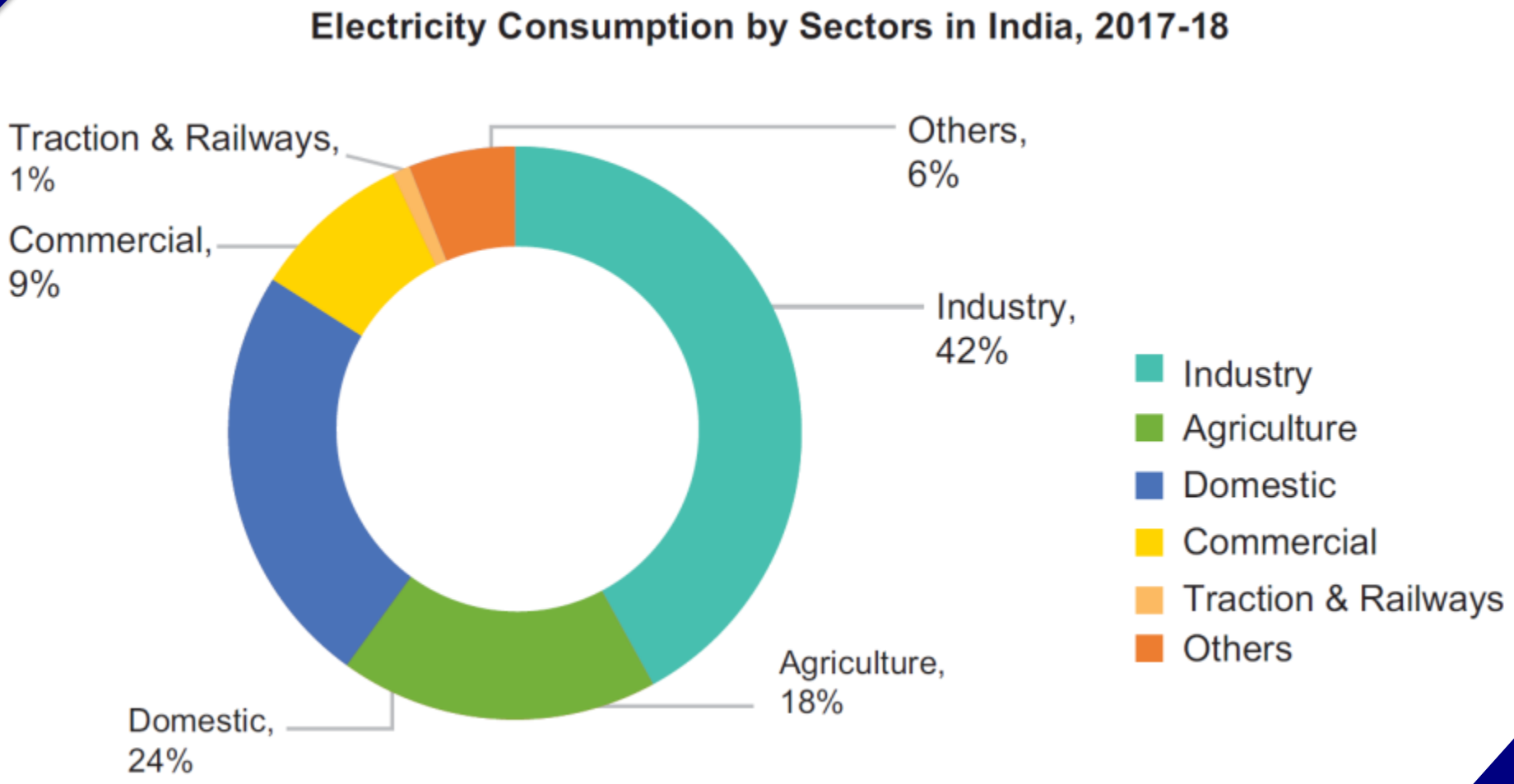
Energy Efficiency Initiatives in the Building Sector

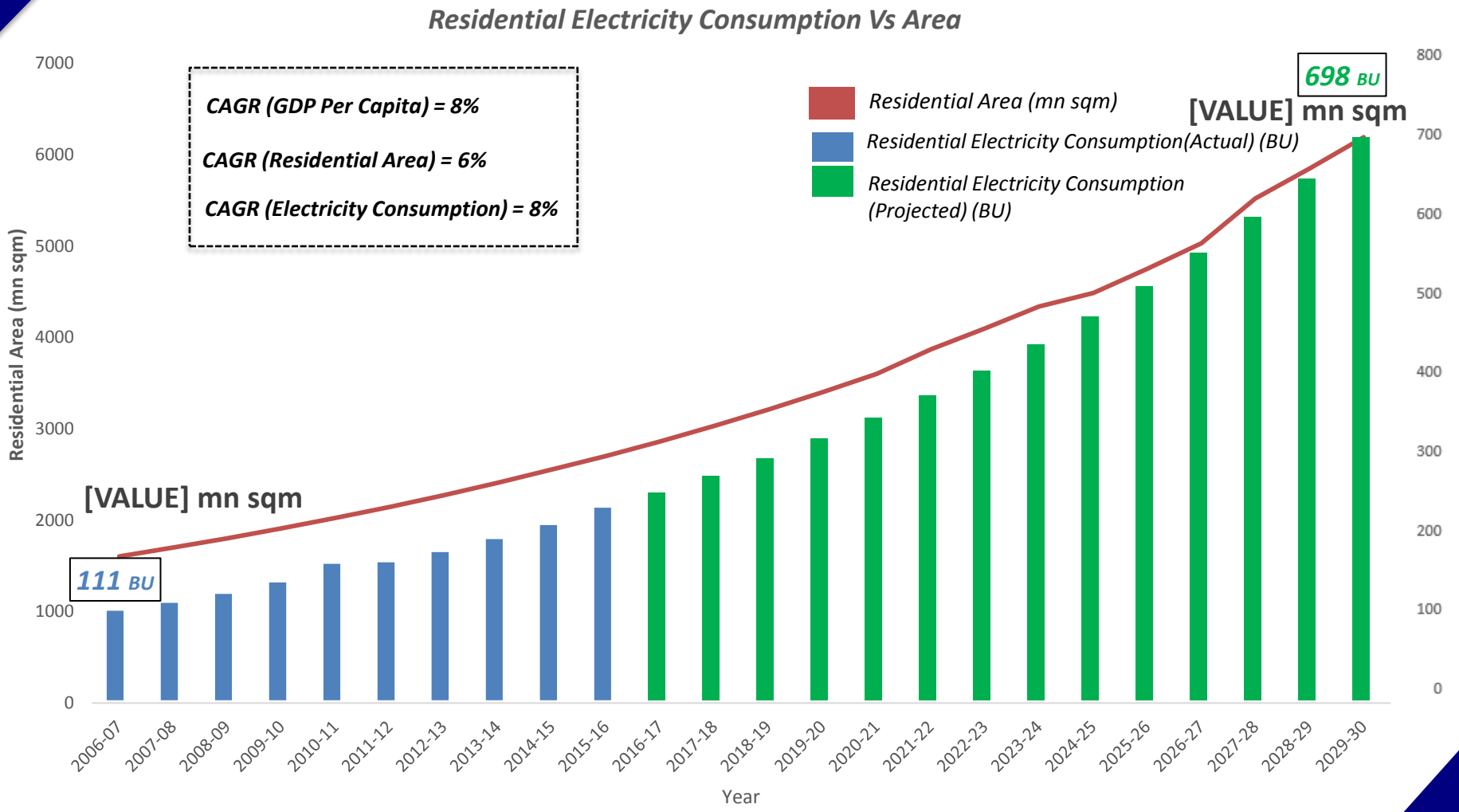
Overview

Bureau of Energy Efficiency

India's Electricity Scenario



Building Sector- Built up area and electricity consumption projection



India will add
3 Billion m² by 2030 of New residential building w.r.t Year 2018

India will add

1 Billion m^2

of New Commercial Buildings by 2030

Government of India Initiatives

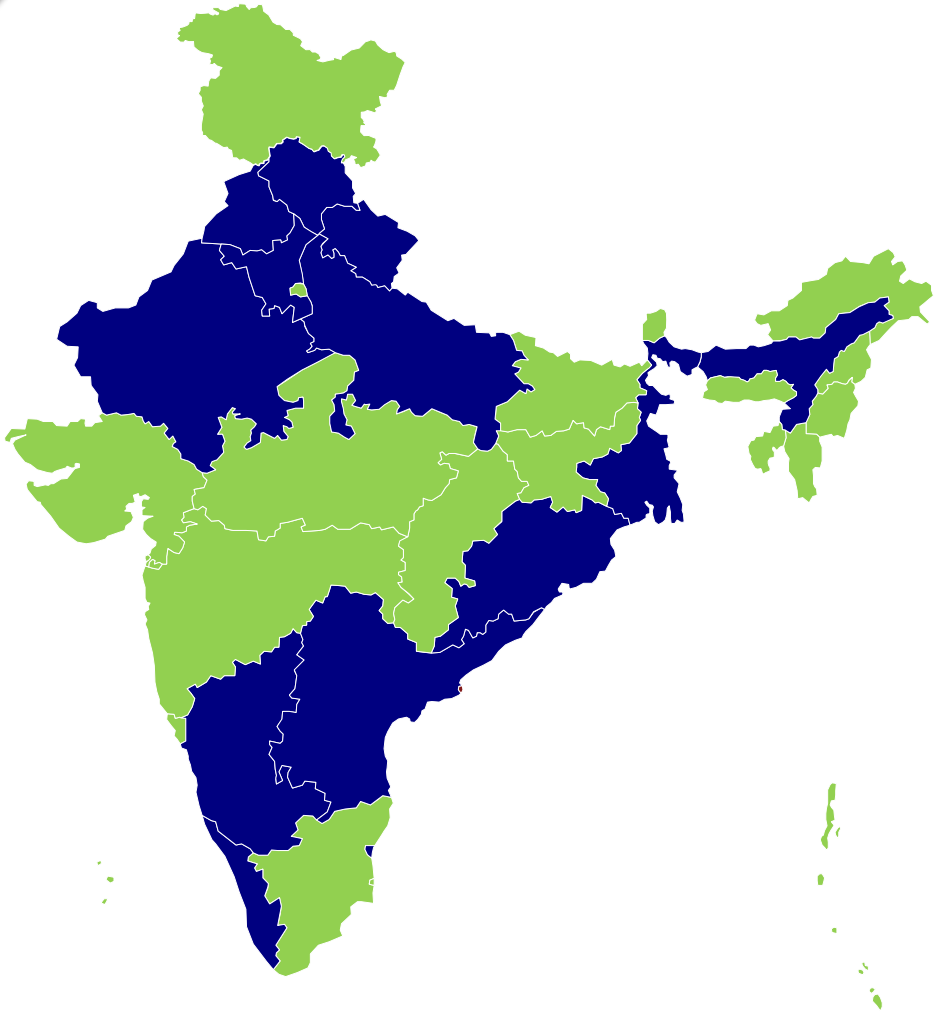
- **Commercial Buildings**
  - Energy Conservation Buildings Codes for New Buildings
  - Super ECBC in States
  - Labeling of Existing Buildings
  - Energy Efficiency Retrofits in Existing Buildings
  - Energy Efficient Components (Appliances & Material)
  - Building Passport (New Scheme)

- **Residential Buildings**
  - Energy Efficiency Building Code for Residential Buildings
  - Energy Efficiency Labelling for Residential Buildings

Scope of ECBC

- **ECBC**
  - Minimum energy efficiency standards
  - Applicable to large commercial buildings
  - Connected load of 100 kW/contract demand of 120 kVA and above
- **ECBC prescribes standards for:**
  - Building Envelope (Walls, Roofs, Windows)
  - Lighting (Indoor and Outdoor)
  - Heating Ventilation and Air Conditioning (HVAC) System
  - Solar Hot Water Heating
  - Electrical Systems

Energy Conservation Building Code



The purpose of this code is to **provide minimum requirements for energy-efficient design and construction** of buildings

15 States & UTs of India have notified ECBC
Other States to notify ECBC soon

States amend ECBC to suit regional and local climatic conditions and may, by rules made by it specify and notify ECBC with respect to use of energy in the buildings

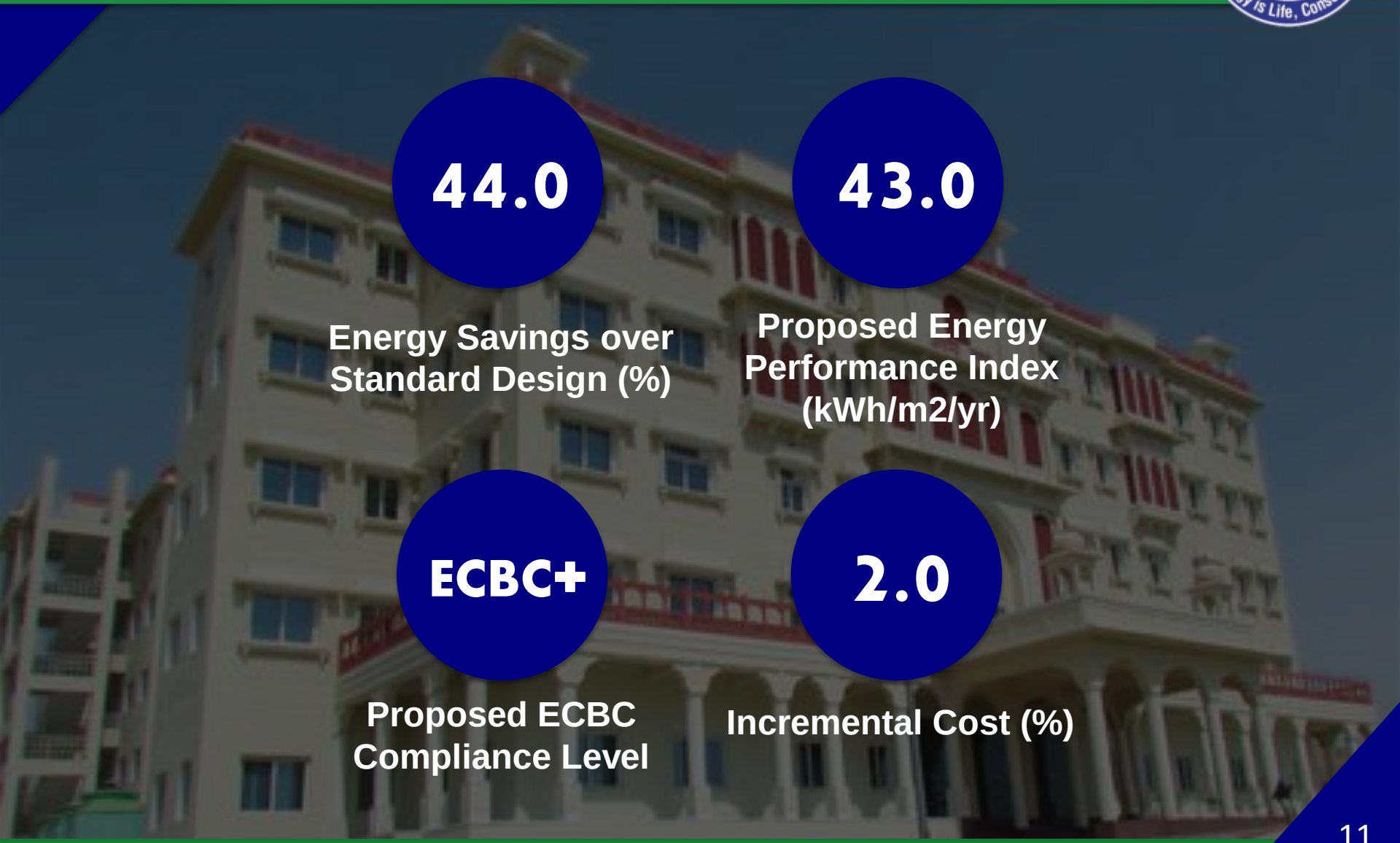
Under process of notification

Notified

Financial Implications of ECBC: Case Studies

Aranya Bhawan, Jaipur

Aranya Bhawan, Jaipur



44.0

Energy Savings over Standard Design (%)

43.0

Proposed Energy Performance Index (kWh/m2/yr)

ECBC+

Proposed ECBC Compliance Level

2.0

Incremental Cost (%)

UPERC Office, Lucknow

UPERC Office, Lucknow

51.0

Energy Savings over Standard Design (%)

86.7

Proposed Energy Performance Index (kWh/m2/yr)

Super ECBC

Proposed ECBC Compliance Level

1.28

Incremental Cost (Cr)

MEDA, Pune

MEDA, Pune

35.4

Energy Savings over Standard Design (%)

31

Proposed Energy Performance Index (kWh/m2/yr)

Super ECBC

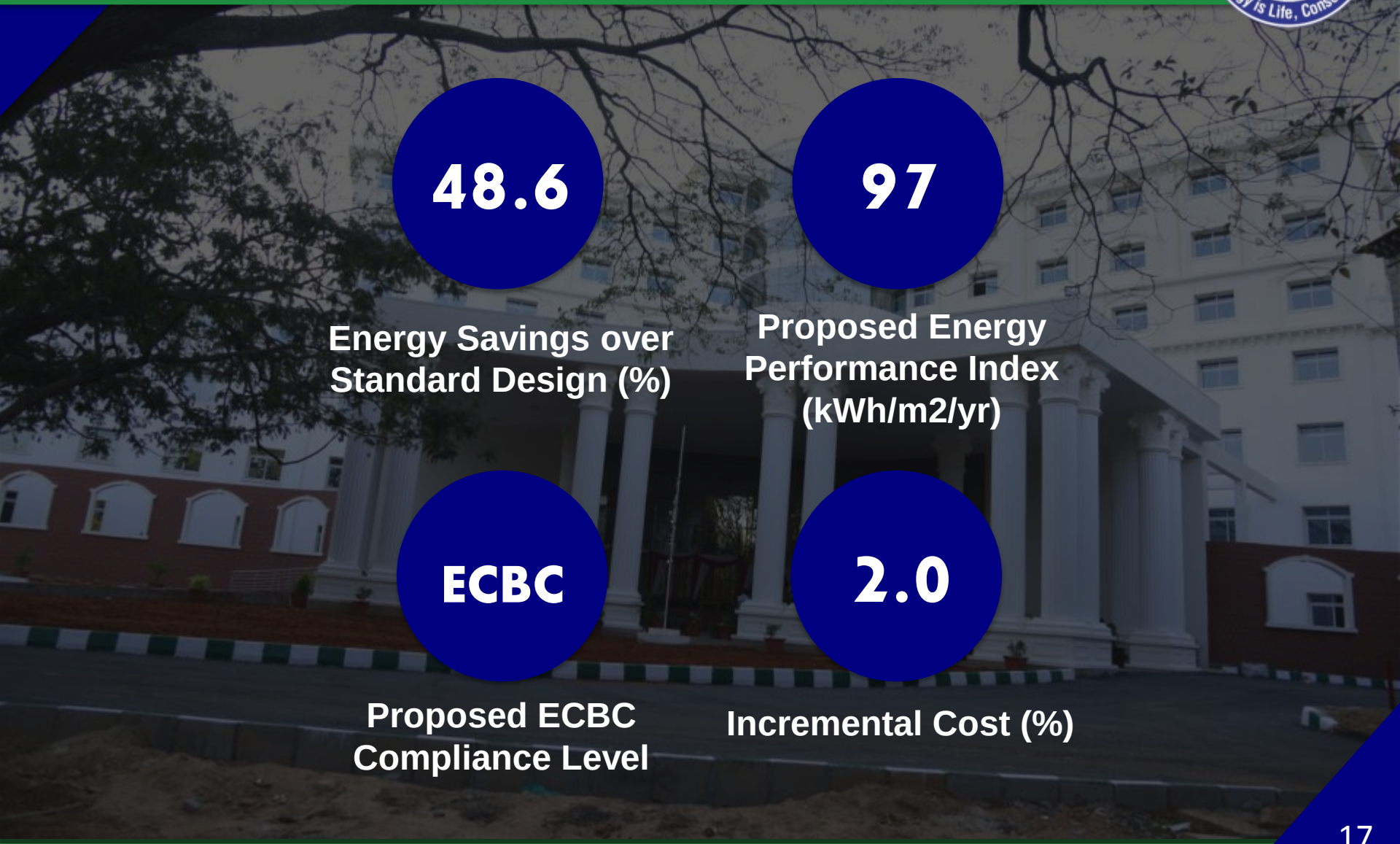
Proposed ECBC Compliance Level

1.32

Incremental Cost (Cr)

KK Guest House, Bangalore

KK Guest House, Bangalore



48.6

Energy Savings over Standard Design (%)

97

Proposed Energy Performance Index (kWh/m2/yr)

ECBC

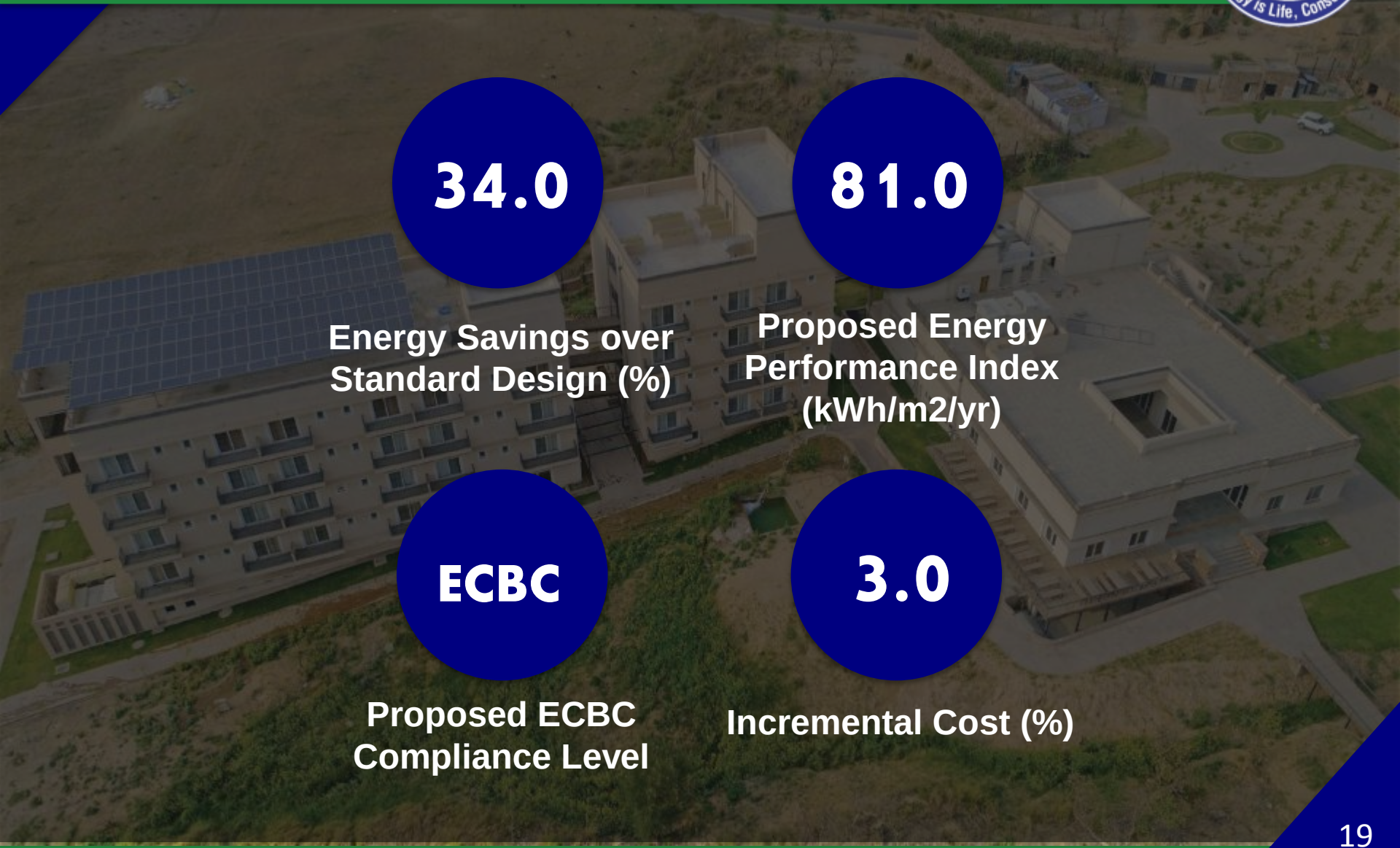
Proposed ECBC Compliance Level

2.0

Incremental Cost (%)

AAETI, Nimli

AAETI, Nimli



34.0

Energy Savings over Standard Design (%)

81.0

Proposed Energy Performance Index (kWh/m2/yr)

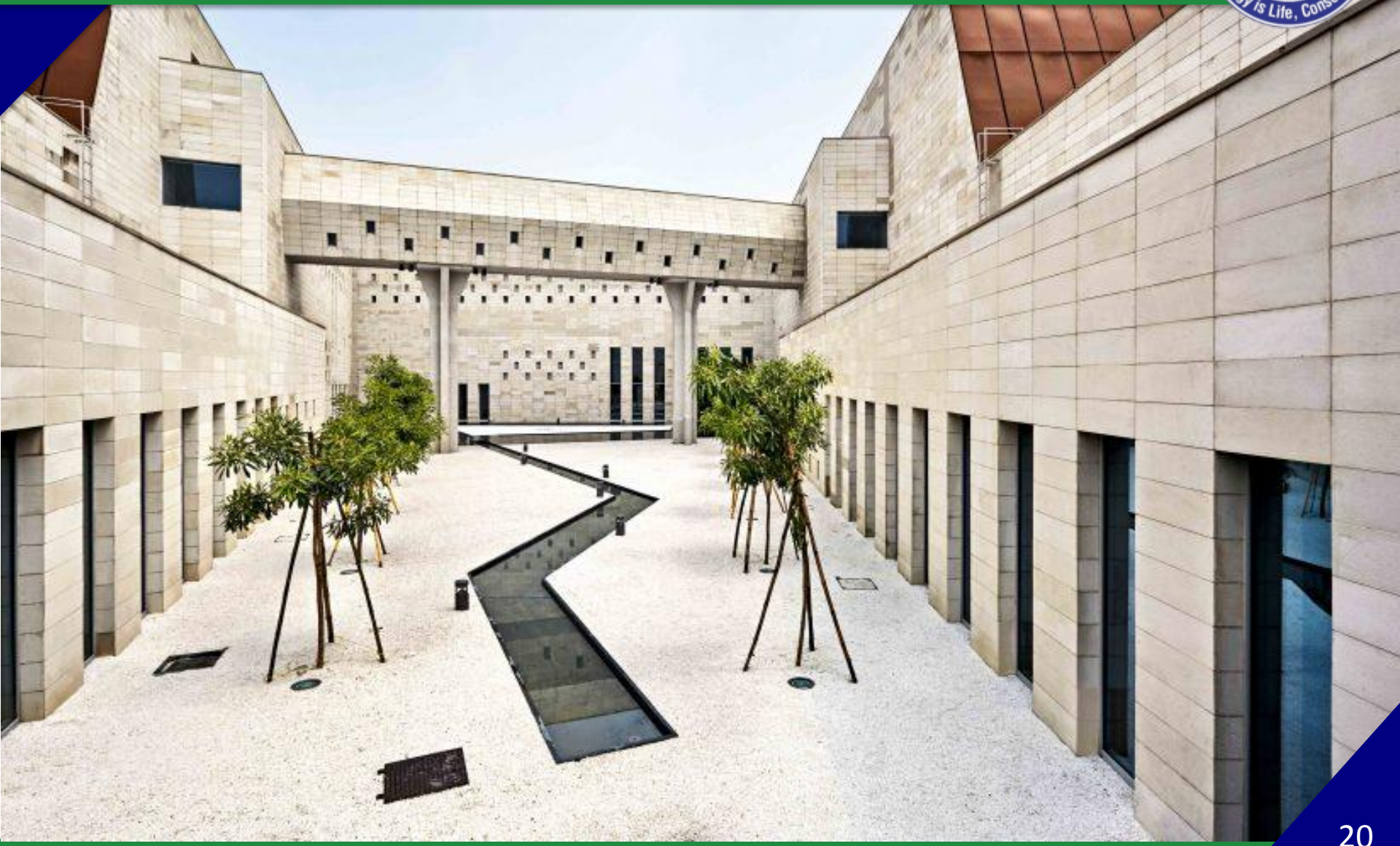
ECBC

Proposed ECBC Compliance Level

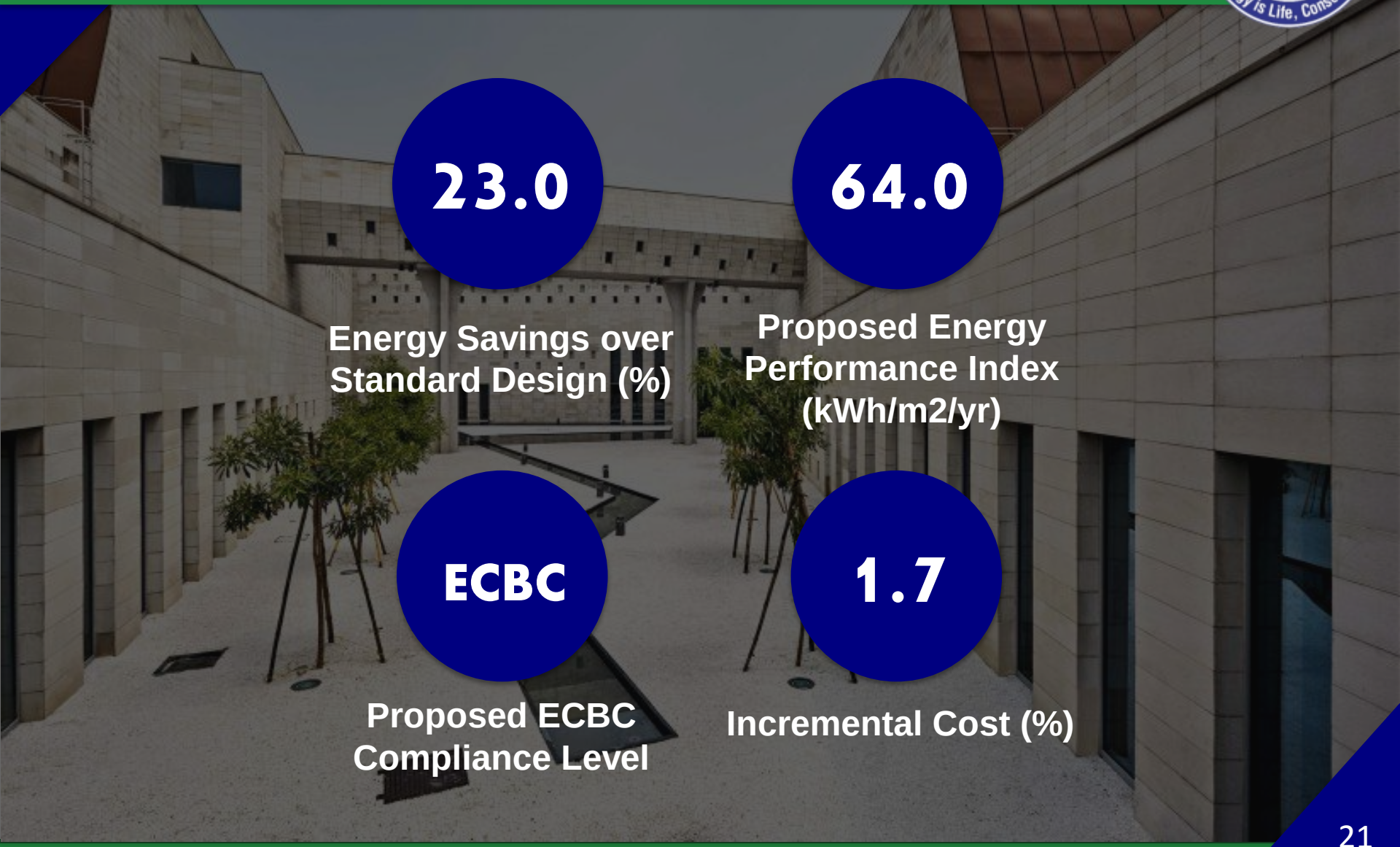
3.0

Incremental Cost (%)

Bihar Museum, Patna



Bihar Museum, Patna



23.0

Energy Savings over Standard Design (%)

64.0

Proposed Energy Performance Index (kWh/m2/yr)

ECBC

Proposed ECBC Compliance Level

1.7

Incremental Cost (%)

Unnati Office, Greater Noida

Unnati Office, Greater Noida

39.0

Energy Savings over Standard Design (%)

93.0

Proposed Energy Performance Index (kWh/m2/yr)

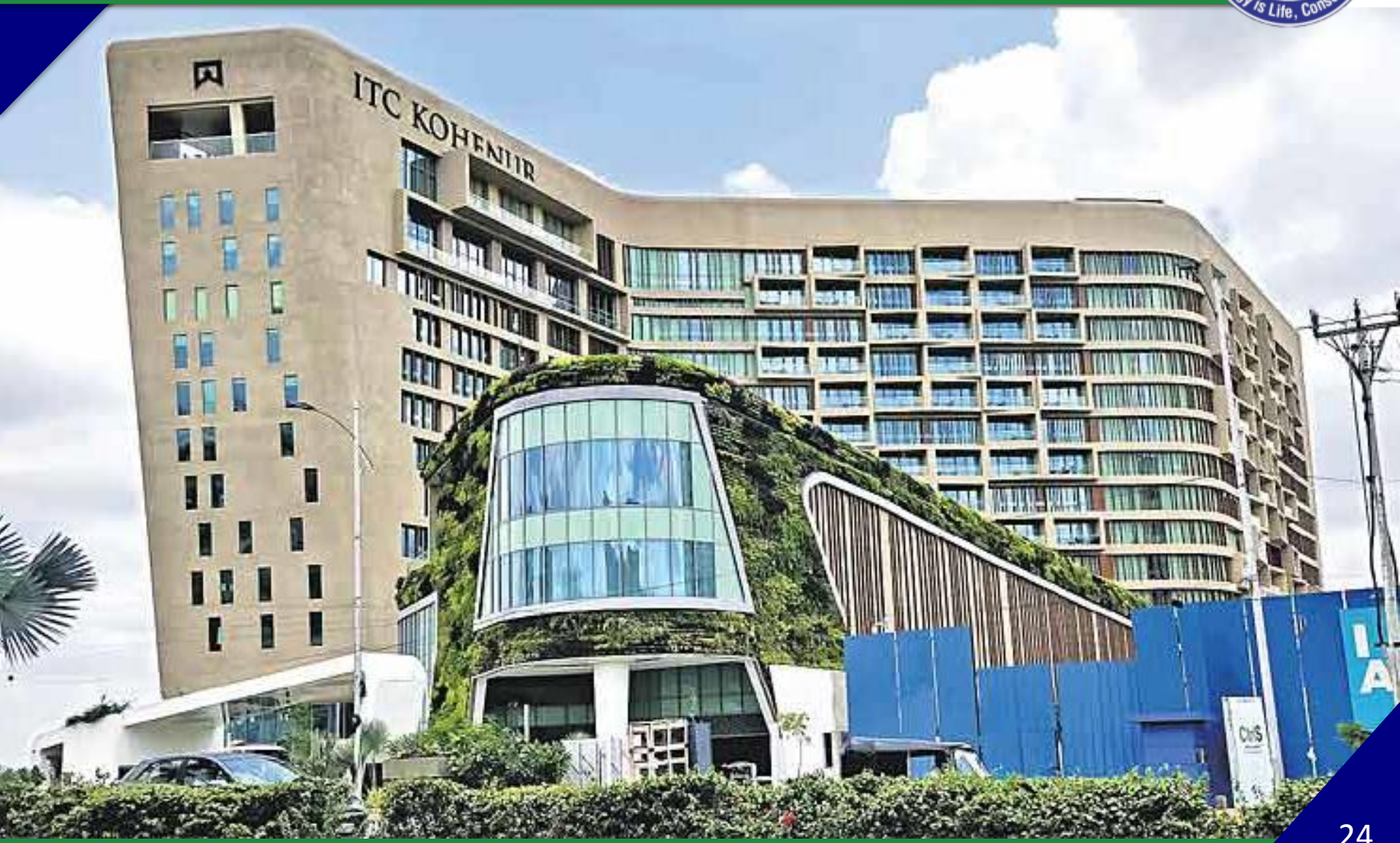
Super ECBC

Proposed ECBC Compliance Level

1.5

Incremental Cost (%)

ITC Kohenur, Hyderabad



ITC Kohenur, Hyderabad

30.4

Energy Savings over Standard Design (%)

269

Proposed Energy Performance Index (kWh/m2/yr)

ECBC

Proposed ECBC Compliance Level

nil

Incremental Cost (%)

Eco-Niwas Samhita 2018

ECO-Niwas Samhita 2018 - an Energy Conservation Building Code for Residential Buildings.

Launched on National Energy Conservation Day in 2018.

Applicable to all residential units with plot area ≥500m^2

(However, states and municipal bodies may reduce the plot area so that maximum residential buildings fall in the category of ENS compliance)

Code is currently under the process of implementation in 5 states of India (Delhi, Punjab, Uttar Pradesh, Karnataka, Maharashtra.

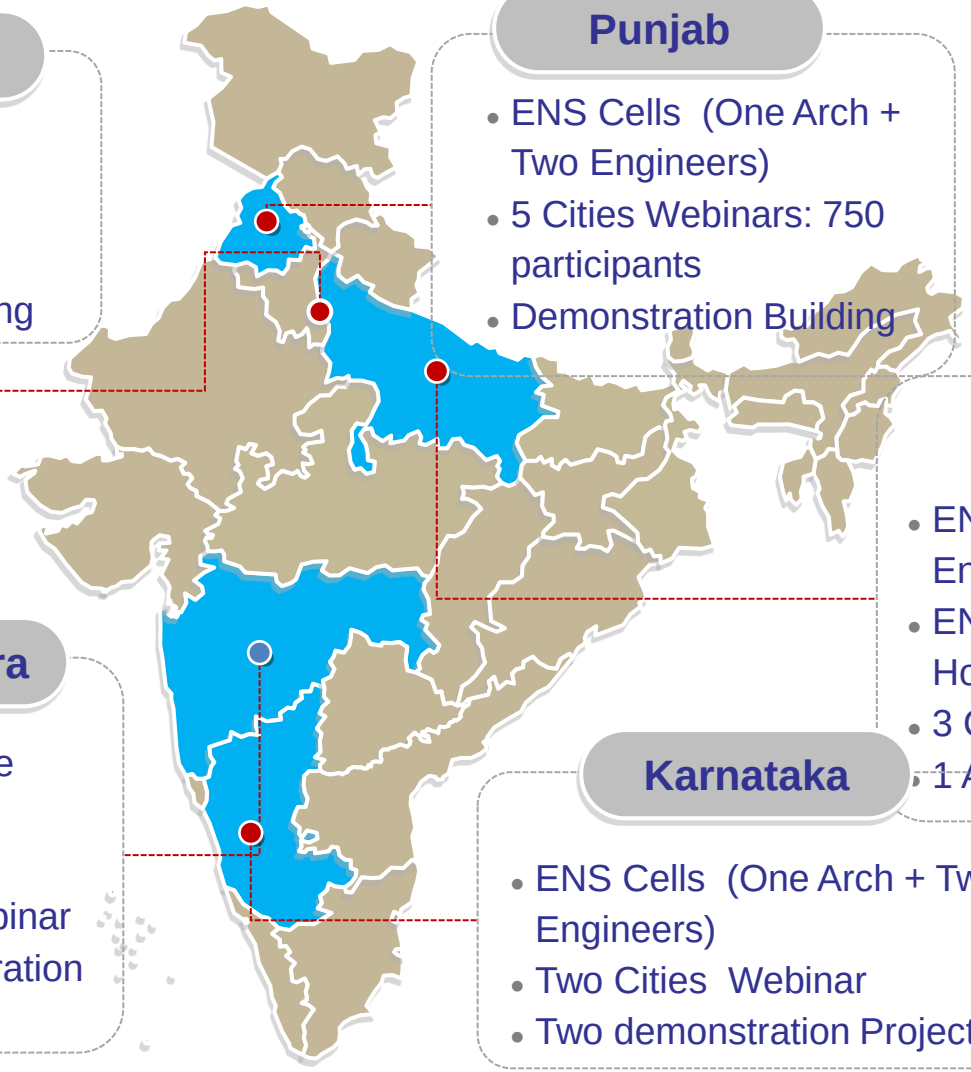
ENS Implementation

Delhi

- ENS Cells (One Arch + Two Engineers)
- Awareness training

Punjab

- ENS Cells (One Arch + Two Engineers)
- 5 Cities Webinars: 750 participants
- Demonstration Building



Uttar Pradesh

- ENS Cells (One Arch + Two Engineers)
- ENS Compliant Affordable Housing
- 3 Cities Webinar: 500 participants
- 1 Awareness training

Maharashtra

- ENS Cells (One Arch + Two Engineers)
- Two Cities Webinar
- Three demonstration Projects

Karnataka

- ENS Cells (One Arch + Two Engineers)
- Two Cities Webinar
- Two demonstration Projects

Star Rating for Energy Efficient Homes

Need of Star Rating Program

Making energy efficient homes to tackle the soaring energy consumption in the residential sector

Helping consumers make an informed decision while buying/leasing through the provision of direct, reliable & costless information

A step forward from EcoNiwas Samhita 2018 launched by Ministry of Power on 14th December 2018 by motivating consumers to move towards energy efficient designs

Objectives of Star Rating Program

- To provide information to consumers for EE Homes
- Energy Sustainability for India
- To achieve Indian NDC Targets
- Market Transformation for Energy Efficiency in each Home

Features of Star Rating Program

- Choice for Consumers to select EE Homes
- Encourages consumers to improve EE
- Peer to Peer Comparison
- Provide information on the potential and actual energy use of buildings

Ancillary benefits of the program

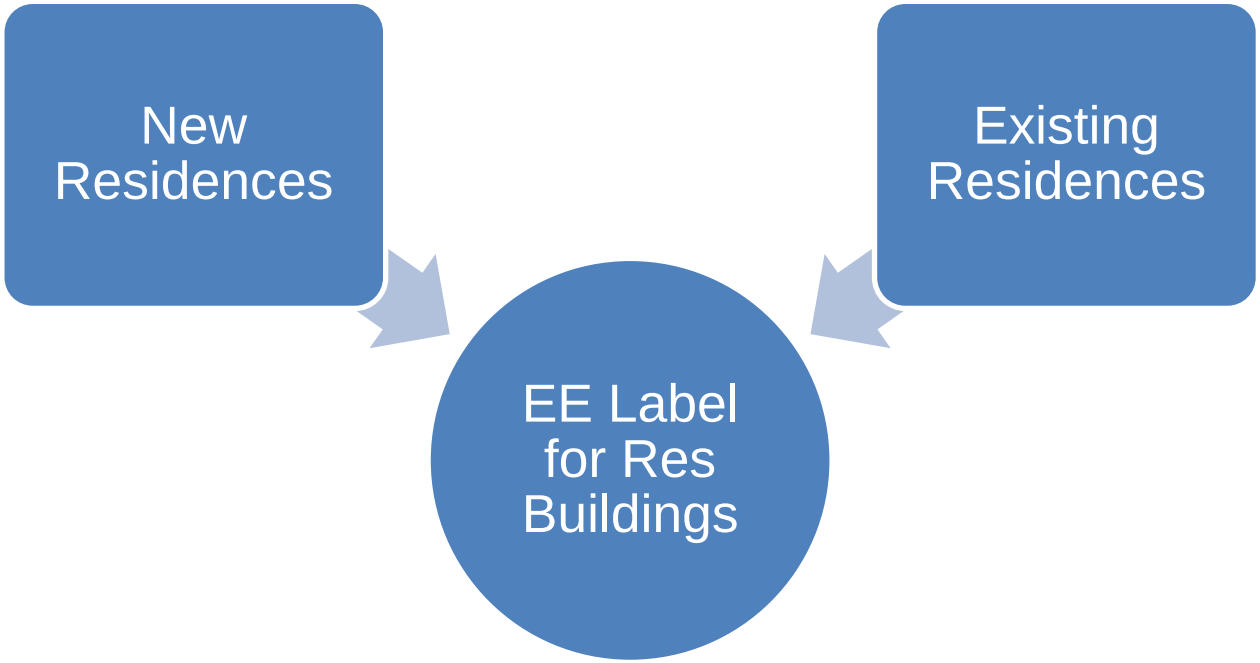
- Embryo to stimulate the larger energy efficient material & technologies market
- Additional set of professionals to expedite the complete the process of residential label granting shall be a stimulant to Indian job market
- Will encourage manufacturers to invest in energy efficient materials & thus support Make in India program
- Disposable income generated from the energy savings will help stimulate other sections of the economy
- Helps the nation work towards fulfilment of Global Sustainable Development Goals 7 of United Nations: Affordable & Clean Energy

Potential of Energy Savings in New residential buildings

Summary of energy savings considering 2018-19 as base year		
Year	**Savings (MU)**	**CO2 million tonnes**
2019-20	408.9	0.3
2020-21	1469.3	1.2
2021-22	3517.5	2.9
2022-23	6699.9	5.5
2023-24	11398.8	9.3
2024-25	20122.5	16.5
2025-26	30788.5	25.2
2026-27	37058.8	30.4
2027-28	44957.1	36.9
2028-29	55200.1	45.3
2029-30	66725.8	54.7
TOTAL	**278347**	**228**

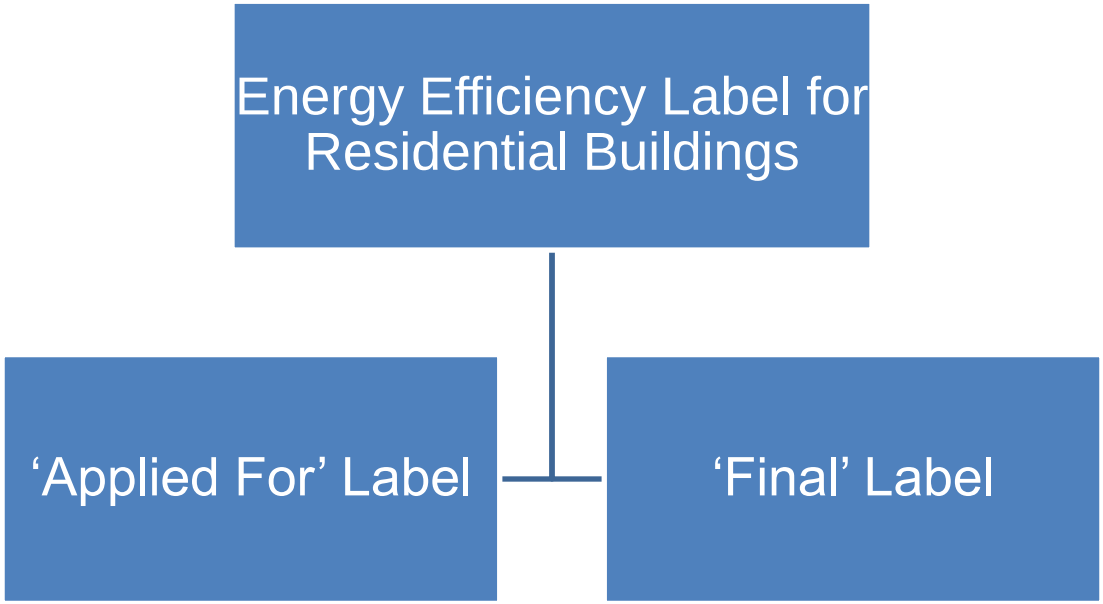
The energy saving potential through proposed labelling program is around 278 BU

Scope of labelling Program



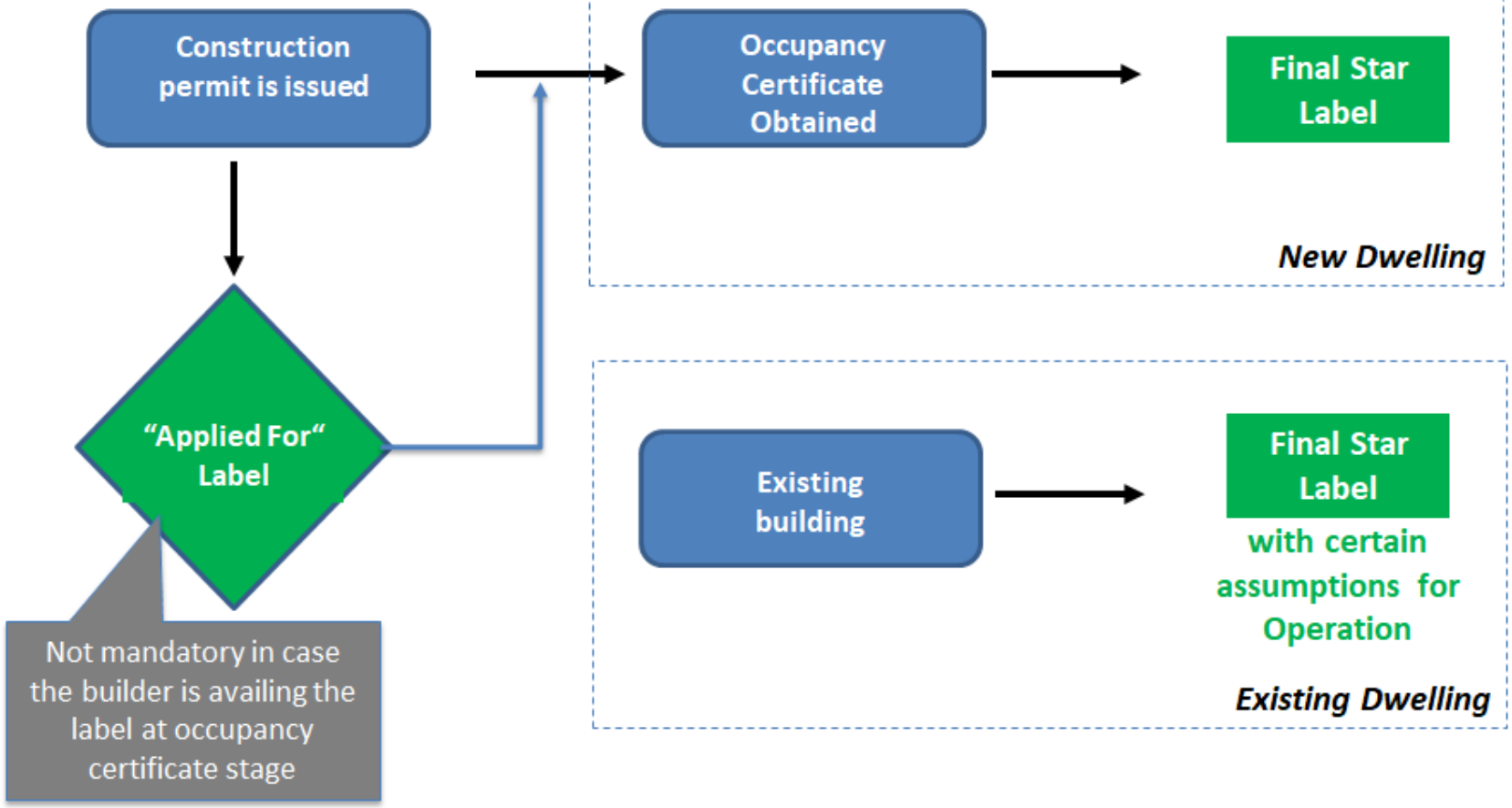
- Program covers all types of residential buildings
- Making EE label a mandatory information required during real estate transaction/leasing will help in achieving the program's objectives

Types of Label



- 'Applied For' Label: This label is applicable for new buildings with construction permit issued by the authorities having jurisdiction. This label shall be mainly used for marketing of the property.
- 'Final' Label: This label is applicable for existing and new buildings. For new building, this label can only be awarded after the occupancy certificate is issued by the authorities having jurisdiction.

Classification of labelling stages



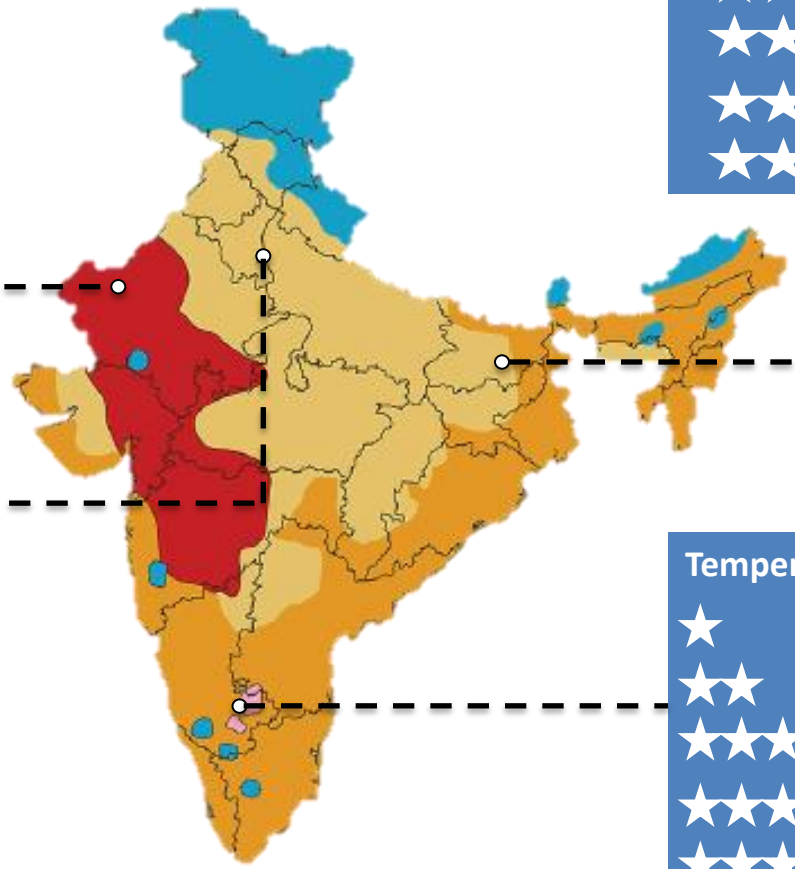
Residential Building Star Rating Plan

Hot & Dry

★	55 < EPI ≤ 67
★★	47< EPI ≤ 55
★★★	38< EPI ≤ 47
★★★★	29 < EPI ≤ 38
★★★★★	EPI ≤ 29

Warm & Humid

★	58<EPI≤64
★★	49<EPI≤58
★★★	39<EPI≤49
★★★★	30<EPI≤39
★★★★★	EPI≤30



Composite

★	52<EPI≤60
★★	45<EPI≤52
★★★	37<EPI≤45
★★★★	29<EPI≤37
★★★★★	EPI≤29

Temperate

★	28<EPI≤31
★★	24<EPI≤28
★★★	21<EPI≤24
★★★★	17<EPI≤21
★★★★★	EPI≤17

Application Process

BEE Star Label for Residential Building:

- Applied For Label (specifically for developers or under construction residential buildings – Voluntary)
- Final Asset Label

Outline of process for awarding BEE Star Label

Preparation stage	Application processing	Implementation stage	Monitoring & Verification
User registration	Application submission	Label renewal	Verification audits
Project/ property registration	Scrutiny of received application	Label transfer	Data reporting for monitoring the progress
	Approval for label	Changes in label awarded already	
		Uptake strategies	

Application processing stage contd..

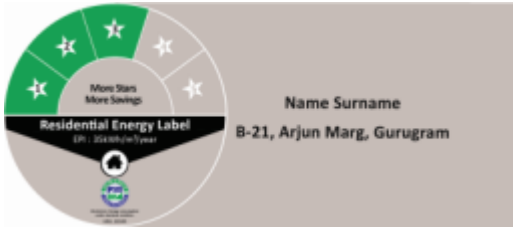
BEE Star Label Approval

Approval by Competent Authority of BEE → Generation of label through tool

Unique Label Reference no. generated

Approval letter

- An online copy of label shall be sent to the applicant through the portal



Name plaque

- Name plaque generated

Passport

- Passport generated online – will include all details of the applicant. Soft copy of the passport auto-emailed to the applicant

Plaque

- The plaque will be provided to the applicant (developer / owner) of the respective residential dwelling upon approval of ‘Final’ label. The developer or owner would be required to submit request to BEE for the plaque.

Passport

- Upon approval building passport shall be generated based on the details provided by label applicant.
- The e-passport can be downloaded from the portal by the applicant.

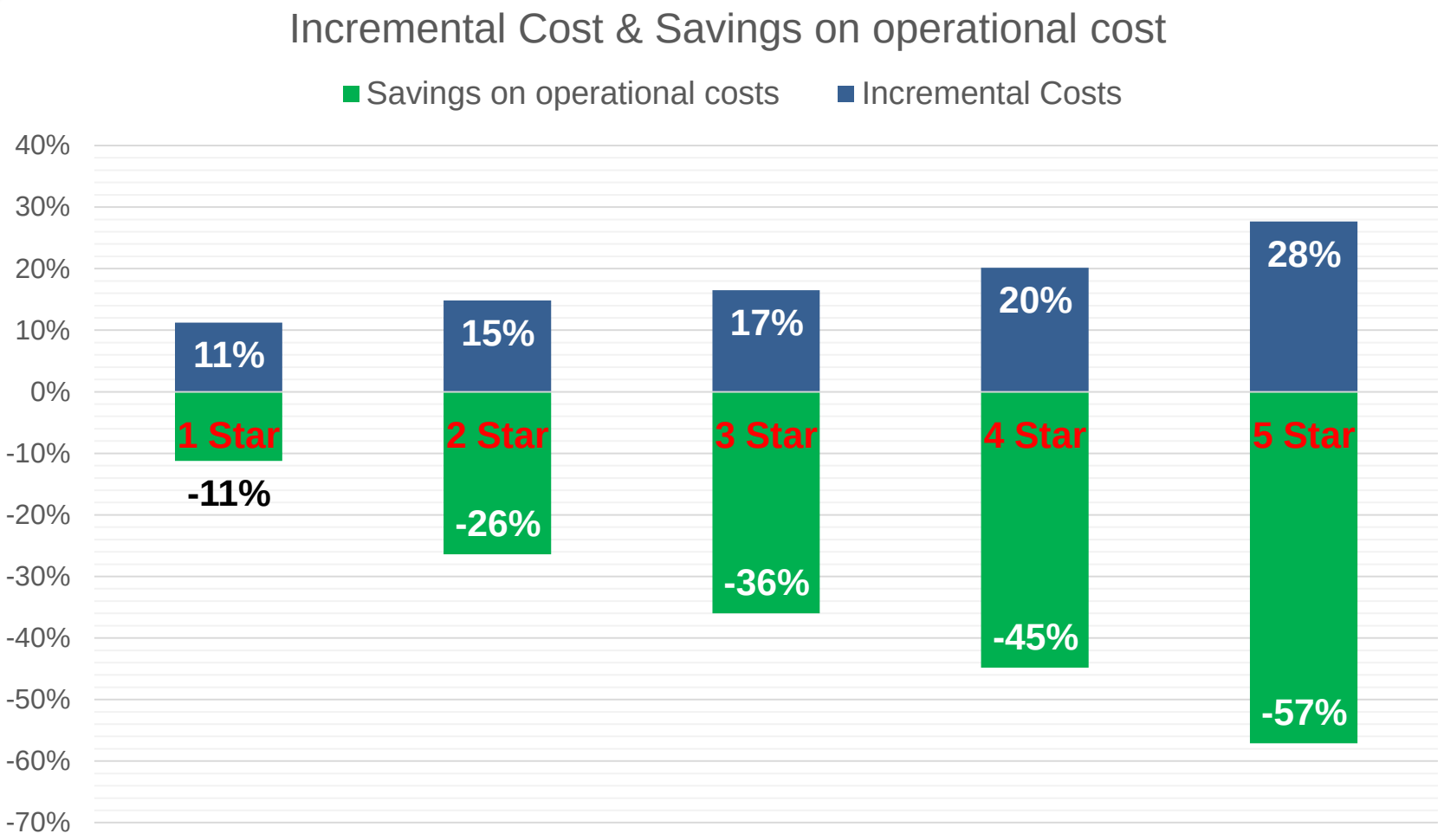
Label validity

Validity of label and plaque from the date of approval by BEE	
'Applied For' Label (New Construction)	3 Years
'Final' Star Label (existing construction)	5 Years
Name plaque	Linked with validity of respective Final Star Label

Dwelling ownership & transfer related cases

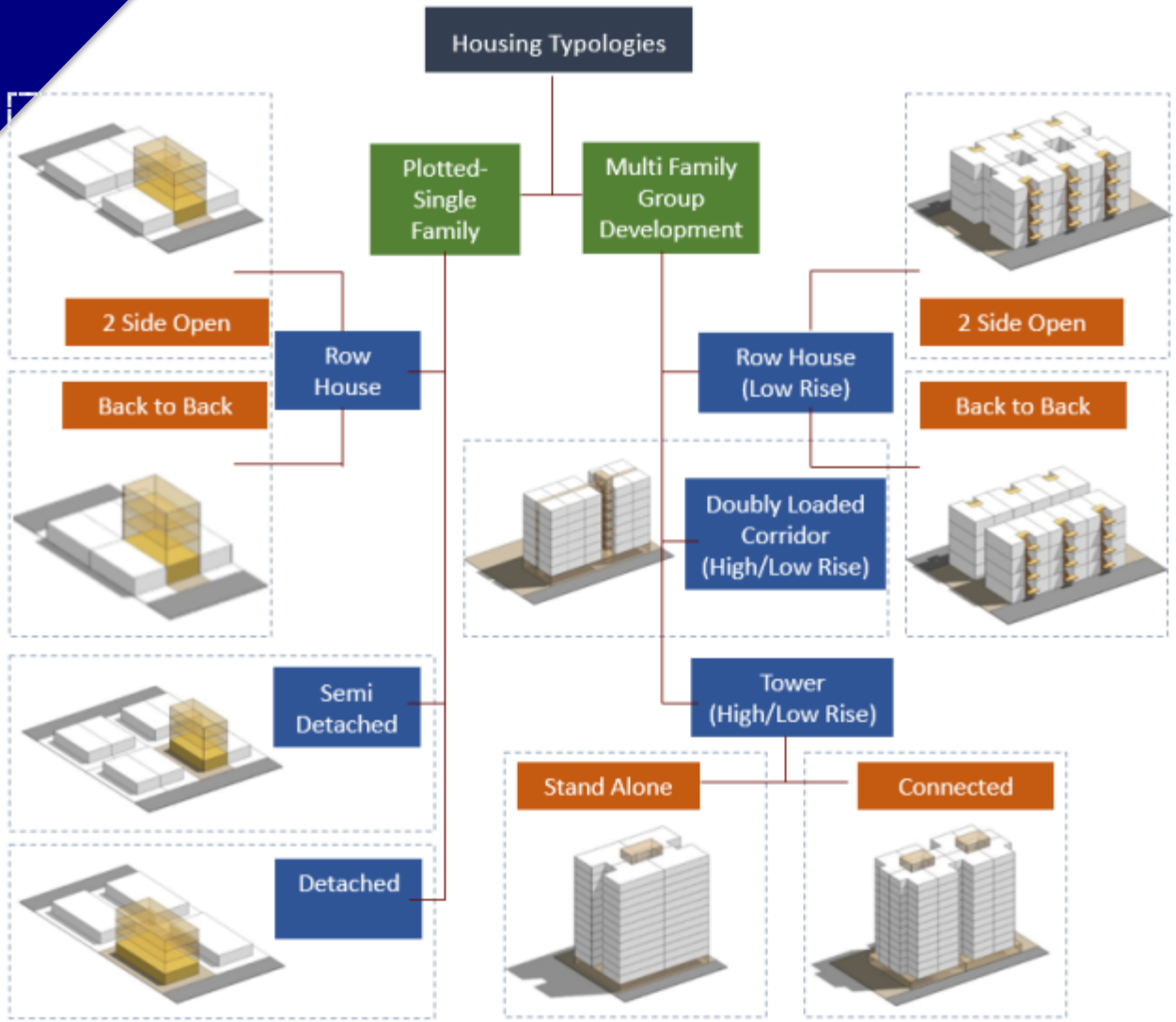
Label Stage	Ownership Transfer cases		
	Developer to owner	**Developer to Developer**	**Owner to Owner**
'Applied For' Label	NA	The already awarded 'Applied for' label stands OBSOLETE. The new developer shall submit application to seek the updated label.	NA
'Final' Label	The owner after seeking the ownership shall submit request to BEE for change of identity details linked with the respective label which was earlier issued to the developer and also submit request for reissue of passport and name plaque	NA	The earlier issued passport and name plaque stands OBSOLETE. The new owner shall submit ownership change documents and respective form to BEE for change in records. Thereafter, the new owner shall submit request for seeking fresh "Name Plaque"

Savings from Star Rating Program

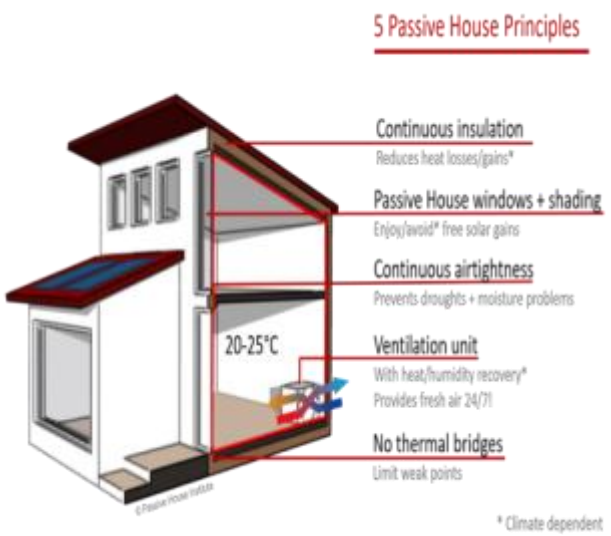


Other Initiatives in Residential Sector

Replicable Design Catalogue for Model Residential Building Designs in India



Typology Matrix

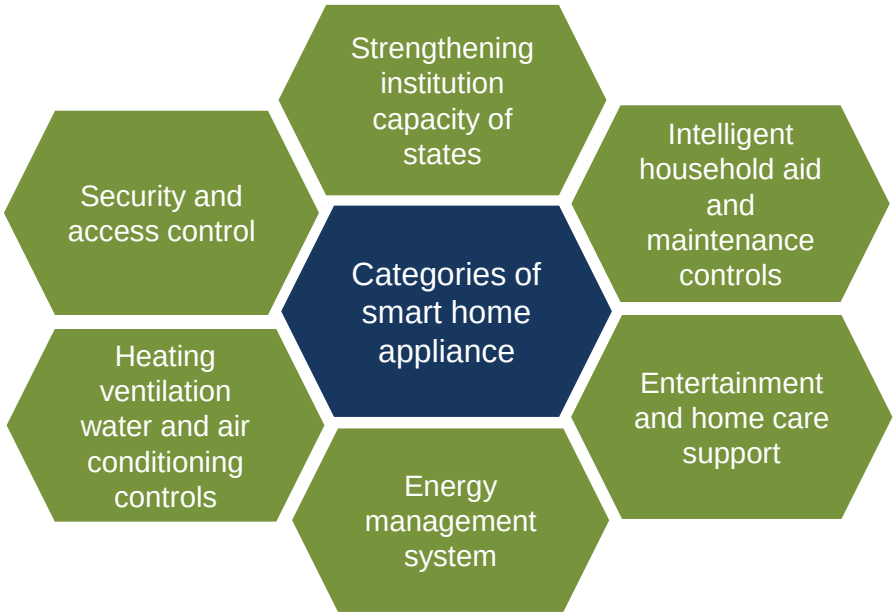


- The Catalogue will consist of about **7000-10000** Design Typology, considering each climate zone.
- Around 3000 No. of typologies for all climatic zone finalised.

Energy Efficient Building Materials Directory of India

- Steering committee meeting conducted.
- Data collection, Company registration and S&L processes are going on.
- **550 NABL** accredited labs were mapped for material testing.
- Discussion on S&L process is going on.
- Conducted Second PSC meeting on 17-Jan 2020
- BEE has proposed to launch the portal in March 2020 with 2000 material list initially.

Smart Home Program - Technology Assessment Study and Pilot Design

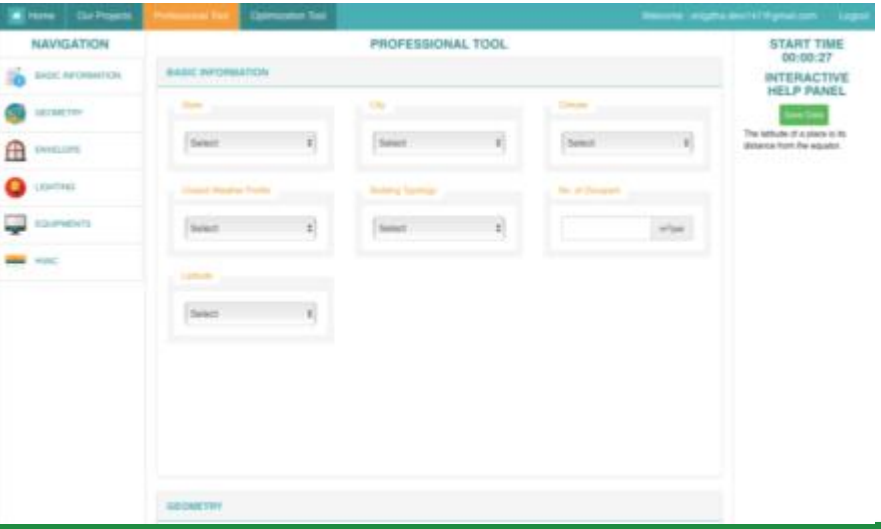


- To project focussed on understand Home automation Technologies & Application potential in India.
- The outcome of the study will be considered further to incorporate in Eco-Niwas Samhita.
- Project kick-off meeting held on 20th Dec 2019.
- The project is in final stage of completion

Preparation of Database and Adaptive Model for Thermal Comfort of occupancy in residential buildings

- In order to revive the Eco-Niwas Samhita in across the country, the study of the thermal comfort is being considered & To develop a single nation-wide adaptive thermal comfort model.
- Project kick-off meeting held on 30th Dec 2019

Eco Niwas Tool



Role Of Financing in Promoting Energy Efficiency in Buildings

Gaps & barriers for Financing in Building sector in India

Gap	Key barriers in the development of Green Affordable Housing	Opportunities/ Mitigation measures
Lengthy approval processes	Certification systems is time consuming since multiple stakeholders are involved	EE Label provides an hassle free online tool which is developed keeping ease of use for the consumer in mind
Government / State affordable housing policies	There is no inclusion of compliance with green housing labels in existing Government and State affordable housing policies	EE Label along with ENS are in the process of being notified in 5 states across India
Lack of awareness of Green Labels and codes	Stakeholders are unaware of the existing green building labels and their benefits	Awareness programs & webinars have been organized for EE label program across India for the last year
Incremental cost for energy efficiency label	Incremental cost for a energy efficiency label must be discounted for in case of affordable green building project	The application fees have been kept at a very affordable threshold keeping this barrier in mind. Green financing will take care of incremental construction costs

Need of Financing

To encourage energy efficiency in residential sector in order to combat the potential impact the sector can have on the environment

Financial incentives along with promotion or marketing is required in order to encourage uptake of the initiative in the initial phase

To overcome the fear of additional costs or the affordability barrier faced by the developers as well as consumers

Form of financing/incentives

- **Low interest loans**
- **Payment of low interest loan through utilities**
- **Direct monetary payment from the government (grant, rebate or reimbursement)**
- **Expedited permit processing**
- **Marketing/publicity/awards**
- **Property or sales tax rebates or abatements**
- **Additional FAR grants**
- **Access loans/loan funds**

Financial Incentives - India

- **Kutumb -** initiative to promote sustainable and energy-efficient real estate development in the affordable sector
- **SBI & KfW** energy efficient housing programme
- **NHB SUNREF -** credit line of 100 million will allows banks, housing finance companies and home buyers to fund green and affordable housing projects and investments
- An additional 5% FAR for complying with 4 or 5-star GRIHA Rating in **Jaipur & Noida**
- **HDFC H-CARE fund series -** Investment in affordable and mid-income residential projects in 15 cities across India
- **Pimpri-Chinchwad Municipal Corporation** offers up to **15% rebate on property tax**, for green buildings and up to **50% on premium** for builders who get their projects GRIHA-certified

Financial Incentives – Global Outlook

Green Deal (UK)

- The Green Deal is a finance scheme aimed at helping homeowners install **new energy saving measures** in their homes.
- Under the Green Deal scheme, the loan was attached instead to the **electricity meter**
- This scheme allowed people to improve their homes without having to come up the **entire upfront costs of the works**.

KfW Energy Efficient Housing Loans (Germany)

- KfW provides housing loads to the tune of **120,000 Euros for achieving different target reductions** in energy consumption
- The scheme also offers **repayment subsidies from 15 – 25%**
- It scheme covers the cost of **hiring an energy efficiency expert** for the design or an auditor in case of an assessment

Financial Incentives – Global Outlook

Canada

- **BMO Eco Smart Mortgage** - BMO Eco Smart Mortgage offers a mortgage rate at 3.29% on a 5-year fixed mortgage for energy efficient homes. To qualify, your home must meet the requirements outlined in the BMO Eco Smart Mortgage
- Home buyers purchasing an energy-efficient home or making energy saving renovations are eligible for a **10% refund of the mortgage** insurance premium

USA

- **Home Energy Loan Program (HELP)** - HELP offers as much as $35,000 in loans for energy-efficient home improvements, including ENERGY STAR® -rated high efficiency heating, air conditioning, insulation, windows, and more
- **Energy Efficient Mortgages (EEM)** - EEM allows homeowners to either finance energy-efficient improvements to their existing homes or increase their home-buying power through the purchase of a new energy-efficient home

Thank You!