



What are the steps?

Building operations and procurement

Buildings

 IEA #energyefficientworld

Buildings energy efficiency sessions in partnership with:

UCL **ENERGY**
INSTITUTE



1. **Where to start:** Energy use in buildings
2. **Where to start:** Energy efficiency potential in buildings
3. **Toolkit:** Energy efficient building design
4. **Toolkit:** Energy efficient building technologies
Special session. Technology demonstration
Where do I get help? IEA's Technology Collaboration Programmes
5. **Toolkit:** Energy efficiency policies and target setting
6. **What are the steps?** Enabling investment with energy efficiency policies
7. **What are the steps?** Implementing building energy codes and standards
8. **What are the steps?** Building operations and procurement
Special session. The multiple benefits of energy efficiency
9. **Did it work?** Evaluation and energy efficiency indicators
Where do I get help? International and regional energy efficiency initiatives
10. **Energy efficiency quiz:** Understanding energy efficiency in buildings

8. What are the steps? Building operations and procurement

Trainers: Brian Dean and Pierre Jaboyedoff

Purpose: To teach the fundamentals of how energy efficiency can be used in operations and management of buildings to reduce energy consumption.

Scenario: Citizens are asking why government-operated buildings are not efficient. *What measures can enable the government to lead by example with efficient buildings?*

Energy management

Resources

Key steps

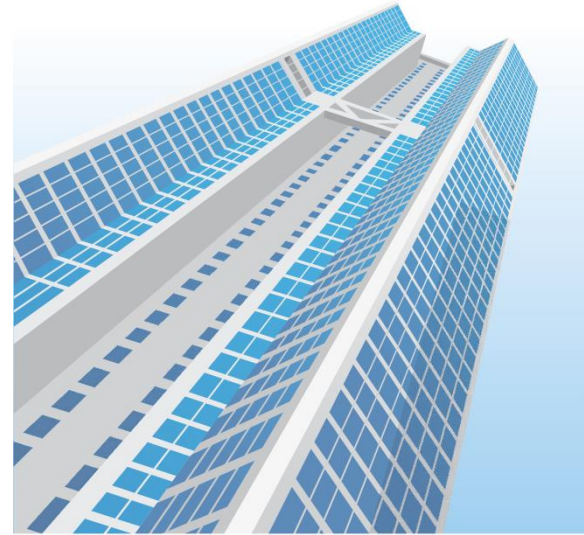


Energy Management IN YOUR SCHOOL



<https://beeindia.gov.in/sites/default/files/guidebook-School.pdf>

ENERGY MANAGEMENT IN YOUR HOTEL



<https://beeindia.gov.in/sites/default/files/guidebook-Hotel.pdf>

1. Initiate an energy management programme
2. Determine efficiency targets
3. Conduct energy assessments
4. Identify energy savings opportunities
5. Calculate costs and paybacks
6. Implement measures
7. Monitor performance

Step 1: Initiate an energy management programme



- Understand existing energy use situation
- Identify a core team
- Identify and set specific objectives, which will guide:
 - Developing and communicating a plan
 - Implementing measures
 - Monitoring performance
 - Motivating stakeholders and staff members

Step 2: Determine efficiency targets



- Follow the path of our training:
 - Examine where is energy being used (session 1-1)
 - Identify energy efficiency potential (session 1-2)
 - Leadership and stakeholder engagement to set targets (session 2-2)
- Start with aspirational targets identified by experts and leadership

Step 3: Conducting energy assessments



- Simple audit (walk through assessment) or detailed audit (energy analysis assessment)
- Use existing forms and checklists to capture the information
 - Energy planning ledger
 - Questionnaire for building operators
 - Walk through checklist

Energy Planning Ledger

How much energy does your school use? Ask to see your school energy bill for this previous year or term.

Requires annual electricity bills for a 12 month period and use them to fill out the ledger provided below. If bill is not for a monthly basis, complete all entries for these consecutive months to make up for a quarter of the year.

School Building Statistics

Current Area Sq. Ft. _____
No. classrooms Area Sq. Ft. _____
Number of offices _____
Building Age _____

Energy Source

Electricity _____ % of total cost
Gas _____ % of total cost

Total electricity use per quarter _____
Total gas use per quarter _____
Number of lighting days _____
Number of students and teachers at your school _____

25

Questions For O&M Staff At Specific School(s) Energy Policy And Building

Questions for O&M Staff at Specific School(s) Energy Policy and Building

Operations Procedures

1. Is there any specific list of standard building operating and maintenance procedures in your building?
2. Are your maintenance records up to date? Of particular interest are the heating and air conditioning of air conditioning and other major building systems.
3. What are the roles of your staff in assessment of energy use in other important areas related to energy conservation?

Building Energy Information

4. What are the energy costs at your school, including or excluding what are the reasons for these charges?
5. How are you provided with the necessary energy conservation or saving information for your school?
6. If you know how do you use this information?
7. Do you know how energy costs at your school compare to costs in other similar schools?

27

Walk Through Assessment Checklist

CHECK LIST	ACTION LIST	OBSERVATION
HEATING & COOLING		
Windows and Built-Ins		
OPERATION		
Control opening/closing of AC unit - use manual control, never automatic control.		
Keep doors and windows closed when using the AC.		
Ensure that thermostat settings are not set too high or too low - set for 74-22°C in winter and 22-27°C in summer.		
Locate AC unit away from direct sunlight where possible.		
Avoid frequent opening of doors/windows of the room.		
MAINTENANCE		
Regularly replace or clean the filter and have a mechanic check the compressor and condenser coils.		
Check and replace thermostat regularly.		
If your compressor doesn't work properly call a certified repair technician.		
The AC motor needs to be checked by a mechanic.		

29

Step 4: Identify energy saving opportunities



Follow the path to low energy existing buildings (session 1-1)

- Start with low-cost and no-cost energy sufficiency and efficiency measures

1. **Make energy savings as part of the culture of the organisation**

- Stakeholder engagement and goal setting

2. **Retro-commission**

- Address maintenance and repair issues
- Identify changes in operations

3. **Building improvements**

- Reduce electrical loads
- Improve building envelope
- Upgrade equipment components

4. **Replacement options**

- Change equipment to be more efficient and right-sized

Step 5: Calculate costs and paybacks

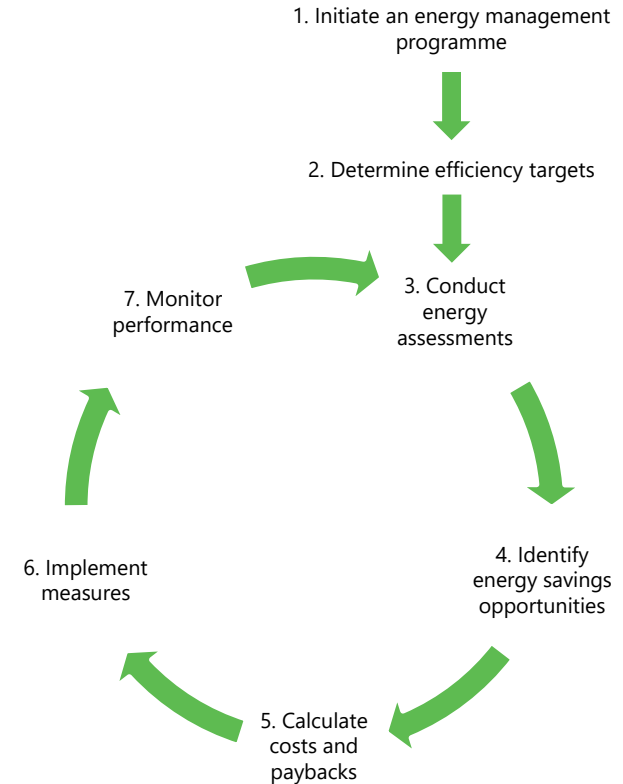


- **Consider the cost analysis type needed:**
 - Simple payback method
 - Return on investment of internal rate of return (IRR)
 - Cost benefit analysis
 - Net present value (NPV)
 - Lifecycle assessment (LCA)
- **Increasingly understand the impact of:**
 - Future energy prices
 - Full range of benefits (multiple benefits of energy efficiency)

Steps 6 & 7: Implement measures & monitor performance



- Implement energy efficiency measures
 - All cost effective measures that have benefit to owners and occupants
- Monitor performance
 - Evaluation of energy efficiency (session 3-2)
 - Data collection / sensors / energy management systems
- Continuous improvement
 - Use the information collected to continue the process again back at step 3 to identify more energy savings opportunities for continuous improvement



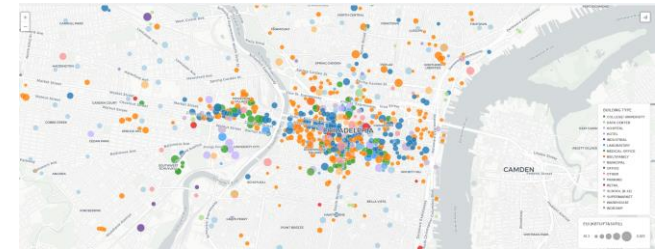
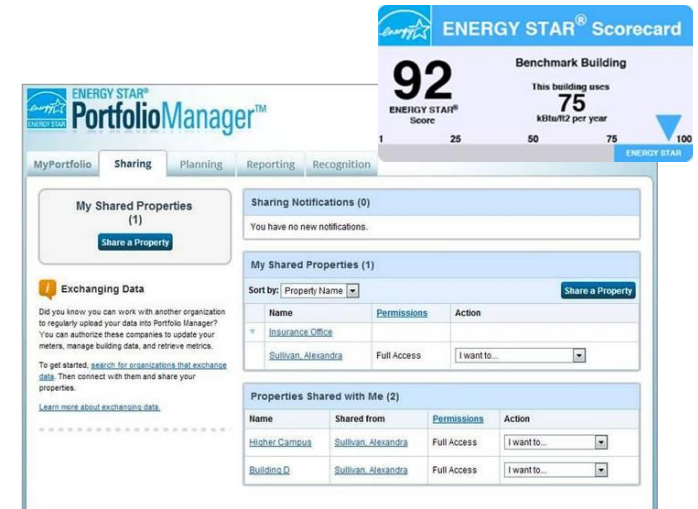
Example: Portfolio Manager from ENERGY STAR



UNITED STATES

Since 2018, according to Local Law 33, **New York City** enacted a benchmarking program, where buildings with over 50,000 gross square feet receive a score generated by EPA's ENERGY STAR program. **In NYC, by the beginning of 2020, the Department of Buildings will assign a grade to each building, which will have to be placed near each building entrance within 30 days after receiving the score.** The benchmarking and disclosure program are part of the city's efforts to reach the goal of reducing greenhouse gas emissions by 80% in 2050.

Other cities in the US have already implemented similar measures. In **Atlanta**, commercial buildings of over 25,000 square feet have been informing the government their ENERGY STAR score since 2015, with the first public report being released in 2017. In **Boston**, residential buildings that are 35,000 square feet or larger, or have 35 or more units must report their energy and water use since 2013, with the city publishing this information in their website annually, with individual reports having to be updated every 5 years. In **Philadelphia**, the local Energy Benchmarking and Disclosure Law requires large commercial and multifamily buildings with over 50,000 square feet to report their water and energy use since 2012. The collected scores can be visualized in an interactive map provided by the government, available [here](#).



Example: mandatory disclosure for commercial buildings in Australia



OBJECTIVE

Require sellers and lessors to disclose information regarding energy efficiency of commercial buildings with over 1,000 m² of floor area, improving transparency on real estate transactions. Not all buildings are affected, requiring accredited assessors for compliance requirements.

BACKGROUND

The **Commercial Building Disclosure (CBD)** came to force in 2010, requiring commercial buildings to **have a Building Energy Efficiency Certificate (BEEC)**, being the BEEC necessarily provided to potential buyers or lessees when requested at the time of sale, lease or sublease. **Such certificates are composed by two parts:** (i) a star-score from a national rating system that measures the environmental performance of buildings, tenancies and homes, called **National Australian Built Environment Rating System (NABERS)**, and (ii) a Tenancy Lighting Assessment, which measures the power density of the installed general lighting systems and its performance level. **BEEC's must be issued every 12 months**, ensuring compatibility to the latest energy efficiency improvements.

ACTIVITIES AND RESULTS

- **7,773 BEEC's had been issued** until 2018, with 2,162 unique buildings certified;
- The initial threshold was 2,000 m², which led to an average of 200 new buildings acquiring the BEEC yearly. In 2017-2018, when the threshold was lowered to 1,000 m², **312 buildings obtained a BEEC**;
- On the NABERS scale from 0 to 6, buildings, **CBD participants score an average of 3.7**. Larger buildings generally present higher scores.



Nabers rating scale

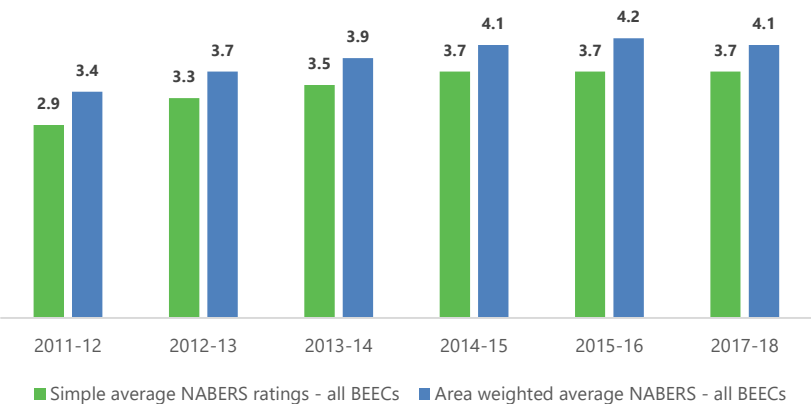
Disclosure program for commercial buildings (CBD) based on EE certificates (BEEC) which have a score from 0 to 6 stars based on their performance (NABERS).

Example: mandatory disclosure for commercial buildings in Australia



MULTIPLE BENEFITS

Commercial buildings using NABERS have reported energy efficiency improvements of almost 10%. In addition to that, surveys conducted in the program framework show that lessors and sellers can obtain up to a 9% green premium on the building value, depending on their score. Accordingly, buildings with BEEC have considerably increased their ratings in the first years of the program (2010 to 2014), but now have shown steady and even slightly decreasing scores due to: increased difficulty due to higher improvements marginal costs, and the reduction of the floor area threshold in 2017-2018, leading to more and smaller, poorer performing buildings participating in the program than the previous years.



Average energy performance of commercial buildings within CBD is improving, but may be reaching its limit. Reducing the floor area threshold may have contributed for the flattening and slight decrease, stabilizing the rating just over 4 stars rating.

Procurement

Public procurement

Bulk procurement



- Procurement is the act of purchasing products or services.
- Procurement policies can be set up for businesses or government organisations.
- Types of procurement:
 - **Public procurement:** policies that require public organisations to purchase products or services that meet a specific standard
 - **Bulk procurement:** policies that enable significant quantities of products or services to be purchased by organisations for either the organisation or clients
 - **Energy savings performance contracting:** agreement on delivering energy efficiency services for a range of projects

Procurement: development and implementation steps

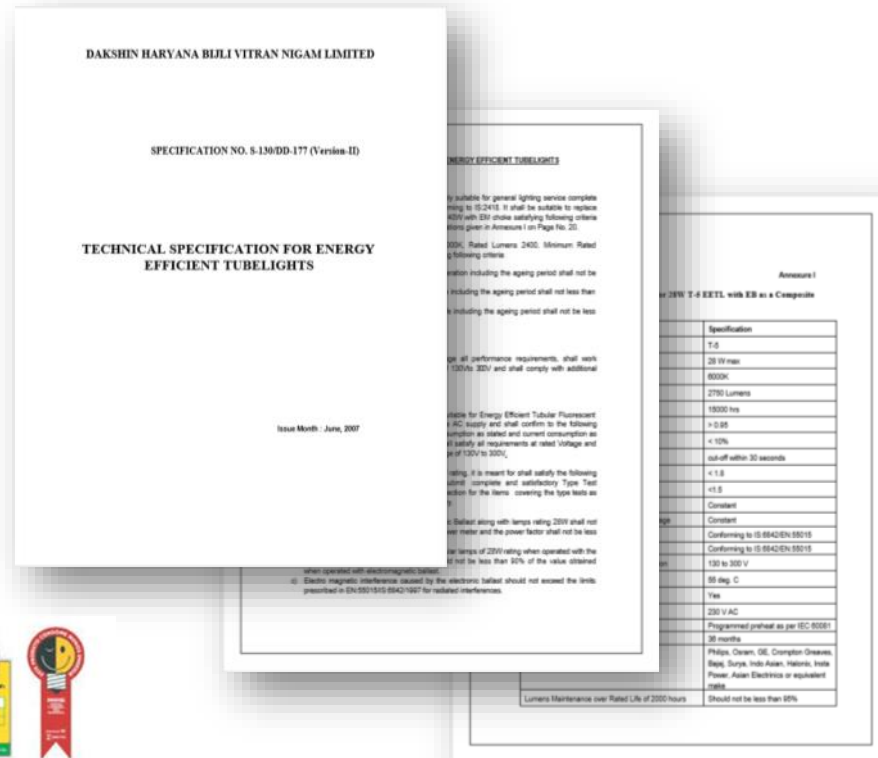


- **What?** The government purchasing efficient and sustainable products and services
- **Why?** Because governments spend more money and can influence the market for products and services
- **How?** Define minimum efficiency requirements in the procurement specifications and enable purchases based on cost effectiveness and lifecycle cost benefit analysis (and not based on first cost as used in some traditional procurement rules)
- **Result?** Efficient and sustainable product and service prices will go down, further improving the cost effectiveness of energy efficiency

Energy efficient and sustainable procurement



- Purchasing products and services that meet certain energy efficiency criteria
- Approaches include:
 - Energy efficiency label / certificate
 - Technical specifications
 - Lifecycle assessment
 - Qualifying product list



From left to right: US ENERGY STAR, EU Energy label, China EE Label, India Bureau of EE Label, Korean EE Label, Mexico Sello FIDE, Thailand EGAT EE Label, Brazil Selo Procel

- **What?** The purchase of efficient and sustainable products and services in large quantities for one organisation or a programme that sells or delivers those products or services to many people or organisations.
- **Why?** Because when products and services are purchased at large scale, it is possible to get a large quantity of “group discount” that will lower the cost
- **How?** Create a legal agreement directly with the product or service provider to enable the purchase of large quantities of products and services over time that will enable improved pricing on the purchase and lower costs for the product or service provider due to increased staff or production utilisation
- **Result?** Efficient and sustainable product and service prices will go down, further improving the cost effectiveness of energy efficiency

- **EESL's UJALA programme:**

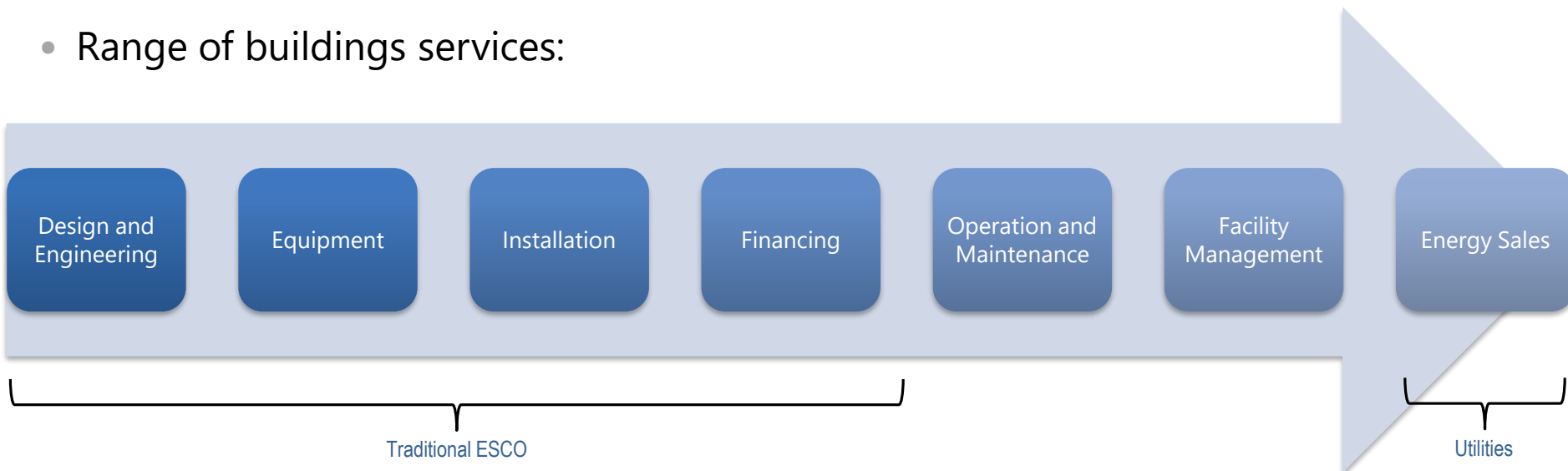
- the world's largest lighting replacement programme, which aims to replace 770 million old lamps with efficient LED lamps without government subsidies



- **Thanks to bulk purchase:**

- UJALA LED bulbs cost only 50 INR
- LED retail prices reduced from 800 INR in 2012 to 200 INR in 2016 and less today
- Leading to one of the fastest LED price reductions in the world
- Helped improve acceptance and availability of LEDs in India

- Energy service company (ESCO) often deliver on ESPCs:
 - Can provide financing for energy efficiency
 - Can provide energy efficiency services
 - Typically tasked with delivering/guaranteeing energy savings
- Range of buildings services:



Scenario:

Citizens are asking why government-operated buildings are not efficient.

What measures can enable the government to lead by example with efficient buildings?



www.iea.org



IEA #energyefficientworld