

ENERGY SAVING OPPORTUNITIES IN COMMERCIAL SECTOR

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Energy Consumption Facts

- Cities consume 75% of the world's energy
- Responsible for 80% of greenhouse gas emissions
- Building heating, cooling and lighting requirements solely account for 30%-40% of primary energy worldwide

Source: Bureau of Energy Efficiency

Commercial Buildings Projected Growth

- Commercial building sector will grow at 7% annually till 2030 in India
- India has only 200 million square meters of installed base, by 2030, it is expected that 8,690 million square meters of additional space will be constructed.
- 70% of the construction of commercial buildings is yet to take place!

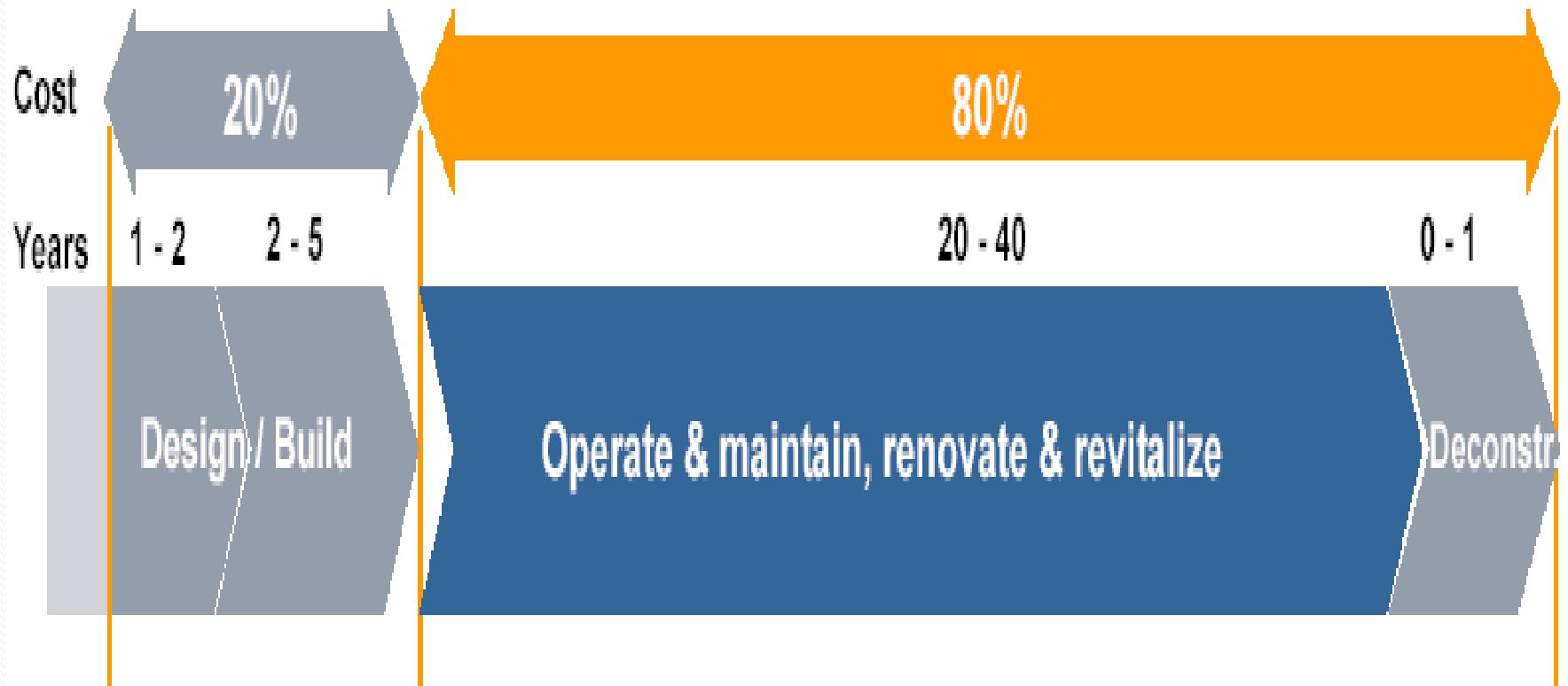
Source: UNEP, Sustainable Building & Construction Initiative

Energy In-efficiency in commercial sector

- Commercial buildings in India have Energy Performance Index (EPI) of 200 to 400 Kwh/sqm/year
- Similar buildings in North America and Europe have EPI of less than 150 Kwh/sqm/year
- Energy conscious design have reduced the EPI to 100 to 150 Kwh/sqm/year in Indian buildings also.

Source: Bureau of Energy Efficiency

Life Cycle of Commercial Building



Source: Siemens

Energy Savings Potential

Energy efficient Commercial Buildings can save up to 40% of power

- Proper orientation, fenestration, shading, roof and wall insulation and efficient glazing – 10%
- Energy Efficient Lighting – 15%
- Energy Efficient Space Conditioning – 15%

Source: Bureau of Energy Efficiency & TERI

Case Study

THE LEELA KEMPINSKI, GURGAON

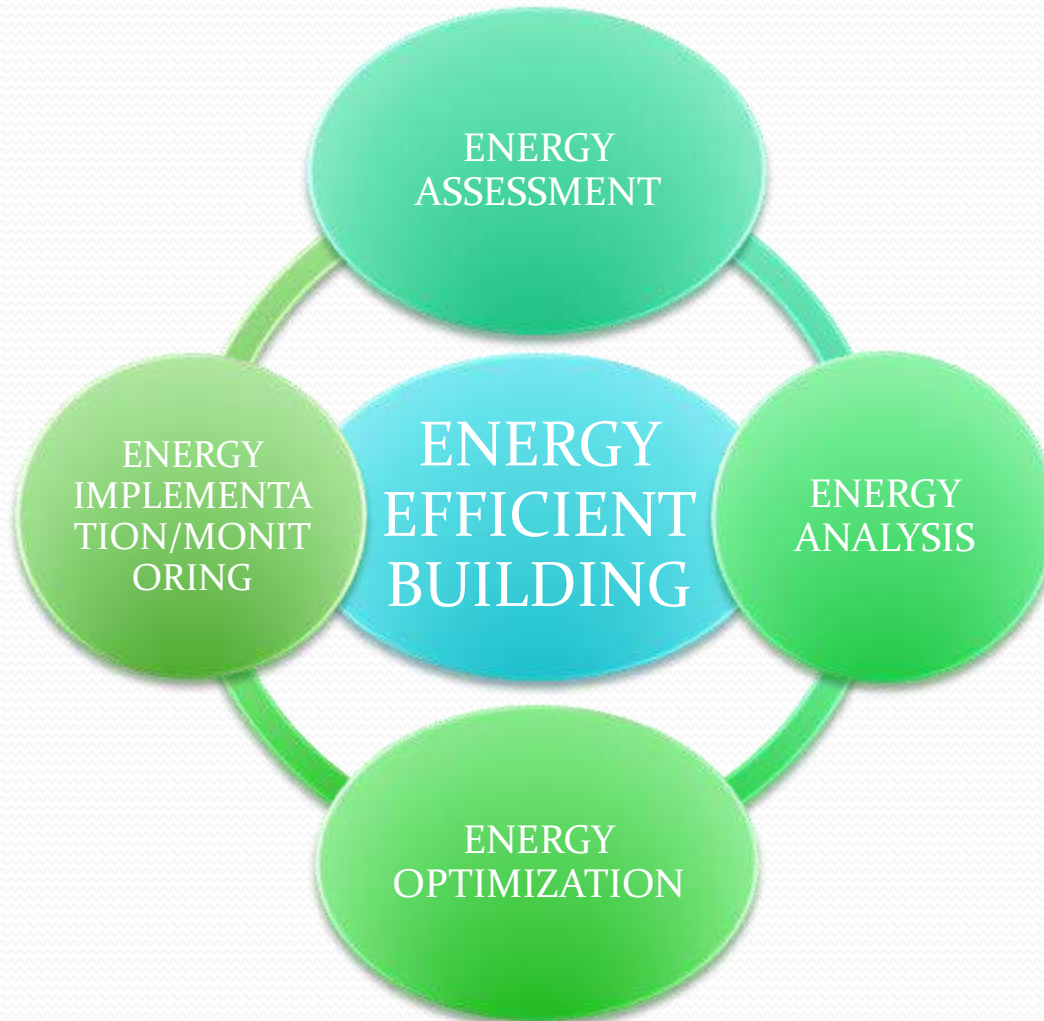
A prestigious luxury Hotel in Delhi (NCR), strategically located at the Delhi - Gurgaon border, with the capital city on one side and Gurgaon's established business district on the other. It has 322 rooms, suites and 90 service apartments.

Scope of Audit

The energy audit was utility specific and covered the following area:

- Steam Boilers
- Hot water boilers
- Motors
- Pumps
- Electrical distribution network
- HVAC system

ANSH Methodology



Major Energy Guzzlers

- Steam Boilers of 0.85TPH steam capacity at 8 kg/cm²: 3 nos.
- Water Boilers of 600000 Kcal with max. operating temperature of 80° C: 2 nos.
- Diesel Generators of 1500KVA: 3 nos.
- Transformers of 1600 KVA: 3 nos.
- HVAC systems of 375 TR and 700 TR: 2 nos. each

Energy Assessment

- Average annual electricity consumption 39,62,660 kWh
- Average annual total HSD consumption 3466937 ltr
- Average annual HSD consumption for steam generation 551729 ltr
- Average annual HSD consumption for water heating 154964 ltr
- Average annual HSD consumption for electricity generation 2760241 ltr

Energy Analysis

Sno.	Particulars	Detailed Analysis		
1	Steam Boilers	Boiler 1	Boiler 2	Boiler 3
	Without ID Fan	84.36%	84.12%	86.56%
	With ID Fan	80.12%	79.70%	82.96%
2	Boiler water pump	5 Kw pump installed against the requirement of 1.5 Kw 75-80% collection, and even that is being drained out without utilization.		
3	Condensate Recovery System			
4	DG cooling water requirement	Required power 18.5 Kw instead of currently 45Kw		
5	Transformers	Operating at 19°C higher then the ambient temperature		
6	Cooling Towers	1400 TR CT operating at requirement of 985.7 TR		
7	Motors			
	Average loading	83.90%		
	Average efficiency	84.59%		
8	Power Factor	> 0.95, but some feeders running at 0.85 lagging		
9	Voltage & Current Harmonics	Less than 10%		

Energy Optimization

Sn o.	ENERGY SAVING PROPOSAL	ANNUAL SAVINGS	INVESTMENT REQUIRED	SIMPLE PAY BACK PERIOD
		Rs.	Rs.	Months
1	Installation of oxygen analyzer for steam boiler	1186560	270000	2.73
2	Condensate recovery	1242396	nil	nil
3	Heat exchanger between condensate and fresh water for supply to guest rooms	3978000	600000	1.81
4	Installation of solar water heater	757010	864000	14
5	Installation of WHRU at Ambience mall generators	19500000	19500000	12
6	Plunger pump replacement for Boiler feed pump	90720	50000	7
7	Automation of condenser pumps	7603200	1100000	2
8	Maintaining transformer at ambient temperature	62015	nil	nil
9	Pump optimization for DG cooling	14310	27000	2
10	Improvement of earthing of transformer and generator, to avoid voltage imbalance.	7983744	375000	17 days
11	Installation of capacitors at HVAC MCC Panel	1493616	150000	1
12	Replacement of large motors with high efficiency motors	1594680	924182	7

Summary

- There are clearly evident energy saving opportunities lying in building operation and maintenance, which get ignored in day to day operation.
- Lack of adequate monitoring equipments in buildings due to cost cutting while installation causes the money to flow down the drain without being seen.
- The payback period of various investment spheres is relatively short and installations are easy.



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