

# C&I Energy Efficiency Program Guidelines

## Packaged Variable Speed Domestic Water Booster Pump Systems

The following is the minimum information required for energy conservation measures (ECM's) related to packaged variable speed domestic water booster pump system installations. Projects applying for incentives related to packaged variable speed domestic water booster pump systems must comply with all applicable requirements listed below in addition to the standard requirements outlined in the Program Manual.

### Required Project Documentation

All projects must provide the following documentation:

1. A detailed scope of work that contains all equipment in the proposed measure and includes existing system operation. Include the following details:
  - a. Extent of work (e.g. installing new VFDs on existing booster pumps; replacement of existing pumps with new variable speed packaged booster pumps)
  - b. Facility size including square footage, number of units, and number of floors where water must be delivered.
  - c. Speed control on each proposed pump
  - d. Qty of Existing Pumps Available
    - i. Quantity of pumps required to meet peak load
    - ii. Quantity of standby/back-up pumps
  - e. Existing flow modulation control strategy (e.g. pressure-reducing valve, pumping into an expansion tank/bladder or other storage system, multiple pumps on staged automatic control (or manual override), multiple pumps on variable frequency drives)
2. Savings Calculations
  - a. Calculations must clearly detail how energy savings were estimated, including showing all engineering formulas and documenting factors, values, and assumptions used in the analysis.
  - b. Analysis must include:
    - i. Baseline & Proposed Annual Consumption (kWh)
    - ii. Baseline & Proposed Summer Peak Demand (kW)
  - c. Project savings may be calculated using the Con Edison Domestic Water Booster Pump Calculator. Custom analyses may also be accepted provided the methodology is well documented and assumptions are reasonable.
  - d. Savings are driven by the reduction of energy consumption through the installation of a more efficient domestic water booster pump system and/or optimizing the control of the water pumping system with new variable speed drives. Savings may not be claimed for rightsizing of new equipment by reducing existing pump horsepower.
  - e. All Packaged Variable Speed Domestic Water Booster Pump Systems shall have the following caps applied to project savings:
    - i. Baseline consumption may not exceed 10% of total building consumption.
    - ii. Total savings may not exceed 80% savings relative to baseline energy consumption
  - f. Typical Project Assumptions for Calculations
    - i. Pump Flow (Pump Capacity at Duty Point)
      1. Set baseline and proposed flow to be equal. Use the duty point flow (gpm) from pump curves.
      2. In cases where pump is not being replaced and there existing pump curve is not available, use the following simplifying assumption to obtain flow at duty point:

$$GPM @ Duty Point = Nameplate GPM \times 0.9$$

- ii. Pump Pressure (Pump TDH at Duty Point)

1. Use the duty point total dynamic head (TDH) from pump curves.
2. TDH at duty point can be different between the baseline and the proposed scenario to capture additional savings related to the removal of existing pressure relief valves on the pumping system.
  - If TDH at duty point decreases, calculations or documentation must be provided to substantiate the reduction.
3. If existing duty point TDH is unknown, use the following simplifying assumption to obtain flow at duty point:
 
$$TDH @ \text{Duty Point} = \text{Nameplate TDH} \times 0.8$$
 Alternatively, the existing TDH may be set equal to the proposed duty point TDH.
4. Maximum Head at Full Speed may be taken from pump specifications. Alternatively, this value may be estimated as follows:
 
$$\text{Maximum Head at Full Speed} = \text{Duty Point TDH} \times 1.3$$
- iii. Motor Efficiency
  1. Set baseline and proposed motor efficiencies equivalent to the NEMA premium motor efficiency, unless supporting documentation showing otherwise is provided.
- iv. Pump Efficiency
  1. Assume a proposed & baseline pump efficiency of 75%, unless supporting documentation showing otherwise is provided.
- v. VFD Efficiency
  1. Assume a proposed VFD efficiency of 98%, unless supporting documentation showing otherwise is provided.
- vi. Annual Operating Hours
  1. Hours of operation shall be based on domestic water load profiles from an accredited source such as COMSTOCK or ASHRAE. Alternatively, 1 week of trend data may be provided to establish proposed load profile.

### 3. Supporting Technical Documentation

- a. Proposed Equipment
  - i. Make and model number of proposed pumps, motors, variable speed drives, or the skid system as applicable.
  - ii. Motor Horsepower
  - iii. Motor Efficiency
  - iv. Existing and proposed water distribution system pumping capacity - discharge rate (gpm) and discharge pressure (psi)
- b. Existing & Proposed Pump Performance curves
  - i. If existing pump curves are not available, baseline gpm and pressure shall be set per the assumptions laid out above.
- c. Additional supporting documentation as noted above may be provided to overwrite default program assumptions.