

## **Sector: Commercial**

## **Category/Practice: Energy / Electricity Distribution Design Requirements**

### **Proposed GB practice**

#### **Description**

An electric distribution system serving a building with a floor area of 15,000 sq. ft. or more must be designed such that each primary electric panel supplies only one electricity use type for the following:

- ♦ HVAC system total energy use.
- ♦ Lighting system total energy use.
- ♦ Plug loads.
- ♦ Process loads.
- ♦ Miscellaneous loads.

Buildings designed and constructed where each load is measured through the use of sub-meters or other equivalent methods are exempt.

#### **Applicability**

New construction: Applies to buildings 15,000 SF and larger

Additions: Applies to new panels for additions 15,000 SF and larger

Alterations: Does not apply

#### **Intent**

Provide the space for meters and segregate energy loads for easier sub-metering of building energy use. This facilitates measurement and verification activities and continuous commissioning and monitoring of building energy use.

Meters are not an energy efficiency/energy conservation technology per se; instead, meters and their supporting systems are devices that provide building owners and operators with data that can be used to:

- Reduce energy/utility use
- Reduce energy/utility costs
- Improve overall building operations
- Improve equipment operations.

How the metered data are used is critical to a successful metering program. Depending on the type of data collected, it can enable the following practices and functions:

- Verification of utility bills

- Comparison of utility rates
- Proper allocation of costs or billing of reimbursable tenants
- Demand response or load shedding when purchasing electricity under time-based rates
- Measurement and verification of energy project performance
- Benchmarking building energy use
- Identifying operational efficiency improvement opportunities and retrofit project opportunities
- Usage reporting and tracking in support of establishing and monitoring utility budgets and costs, and in developing annual agency energy reports.

This practice does not require sub-metering, only providing the capability to do it.

## Benefits and Costs

### Triple Bottom Line Benefits

People: Better information on building energy use can make diagnosing building problems easier for building managers.

Economic: According to the *Federal Building Managers O&M Best Practices Guide*, installing sub-meters and utilizing the data to verify utility billing, identify problems with equipment, manage peak demand periods, and identify efficiency opportunities can lead to energy savings as high as 20 percent. The guide recommends estimating 2 percent savings for determining the economic case for a sub-meter.

Note that these savings only apply if sub-meters are installed and the data used to actively manage energy use. This measure as it stands alone does not produce energy savings.

Environment: Reduced energy consumption and CO<sub>2</sub> emissions (~400 pounds of CO<sub>2</sub>/square foot/year)

### Costs passed to owner

Assuming an additional panel must be added, the cost would be \$1,750 per structure for buildings less than 35,000 square feet. Larger buildings will likely have a sufficient number of electrical panels to segregate loads without adding additional equipment. Note that the proposed practice does not require sub-metering and no savings will result without sub-metering. Each sub-meter is estimated to cost at least \$1,500 according to the Federal O&M guide.

### Lost Opportunity

This is a lost opportunity if not done at the time of construction. Without this in place it would likely be difficult and/or expensive to monitor discrete building systems.

## Implementation

### Availability of products and/or services

Readily available.

**Practicality**

No significant obstacles.

**Certification Issues**

N/A

**Enforcement Procedures**

Permit application/plan review: Submit design details with construction documents.

Field inspection: City building inspector performs standard compliance inspection.

Certificate of Occupancy: Nothing additional.

**Support Materials Needs**

Documentation of requirements

**Training Needs – Industry**

Minor training needs for ME firms, electricians

**Training Needs – Staff**

Minor training for plan reviewers and inspectors

**Background****Current practice**

No current requirement.

**Context**

The value of sub-metering building loads is increasingly being recognized in the building community. Awareness of energy consumption by system can help to verify utility billing, understand utility rates and costs, measure and verify energy project performance, manage peak demand, and identify efficiency opportunities. Furthermore, displaying building energy consumption information for occupants can be a useful tool in promoting behavior change.

Under current practices, sub-metering at the electrical panel can be difficult due to mixed and sometimes poorly labeled loads on each panel.

**Related GB practices**

- Increasing levels of measurement and control in building automation systems will be supported by physically separating types of energy consumption and clearly labeled loads.
- ENERGY STAR and LEED-EB certifications can be supported with sub-metering data

**Known objections**

- Space may be limited at the point of installation for electrical panels
- Additional cost
- Requires the use of temporary or permanent sub-metering and the analysis of that data to reveal energy saving opportunities