# APPENDIX 3Q - METERING MATRIX

| System | Load Category Grouping (For targeted energy monitoring) | Individual Circuit Metering Required? | Electrical Consumption Metering | | | | | | | Utility Grade Gas Meter(s) | Thermal (BTU) - Steam or Hydronic Meter(s) | Flow Meter(s) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Department-Level Grouping | Electrical Revenue Certified Meter(s) | Electrical Power Quality Meter(s) | Electrical Energy Information Meter(s) | BMS Current Transducer for calculating electrical energy usage | Current Transducer - to provide status only | BACnet meter(s) | | | | |
| **Main Electrical Utility Service Meter(s)** | Electrical Power Supply - Utility | X | | X | X | | | | | | | | |
| **Natural Gas:** | | | | | | | | | | | | | |
| Interruptible | | | | | | | | | | X | | | |
| Uninterruptible | | | | | | | | | | X | | | |
| **Main Building Water Meter(s)** | | | | | | | | | | | | X | |
| | | | | | | | | | | | | | |
| **Cooling** | | | | | | | | | | | | | |
| Chillers (1 per chiller) | Cooling | X | | | | O | | X | O | | | | |
| Cooling Tower | Cooling | | | | | O | | X | O | | | | |
| Cooling Tower DCW Make-Up | Cooling | | | | | | | | | | | X | |
| Chilled Water - Total | Cooling | | | | | | | | | | X | | |
| Space Cooling - Sub Meter | Cooling | | | | | | | | | | X | | |
| Process cooling - Sub Meter | Cooling | | | | | | | | | | X | | |
| MRI, CT Scans - Sub Meter | Cooling | | | | | | | | | | X | | |
| Pumps | Cooling | | | | | O | O | X | O | | | | VFD BACnet must provide power consumption or CT |
| Energy for Heat Recovery | Heat Recovery | | | | | O | O | | O | | X | | The intent of this line item is to quantify the amount energy of "forced mechanical cooling" to generate heat for the heat recovery plant (i.e. using mechanical cooling for space cooling when free cooling would otherwise be available and/or the cooling energy to recover heat from exhaust heat recovery coils). This should include the amount of thermal cooling energy plus the electrical energy consumed by the pumps and compressor for "forced mechanical cooling." The meters that are required to quantify the total amount of cooling energy (thermal, pumping, and compressor energy) for the chiller plant may be sufficient to also quantify the energy for heat recovery, in which case no additional physical meters would be required and this energy can be a calculated quantity. |
| | | | | | | | | | | | | | |
| **Heat Recovery Plant** | | | | | | | | | | | | | |
| Heat Recovery Chiller | Heat Recovery | X | | | | O | | X | O | | | | |
| Source Heat | Heat Recovery | | | | | | | | | | X | | |
| Simultaneous | Heat Recovery | | | | | | | | | | X | | |
| Exhaust air heat recovery | Heat Recovery | | | | | | | | | | X | | |
| Condenser Output - Total | Heat Recovery | | | | | | | | | | X | | |
| Heat Recovery Output for NSP - Sub-Meter | Heat Recovery | | | | | | | | | | X | | Utility Grade Thermal Metering Required |
| Heat Recovery Output for NEU - Sub-Meter | Heat Recovery | | | | | | | | | | X | | Utility Grade Thermal Metering Required |
| Pumps | Heat Recovery | | | | | O | O | X | O | | | | |
| | | | | | | | | | | | | | |
| **Hot Water Boilers** | | | | | | | | | | | | | |
| Gas Meter on each boiler | Space Heating + DHW | | | | | | | | | X | | | Acceptable to calculate a break out of the gas usage for space heating vs DHW |
| BTU Meter on hydronic side | Space Heating + DHW | | | | | | | | | | X | | Acceptable to calculate a break out of the hydronic heating energy / usage for space heating vs DHW |
| Glycol HX | Space Heating | | | | | | | | | | X | | |
| Hot water for DHW Loads | DHW | | | | | | | | | | X | | |
| Boiler blower motor fan energy (1 per boiler) | Space Heating + DHW | | | | | | O | X | O | | | | Acceptable to calculate a break out of the gas usage for space heating vs DHW |
| Heating Pumps | Pumps | | | | | O | O | X | O | | | | |
| | | | | | | | | | | | | | |
| **AHU/MUA:** | | | | | | | | | | | | | |
| Supply Fan systems with a combined fan power of 5 HP or less | Ventilation | | | | | | O | | O | | | | It is not acceptable to only provide Current Transducers for fan arrays with individual fans less than 5 hp. |
| Supply Fan systems with a combined fan power of more than 5 HP | Ventilation | | | | | O | | X | O | | | | |
| Return Fan systems with a combined fan power of 5 HP or less | Ventilation | | | | | | O | | O | | | | It is not acceptable to only provide Current Transducers for fan arrays with individual fans less than 5 hp. |
| Return Fan systems with a combined fan power of more than 5 HP | Ventilation | | | | | O | | X | O | | | | |
| Exhaust Fan systems with a combined fan power of 5 HP or less | Ventilation | | | | | | O | | O | | | | It is not acceptable to only provide Current Transducers for fan arrays with individual fans less than 5 hp. |
| Exhaust Fan systems with a combined fan power of more than 5 HP | Ventilation | | | | | O | | X | O | | | | |
| Total AHU Energy | Ventilation | | | | | | | | | | | | |
| Supply Air Flow Meter on any AHU w/SF > 5 HP | Ventilation | | | | | | | | | | | X | Must be constructed in such a way to guarantee this accuracy as per manufacturers recommended install |
| VAVs Flow Station | | | | | | | | | | | | X | |
| Return Air Flow Meter | | | | | | | | | | | | X | |
| Exhaust Air Flow Meter | | | | | | | | | | | | X | |
| VAVE Flow Station | | | | | | | | | | | | X | |
| Energy Valves on H/C, C/C, EHRC, PHC for all AHUs w/ SF > 5 HP | | | | | | | | | | | X | | Energy valves or equivalent are acceptable for metering the thermal load transferred to/from the air stream. |
| Sensors | | | | | | | | | | | | | Industrial grade sensors on larger AHUs/Pumps (50 HP and up) |
| Heat Recovery | | | | | | | | | | | X | | All heat recovery systems to be metered to record amount of energy recovered |
| | | | | | | | | | | | | | |
| **Steam Plant** | | | | | | | | | | | | | |
| Gas meter on each boiler + Oil Flow Meter | | | | | | | | | | X | | | |
| Back Up Fuel Oil | | | | | | | | | | | | X | |
| Utility Grade steam meter on primary Steam Supply | | | | | | | | | | | X | | |
| Utility Grade steam meter on each boiler | | | | | | | | | | | X | | |
| DHW Top-Up (Steam Side) | | | | | | | | | | | X | | |
| DHW Top-Up (Domestic Side) | | | | | | | | | | | X | | |
| Humidification | | | | | | | | | | | X | | Electrical meters required if steam is generated from electrical steam generator or for boosting steam production at the zone level |
| Meter to calculate Steam Line Losses (if practical) | | | | | | | | | | | X | | |
| Condensate Recovery Metering Energy Center | | | | | | | | | | | X | | |
| Flue Economizer Heat Recovery Meter Energy Center | | | | | | | | | | | X | | |
| | | | | | | | | | | | | | |
| **MDRD** | | | X | | | | | | | | | | |
| MDRD - Electrical | Process (MDRD) | | | | | X | | | | | | | |
| MDRD - Steam | | | | | | | | | | | X | | |
| MDRD - DHW | | | | | | | | | | | X | | |
| MDRD - DCW | | | | | | | | | | | | X | |
| Condensate Recovery Meter MDRD | | | | | | | | | | | X | | |
| | | | | | | | | | | | | | |
| Bedpan Disinfectors | Process (MDRD) | | X | | | O | O | | O | | | | |
| Distributed Food Services areas on the units (equipment circuits) | Process (Kitchen) | | X | | | X | | | | | | | |
| | | | | | | | | | | | | | |
| **Kitchen** | | | | | | | | | | | | | |
| Gas meter | | | | | | | | | | X | | | |
| Electrical (kettles, hoods, etc) | Process (Kitchen) | | | | | X | | | | | | | |
| DCW | | | | | | | | | | | | X | |
| DHW | | | | | | | | | | | X | | |
| Process Cooling (walk-in freezers/walk-in coolers) | | | | | | | | | | | X | | |
| | | | | | | | | | | | | | |
| **Interior Lighting (including parkade)** | Lighting (Interior) | | X | | | X | | | | | | | Virtual metering from addressable controls system is acceptable where per-zone or per-fixture on/off/dimming level data is provided. Night lights, surgical lights, exit signs and emergency unit lighting do not require metering. |
| **Exterior Lighting** | Lighting (Exterior) | | | | | X | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Department-Level Grouping | Electrical Revenue Certified Meter(s) | Electrical Power Quality Meter(s) | Electrical Energy Information Meter(s) | BMS Current Transducer for calculating electrical energy usage | Current Transducer - to provide status only | BACnet meter(s) | | | | |
| **Elevator(s)** | Elevators | | | | X | | | | | | | | Bi-directional power measurement required (to measure regenerative braking output) |
| **EV Chargers - General Use** | EV Charging | | | | | X | | | | | | | Electrical energy data from EVSE is acceptable instead of separate electrical meters |
| **Ambulance Chargers** | Ambulance Charging | | | | | X | | | | | | | Electrical energy data from EVSE is acceptable instead of separate electrical meters |
| **AGV Chargers** | AGV Charging | | | | | X | | | | | | | All outlets or hard wired equipment located in Comm Rooms (except housekeeping receptacles) can be grouped together as IM/IT loads |
| **IM/IT Equipment** | IMIT | | | | X | | | | | | | | All outlets or hard wired equipment located in Comm Rooms (except housekeeping receptacles) can be grouped together as IM/IT loads |
| **Potable Domestic Water** | | | | | | | | | | | | | |
| DCW - Total Building | | | | | | | | | | | | X | |
| DHW - Total Building | | | | | | | | | | | X | | |
| Booster Pumps | Pumps | | | | | O | O | | O | | | | |
| Recirculation Pumps | Pumps | | | | | O | O | | O | | | | |
| Reverse Osmosis (RO) - (DCW) | RO System | | | | | | | | | | | X | Amount of DCW delivered to RO system to be metered. |
| Renal Dialysis (DCW) | | | | | | | | | | | | X | |
| Irrigation Top Up (to grey water) | | | | | | | | | | | | X | |
| Cooling Tower Top-Up (to grey water system) | | | | | | | | | | | | X | |
| DCW / IPU Tower | | | | | | | | | | | | X | |
| DHW / IPU Tower | | | | | | | | | | | | X | |
| **Fire Protection & Smoke Control** | | | | | | | | | | | | | |
| Fire Pumps & Jockey Pumps | | | | | | | | | | | | | Metering not required for these systems |
| Dry sprinkler air compressors | | | | | | | | | | | | | Metering not required for these systems |
| Smoke control pressurization fans | | | | | | | | | | | | | Metering not required for these systems |
| **Rain Water System Metering** | | | | | | | | | | | | | |
| Irrigation | | | | | | | | | | | | X | |
| Cooling Tower - Make-up | | | | | | | | | | | | X | |
| UV - Electrical | Process (Grey Water) | | | | | O | O | | O | | | X | |
| Aeriation | Process (Grey Water) | | | | | O | O | | O | | | | |
| Site | | | | | | | | | | | | X | |
| **Parking** | | | | | | | | | | | | | |
| Exhaust Fans | Ventilation | | | | | O | O | | O | | | | |
| Ambulance Garage Exhaust Fans | Ventilation | | | | | O | O | | O | | | | |
| Make-Up Water | Ventilation | | | | | | | | | | X | | |
| Fan Power | Ventilation | | | | | O | O | | O | | | | |
| Heating (heating coil or unit heater) | Heating | | | | | O | O | | O | | X | | Electric unit heaters to be metered if applicable |
| **Electrical Outlets (per department/floor)** | Plug Loads | | X | | | X | | | | | | | Plug loads may be calculated by subtracting other load types from total panel load, but only on panels where all other load types (i.e. lighting, mechanical, process) are independently metered. |
| **Electrical Panel Feeders - Facility** | N/A | X | X | | | X | | | | | | | |
| **Electrical Panel Feeders - Commercial Opportunity & Retail Tenants** | Electrical Power Supply - Tenants | X | | X | | | | | | | | | Project Co to include space and communications wiring provisions to connect future tenant meters to base building metering system, each tenant to be metered for DCW, DHW, electrical, gas |
| **Electrical CDP Feeders** | N/A | X | | | X | | | | | | | | |
| **Electrical MCC Feeders** | N/A | X | | | X | | | | | | | | |
| **Electrical Main Transformer Feeders** | N/A | X | | | X | | | | | | | | |
| **Electrical each HVATS Feeder** | N/A | X | | | X | | | | | | | | |
| **UPS System Output** | UPS | X | | | X | | | | | | | | UPS meters may be grouped into one meter point per paralleled bank of UPS units. |
| **MRI/CT/Fluoroscopy (per unit)** | | | | | | | | | | | | | |
| Electrical Load | Imaging | X | | | X | | | | | | | | Project Co to include space and communications wiring provisions for imaging equipment meters in planned Future Expansion areas. |
| Process Cooling | Imaging / Cooling | | | | | X | | | | | X | | |
| Laser | Plug Loads | | X | | | X | | | | | | | Separate laser outlet metering not required, can be grouped with plug loads |
| Angiography | Imaging | | | | | X | | | | | | | |
| **Med Gas** | | | | | | | | | | | | | |
| Medical Air | Med Gas | | | | | O (per compressor) | O (per compressor) | | O (per compressor) | | | | BMS to record run hours of these systems. |
| Medical Vacuum | Med Gas | | | | | O (per compressor) | O (per compressor) | | O (per compressor) | | | | BMS to record run hours of these systems. |
| Nitrogen | Med Gas | | | | | O (per compressor) | O (per compressor) | | O (per compressor) | | | | BMS to record run hours of these systems. |
| Instrument Air | Med Gas | | | | | O (per compressor) | O (per compressor) | | O (per compressor) | | | | |
| Anesthetic Gas Scavenging System (AGSS) | Med Gas | | | | | O (per compressor) | O (per compressor) | | O (per compressor) | | | | |
| **Sump Pumps (Sanitary / Storm)** | Pumps | | | | | O | O | | O | | | | |
| **Generators** | | | | | | | | | | | | | |
| Electrical (per generator) | Electrical Power Supply - Diesel Generators | X | | | X | | | | | | | | |
| **Neighbourhood Energy Utility (NEU)** | | | | | | | | | | | | | |
| Thermal - From NSP Heat Recovery (low carbon) to NEU | | | | | | | | | | | X | | Utility Grade Thermal Metering Required |
| Thermal - From NSP Boiler to NEU | | | | | | | | | | | X | | Utility Grade Thermal Metering Required |
| NEU Thermal Supply to NSPH | | | | | | | | | | | X | | Utility Grade Thermal Metering Required |
| **Distributed Resources (local renewable thermal / electrical generation & energy storage)** | Distributed / Renewable Resources | X | | X | X | | | | | | X | | If other local power generation (e.g. solar PV) or grid-connected electricity storage is installed, a separate revenue grade power quality meter is required for each point of common coupling. |

**General Notes**:
Advanced Energy Metering requires 10% of any load to be independently metered. Dashboard not required by LEED but can be included in Schedule 3.
X = Required metering method / feature
O = Select one of these metering methods