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In an effort to promote electricity-saving measures for Existing Buildings projects in MPP, past projects were analyzed to determine what differentiates projects with average performance from those that achieve a much higher percentage of electric savings. A broad sample was examined, and some trends were identified.

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### **How are higher level savings accomplished?**

Top savings performance relies primarily on the development of successful scopes of work. The projects with the greatest electric savings identify significantly more lighting opportunities, 30%-60% more compared to average projects. The best work scopes also recommend measures that result in six to eight times greater savings for motors and appliances.

### **Opportunities vary according to building size and type**

For smaller buildings of 100 units or less and garden apartment type housing, 80% or more of the top electric saving projects rely heavily on lighting improvements and savings from the replacement of older refrigerators. While savings from lighting upgrades tend to play a significant role in top performing projects of any size, it appears to be particularly important for these smaller buildings.

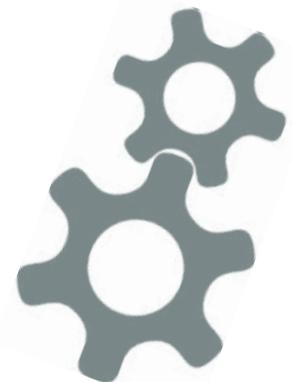
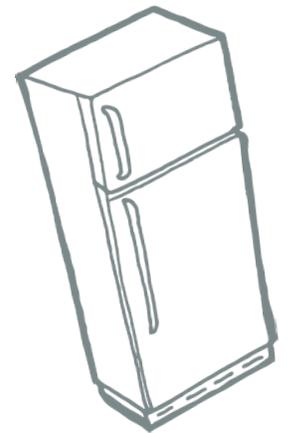
Electric savings tend to be more broadly diversified in larger multi-story buildings, with lighting still common, but more opportunities being identified for motor upgrades and the improvement of central HVAC equipment not typically found in smaller buildings. Larger buildings are often served by equipment with large motors that operate for many hours per year, and the installation of variable speed drives on large pumps or fans, or the upgrading of elevators which operate with DC motor generator sets, can offer the potential for significant electric savings.

### **It can take money to save energy...**

It seems clear that the highest performing projects invest more money per unit for electric measures than average projects, at least 50% more based on the sample. In-unit improvements also often play a key role for buildings in boosting electric savings above average levels. This underscores the importance of partnering with the building owners and management in developing work scopes that will achieve a high level of electric savings, as they often will have higher first costs or require large capital improvements, and some of the immediate benefits of in-unit improvements may accrue largely to the tenants. Encourage building owners to look beyond short simple paybacks when considering which energy conservation measures to implement.

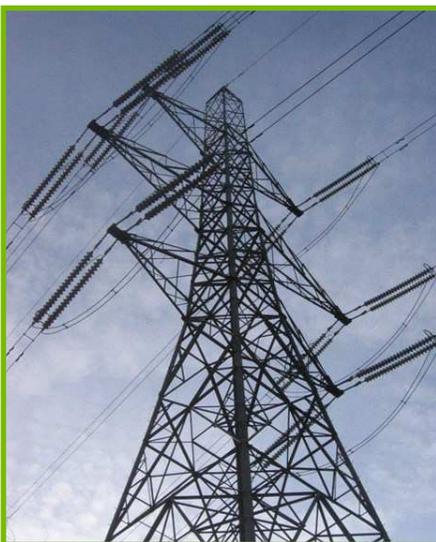
## Guidelines for projects to achieve greater electric savings

- Discuss with the building owner or responsible parties their goals and whether they will consider implementing in-unit lighting improvements and refrigerator replacements and/or big capital projects like chiller replacements.
- Look hard for lighting opportunities. Are there significant numbers of incandescent bulbs or T-12 lighting? Are there common areas that are over lit and might offer opportunities for de-lamping or removing fixtures? Is there high intensity discharge exterior lighting that might be replaced with LED fixtures of lower wattage? Are there outside lights found on during the day? Are there lights on continuously or for extended periods in common areas? Could bi-level lighting be recommended for stairways? Are there incandescent or fluorescent exit signs that could be replaced with LED signs?
- Get a complete inventory and check the age and rated electric use of 100% of the refrigerators in all buildings; most refrigerators older than ten years could be replaced with newer units that use substantially less energy.
- Look for any large motors and determine the hours of use and duty cycles. Do they run for long hours? Are they older motors that could be replaced with premium efficiency motors? Do they often operate at part loads and could benefit from variable-frequency drives (VFDs)?
- Motors that may typically yield good savings from VFDs can be found on:
  - water booster pumps
  - chilled water pumps
  - cooling tower pumps
  - electric chiller compressors
  - dual temperature pumps
  - pumps on large hydronic systems
- Any motors larger than one horsepower that run continuously or for long hours may present good savings potential for improvements
- Most larger buildings have elevators that run for many hours per day. It is relatively common for older elevators to operate with DC motor-generator sets, which suffer from combined efficiency losses and consume energy constantly, even in standby mode. In addition to electric savings, maintenance cost savings can be gained by replacing motor-generator sets with solid-state rectifiers or replacing the DC motors with variable voltage variable frequency (VVVF) drives.



## Guidelines for projects to achieve greater electric savings

- Ask about the building ventilation schedules. Are fans operating continuously for areas that do not require continuous ventilation? Is there ventilation in excess of code-mandated rates? Significant electric savings can be achieved by:
  - sealing leaks and reducing total airflow
  - installing variable speed exhaust fans
  - adding fan timers that can be shut off for periods of the day or night
- Look for opportunities with any large fans: could they be reduced in size or upgraded with variable speed drives?
- Electric savings can sometimes be gained from the de-commissioning of old equipment that is being removed when fuel conversions are recommended. In conversions from #6 oil to natural gas, the oil circulator pump, electric pre-heater and fuel tank heaters can be taken out of service, saving electricity.
- What is the age and efficiency of the central cooling plant? Buildings with older electric chillers have the potential for large savings with the upgrade to new and more efficient electric chillers with variable speed controllers.



The goal of achieving greater electric savings in multi-family buildings is one that relies heavily on the skills and perceptions of the auditing team in tandem with the willingness of the building owners to invest in a forward thinking way. Attention to the identification of good measures in buildings, and not missing savings opportunities, is critical in developing scopes of work that will provide significant electric savings. The decision of the ownership to make in-unit improvements is often critical for meeting goals in top performing projects; they should be supported in this with recognition for their contributions to reducing both demand and source energy consumption for their building.