SECTION XYZ
ENERGY METERING AND ENERGY CONSUMPTION MANAGEMENT

XYZ.1 General. Buildings with a gross conditioned floor area over 20,000 square feet (1860 m²) shall comply with Section XYZ. Buildings shall be equipped to measure, monitor, record, and display energy consumption data for each energy source and end use category per the provisions of this section to enable effective energy management. For multifamily buildings where residents are permanent in nature, the floor area of dwelling units shall be excluded from the total conditioned floor area. Alterations and additions to existing buildings shall conform to Section XYZ.5. Utility electrical main source metering shall have Net Meter capability.

Exceptions:

1. Tenant spaces within buildings if the tenant space has its own utility service and utility meters.
2. Buildings in which there is no gross conditioned floor area over 10,000 square feet (929 m²), including building common area, that is served by its own utility services and meters.

XYZ.1.1 Alternate metering methods. Where approved by the building official, energy use metering systems may differ from those required by this section, provided that they are permanently installed and that the source energy measurement, end use category energy measurement, data storage, and data display have similar accuracy to and are at least as effective in communicating actionable energy use information to the building management and users, as those required by this section.

XYZ.1.2 Conversion factor. Any threshold stated in kW or kVA shall include the equivalent Btu/h heating and cooling capacity of installed equipment at a conversion factor of 3,412 Btu per kW or 3,071 Btu per kVA.

XYZ.2 Energy source metering. Buildings shall have a meter at each energy source. For each energy supply source listed in Sections XYZ.2.1 through XYZ.2.2, meters shall collect data for the whole building or for each separately metered portion of the building where not exempted by the exceptions to Section XYZ.1.

Exceptions:

1. Energy source metering is not required where end use metering for an energy source accounts for all usage of that energy type within a building, and the data acquisition system accurately totals the energy delivered to the building or separately metered portion of the building.
2. Solid fuels such as coal, firewood or wood pellets that are delivered via mobile transportation do not require metering.

XYZ.2.1 Electrical energy. This category shall include all electrical energy supplied to the building and its associated site, including site lighting, parking, recreational facilities, and other areas that serve the building and its occupants.
Exception: Where site lighting and other exterior non-building electrical loads are served by an electrical service and meter that are separate from the building service and meter, the metering data from those loads is permitted to be either combined with the building’s electrical service load data or delivered to a separate data acquisition system.

**XYZ.2.2 Site-generated renewable energy.** This category shall include all electricity generated from on-site solar, wind, geothermal, tidal, or other natural sources. Net data shall be provided when energy is supplied to the grid.

**XYZ.3 End-use metering.** Meters shall be provided to collect energy use data for each end-use category listed in Sections XYZ.3.1 through XYZ.3.7. These meters shall collect data for the whole building or for each separately metered portion of the building where not exempted by the exceptions to Section XYZ.1. Not more than 10 percent of the total connected load of any of the end-use metering categories in Sections XYZ.3.1 through XYZ.3.6 is permitted to be excluded from that end-use data collection. Not more than 10 percent of the total connected load of any of the end-use metering categories in Sections XYZ.3.1 through XYZ.3.6 is permitted to consist of loads not part of that category. Multiple meters may be used for any end-use category, provided that the data acquisition system totals all of the energy used by that category. Full-floor tenant space sub-metering data shall be provided to the tenant in accordance with Section XYZ.3.7, and the data shall not be required to be included in other end-use categories. Minimum requirements for separation of electrical loads are included in Table XYZ.3-A.

Exceptions:

1. HVAC and water heating equipment serving only an individual dwelling unit does not require end-use metering.
2. Separate metering is not required for fire pumps, stairwell pressurization fans or other life safety systems that operate only during testing or emergency.
3. End use metering is not required for individual tenant spaces not exceeding 2,500 square feet (232 m²) in floor area when a dedicated source meter meeting the requirements of Section XYZ.4.1 is provided for the tenant space.
4. Healthcare facilities with loads in excess of 150 kVA are permitted to have sub-metering that measures electrical energy usage in accordance with the normal and essential electrical systems identified in Article 517 of the National Electrical Code, except that sub-metering is required for the following load categories:
   4.1. HVAC system electricity use per the requirements of Section XYZ.3.1.
   4.2. Water heating electricity use per the requirements of Section XYZ.3.2.
   4.3. Process load system electricity per the requirements of Section XYZ.3.6 for each significant facility not used in direct patient care, including but not limited to food service, laundry, and sterile processing facilities, where the total connected load of that facility exceeds 50 kVA.
5. End-use metering is not required for electrical circuits serving only sleeping rooms and guest suites in multifamily buildings where the residents are
primarily transient in nature. This exception does not apply to common areas or
to equipment serving multiple sleeping rooms.

XYZ.3.1 HVAC system energy use. This category shall include all electricity that is used
by boilers, chillers, pumps, fans and other equipment used to provide space
heating, space cooling, dehumidification and ventilation to the building, but not
including energy that serves process loads, water heating or miscellaneous loads
as defined in Section XYZ.3.

Exceptions:

1. All 120 volt equipment.
2. 208/120 volt equipment in a building where the main service is 480/277
   volt power and the HVAC loads are isolated and metered at 480/277
   volts.

XYZ.3.2 Water heating energy use. This category shall include all electricity used for
heating of domestic and service hot water, but not electricity used for space
heating.

Exception: Water heating electricity use less than 50 kVA does not
require end-use metering.

XYZ.3.3 Interior lighting system energy use. This category shall include all electricity
used by interior lighting, but not including plug-in task lighting.

XYZ.3.4 Exterior lighting system energy use. This category shall include all electricity
used by exterior lighting, including lighting in parking structures and lots.

XYZ.3.5 Plug load system energy use. This category shall include all electricity used by
appliances, computers, plugged-in task lighting, and other equipment and
devices, but not including vertical transportation equipment or equipment
covered by other end-use metering categories listed in Section XYZ.3. In a
building where the main service is 480/277 volt, each 208/120 volt panel is
permitted to be assumed to serve only plug load for the purpose of Section XYZ,
unless it serves nonresidential refrigeration or cooking equipment.

Exception: Where the total panel main capacity of connected plug load
circuits is less than 20 kVA, end-use metering is not required.

XYZ.3.6 Process load system energy use. Meters shall collect data for electricity used by
any non-building process load, including but not limited to nonresidential
refrigeration and cooking equipment, laundry equipment, industrial equipment,
and stage lighting.

Exception: Where the total panel main capacity of process load circuits
is less than 50 kVA, end-use metering is not required.
XYZ.3.7 Elevators, escalators, moving walks, and transit systems. Meters shall collect data for electricity used by any elevators, escalators, moving walks, and transit systems.

XYZ.3.8 Renewable power source (net and total). Meters shall collect data for electricity for renewable energy systems. Loads specifically fed by renewable are also metered.

XYZ.3.9 Charging stations for electric vehicles. Meters shall collect data for electricity for charging stations for electric vehicles.

XYZ.3.10 Full-floor tenant space electrical sub-metering. In a multitenant building, where more than 90 percent of the leasable area of a floor is occupied by a single tenant, an electrical energy use display shall be provided to the tenant in accordance with the requirements of Section XYZ.4.3. Electrical loads from areas outside of the tenant space or from equipment that serves areas outside of the tenant space shall not be included in the tenant space submetering. A single display is permitted to serve multiple floors occupied by the same tenant.

### TABLE XYZ.3-A: MINIMUM REQUIREMENTS FOR SEPARATION OF ELECTRICAL LOAD

<table>
<thead>
<tr>
<th>Electrical Load Type</th>
<th>Electrical Services rated 50 kVA or less</th>
<th>Electrical Services rated more than 50kVA and less than or equal to 250 kVA</th>
<th>Electrical Services rated more than 250 kVA and less than or equal to 1000kVA</th>
<th>Electrical Services rated more than 1000kVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting including exit and egress lighting and exterior lighting</td>
<td>Not required</td>
<td>All lighting in aggregate</td>
<td>All lighting disaggregated by floor, type or area</td>
<td>All lighting disaggregated by floor, type or area</td>
</tr>
<tr>
<td>HVAC systems and components including chillers, fans, heaters, furnaces, package units, cooling towers, and circulation pumps associated with HVAC</td>
<td>Not required</td>
<td>All HVAC in aggregate</td>
<td>All HVAC in aggregate and each HVAC load rated at least 50 kVA</td>
<td>All HVAC in aggregate and each HVAC load rated at least 50kVA</td>
</tr>
<tr>
<td>Domestic and service water system pumps and related systems and components</td>
<td>Not required</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
</tr>
<tr>
<td>Plug load including appliances rated less than 20 kVA</td>
<td>Not required</td>
<td>All plug load in aggregate; Groups of plug</td>
<td>All plug load separated by floor, type or area;</td>
<td>All plug load separated by floor, type or area</td>
</tr>
<tr>
<td>Loads exceeding 20 kVA connected load in an area less than 5000 sf</td>
<td>Groups of plug loads exceeding 20 kVA connected load in an area less than 5000 sf</td>
<td>All groups of plug loads exceeding 20 kVA connected load in an area less than 5000 sf</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elevators, escalators, moving walks, and transit systems</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other individual non-HVAC loads or appliances rated 50 kVA or greater</td>
<td>All</td>
<td>Each</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial and commercial process load centers 50 kVA or greater including theatrical lighting installations and commercial kitchens</td>
<td>All</td>
<td>Each</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renewable power source (net or total) and dedicated loads.</td>
<td>Each group</td>
<td>Each group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charging stations for electric vehicles</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

XYZ.4 Measurement devices, data acquisition system and energy display.

XYZ.4.1 Meters. Meters and other measurement devices required by this section shall have local displays or be configured to communicate electrical energy data to a data acquisition system. Source meters may be any digital-type meters that collect data of actual electricity use. All meters shall have an accuracy of +/− 2%, including current sensor error. All required metering systems and equipment shall provide at least 15-minute incremental data that is fully integrated into the data acquisition and display system per the requirements of Sections XYZ.4.2 and XYZ.4.3.

XYZ.4.2 Data acquisition system. The data acquisition system shall store the data from the required meters and other sensing devices for a minimum of 36 months. For
each energy supply and end-use category required by Sections XYZ.2 and XYZ.3, it shall provide real-time energy consumption data and logged data for any 15-minute increment, day, month or year.

XYZ.4.3 Energy display. For each building subject to Sections XYZ.2 and XYZ.3, either a readily accessible and visible display, or a web page or other electronic document accessible to building management or to a third-party energy data analysis service shall be provided in the building accessible by building operation and management personnel. The display shall graphically provide the present energy consumption data for each whole building energy source, plus each end-use category, as well as the average and peak values for any day, week or year.

XYZ.4.4 Commissioning. The entire system shall be commissioned in accordance with Section XYZ.5. Deficiencies found during testing shall be corrected and retested and the commissioning report shall be updated to confirm that the entire metering and data acquisition and display system is fully functional.

XYZ.5 Metering for existing buildings.

XYZ.5.1 Existing buildings that were constructed subject to the requirements of this section. Where new or replacement systems or equipment are installed in an existing building that was constructed subject to the requirements of this section, metering shall be provided for such new or replacement systems or equipment so that their energy use is included in the corresponding end-use category defined in Section XYZ.2. This includes systems or equipment added in conjunction with additions or alterations to existing buildings.

XYZ.5.1.1 Small existing buildings. For existing buildings that were constructed subject to the requirements of this code, but were exempt from the requirements of Section XYZ due to being smaller than the thresholds set forth in Section XYZ.1, metering and data acquisition systems shall be provided for additions over 10,000 square feet (929 m²) in accordance with the requirements of Sections XYZ.2, XYZ.3, and XYZ.4.

XYZ.5.2 Metering for HVAC equipment replacement. Where permits are issued for new or replacement HVAC equipment that has a total heating and cooling capacity greater than 1,200 kBtu/hour and greater than 50 percent of the building’s existing HVAC heating and cooling capacity, within any 12-month period, the following shall be provided for the building:

1. Energy source metering required by Section XYZ.2.
2. HVAC system end-use metering required by Section XYZ.3.1.
3. Data acquisition and display system per the requirements of Section XYZ.4.

Each of the building’s existing HVAC chillers, boilers, cooling towers, air handlers, packaged units, and heat pumps that has a capacity larger than 5 tons or that represents more than 10 percent of the total heating and cooling
capacity of the building shall be included in the calculation of the existing heating and cooling capacity of the building. Where heat pumps are configured to deliver both heating and cooling, the heating and cooling capacities shall both be included in the calculation of the total capacity.

Each of the building’s existing and new HVAC chillers, boilers, cooling towers, air handlers, packaged units, and heat pumps that has a heating or cooling capacity larger than 5 tons or that represents more than 10 percent of the total heating and cooling capacity of the building shall be included in the HVAC system end-use metering.

Construction documents for new or replacement heating and cooling equipment projects shall indicate the total heating and cooling capacity of the building’s existing HVAC equipment and the total heating and cooling capacity of the new or replacement equipment. Where permits have been issued for new or replacement heating and cooling equipment within the 12-month period prior to the permit application date, the heating and cooling capacity of that equipment shall also be indicated. For the purpose of this tabulation, heating and cooling capacities of all equipment shall be expressed in kBtu/hour.

**XYZ.5.3** Tenant space electrical sub-metering for existing buildings. For tenant improvements in which a single tenant will occupy a full floor of a building, the electrical consumption for the tenant space on that floor shall be separately metered, and the metering data provided to the tenant with a display system per the requirements of Section XYZ.4.3. For the purposes of this section, separate end-use categories need not be segregated.

**Exception:** Where an existing branch circuit electrical panel serves tenant spaces on multiple full floors of a building, only the specific circuits feeding the tenant shall be monitored. The other circuits served by the panel are not required to be monitored.

**XYZ.5.4** Metering for complete electrical system replacement. If all, or substantially all, of the existing electrical system is replaced under a single electrical permit or within a 12-month period, all of the provisions of Section XYZ shall be met.