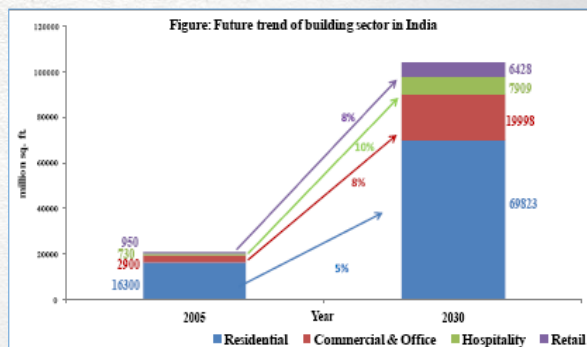
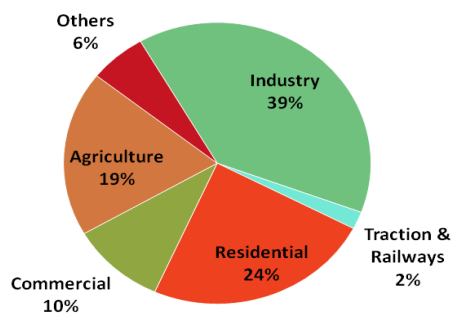


Energy Efficiency in Building : EESL's Experience

Overview of India's Commercial Building Sector

- Building energy consumption accounts for over 35 percent of electrical energy consumption in the country, and is rising annually at 8 % .
- If buildings continue to be built and operated in the conventional manner, electricity consumption by commercial buildings may increase by more than 3 times by 2021.
- Electricity consumption by Heating/ cooling appliances will grow by 180% and by lighting will grow by 80% by 2021.



EESL's Turnover & Pipeline of Projects

Turnover : US \$10.5 mn (2014-15), US \$110 mn (2015-16), Expected US \$400 mn (2016-17)



Expected Project worth :

\$6-7 b over next 3-4 years – Includes 10 mn fans, 1 mn agriculture pumps, municipal pumps, smart grids, buildings, etc

Energy Efficiency in Buildings

- **Target Group** : Govt and Non-Govt Establishments
- **Typical Potential** : 15 – 30 % energy cost reduction
- **Areas of Intervention** : Lighting, Air-Conditioning, Water Pumping
- **EESL Model** : Project Management Consultancy (PMC) and/or ESCO
- **Project Characteristics** :
 - Typical Investment - \$ 200,00 to 250,000 for 1000 kW of running load
 - Simple Pay-back Period : 1.5 to 2 years
 - Typical Implementation Period : 3 to 6 months
 - Typical PMC fee : 20-25 % of total project value
 - Project Cycle : 1 to 4 years
- **Present Status** : Over 500 buildings in pipeline, implementation in progress for over 20 buildings (Mostly the Iconic Govt. buildings in India)
- **Value Added Services** : Capacity Building of building O&M team, Building EMS, Benchmarking of group of similar buildings





EESL's Building Energy Efficiency Program

- **Central Govt. Buildings**

- **State Govt. Buildings**

- **Commercial Building**

- **Others :**

- Corporate Buildings
- Railway Stations
- Bank ATMs
- Industry In-Campus Buildings

- **No. of Buildings in Pipeline** : 1000+
- **Connected Load** : 343 MW
- **Planned Investment** : 19.6 mn \$
- **Expected Savings** : About 40 %
- **Reduction in Peak Demand** : 118 MW

Pay-back period : 1.5 years, Electricity Price : Rs. 8 per kWh, 12 hours per day, 300 days per year

Target by March 2019

Investment : 80 mn\$
Peak Demand Reduction : 400 MW



Lighting



Air-Conditioning



Ceiling Fans



BEMS

PMC Model



| Sl. No. | Aspects | Clients Scope | EESL's Scope |
|---------|------------------------------|--|--|
| 1 | Inventory Collection | NA | Though Walk Trough Audit, Questionnaires etc. |
| 2 | Technology Suggestion | NA | Submit best suitable technology based on energy audit |
| 3 | Tender Process | Only Letter of Award (LoA) to be issued | Tender document preparation, bid management, finalization of Bidder etc. |
| 4 | Capital Investment | Entire project investment (including EESL's Fee) | NA |
| 5 | Project Monitoring | NA | Taken care by EESL |



ESCO / Integrated Model

| Sl. No. | Aspects | Clients Scope | EESL's Scope |
|---------|-----------------------|---------------|--|
| 1 | Inventory Collection | NA | Though Walk Trough Audit, Questionnaires etc. |
| 2 | Technology Suggestion | NA | Submit best suitable technology based on Inventory Collected |
| 3 | Tender Process | NA | Tender document preparation, bid management, finalization of Bidder etc. |
| 4 | Capital Investment | NA | Entire project investment |
| 5 | Project Monitoring | NA | Taken care by EESL |

Successful ESCO Project by EESL : A Case

Project : Energy Efficiency Retrofit Program in a High-Rising Building

Energy Audit
(Walk Through)

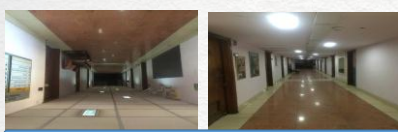
Preparation of
Scheme

Identification of
Intervention

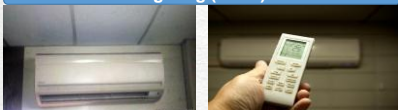
Signing of MoU
with Client

Implementation

Warranty Support &
Payment Recovery



Lighting (LEDs)



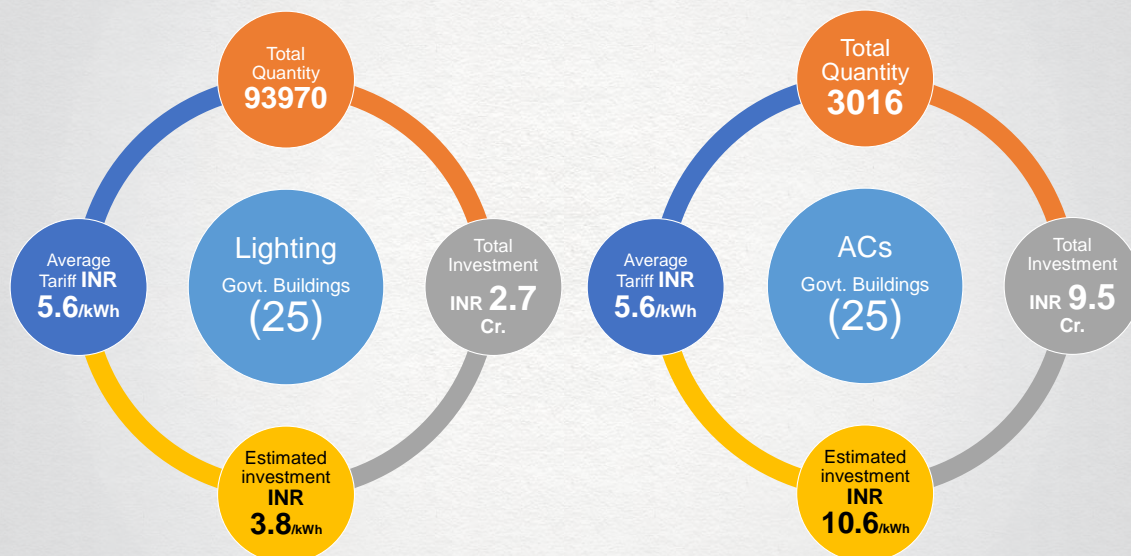
Air Conditioning (5-Star ACs)

Deemed Saving Approach

28% Reduction in Energy
Consumption

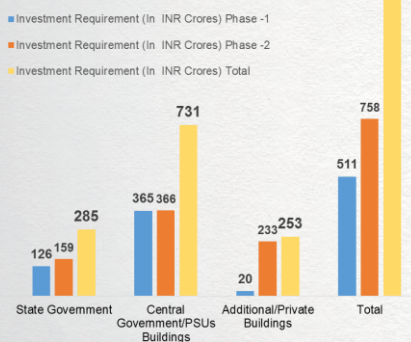
| HEAD | UNIT | Values |
|--|-------------|--------|
| Estimated Energy Savings | KVAh | 123638 |
| Fixed Tariff, Rs. per KVAh | \$ Per KVAh | 0.125 |
| Estimated Annual Cost Savings | \$ Per year | 15465 |
| AMC getting free for Client on Air Conditioning (\$ 12.3/AC/Annum) | Per year | 332.30 |
| Total Cost Savings | \$ Per year | 15796 |
| Investment, Rs. | \$ | 35888 |
| EESL PMC fee | \$ | 4306 |
| Estimated Capital Cost of the project | \$ | 40194 |
| Equity Portion (20% of capital cost) | \$ | 8039 |
| Return on Equity 23.7% per annum | \$ | 5894 |
| Debt portion (80% Cost of capital) | \$ | 32156 |
| Debt Interest (11%per annum) | \$. | 10078 |
| Total Estimated Repayment to EESL | \$ | 56167 |
| Contract Period | Years | 5 |
| Payout to EESL annually | \$ | 11233 |
| EESL Share | % | 71% |
| EESL Quarterly repayment | \$ | 2808 |
| No. of repayments | Quarterly | 20 |

EESL Investment Scenarios – Completed Buildings

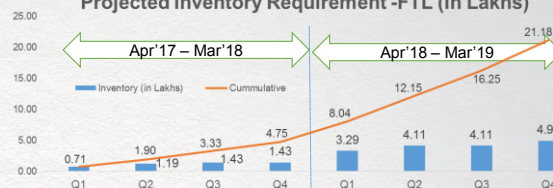


Inventory & Investment : Plan

Estimated Investment (In INR Crore)
In Apr'17 to Mar'19



Projected Inventory Requirement -FTL (In Lakhs)



Projected Inventory Requirement -Ceiling Fans (In '000s)



Projected Inventory Requirement -ACs (In '000s)



Completed Buildings



| S.No. | Building Name | Total Investment-Phase-1 (INR) | Estimated cost of energy savings -Phase -1 (INR) | Estimated Annual Energy Saving potential - Phase -1 (in kWh) |
|-------|---------------------------|--------------------------------|--|--|
| 1 | Jammu Secretariat | 1200000 | 600000 | 100000 |
| 2 | Jammu Assembly | | | |
| 3 | Vidyut Bhawan | 954911 | 477456 | 79576 |
| 4 | Lok NAYAK Bhawan | 5481205 | 2740603 | 456767 |
| 5 | Transport Bhawan | 1360531 | 680266 | 113378 |
| 6 | Sardar Patel Bhawan | 1915390 | 957695 | 159616 |
| 7 | Sewa Bhawan | 6942213 | 3471107 | 578518 |
| 8 | West Block | 2893608 | 1446804 | 241134 |
| 9 | East Block | 4930035 | 2465018 | 410836 |
| 10 | Nirman Bhawan | 10892000 | 5446000 | 907667 |
| 11 | IP Bhawan | 12585000 | 6292500 | 1048750 |
| 12 | Krishi Bhawan | 4181309 | 2090655 | 348442 |
| 13 | Vigyan Bhawan Annex. | 2032103 | 1016052 | 169342 |
| 14 | Puspaha Bhawan | 847970 | 423985 | 70664 |
| 15 | Shastri Bhawan | 6899434 | 3449717 | 574953 |
| 16 | IAS Association | 276000 | 138000 | 23000 |
| 17 | IWAI | 3009000 | 1504500 | 250750 |
| 18 | Niti Aayog | 21600000 | 10800000 | 1800000 |
| 19 | BCC & I | 1400000 | 700000 | 116667 |
| 20 | UPSC | 8207000 | 4103500 | 683917 |
| 21 | Coal India Limited | 9000000 | 4500000 | 750000 |
| 22 | Rajiv Chowk metro station | 3500000 | 1750000 | 291667 |
| 23 | Barakhamba Metro station | 3500000 | 1750000 | 291667 |
| 24 | Dena Bank | 7800000 | 3900000 | 650000 |
| 25 | MOIL | 1387000 | 693500 | 115583 |

Projects Under Implementation Stage



| Name of Buildings | | | |
|-------------------|-----------------------------------|----|-----------------------------|
| 1 | Mahindra & Mahindra (21) | 13 | CGO Complex (12 Buildings) |
| 2 | DMRC METRO STATIONS | 14 | CMO OFFICE, Rajasthan |
| 3 | | 15 | GOVERNOR HOUSE, Rajasthan |
| 4 | Rashtrapati Bhavan | 16 | DENA Bank, Mumbai |
| 5 | DGCA, New Delhi | 17 | YASHADA PUNE |
| 6 | IFCI Ltd, New Delhi | 18 | MOIL, NAGPUR |
| 7 | ATM's | 19 | IWAI, Noida |
| | Union Bank of India & Canara Bank | | |
| 8 | BESCOM | 20 | NEEPCO, Shillong |
| 9 | IAS Association | 21 | Coal India Limited, Kolkata |
| 10 | PWD GOVT. BUILDINGS | 22 | 14 CPWD Buildings |
| 11 | NTPC NRHQ LUCKNOW | 23 | NITI Aayog- Phase II |
| 12 | PMI NTPC | 24 | PDIL, NOIDA |

*** Apart from above EESL also Implementing the EE Projects in all over India CPWD Buildings*

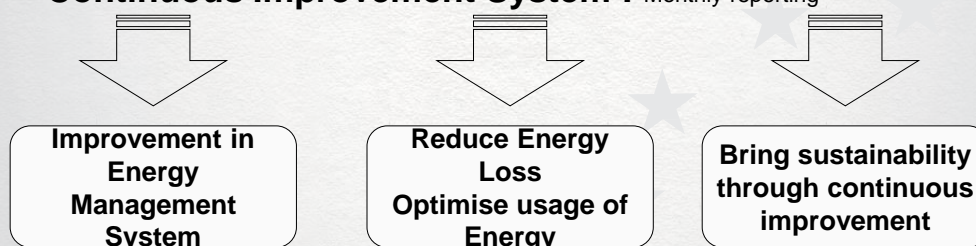
EESL Project in Pipeline

| S.No. | Building Name | Model Type | Total No. of Buildings | Expected Investment (In Lakh INR) | Expected Revenue |
|--------------|---|------------|------------------------|-----------------------------------|------------------|
| 1 | Odisha - Different Buildings of State Govt. | ESCO | 150 | 3750 | 450 |
| 2 | Power Grid Corporation of India Limited | ESCO | 168 | 3360 | 403.2 |
| 3 | Gujarat - Different Buildings of State Govt. | ESCO | 15 | 375 | 45 |
| 4 | Railway Stations | ESCO | 11 | 142 | 17.04 |
| 5 | ATM | ESCO | 1000 | 850 | 102 |
| 6 | Rajasthan-Different Buildings of State Govt. | ESCO | 48 | 720 | 86.4 |
| 7 | CPWD | ESCO | 20 | 300 | 36 |
| 8 | Jharkhand-Different Buildings of State Govt. | ESCO | 150 | 2250 | 270 |
| 9 | Miscellaneous (BESCOM/KGCMC/NFL/EPTRI/CAG/TE RI/BJP Office) | ESCO | 25 | 625 | 75 |
| 10 | Railways | ESCO | 20 | 1000 | 120 |
| 11 | North-East State Buildings | ESCO | 20 | 300 | 36 |
| 12 | UP Power Corporation Power Plants | ESCO | 5 | 2200 | 264 |
| 13 | Shri Mata Vashino Devi Shrine Board | ESCO | 100 | 2000 | 240 |
| Total | | | 1732 | 17872 | 2144.64 |



Tangible Outcomes from Building EE Programs

- **Formats and Procedures on Data Monitoring & Accounting**
- **Baseline Scenario** : Benchmarking
- **Energy Audit Report** : Potential Estimation
- **Energy Audit Manual** : Procedure for performance evaluation
- **Continuous Improvement System** : Monthly reporting





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