New Jersey's Clean Energy PROGRAM
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New Jersey Board of Public Utilities
Office of Clean Energy

Pay for Performance Technical Tip

Energy Modeling and Reporting Requirements

MODEL ORGANIZATION AND MEASURE SIMULATION

When modeling the proposed design, all recommended energy-efficiency measures must be modeled incrementally. For example, in eQuest the "parametric runs" function must be used to model all energy reduction measures where possible. In TRACE 700, the "Alternates" function must be used. Keep in mind that TRACE 700 only allows up to four (4) Alternates; therefore if modeling more than three (3) measures, Alternate-4 should be 'saved as' Alternate-1 and additional measures modeled as subsequent Alternates.

This function not only facilitates the QC review of the model but also decreases the time to create models, and reduces the number of unintended, erroneous differences between the baseline and proposed simulations. The energy impact of each measure can easily be evaluated and documented.

If there are no changes to the HVAC system *type*, only one model shall be submitted. In cases that the HVAC system type changes from the baseline to proposed design, two models may be submitted, applying primarily to New Construction projects. The first model shall only include the baseline building components. The proposed model shall initially be a copy of the baseline model. Changes to the HVAC systems shall be made in the detailed interface [eQuest] (e.g. inclusion of water source heat pump in the proposed design). Other than the change in systems, there shall not be any other changes between the two models. Once the proposed systems are included in the proposed model, each of the measure improvements shall be modeled as a separate parametric run/alternate added to all the previous parametric runs/alternates. The compare documents feature of Microsoft Word or other word processor may be used to compare the .inp files of the baseline and proposed models [eQuest] to identify any unintended differences between the two models.

Model submissions that do not incorporate parametric runs [eQuest], alternates [TRACE], or an equivalent process will not be accepted.

ENERGY PENALTIES

New Construction Projects: All differences between the baseline and proposed models shall be documented in the Energy Reduction Plan including any energy penalties to the building (e.g. electric resistance heaters in the proposed design). The Energy Reduction Plan requires the documentation of each building component in the baseline and proposed models (see Table 5. Proposed and Baseline Components Used in Energy Simulation of ERP template).

Existing Buildings Projects: Any energy increase resulting from recommended energy-efficiency measures must be documented in the Energy Reduction Plan, Table 14. Examples include installing air-conditioning where there was previously none, increasing ventilation rates, etc.

DOCUMENTING MODEL INPUTS

All measure descriptions in the "Recommended Measures" section shall include all key model inputs for all measures. Any input used in the simulation software that corresponds to an energy reduction measure shall be included with the description of the measure. Key model inputs include but are not limited to the following: equipment capacity, equipment size, equipment efficiency, appliance and lighting power density, R-values, U-factors, SHGC, etc.

Energy Reduction Plans missing a significant number of key model inputs will not be accepted.

New Construction Example:

DHW: Install Direct-fired Boiler

Description of Energy Efficiency Recommendation
- One central DHW natural gas boiler located on the 1st floor; 1.4 MMBtu/hr.
- Size of boiler tank: 200 gallons
- Storage Tank: 1000 gallons
- Thermal Efficiency: 85%
- Energy Factor: 0.765
- Proposed storage tanks have R-12.5 insulation and temperature set point of 120ºF
- Estimated cost: $50,000

Baseline Component
- One 1.4 MMBtu/hr natural gas domestic hot water boiler
- Size of boiler tank: 200 gallons
- Storage Tank: 1,000 gallons
- Thermal Efficiency: 80%
- Energy Factor: 0.72
- Baseline storage tanks have R-12.5 insulation and temperature set point of 120ºF
- Estimated cost: $40,000

Estimated Incremental Hard Cost
- $10,000

Existing Building Example:

Boiler Replacement

Description of Improvement
Replace boilers with (2) 2000 mbh modulating condensing boilers rated at 90% CE or higher

Existing Conditions
Existing 70% efficient hot water boilers are over 30 years old and at end of useful life.

Assumptions
In eQUEST, measure was modeled by modifying boiler type set to hw-condensing, heat-input-ratio to 1.11.

DOCUMENTING PROPOSED MEASURES

In addition to the key modeling inputs mentioned above, the description of the proposed measure must also include quantity, model numbers (where available), and equipment location (where applicable). This information must be included for all measures, including not only equipment and appliances, but also any envelope measures. For example, the number of windows and square footage of wall insulation should be included with the description of the corresponding energy efficiency measures for windows and walls. For any lighting measures, descriptions must include a schedule of the proposed lighting including fixture types by space, as shown on lighting plans for the project. HVAC measure descriptions should include system type, size, manufacturer/model (if available) and efficiency in the appropriate units. This is necessary for facilitating post-installation inspections.

MODELING ASSUMPTIONS

Any modeling assumptions that are outside the scope of ASHRAE 90.1-2007 and Program Guidelines must be documented in Appendix C of the Energy Reduction Plan or included in the description of the Energy Efficiency Measure. Assumptions used to calculate energy and cost savings from advanced measures or measures that cannot be modeled explicitly using the simulation software must be included in Appendix C. If external calculation spreadsheets are included with the submittal package, key assumptions and equations used shall be clearly documented in Appendix D of the Energy Reduction Plan. Energy savings calculations performed outside of the simulation tool must be documented and submitted to the Market Manager for approval.

MEASURE GRANULARTITY

Partners must submit incremental savings for each individual measure. Distinct energy efficiency measures should not be combined if individual components have separate baselines OR if individual components improve efficiency, reduce flow rates, and/or reduce hours of operation. For example, installation of NEMA premium efficiency motors and variable frequency drives are two separate measures.

Multiple components or systems may be grouped and reported as a single measure provided that these components/systems belong to the same end use. For example, different types of lighting fixtures may be modeled and reported as a single measure, but lighting fixtures and HVAC system upgrade cannot be combined. Measure granularity is defined by the measure list in the ERP Template.