

In NYSERDA's Multifamily Performance Program, there are four common mistakes that typically have required a revised SAV-IT:

- 1) Assumptions used to calculate savings are unclear.
- 2) Responses on Measure QC tab are not defensible.
- 3) Existing conditions are not fully documented.
- 4) The Simulation Guidelines are not being followed.

Catching and correcting these common mistakes before submitting to NYSERDA will expedite the review process and SAV-IT approval. Please also refer to the sample SAV-IT, which can be used as a guide to what is expected and includes the examples seen in this Tech Tip.

Common Mistake #1: Assumptions Used to Calculate Savings Are Unclear

The *Measure Descriptions* tab must contain a clear summary of the existing conditions, a description of the measure, the assumptions used to calculate energy savings, and the measure location. This information is used both by the SAV-IT technical reviewer to confirm savings calculations and by the future QC inspector to assess if the measure was successfully installed.

The most common error on this tab is that the important assumptions are unclear or missing. All assumptions and data that were entered into the energy model or that were used in external calculations should be documented in the Important Assumptions column of the *Measure Descriptions* tab. All the

model or calculation inputs that changed because of the proposed measure should be included. Specifically, the following should be stated, as applicable, for each measure: efficiency of the existing and proposed equipment (e.g. steady state efficiency for boilers, flow rates for aerators, motor efficiency, wattage for lighting replacements, insulation thickness and R-value, air changes per hour for air sealing, etc.), quantity installed, run hours per year, the penetration rate for in-unit measures (i.e. the percentage of apartments that will have the measure installed). The assumptions and details noted for the existing conditions should be consistent with what is reported in other tabs of the SAV-IT, such as the *Existing Conditions* and *General Project Info* tabs.

The following chart shows three examples taken from submitted SAV-IT workbooks where the information in the Important Assumptions column is insufficient. The right-most column offers suggested improvements to each example.

Example 1: Low-flow Devices. The Provider described the reality that not all apartments will agree to change their showerheads because some of them bought and installed their own. The assumed penetration rate must be noted in the Important Assumptions column.

Example 2: Envelope Insulation. The Provider included the assumed pre- and post-construction R-values, but did not include the assumptions related to air leakage.

Measure Descriptions Tab					
	Measure Classification	Existing Conditions	Measure Description	Important Assumptions - As Submitted	Important Assumptions - Improved
Example 1	Low-flow Devices	Based on apartment sampling, high flow rates are found in many apartment showerheads and in kitchen and bathroom aerators.	Install showerheads rated for 1.5 gpm in all showers that do not currently have flow-restricting showerheads installed. Tenants will have the option to refuse new showerheads where they own the existing showerhead. Install faucet aerators rated for 1.5 gpm on all kitchen faucets. Install faucet aerators rated for 1.5 gpm on all bathroom faucets.		Average pre-construction measured flow rates: Showerheads - 1.8 gpm Kitchen faucets - 1.8 gpm Bathroom faucets - 1.6 gpm Assumed post-construction flow rates: Showerheads - 1.5 gpm Kitchen faucets - 1.5 gpm Bathroom faucets - 1.5 gpm Assumed penetration rate - 70% for showers, 85% for kitchens and bathrooms.
					Existing R-value: R-6 Proposed R-value: R-19
Example 2	Insulation, Other Shell	Rim joists have deteriorating insulation and are very leaky. This area allows unnecessary infiltration between the outdoors and the basements. Air infiltration was also observed around piping penetrations and glass block windows.	Apply air sealing techniques to seal holes and penetrations within all accessible areas of the basement. Remove and dispose of fiberglass batts within all exposed basement bays. Spray closed cell foam on all exposed rim joists. Bring insulation up to R-19.	Existing R-value: R-6 Proposed R-value: R-19	Existing R-value: R-6 Proposed R-value: R-19 Material R-values taken from ASHRAE fundamentals. Pre-construction infiltration: 0.7 ACH Post-construction infiltration: 0.65 ACH Based on eliminating 250 linear feet of 1/16" crack at joint where rim joist meets the CMU.

Measure Descriptions Tab (Continued)					
	Measure Classification	Existing Conditions	Measure Description	Important Assumptions - As Submitted	Important Assumptions - Improved
Example 3	Air Sealing	The building entry doors to the apartment hallways are in very poor condition. They all have major gaps at the base and many of them do not latch closed. There is significant air leakage coming through these doors into the common hallways.	Install 98 new entry doors on the front and back of the buildings complex-wide. All doors have new weather-stripping and seal tight to prevent uncontrolled air leakage.	Quantity installed: 98 Includes commercial door weatherstripping	Quantity installed: 98 Includes commercial door weatherstripping Pre-construction infiltration: 0.7 ACH Post-construction infiltration: 0.6 ACH Assumed each door has 10 linear feet of 1/32" crack that will be completely eliminated by the air sealing.

Example 3: Air Sealing. The Provider quantified the number of doors being air sealed but did not include the size of the cracks or the assumed pre- and post-construction air changes per hour (ACH) that were used to calculate energy savings.

**Common Mistake #2:
Responses on Measure QC Tab Are Not Defensible**

The *Measure QC* tab has several automated QC checks that trip flags and display warning text when savings and/or installed costs are out of range. In the Measures table at the top of the page, two tiers of QC flags can trip. The first tier is based on the range of savings and installed costs seen in typical MPP projects, and the flags are shown by blue (low) and red (high) text. This tier of QC flag is shown in Examples 4-7. A cost or savings value that falls outside of the typical range may be acceptable if there are defensible assumptions and/or data to support those values. The second tier of flags only applies to specific measures for which the Program has very strong data supporting the achievable savings in multifamily buildings, and it trips when unacceptably high savings are predicted for those measures (see Example 8).

The first response to a Measure QC flag should always be to

return to the assumptions in the calculations/model to ensure that they are reasonable and conservative. Often, correcting the assumptions will resolve the flag.

Providers are required to respond to any measure that is flagged for the MMBtu savings, percent savings, or installed cost being too high or too low. For savings that fall out of range, the response should include gathered data, industry standard references, and/or explanations of existing conditions that cause savings to be higher or lower than expected. For installed costs that fall out of range, contractor quotes and RS Means calculations should be submitted with the SAV-IT and referenced in the explanation on the Measure QC tab. Adequate responses from the Provider facilitate the review process, while insufficient responses will delay the review because the reviewer will require further explanation.

Example 4: Distribution System Upgrade flagging high energy savings and high installed cost. Because NYSERDA reviewers do not generally have access to the energy model, it is not sufficient to say that the savings match the model. The additional information in the improved response shows why savings for this project is higher than expected. The estimated installed cost is justified using RS Means, which the Provider submitted with the SAV-IT.

Measure QC Tab							
	Measure Classification	Measure Name	Cost	Site Energy Savings (MMBtu)	Source Energy Savings (%)	Response - As Submitted	Response - Improved
Example 4	Distribution System, Upgrade	Replace PTACs in Apartments	\$972,180	637	4.1%	The savings reported match the model.	The original PTAC units were from 1971. We calculated the fan power was 50% less with the new units. Calculated cost using RS Means. See attached spreadsheet for breakdown.

Measure QC Tab (continued)							
	Measure Classification	Measure Name	Cost	Site Energy Savings (MMBtu)	Source Energy Savings (%)	Response - As Submitted	Response - Improved
Example 5	Boiler/Burner Clean and Tune	Boiler Tune-Up	\$3,000	959	2.6%	The three (3) boilers which require cleaning and tuning tested as having excessively high excess air. Cleaning and tuning these boilers would result in a modest combustion efficiency increase.	The three (3) boilers which require cleaning and tuning tested as having excessively high excess air. For this measure we assumed a 2% increase in combustion efficiency based on an estimated 30% decrease in excess air. See US Dept of Energy, Energy Tip: https://www1.eere.energy.gov/manufacturing/tech_assistance/pdfs/steam_4_boiler_efficiency.pdf
Example 6	Other Cooling Measure	Remove AC Units	\$90,000	524	2.1%	Through-wall ACs will be replaced with heat pumps, so cooling load will be reduced.	The through-the-wall air conditioners and sleeves will be removed, and the sleeves will be completely air sealed, resulting in a significant reduction in infiltration into the apartments. The proposed heat pumps will provide cooling to the apartments. The estimated cost comes from a contractor quote; please see attached quote from All Star HVAC.
Example 7	Boiler Replace (Central)	Boiler Insulation	\$1,500	3,900	10.5%	This measure has high savings because of the boiler jacket losses. Since very high jacket losses were observed during the audit, we expect the boiler insulation to reduce the standby losses drastically. There is no option for 'boiler insulation' in the dropdown menu in the measure description column.	Measure re-classified and assumptions adjusted. Savings and costs are now within expected range.

Example 5: Boiler/Burner Clean and Tune flagging high energy savings. By providing the assumptions used in the model, the improved response allows the reviewer to assess the reasonableness of the assumptions.

Example 6: Other Cooling Measure flagging high energy savings and low installed cost. This measure should be re-classified as an Air Sealing measure. Fixing the measure classification clears the flag on the savings being too high. The estimated cost is justified using a quote from an installer as submitted by the Provider.

Example 7: Boiler Replace (Central) flagging low installed cost and high energy savings. There are two problems with this submittal. First, this measure is incorrectly classified, as the Provider noted but did not fix. "Other Heating Measure" should have been chosen. Fixing the measure classification clears the flag on the cost of this measure. Second, the savings are flagged as being too high for a complete boiler replacement, but the measure includes adding less than 100 square feet of insulation. The Provider must review the energy savings calculation and adjust the assumptions used.

Measure QC Tab - Second Tier Flag Tripped

	Measure Classification	Measure Name	Cost	Site Energy Savings (MMBtu)	Source Energy Savings (MMBtu)	Source Energy Savings (%)	Comment
Example 8	Low-flow Devices	Addition of Low Flow Devices	\$17,185	3,200	3,360	8.6%	This measure is being flagged as projecting savings above the maximum allowable site savings of 1,178 MMBtu. Please check your assumptions and data inputs to lower the savings accordingly. This SAV-IT will not be approved until the savings are brought below the cap.

Example 8: Low-flow Devices. The savings for this measure are so high that they have tripped the second tier of QC flag; warning text appears highlighted in red in the Comment column. The savings for this measure must be reduced before this SAV-IT will be approved.

Please review all measures for comments that show the higher tier flag has been tripped. The SAV-IT will not be approved until the savings for those measures are reduced.

To further expedite the review, submit your model and/or external calculations for any measures that still have cost or savings flags tripped on the Measure QC tab after you have finalized your calculations and explanations. This will allow the reviewer to fully assess your assumptions and maybe avoid the need for the reviewer to ask for further clarification about those measures.

Common Mistake #3: Existing Conditions Are Not Fully Documented

Providers are required to fully document the envelope and mechanical system on the *Existing Conditions* tab. The following tables on that tab should be completely filled out for every project:

Envelope

- Envelope Components
- Windows
- Exterior Doors
- Air Infiltration

Mechanical Systems

- Heating Components
- Cooling Components
- Distribution Systems
- Temperature Measurements
- Ventilation

Additionally, Providers must fully document all building systems that will be improved as part of the project's participation in MPP. When measures are added to the *Measure Descriptions* tab, the relevant sections for each measure will automatically be unhidden on the *Existing Conditions* tab. The sections that are initially hidden and only need to be filled out if there is a recommended improvement are:

- Appliances/Laundry
- Fans
- Pumps
- Motors
- Elevators
- DHW
- Other Systems

For example, if low flow aerators are in the scope of work, the following tables on the *Existing Conditions* tab will be unhidden and therefore must also be filled out: DHW System; DHW System Distribution; and DHW Temperatures/Fixture Flow Rates.

When the scope of work has been finalized and all measures have been added to the *Measure Descriptions* tab, be sure to review the *Existing Conditions* tab and fill out all unhidden sections.

Finally, it is important that the information on the *Existing Conditions* tab match the information on the *Measure Descriptions* tab. Inconsistencies between the two tabs prevent the reviewer from assessing the savings from the proposed improvements and will often lead to a SAV-IT being returned for revision.

Common Mistake #4: Simulation Guidelines Are Not Being Followed

The Simulation Guidelines describe how almost all aspects of multifamily buildings should be modeled to accurately estimate energy savings. Providers are required to follow the technical standards in the Simulation Guidelines to both model the baseline energy use of a project and to calculate the savings for all measures in the project. Refer to the Tech Tip *Understanding the MPP V8.1 Simulation Guidelines*, published January 7, 2019, for an overview of the Simulation Guidelines. Below are several situations where the Simulation Guidelines are not always followed:

1. Estimating the existing efficiency of the heating system (Section 6.1): The Simulation Guidelines describe how to calculate the efficiency for several types of heating equipment. They also include a table of minimum age-based efficiencies for other types of equipment where instructions are not provided for calculating the efficiency.
2. Modeling temperature reductions from heating controls (Section 7.2): The Simulation Guidelines provide research-based limits on modeling the temperature reductions that can be achieved from a variety of heating control improvements.
3. Estimating properties of existing windows (Section 10.2): The Simulation Guidelines list the solar heat gain coefficients and U-values that must be used in the baseline model when building-specific information is not available.

The Simulation Guidelines cover many more aspects of building modeling than the three examples above and must be used for all covered parts of the baseline building and the measure calculations, regardless of whether the building is modeled using modeling software or Excel calculations.

Conclusion

To speed up the review process, perform an internal review before submitting a SAV-IT to NYSERDA. Be sure to specifically review the following:

- Make sure all information that was used to calculate savings is detailed in the Important Assumptions column of the *Measure Descriptions* tab.
- Confirm that all measures have been classified correctly on the *Measure Descriptions* tab.
- Review all assumptions for installed cost and savings flags on the *Measure QC* tab. If assumptions are conservative and reasonable, provide justification and documentation to support them.
- Make sure that no tier-two flags are tripped, and that no measure has a comment on the *Measure QC* tab that says “The SAV-IT will not be approved until the savings are brought below the cap.”
- Submit the model and/or external calculations for any measures that still have cost or savings flags tripped on the *Measures QC* tab after you have finalized your calculations and explanations.
- Review the *Existing Conditions* tab to make sure all sections are completely filled out.
- Carefully compare the *Existing Conditions* tab and the *Measure Descriptions* tab; all information must match.
- Confirm that the modeled values, assumptions, and calculations for the baseline model and all measures are per the Simulation Guidelines.