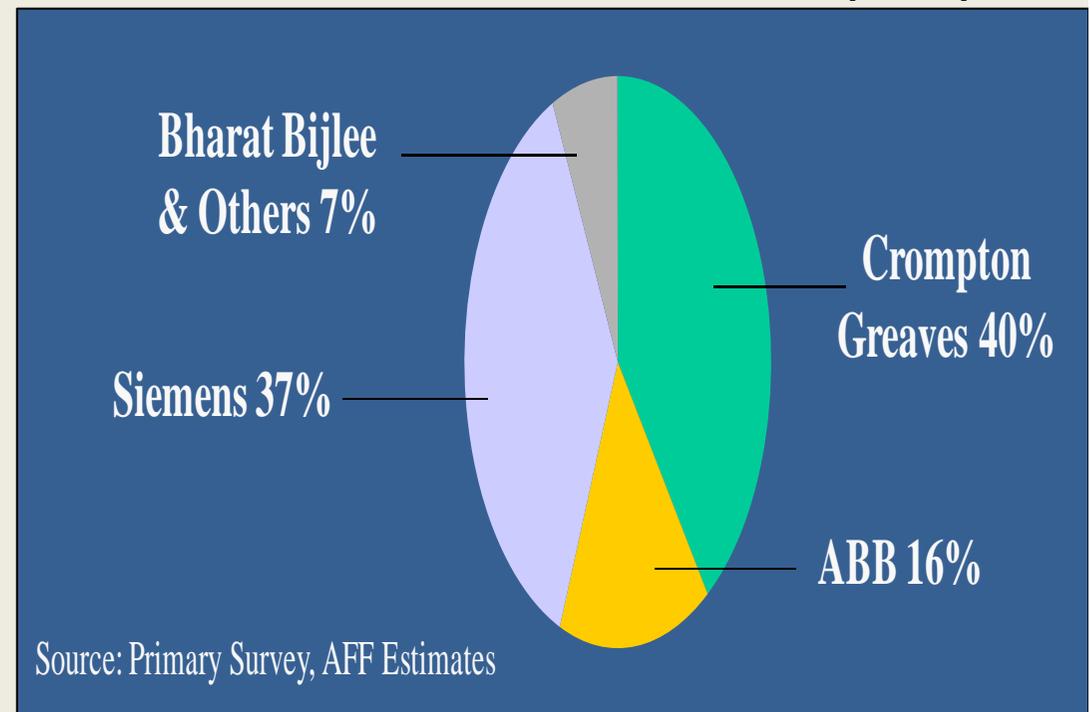
Market Transformation Potential : Induction Motors

5% improvement in efficiency targeted



EE Motors: Current Market Status

Market Share - EFF1 Motors (Nos.)

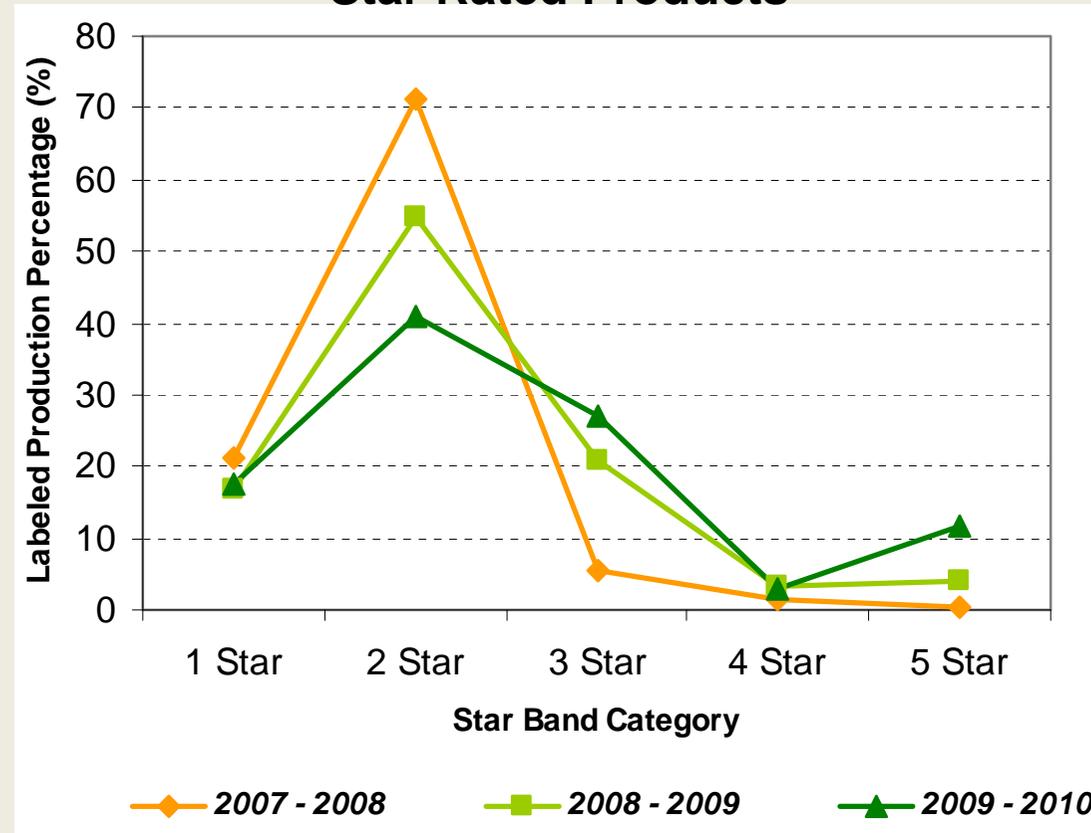


Market growth CAGR of 2% , with 50% unorganized sector

Market transformation in Air Conditioners

Benchmarking with efficient products leading
Market to transform into Greener products

Star Rated Products



Graphical representation of labeled production sales data for 3 consecutive years shown above demonstrates the increase in demand / sales of higher star rating models in the market

Market transformation in Air Conditioners

Energy Efficiency Ratio

Period	Weighted Avg. EER
07 - 08	2.61
08 - 09	▲ 2.66
09 - 10	▲ 2.72

In order to examine the shift in market towards higher rating models, the weighted average energy efficiency ratio has been calculated for the last 3 consecutive years.

EER values mentioned above represents an increase of approx. 2% in the value of EER over the consecutive years leading industries and market towards higher energy efficient appliances.

Market transformation in Air Conditioners

Specific Energy Consumption

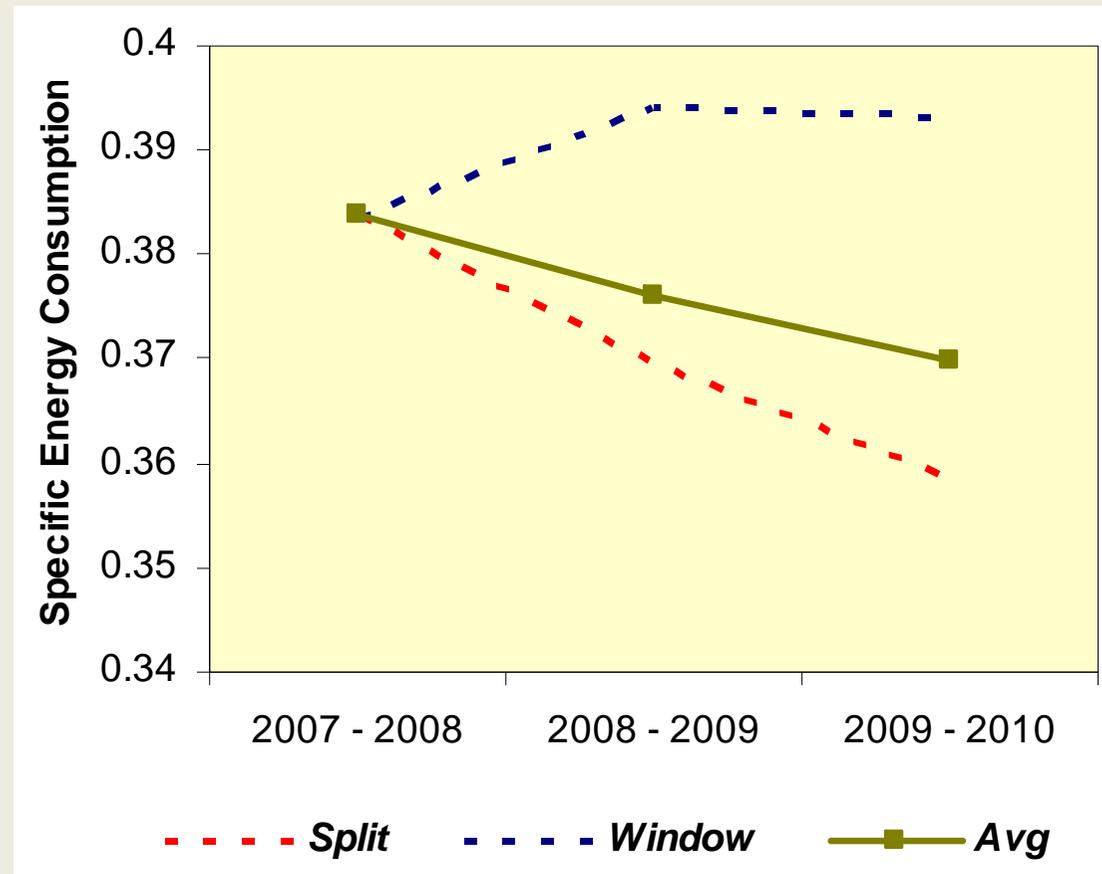


Chart shown above illustrates the specific energy consumption, considering room air conditioners in overall there is a decrease in energy being consumed to achieve a cooling capacity from the year 2007-08 to 2009-10

Market transformation in Refrigerators

Star Rated Products

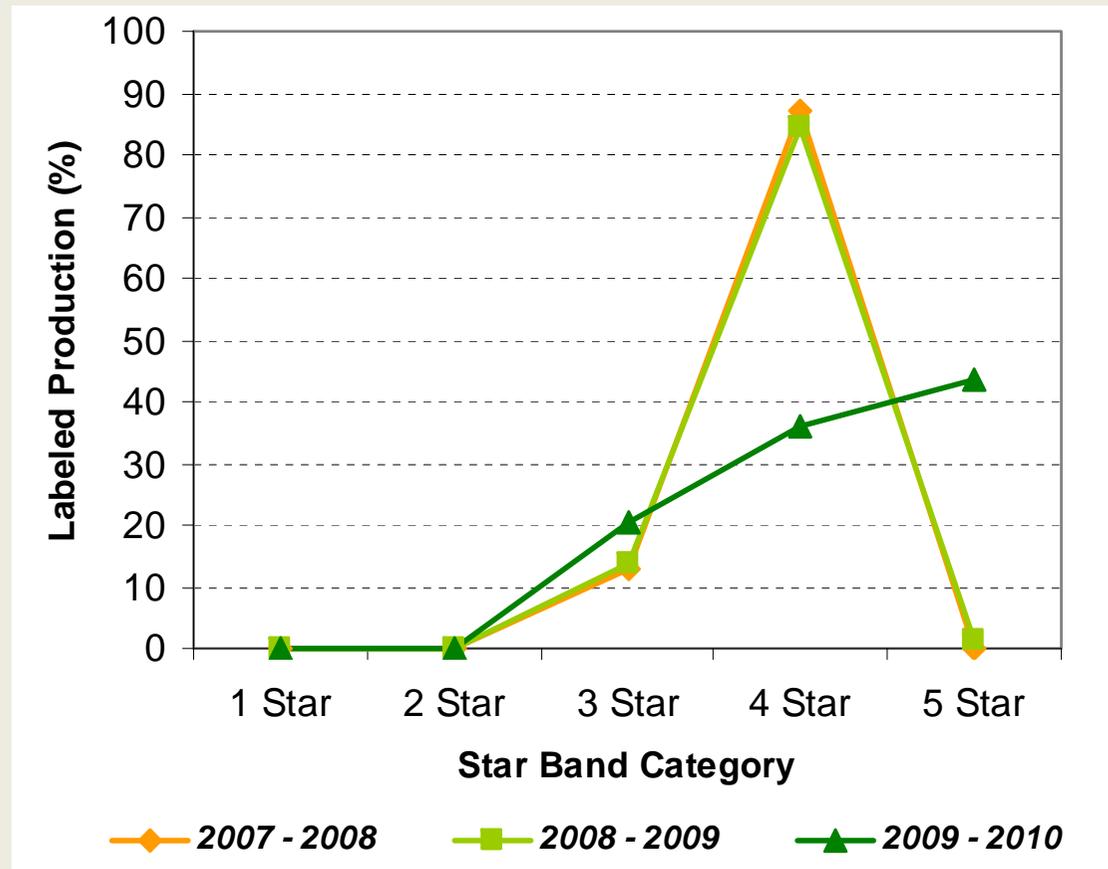


Chart above illustrates the pattern of labelled production respective to the star band category. As in comparison to the 2 previous years the production for 5 star rated models has increased by more than 40% in the year 2009-10. Also the maximum number of products sold in the year 2009-10 lies under 5 star category thus resulting in market shift towards more efficient appliances.

Market transformation in Refrigerators

Specific Energy Consumption

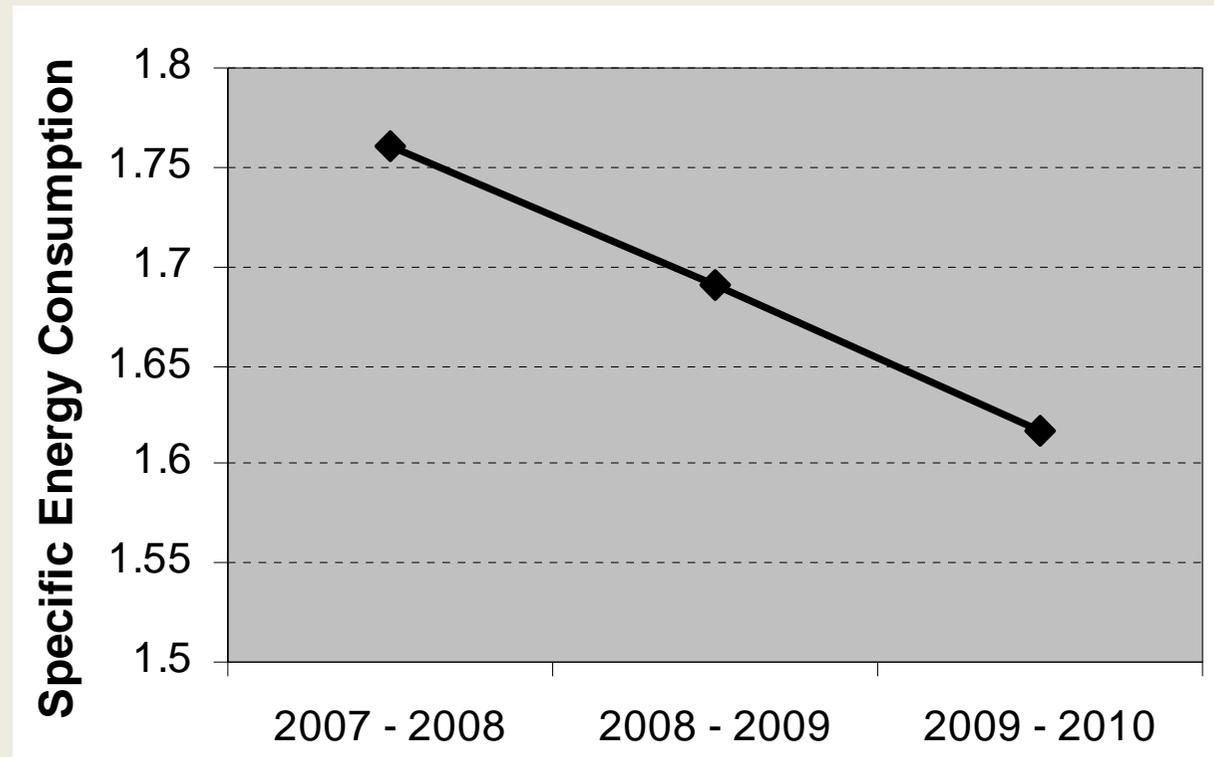
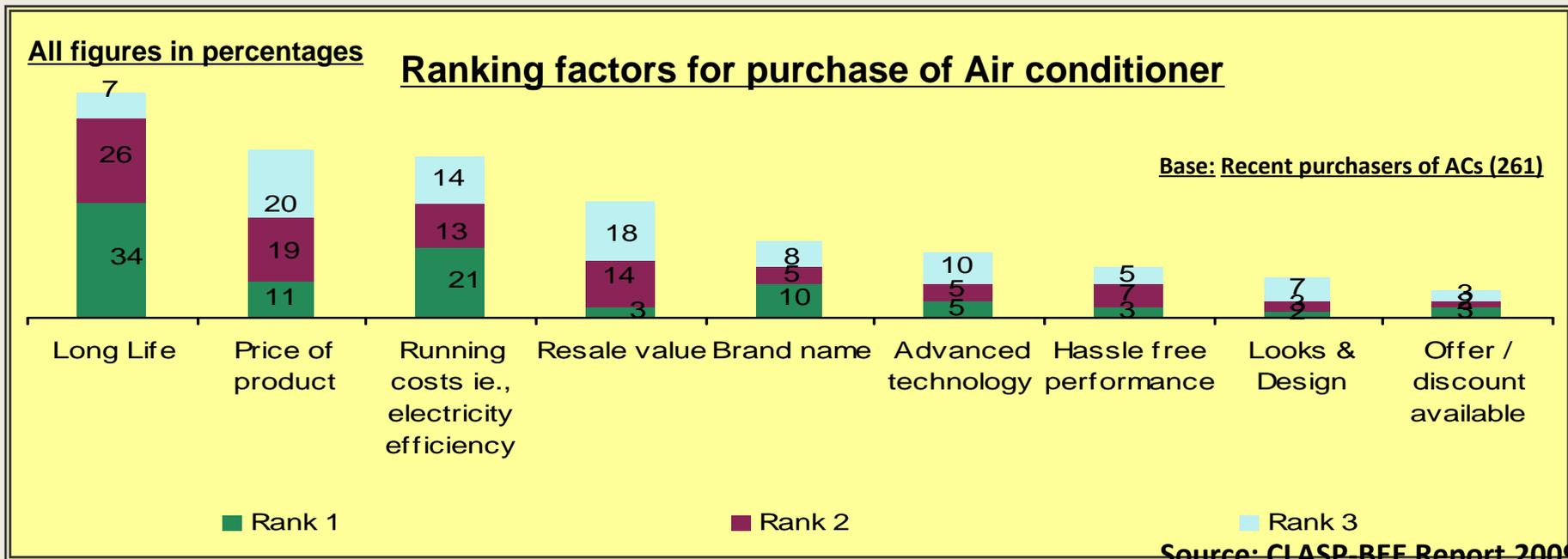
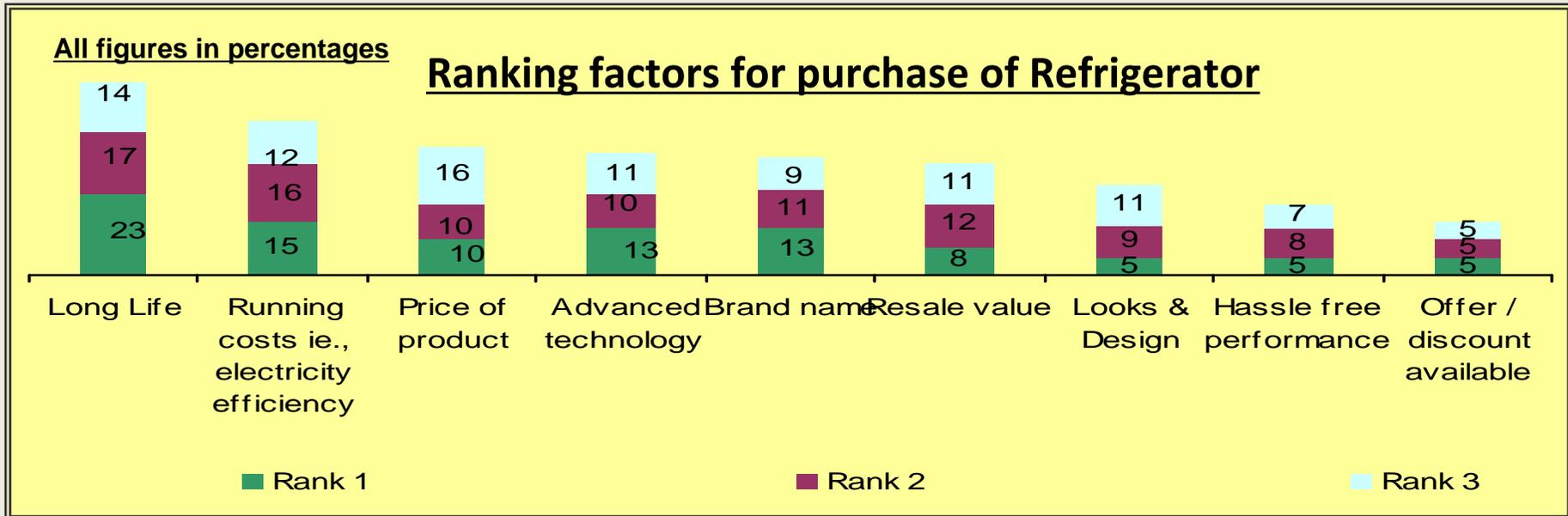
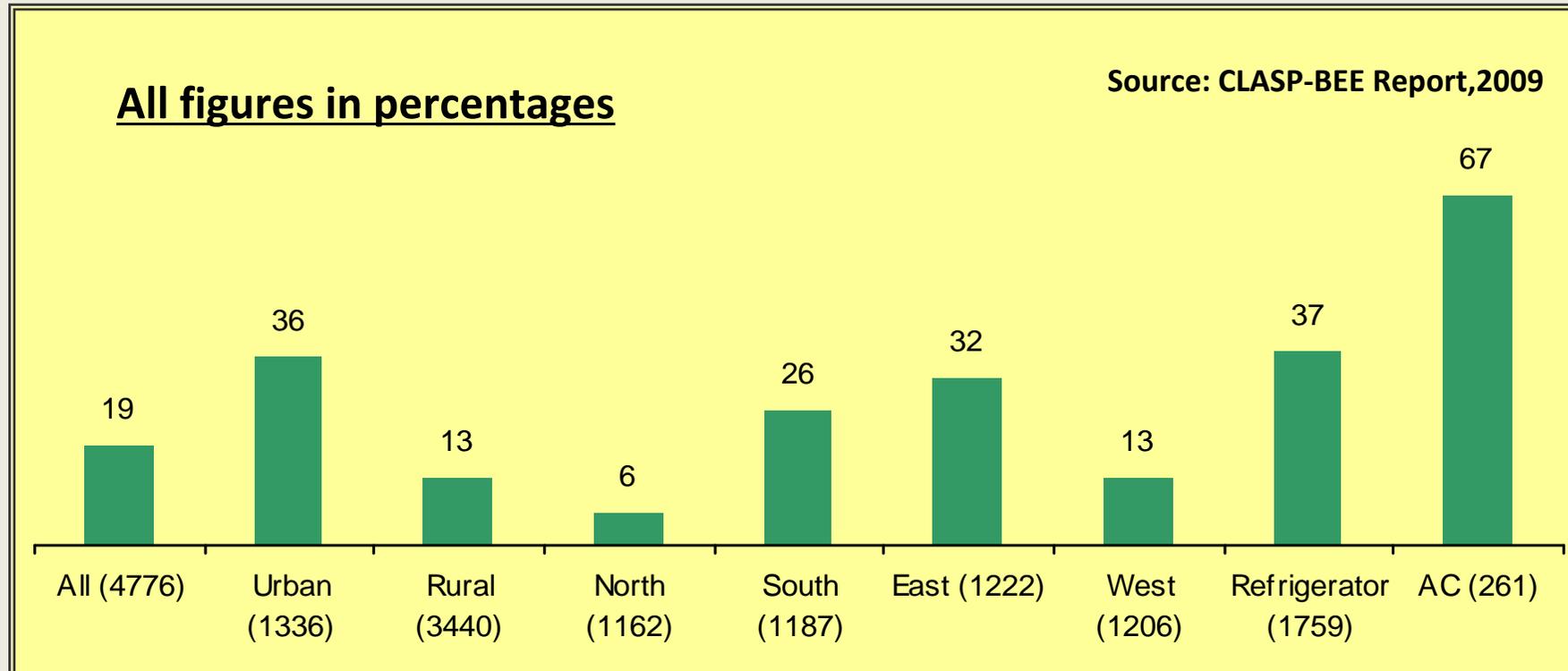


Chart shown above provides an overall pattern of specific energy consumption combining both direct cool type and frost free type refrigerator. The decreasing trend of specific energy consumption illustrates the fact that more number of higher efficient appliances are being sold in the market resulting in energy saving and market shift towards more efficient appliances.

Purchase Drivers of Energy Efficient Appliances

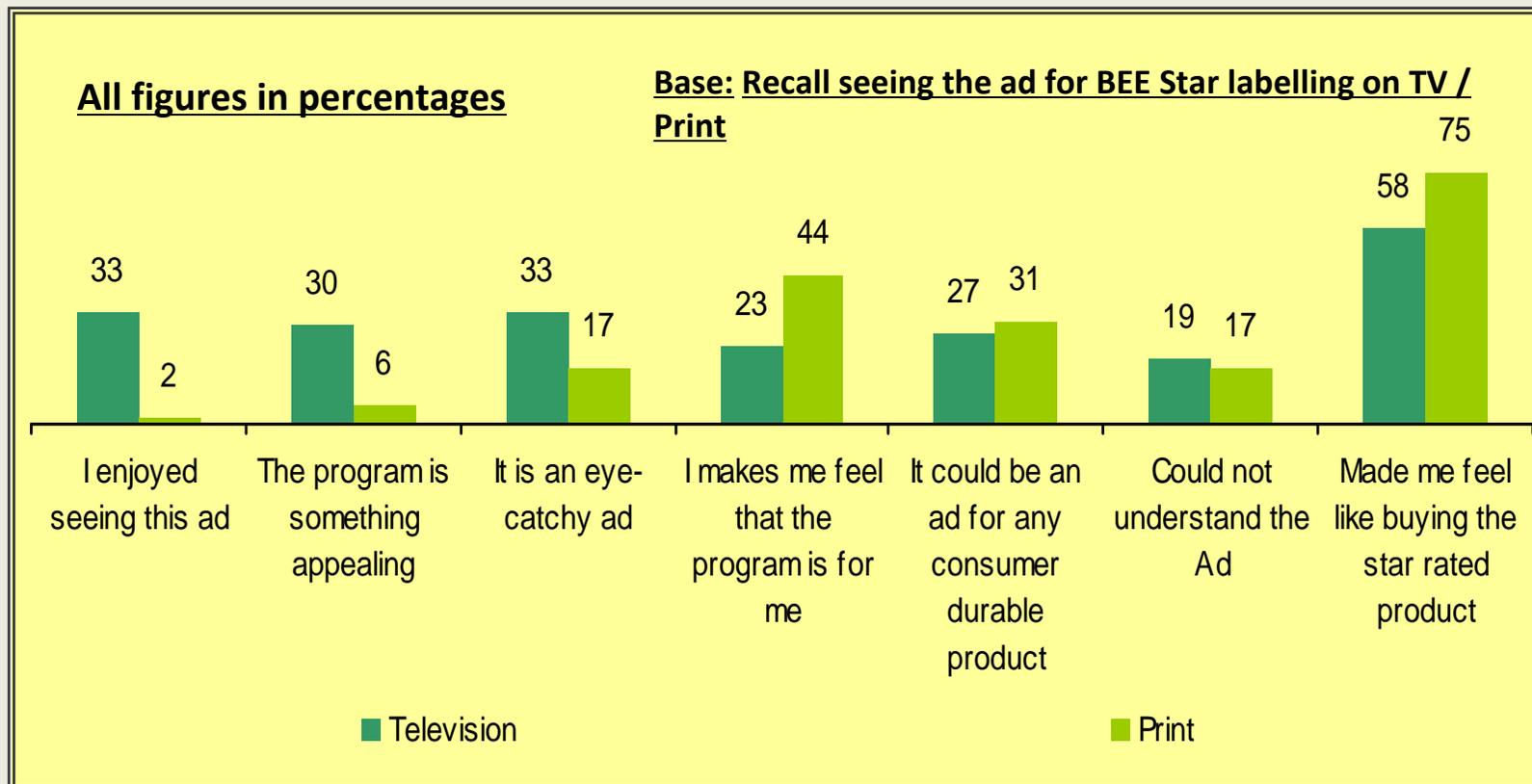


Awareness of the BEE Labeling Program



- Close to 1/5th of the General Public is aware about the BEE Labeling Program, this is without any pro
- There is higher awareness of the initiative in urban in comparison to rural areas
- Higher awareness amongst recent purchasers of Refrigerators and ACs.

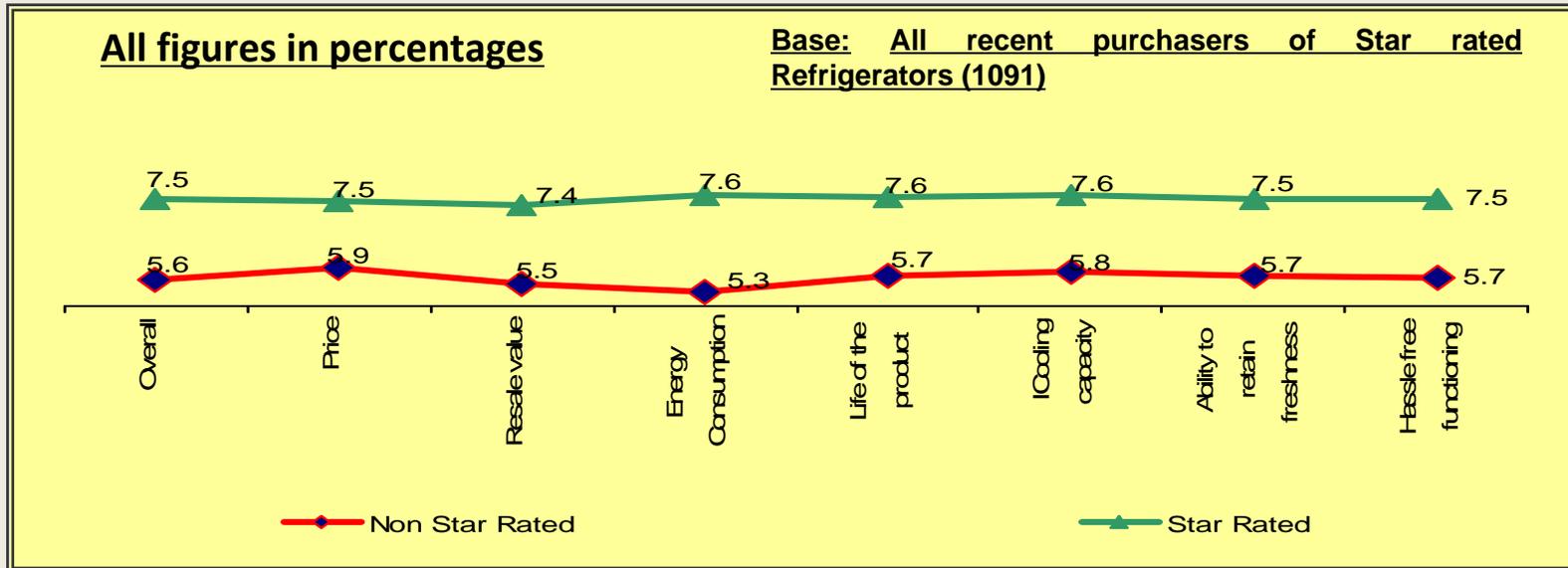
Impact of BEE Media and Awareness Campaign



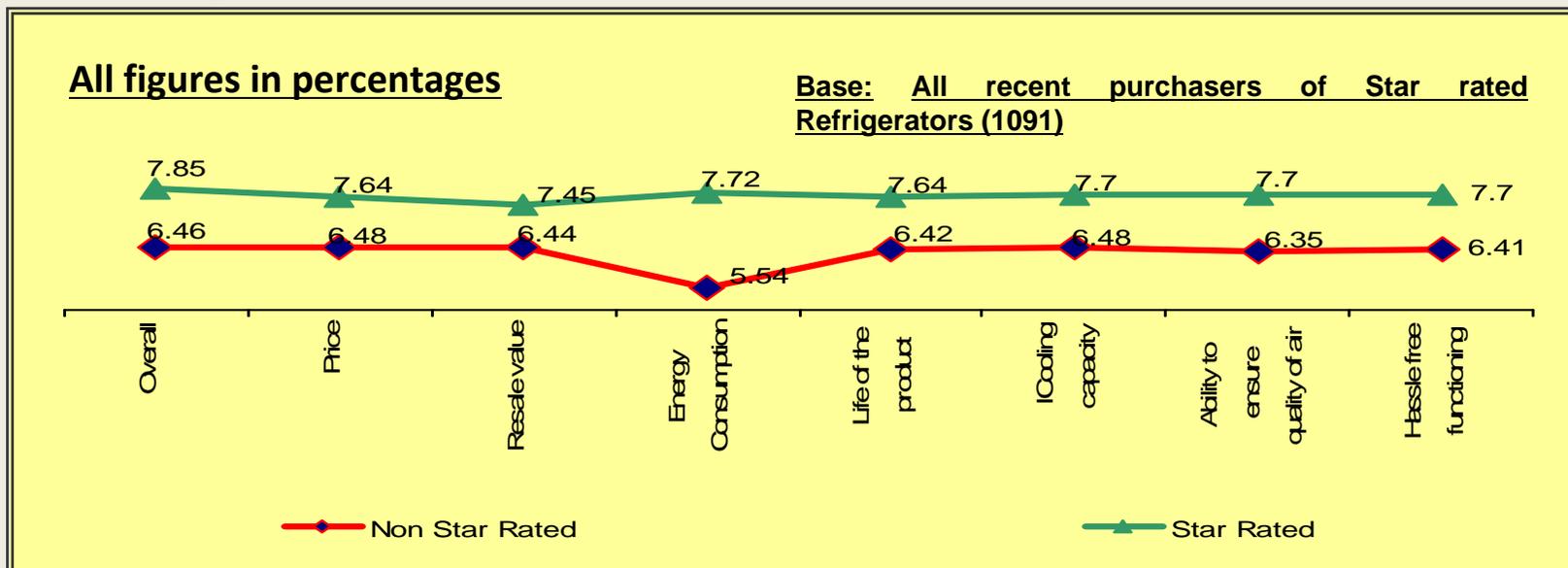
Source: CLASP-BEE Report, 2009

One of the major outcome of the Study was that there is a need of continuous Media Campaign by BEE for increase recall value among consumers.

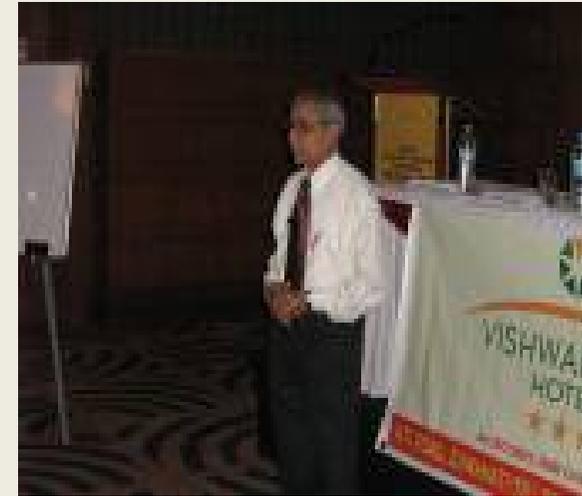
Perceptions of Star rated Refrigerators Vs Non star rated Refrigerators



Perceptions of Star rated AC's Vs Non star rated AC's



Consumer / Sales Executives awareness and Educational program



If Rising Electricity Bills Are Bothering You, Switch to Electrical Appliances with BEE Label Reading the label...

Labels For Refrigerators

Count the stars within the coloured strip. More Stars, More Savings.

Know the number of electricity units consumed in one year

See the BEE logo for authenticity of the label

Labels For ACs

Count the stars within the coloured strip. More Stars, More Savings.

Know the Energy Efficiency Ratio (Higher EER means More Savings)

See the BEE logo for authenticity of the label

Energy and Cost saving for 250 Litres Frost Free Refrigerator at different Star Rating

Star Rating	Energy Consumption Per Year (Approx.)	Per Unit Charge Rs. (approx.)	Electricity Cost/Year in Rs.	Total Saving (w.r.t No star) Every year (Rs.)	Refrigerator Cost in Rs. (Approx.)	Cost Difference Rs.	Pay Back Period in Years
NO STAR	1100	2.50	2750	0	14000	0	0
1 (One)	977	2.50	2443	308	15000	1000	3.25
2 (Two)	782	2.50	1955	795	15500	1500	1.89
3 (Three)	626	2.50	1565	1185	16500	2500	2.11
4 (Four)	501	2.50	1253	1498	17500	3500	2.34
5 (Five)	400	2.50	1000	1750	18500	4500	2.57

Energy and Cost saving for 1.5 Ton Windows or Split Air conditioner at different Star Rating

Star Rating	Maximum Cooling Capacity (Watts)	Minimum Energy Efficiency Ratio (EER)	Input Power (Watts)	Units consumption /Day (kWh)	Per Unit Charge Rs. (approx.)	Electricity Cost/ Month Rs.	Cost Saving Rs. Per Year (w.r.t. No star) (Approx.)
No Star	5200	2.20	2364	9.45	2.50	709	0
1 (One)	5200	2.30	2261	9.04	2.50	678	308
2 (Two)	5200	2.50	2080	8.32	2.50	624	851
3 (Three)	5200	2.70	1926	7.70	2.50	578	1313
4 (Four)	5200	2.90	1793	7.17	2.50	538	1712
5 (Five)	5200	3.10	1677	6.71	2.50	503	2059

Note: Assuring 8 hrs. operation per day for five months in a year

Label For Tubular Fluorescent Lamps

STAR RATING	★	★★	★★★	★★★★	★★★★★
Lumens per Watt at 0100 hrs of use	<61	>=61 & <67	>=67 & <86	>=86 & <92	>=92
Lumens per Watt at 2000 hrs of use	<52	>=52 & <57	>=57 & <77	>=77 & <83	>=83
Lumens per Watt at 3500 hrs of use	<49	>=49 & <54	>=54 & <73	>=73 & <78	>=78

Count the stars within the coloured strip. More Stars, More Savings

Know the Lumens per watt. More Lumens mean More Light

Under test conditions when tested in accordance to IS 2418. Actual efficiency will vary as per site conditions.



See the BEE logo for authenticity of the label

You can reduce your electricity bills and help India to increase the availability of electricity for more people, simply by buying Refrigerators, ACs & Tubelights that bear BEE's Star-Rated Energy Efficiency Labels.

● The BEE Star Energy Efficiency Labels have been created to standardise the energy efficiency ratings of different electrical appliances and indicate energy consumption under standard test conditions. ● These labels indicate the energy efficiency levels through the number of Stars highlighted in colour on the label. ● The BEE Star Labels include a Star Rating System that ranges from One Star (least energy efficient, thus least money saved) to Five Stars (most energy efficient, thus most money saved).

*** Bachat ke sitare ***



BUREAU OF ENERGY EFFICIENCY
(Ministry of Power, Govt. of India)
4th Floor, Sewa Bhawan, R.K. Puram,
New Delhi-110066, Web:- www.bee-india.nic.in

The Bureau of Energy Efficiency (BEE), Ministry of Power, Government of India and the International Energy Agency (IEA) are organizing the International Conference of Standby Power on the 2nd and 3rd April, 2008 in Stein Auditorium, India Habitat Centre, New Delhi, India For more details please visit www.bee-india.nic.in and www.energymanagertraining.com

Challenges and Barriers

- Aggregation of Baseline Data.
- Lack of Established Testing Protocols for EE.
- Strengthening of Nationwide Testing Capacity
- Unorganized market for several appliances plays key role in regional markets.
- Institutional Challenges for upscale of such a nationwide scheme.
- Sustainable & Robust Model for Monitoring and Verification
- Continuous and Strategic Media Campaign
- Public Procurement and Payback based Purchases in terms of EE appliances
- Incentive based Promotion for Manufacturers in addition to the market based promotion.
- Technical and Manpower Support for further enlargement



Contact:

alvin.jose@teri.res.in , ajose@beenet.in