tech overview

applicable building types
multifamily and commercial
implementation
anytime, at tenant turnover
fast facts
- reduces energy use
- reduces GHG emissions
- improves tenant experience
- encourages energy reduction
- reduces utility costs
- enhances building performance

tech primer

Plug Loads and Tenant Energy Use Reduction

A guide to saving energy in tenant occupied spaces.

cost & benefits

GHG savings

Tenant Experience Improvements

Utility Savings

Capital Costs

Maintenance Requirements

*ratings are based on system end use, see back cover for details.

Understanding plug loads and tenant energy use

Energy use in tenant spaces can be significantly reduced by adopting simple user engagement strategies, upgrading to efficient appliances and equipment, sub-metering tenant spaces, and installing smart lighting controls.

How tenants use energy

Plug loads refer to the amount of energy used through electrical outlets for things like electronics and appliances in tenant-occupied spaces that, along with lighting and other energy consuming equipment used by tenants, add up to a significant portion of electricity use in buildings, especially commercial offices.

Many opportunities to reduce plug loads and tenant energy use are relatively low cost but require increased coordination and engagement with tenants. Combining inexpensive technology upgrades with tenant education and behavior change can help reduce energy use in both multifamily and commercial spaces.

During tenant turnovers, incorporating energy conservation practices into lease language helps establish energy use expectations. Educating tenants on efficiency best practices gives them the tools to reduce energy use and helps create advocates within a building or occupant group. Tenants participating in plug load and energy use reduction programs may also be more receptive to other energy improvements and technology investments.

Installing sub-meters and tracking energy consumption can increase tenants' motivation to improve energy efficiency by revealing how and when energy is used. Data sharing allows tenants to track energy use over time and witness the success of efficiency improvements.

Technology improvements that further reduce plug loads include upgrading appliances and equipment to high-efficiency models and installing vacancy sensors or timers on lighting and equipment.

A lighting vacancy sensor saves energy by automatically turning off lights when a room is empty.

Assess
Always consult a qualified service provider before undertaking any building upgrades.

Upgrade Electrical Service For Future Improvements
Upgrading a tenant's electrical service to 201/230 volts should be conducted when installing electricity sub-meters.

Upgrading to 201/230 volts enables future energy efficiency and electrification upgrades.

Engage and Educate Tenants
Engaging tenants in a plug load reduction strategy may be a significant departure from the normal landlord-tenant relationship. Consider setting up a tenant association that can evaluate how to implement energy conservation efforts.

To avoid resistance, each occupant group should be engaged with individually.

How to reduce plug loads and tenant energy use

Tenant education and energy conservation programs can begin anytime, whereas equipment, appliance, and control upgrades are best implemented during tenant turnovers.

Retrofit solutions

There are multiple steps to reducing plug loads and tenant energy use in multifamily and commercial buildings:

A Commercial Strategies –

1. Install Sub-Meters with Feedback to Tenants – Sharing metered energy data can encourage tenants to conserve energy.

- Create an online portal or install a flat panel monitor in each tenant's lobby to give occupants a view of their energy use. With more granular information such as daily summaries or real-time energy use data, the occupants can investigate where and how they are using energy.
- Create friendly competition to encourage energy reduction by comparing energy use data to other spaces in the building, or to similar spaces in other buildings, to show tenants if they are high energy users.

2. Install Vacancy Sensors – Program vacancy sensors with controls to turn off lights and appliances when spaces are not in use, especially overnight or after office hours.

3. Use ENERGY STAR certified appliances – Upgrade office equipment such as computers, printers, and TVs, as well as refrigerators, microwaves, coffee machines, and other appliances to ENERGY STAR certified models.

4. Include Power Usage Effectiveness in Lease Documents – For commercial leases with IT infrastructure, include requirements for Power Usage Effectiveness (the ratio that describes the efficiency of a computer data center) and encourage waste heat recovery.

5. Encourage Tenants to –

- Use the resources available at the ENERGY STAR Bring Your Green to Work website.
- Use timers on appliances such as water heaters or other appliances that are not in use overnight.
- Use energy saving settings on monitors and computers.
- Use window shades to keep cooling loads down.
- Install signs or other simple communications that remind tenants to turn off lights, computers, and HVAC units when not in use.

B Multifamily Strategies–

1. Install Sub-Meters – It's best practice to sub-meter each apartment, as tenants who pay for electricity tend to be more motivated to reduce energy use.

- If billing tenants for electricity is not desirable, sub-metering without billing can still encourage energy conservation. With the right messaging, each resident can contribute towards reducing the overall energy use of the building. Refer to the ENERGY STAR website for communication and messaging strategies.

2. Use ENERGY STAR certified appliances – Replace old appliances with energy efficient models. Upgrading all refrigerators, microwaves, and dishwashers to ENERGY STAR certified appliances can greatly reduce each unit's energy use.

- In buildings where appliances are owned by tenants, coordinate a bulk purchase to reduce the per-unit cost and comprehensively upgrade all appliances to efficient models.

3. Install high-efficiency electric stoves – Replace electric coil stoves, including infrared cooktops, with more efficient induction cooktops.

- Where gas stoves exist, make sure apartment electricity service is 208/230V and switch to electric induction cooktops and ovens.

4. Encourage Tenants to:

- Use the resources available at the ENERGY STAR Live Green at Home website.
- Deactivate power strips and electronics, turn off routers, cable boxes, coffee machines, and televisions when not in use.

Costs and benefits of reducing plug loads*

Greenhouse Gas (GHG) Savings

Depending on a building's baseline energy use, plug load reductions can significantly lower electricity-related GHG emissions without compromising tenant experience.

Tenant Experience Improvements

Upgrading appliances to more efficient models improves tenant experience, and removing gas appliances from apartments reduces fire risk and harmful combustion products from the air. Saving energy can make a tenant feel empowered and more satisfied with the building they work or live in.

Utility Savings

If the building is submetered, owners will see little change in utility bills as most utility savings will appear on tenant bills.

Capital Costs

A small capital investment is required for installing sub-metering, appliance upgrades, and other plug load reduction strategies.

Maintenance Requirements

Regular engagement with tenants may improve how building staff execute operations and maintenance tasks. Occupants can tip off staff to maintenance issues and reduce repair cost and downtime.

Take Action

This document is one of more than a dozen High Performance Technology Primers prepared by the Building Performance Partnership (BPP) to introduce decision-makers to solutions that can help them save energy and improve comfort in their buildings.

For more information, contact
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The Building Performance Partnership (BPP), created by Building Energy Exchange (BE-Ex) and the Institute for Market Transformation (IMT), supports the creation and operation of local high-performance building hubs that accelerate measurable, equitable, and sustainable action to improve the health, comfort, and performance of buildings. With support from both BE-Ex and IMT, partner hubs serve their respective regions with customized resources that cater to the needs of their communities while benefiting from the existing resources and expertise of our network.

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*The Costs & Benefits rating system is based on a qualitative 1 to 4 scale where 1 () is lowest and 4 () is highest. **Green** correlates to savings and improvements, **dark blue** correlates to costs and requirements. Ratings are determined by industry experts and calculated relative to the system end use, not the whole building.

Note: Most utility cost savings will be on tenant bills unless the building is master metered.