

solution package

# Lighting and Plug Loads

A guide to lighting and plug load solutions that improve comfort, marketability, and energy efficiency.

The BE-Ex solution packages are a suite of six documents compiled from the *Anatomy of an Energy Efficient Building* exhibit on view at Building Energy Exchange's downtown resource center, or virtually at [be-exchange.org/anatomy](http://be-exchange.org/anatomy)

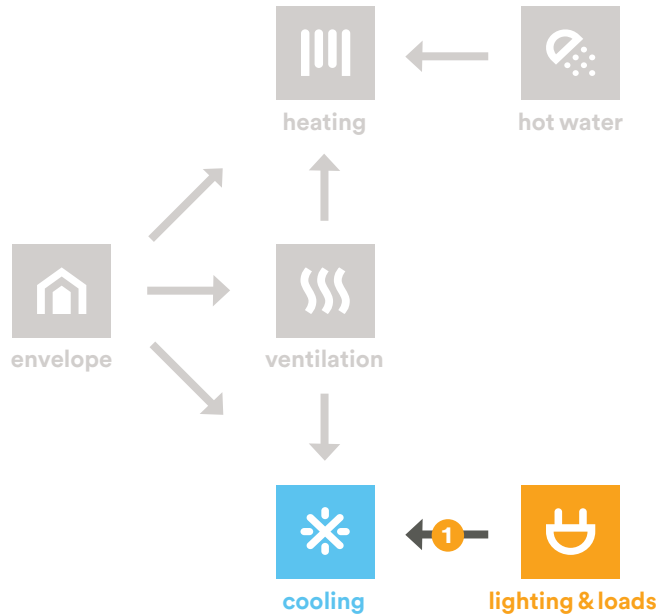
HEALTHY  
SUSTAINABLE  
ENERGY EFFICIENT  
COST EFFECTIVE  
BETTER!!!

Anatomy  
of a  
Building

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# system interaction

The performance of lighting systems and plug loads is often contingent on the function of other building systems. Lighting and plug load upgrades should be considered in the context of how other systems will impact them.



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## lighting & loads → cooling

Lighting, electronics, and appliances all generate heat, resulting in marked increases in cooling loads, particularly in commercial buildings.

# operations & maintenance



Investing in operations and maintenance best practices ensures that building systems run optimally, enabling proper performance in existing equipment and maximizing return on investment in new systems. Best practices for lighting and plug loads include:

## lighting:

- Program building management systems to reduce lighting during periods of high regional electricity demand and peak prices.
- Set lighting controls to automatically dim or turn off lights based on vacancy sensors, anticipated scheduling needs, and/or historic energy use data.
- Share submetering data and energy use reports/breakdowns with occupants.
- Educate occupants on proper use of advanced lighting systems and opportunities to reduce energy waste.

## plug loads:

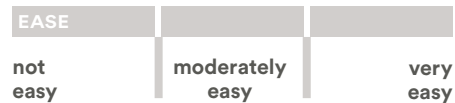
- Incorporate energy conservation practices and submetering guidelines into lease agreements.
- Engage tenants and occupants in developing plug load reduction strategies.
- Appoint a Sustainability Champion to serve as a point of contact and organizer for each tenant space.
- Set timers, smart plugs, or controls to turn off equipment and appliances after working hours.
- Use energy savings settings on monitors and computers.
- Review appliance and equipment use periodically and eliminate or consolidate duplicate and unused equipment.



Reducing lighting and plug loads yields significant energy savings along with many other benefits, such as improved aesthetics when upgrading fixtures and appliances, and greater occupant comfort, wellness, and productivity.

## Key

### EASE OF IMPLEMENTATION



**Ease of Implementation** reflects technical and financial feasibility.

Measures marked “not easy” are typically expensive, complex, highly disruptive, or pay back slowly, while “very easy” measures tend to be in-expensive, quick, and straightforward.

### PROJECT IMPACT



**Project Impact** reflects potential to reduce energy and emissions and to improve system performance.

“Low impact” measures typically yield minor savings and incremental improvements, while “high impact” measures achieve major savings and comprehensive improvements.

### ADDED BENEFITS

**operations & maintenance**  
Keeps building performing optimally when completed on a routine basis

**health & comfort**  
Enhances indoor environmental quality and advances occupant wellbeing

**marketability**  
Improves aesthetics and upgrades occupant spaces, increasing appeal to potential tenants

**future-ready**  
Puts building on path for long-term emissions reduction and legislative compliance

### RATING SYSTEM METHODOLOGY

Ratings and benefits of energy conservation measures were assigned based on NYC energy audit data and analysis by industry experts. Actual results will vary by building type, use, and baseline conditions.

## Improve Lighting Quality & Reduce Energy Waste

### Install LED Bulbs

Consider replacing both the bulb and the lighting fixture to maximize efficiency and improve aesthetics.



### Design for Daylight

Strategically place interior walls, windows, and furniture to allow maximum daylight into a space.



## Improve Lighting Quality & Reduce Energy Waste, cont.

### Incorporate Task Lighting & Reduce Overhead Lighting

Task lights, like desk lamps, enable individuals to illuminate work surfaces to desired levels and reduce the need for overhead lighting.



### Install Daylighting Sensors & Controls

Program daylighting controls to automatically adjust window shades and electric lighting to maximize use of natural light.



# lighting & plug loads efficiency measures



## Improve Lighting Quality & Reduce Energy Waste, cont.

### Install Zoning Wiring & Controls

Establish zoning to enable localized groups of lights and appliances to be controlled manually or by building control systems.



### Install Scheduling or Vacancy Based Controls

Automatically dim or turn off lights when common spaces are vacant, or at programmed times of the day.



## Update Equipment & Supply Power Only to Items in Use

### Upgrade Transformers/Fuse Boxes

Upgrade electrical service to enable future efficiency and electrification upgrades.



### Upgrade Appliances

Install ENERGY STAR certified appliances and right-size equipment to meet modeled and/or measured building needs.



## Update Equipment & Supply Power Only to Items in Use, cont.

### Use Advanced Power Strips & Smart Plugs

Minimize vampire loads drawn from appliances in standby or low-power states.



### Install Submetering & Disclose Data

Install submeters to identify high energy use equipment and operations. Share data with end-users to encourage conservation.



### Inventory & Consolidate Plug & Process Loads

Remove duplicate and/or underused equipment and appliances and consolidate to fewer, higher efficiency devices.



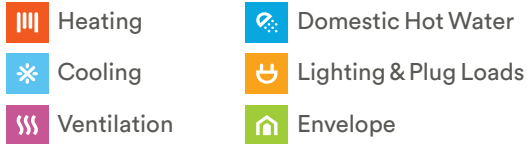
### Incorporate Scheduling or Vacancy Based Controls

Automatically power off unused or idle equipment.



## Further Reading

The BE-Ex solution packages cover the following building systems:



To access the suite of solution packages, visit:  
[be-exchange.org/anatomy-solutions](http://be-exchange.org/anatomy-solutions)

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