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Market Assessment Of EE Building Materials

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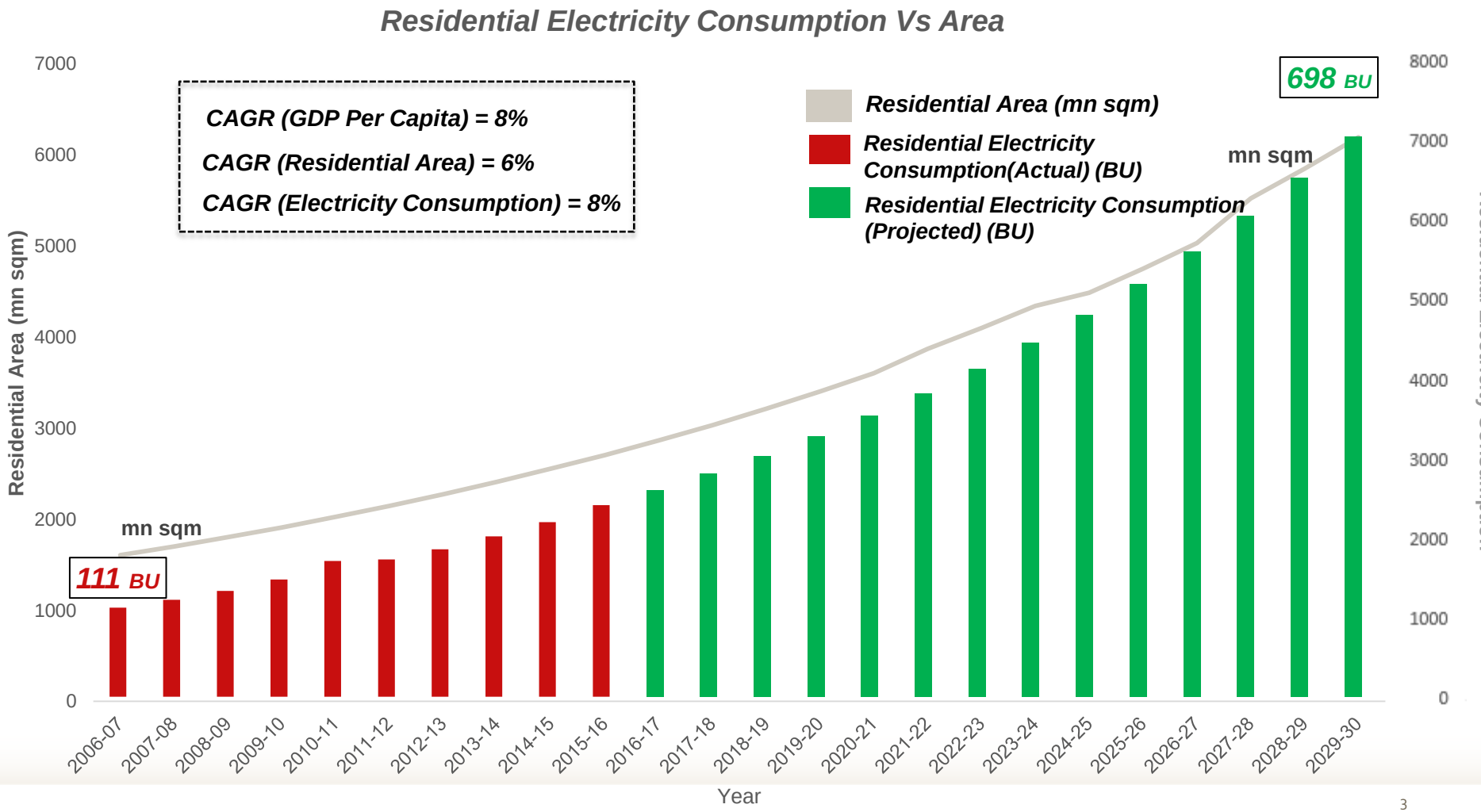
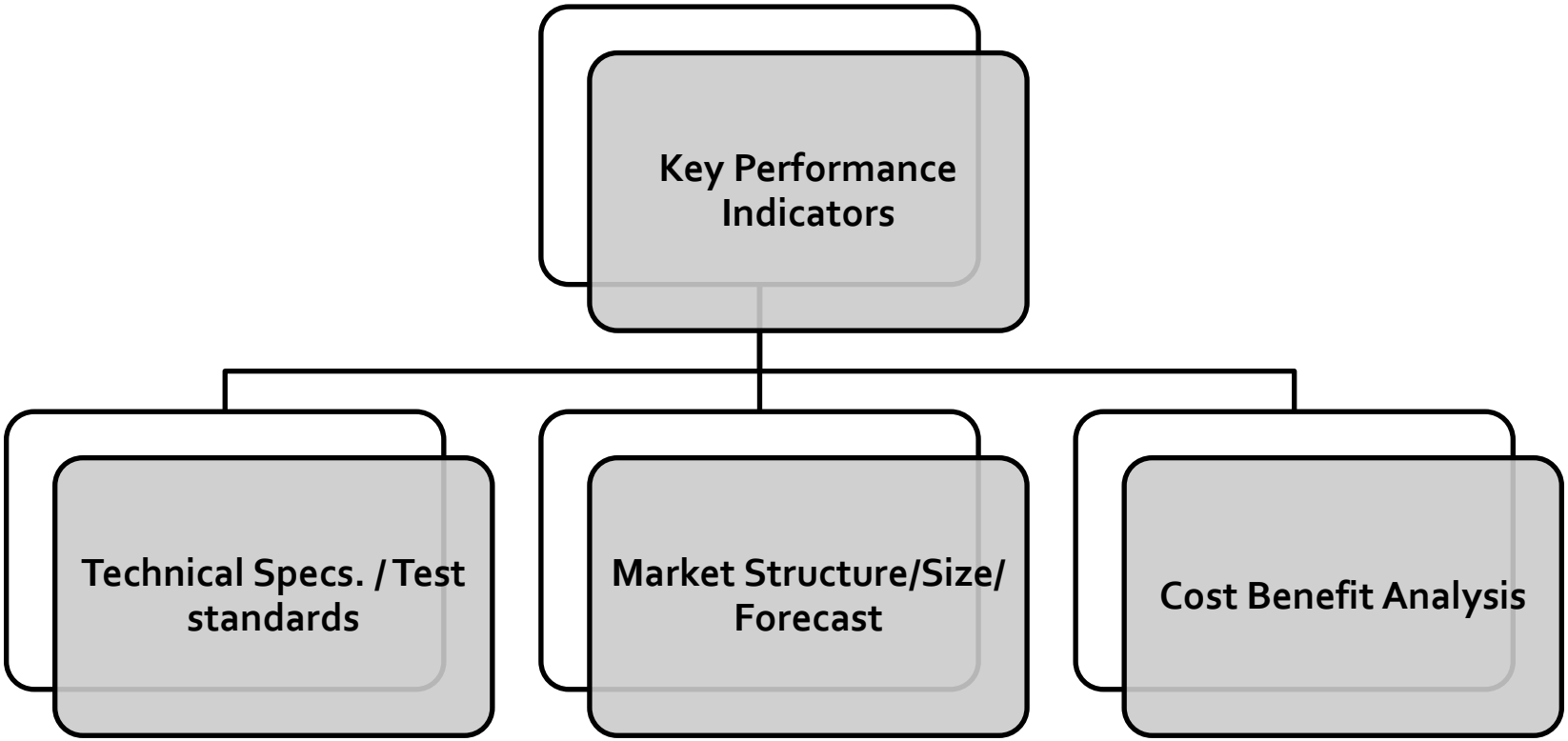
Agenda

- Building Sector- Built up area & Electricity consumption
- Snapshot – Building Material Market Assessment (AAC blocks)
  - Key performance Indicators
  - Forecasting future trends
  - Market size and supply chain
  - Cost Benefit Analysis
  - Gaps and actions
- Project Objectives
- Way forward

Building Sector- Built up area & Electricity consumption



Snapshot – Building Material Market Assessment (AAC blocks)



Technical Specifications

Particulars	Units	AAC	Bricks
Size	mm	625X240 / 600X200	230 mm x 115 mm x 75 mm
Compressive Strength	N/mm^2	35-40 kg/cm^2 (as per IS:2185)	25-30 kg/cm^2
density	Kg/m^3	550 – 650	1950 kg / m^3
Fire Resistance	Hrs.	4 (For 200mm thick wall)	Two hours
Thermal Conductivity	W/m-k	0.13 – 0.18	0.81

Advantages over traditional bricks:

- Thermal insulation
- Structural strength
- Density
- Fire resistance
- High sound reduction index
- Being light weight saves cost & energy in transportation and labour expenses

Test standards & labs

The relevant Indian test standard for AAC blocks is **IS 2185**: **Part 3 1984** i.e. **"Concrete masonry units - Autoclaved cellular Aerated concrete blocks"** density upto 1000 kg/m^3 Major tests include :

- ✓ Block density
- ✓ Compressive strength
- ✓ Thermal conductivity
- ✓ Drying shrinkage

S.No	Regions	Test Labs in each region
1	North	34
2	East	4
3	Central	2
4	West	19
5	South	11

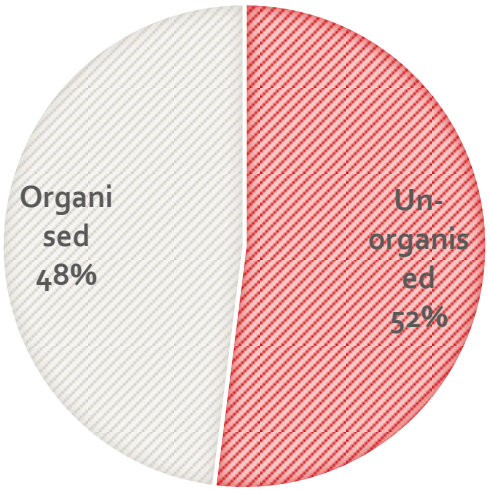
Stakeholder interaction suggested that, all the players in organized category have in house test facility.

It can be established every regions has sufficient number of labs with NABL accreditation to carry out the testing of AAC blocks.

Market structure

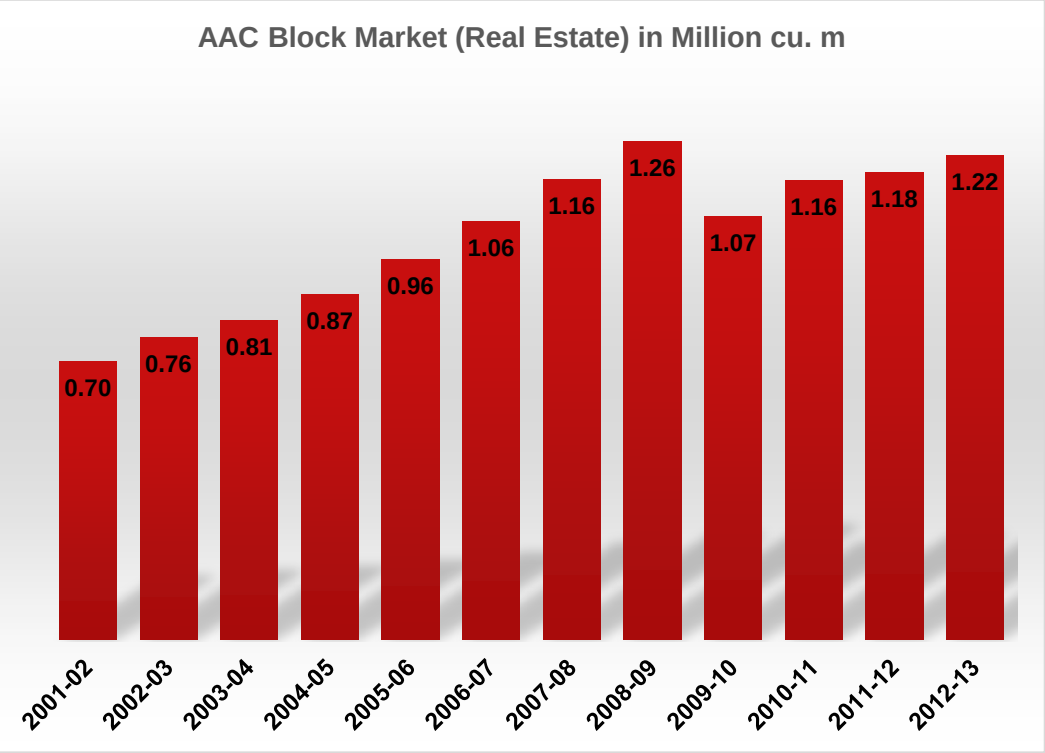
Stakeholder interaction suggested that large part of AAC i.e. 52% is still unorganized. Major players from organized sector includes:

Company	Plant Location	Capacity (cu.m)
Biltech	Palgarh, Bhigwan, Palwar, Sriperunbudur, Budge	1 million
BG Shirke	Pune, Bangalore	0.5million
Ultra Tech	Mumbai	0. 5million
CK Birla, HIL	Chennai, Surat	0.35 million
Unorganized Sector		2.5 million
Total		**4.85 million**



Present overall AAC market stands at 3.5 million cu.M against total capacity of 5 million cu. M (utilization rate of 70%). AAC blocks are still surplus in capacity and can cater to the demand for few more years without adding any extra facility or plant.

Market size and supply chain - AAC block



AAC supply chain is direct, involving few intermediaries. Channel for procurement is:

- Direct from the manufacturer
- Procurement through traders
- Stakeholder interaction suggested that, manufacturing facility/plant **caters the demand within the radius of 500 km**.

Suitability of AAC to west and south:

- ***Better clay brick quality at cheaper rates in north and east***
- ***Majority of plants and supply are concentrated in western and southern region***

Cost Benefit Analysis

Particulars	Unit	Details
Area per floor	Sq.m	1,000
Number of floor		5
Window to wall ratio	Uniformly distributed over all facades	40%
Roof Construction	W/sqm-K (Btu/Hr-sqft-°F)	0.408 (0.072)
Glass U-value	W/sqm-K (Btu/Hr-sqft-°F)	5.8 (3.3)
Glass SHGC		0.29
Glass VLT	%	40
Lighting Power Density (LPD)	W/sqm	10
Equipment power Dendity (EPD)	W/sqm	20
Schedule		9 AM to 6 PM
Cooling set point	˚C	24
Heating set point	˚C	21
HVAC System (COP)		
Packaged air cooled	kW/kW	3
Wall Area	Sqft	14,400
Type of wall (Brick/ AAC)		
Cost of wall construction with Brick	Rs./Sqft	42
Cost of wall construction with AAC	Rs./Sqft	50
Extra cost for AAC over brick	Rs./Sq.ft	8
Total extra cost of AAC block	Rs.	1, 15,200

Cost Benefit Analysis

	Hyderabad	Delhi	Mumbai	Kolkata	Chennai	Bangalore
BRICK ('000 k Wh)	990.93	916.08	1001.70	1012.10	1050.00	847.56
AAC ('000 kWh)	922.52	916.08	937.89	938.92	979.17	798.67
Savings ('000 kWh)	68.41	74.49	63.81	73.18	70.83	48.89
Savings per sqft of external wall area (kWh)	4.75	5.17	4.43	5.08	4.92	3.40
Annual energy cost savings (Rs.)	342,050	372,450	319,050	365,900	354,150	244,450
Extra cost for AAC block construction over brick wall construction (Rs.)	115,200	115,200	115,200	115,200	115,200	115,200
Payback (years)	0.34	0.31	0.36	0.31	0.33	0.47

Conclusion - KPI

	KPI's	Value	Remarks
Technical specification	Thermal conductivity	K- 0.13- 0.18 W/m ◦k	Threshold value
	Compressive Strength	35 – 40 kg/cm^2	Range as per IS 2185 : 1984
	Test standards	IS 2185 :1984	IS 2185: 1984 (Part 3) available
	Test lab	Almost 70 labs	Good regional spread of NABL accredited labs
Market	Market structure	48% organized	4 major players in organized market
	Production capacity	App. 5 Million cu. M	Both organized and unorganized players
	Market size in 2012 -13	1.23 Million cu. M	Simple supply chain. West & South find major application of AAC.
	Market forecast till 2020 -21	1.75 Million cu. m as per BAU	
Cost Benefit Analysis	Performance with water cooled system	5 – 10 months depending upon city	Good energy savings and attractive payback
	Performance with air cooled system	4- 6 months depending upon city	Good energy savings and attractive payback

Gaps and actions

S.No	Gaps	Next Actions
1	Majorly unorganized market thus, ensuring minimum standards for good quality/efficient AAC blocks in commercial segment is a challenge	Need to develop a strategy to engage unorganized players
2	Present production capacity seems sufficient to meet next 2-3 years of demand	Need to create market and give confidence to manufacturers to plan for fresh capacity additions
3	Limited labs with NABL accreditation facilities for thermal conductivity test (most important test)	Need to ramp up these facilities to cater to market demand
4	Limited engagement of AAC block industry	Need to create a forum for effective data collection mechanism and identify R& D opportunities

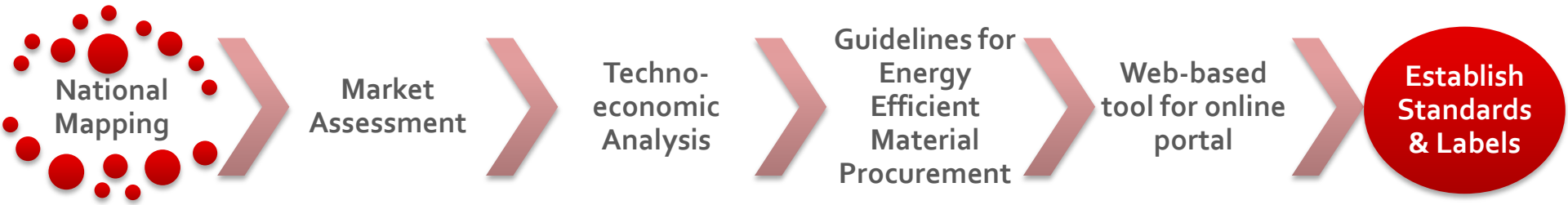
Project Objective

- Study the readiness of the market for implementation of building energy codes (ECBC & ECBC-R)
- Identify stakeholders associated to these building materials and understand domestic production capacity
- Develop key performance indicators for the assessment of energy efficient building materials
- Develop a tool to make a model building by taking input of Building material from the directory
- Gap assessment and recommend next actions to support market readiness for ECBC & ECBC-R

Approach

Conduct study to promote market transformation towards energy efficient materials through development of building materials directory and a policy roadmap.

The entire activity is divided into following:



National Mapping

- National mapping of major Building Materials and products;
- Capture product performance data to demonstrate efficiency of materials;
- Identify associated test methodologies used to define these efficiencies;
- Detail available standards and testing infrastructure;
- Identify phase out and transformation from conventional to energy efficient materials;
- Comparison of performance data with local and international labeling / MEP requirements.

Market Assessment

- Assess the size of the national market for all major Building Materials;
- Assess impact of the building energy codes and green building certifications;
- Develop a forecast for market growth of energy efficient materials in India;
- Assessment of Monitoring, Verification, and Enforcement;
- Identify the barriers that exist to increased market penetration of efficient building materials

Techno-economic Analysis

- Assess typical energy consumption of buildings w.r.t material / product efficiencies for five climatic zone
- Define and profile existing and potential material / product technologies
- Develop strategies for energy saving opportunities. Assess national energy impacts;
- Assess international test procedures and energy performance standards;
- Assess the availability of testing infrastructure in India

Guidelines for Energy Efficient Material Procurement

Develop procurement rules for integration in tender document of energy efficient new buildings and retrofits; mentioning following specifications:

- minimum energy performance targets or savings;
- Restrict the use of toxic or hazardous substances in building materials;
- Specify the use of sustainably sourced natural materials;

Develop procurement rules for integration in tender document of energy efficient new buildings and retrofits; mentioning following specifications:

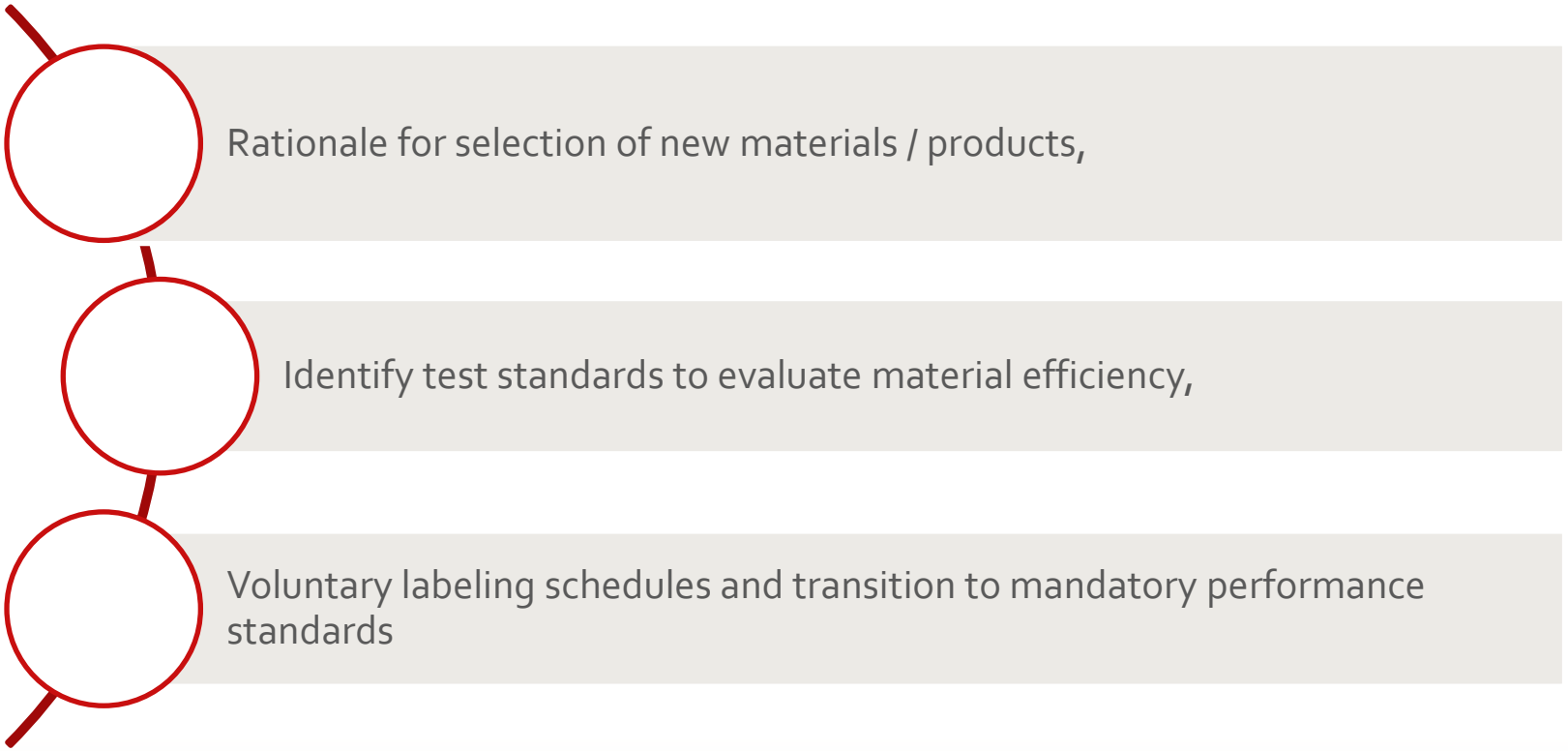
- Include commissioning, measurement and verification for training users;
- Environmental impact of the material during its overall life (including manufacturing, construction, demolition, reuse/recycle, etc.)

Develop specifications of building materials for incorporation in Schedule of Rates (SOR) developed by CPWD and State PWD

Web-based tool for ECO-NIWAS portal

- Develop a database of at least 5,000 materials/products having cost details, energy performance parameters, thermo-physical parameters, embodied energy, environmental impact parameters;
- Dedicated interface for manufacturers to upload material information in online database;
- Intuitive web-based tool to visualize and compare building materials to assist in material selection;
- Linkage of database with the existing building performance tool on ECO-NIWAS portal

Process for establishing Standards & Labels



Thank you