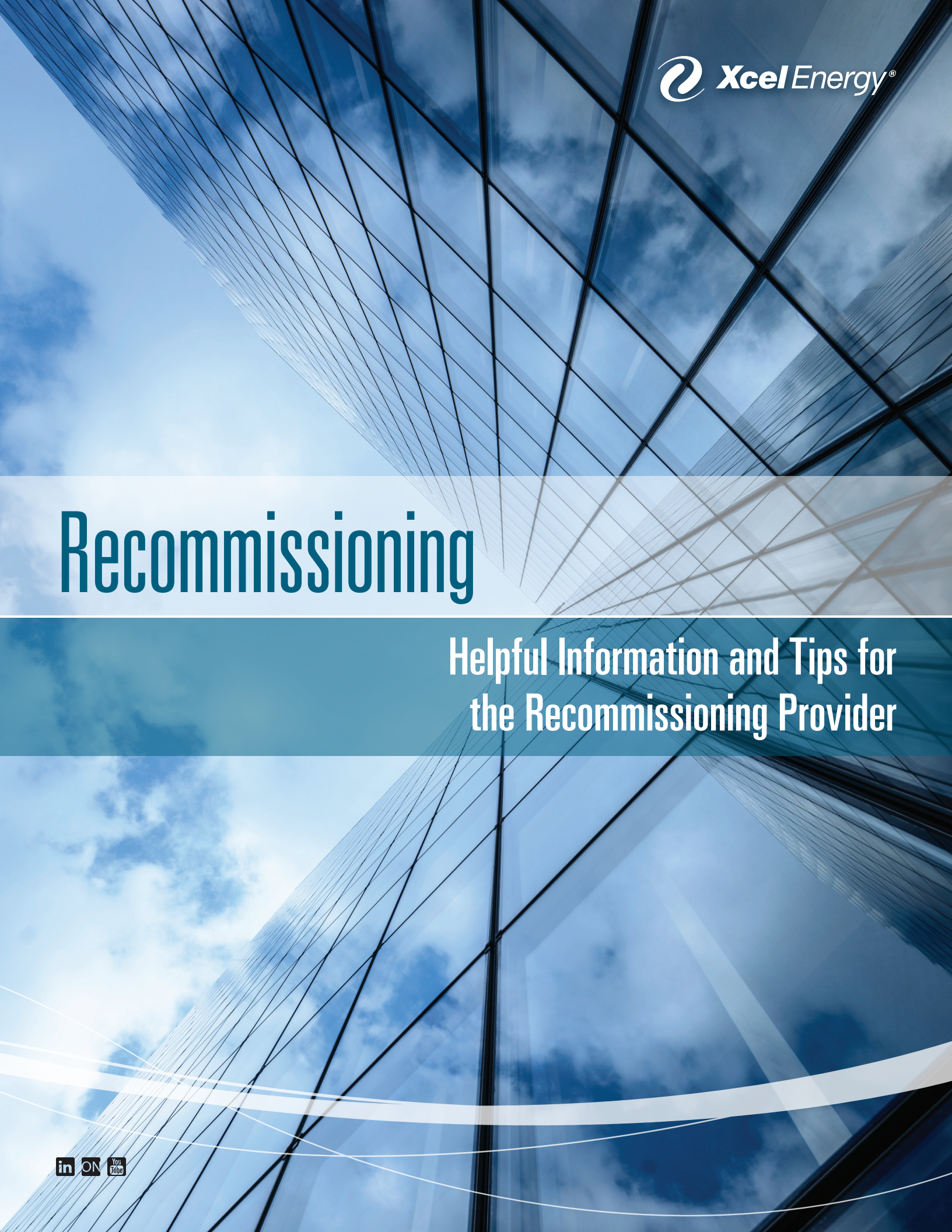

Xcel Energy®
Recommissioning
Helpful Information and Tips for
the Recommissioning Provider

Introduction to Recommissioning

Our Recommissioning program, which covers both Recommissioning and Retrocommissioning projects, is there for you to help your customers identify ways to become more energy efficient while meeting (or exceeding) their building needs. Our program is available to Xcel Energy business customers in Colorado and Minnesota.

Recommissioning is the process of returning a building's mechanical and lighting systems, along with the building controls, to their peak performance. Recommissioning is intended to optimize the existing systems without having to add new components, which typically expose low-cost measures with attractive paybacks.

We've put together the following information to help you and your customers participate through the process of applying for study rebates, getting your study approved, and acquiring the implementation rebates that are part of our Recommissioning program.

We offer three types of rebates for our business customers who undergo Recommissioning studies:

1) A rebate on approved studies for up to 75 percent of the study amount, not to exceed $25,000
2) A rebate for measures implemented within a study
   - In Colorado, we pay $400/kW or $0.08/kWh saved, whichever is greater, and $4/Dth for our gas customers. Rebates are available for measures with a one to 15-year payback.
   - In Minnesota, we pay $400/kW or $0.0456/kWh saved, whichever is greater, and $5/Dth for our gas customers. Rebates are available for measures with a nine-month to 15-year payback. Bonus incentives are available to customers who implement measures within 9 months of study approval. An additional $0.03/kWh and/or $3/Dth on top of the regular implementation rebates. Max bonus is $10,000 or the total out of pocket cost for the study, whichever is lower.
3) A Fast Track implementation rebate for customers who have performed their own Recommissioning study, without funding from us or who have already identified recommissioning measures through a vendor proposal
   - Customers can earn the same implementation rebate levels as #2 above.

To help you calculate energy savings for recommissioning measures identified within a building, you can use Xcel Energy's Recommissioning Calculator Tool. To access the tool, please fill out a license agreement located on **xcelenergy.com/TradePartners** and submit it to us. The tool can only be used on approved Xcel Energy recommissioning projects in Minnesota and Colorado.

If you have not participated in our Recommissioning program before, please complete the Investigator Application on the trade partner site and follow the instructions for what to include with your submittal. We will also set up a time to review our program rules and requirements.

More trade partner program information and all necessary rebate forms can be downloaded from **xcelenergy.com/TradePartners**. Go to "**Business Trade Partners**," then click on "**Recommissioning**."

You can refer customers to xcelenergy.com/Recomm to view program information. All applications, forms, case studies and other relevant materials are located here.

If you have additional questions, call **1-855-839-8862** and ask to speak with the recommissioning trade relations manager.

Program Process

Here's the three-step process for our program and some tips for working through each one (additional tips can be found at the end of this booklet):

STEP 1: Study Preapproval

At this initial stage, you'll work with the customer to complete the following:

- The Recommissioning Study Preapproval Application
- The recommissioning proposal
- Addendum A (list of measures)
  - Review list of measures and identify if there are any measures that aren't applicable to the building being studied and document reasons why. All other measures should be analyzed during the study.

The following key information is required on these documents.

On the Recommissioning Study Preapproval Application:

- Customer and recommissioning provider signatures
- Study cost
- Square footage of the building and type of customer (retail, office, etc.)

On your recommissioning proposal:

- A building description
- A description of building energy-using equipment and systems
- The systems and opportunities to be analyzed
- Preliminary ideas on conservation opportunities
- Any known benchmarking information (optional)

Once you have completed the necessary forms, submit them to the customer's Xcel Energy account manager.

Call our energy efficiency specialists at **1-855-839-8862** if you need to identify the correct account manager, and for assistance getting the customer's billing history.

STEP 2: Study Completion

If the application is preapproved, you will receive an email from us. Generally, recommissioning studies take less than three months to complete, but please keep Xcel Energy updated throughout the process. We encourage you to use our Recommissioning Calculator Tool to help calculate energy savings. After you complete the study, please complete a study report in electronic format that includes:

- Assumptions
- A description of all measures identified
- Completed Addendum A (list of measures)
- All other requirements as listed in the Recommissioning Study Application

Tip: Please review the study report sample to get an idea of what we expect in the study report. It's available on **xcelenergy.com/TradePartners**.

Tip: For calculations, please remember the following (if you're not using our calculator tool):

- Use fluid flow, thermal and thermodynamic formulas, pump and fan laws, and equipment efficiencies and performance graphs/charts in applying engineering formulas. Supply manufacturer literature and cut sheets as needed to support your calculations.
- Determine the baseline, the proposed new operation and highlight the difference using appropriate energy computations for demonstrating the savings and reductions. Show your assumptions.
- Peak demand savings must occur during peak cooling conditions (~97 degrees F), during the peak window between 2 p.m. and 6 p.m., Monday to Friday, from June to September. Using Typical Meteorological Year (TMY) data for calculations is recommended. TMY data is available through **http://rredc.nrel.gov/solar/old_data/nsrdb/1991-2005/tmy3/**.
- Break out demand, energy and fuel costs separately.
- Use the approved customer rates that are posted on **xcelenergy.com/TradePartners** to calculate savings.

If you used our Recomissioning Calculator Tool, you'll need to submit that to us with the study.

The Energy Conservation Opportunities (ECO) form needs to be completed electronically as well. As with other Recommissioning program materials, it can be found on **xcelenergy.com/TradePartners**. Be sure to go to this site to access the most up to date ECO Form for every study you complete, as we periodically make enhancements to it.

A completed ECO Form should include:

- All measures identified during the study and energy saving items you may have fixed while doing the study. It's important to document all savings no matter what the payback is, to help justify the study funding.
- A clear differentiation among the recommendations for Recommissioning, prescriptive and custom efficiency measures
- Estimates of prescriptive rebates (show calculations for rebates within the study)
- Electric and gas savings, regardless of whether the customer is an Xcel Energy natural gas customer or not

Tip: The ECO form will automatically populate a Recommissioning rebate amount when you enter data. If the measure is prescriptive, you will need to manually enter the estimated prescriptive rebate. The customer must apply for preapproval before implementing Custom Efficiency measures.

Tip: Our energy efficiency engineer will contact you with questions regarding the study. Please respond promptly to keep the study approval process moving.

Tip: Please present only the final, approved study report to the customer, as we may request changes or clarifications to the study draft.

Tip: If you are helping the customer apply for Fast Track implementation rebates, they will need to submit a Fast Track Preapproval Application, the study report and/or proposal with energy calculations and an ECO form. Our engineer will review the information to make sure our requirements have been met and that all information listed above is included (i.e., calculations, assumptions).

STEP 3: Implementation of Study Recommendations

When the study report is approved, we will determine which, if any, implemented measures require measurement or verification (M&V) before and after implementation and notify both you and the customer in the study approval letter. When the customer knows they'll implement a measure that requires M&V, they should notify us so we can begin the M&V process. We will hire a third-party provider to complete the M&V process.

Once measures have been implemented and verified, the customer should submit a completed, signed ECO Form along with invoice copies from the implementation work to their Xcel Energy account manager. Then, after review and approval by us, we issue the implementation rebate.

Tip: Implementation invoices must detail the cost of each individual measure.

Tip: The customer should sign off on all measures they completed, regardless of the payback.

Incentives for our Trade Partners

CO: You may qualify for a trade incentive of up to $1 per 1,000 kWh of recommissioning opportunities identified in your Recommissioning study. The maximum incentive is up to $1,000 per study with a minimum of $250.

MN: You may qualify for a trade incentive of 20% of the customer's implementation rebates for helping customers implement recommended recommissioning opportunities. The maximum incentive is up to $5,000 per study with a minimum of $5. You may earn a flat $250 for approved fast track Recommissioning projects.

Addendum A (list of 38 measures)

The following list of 38 measures is included in Addendum A and are commonly found within a building—half of which are also included in the Recommissioning Calculator Tool. During the preapproval phase, you will need to identify if there are any measures that aren't applicable to the building being studied and document reasons why.

All other measures should be analyzed during the study. At the end of the study, you will also need to identify which measures you recommended and document reasons why you didn't recommend the rest. Addendum A can be found on the Recommissioning page on xcelenergy.com/TradePartners.

	Measure	Description
1	Replace/repair/calibrate sensor	Correct sensor functionality.
2	Tune/upgrade controls	General building-wide controls tune-ups, modifications or upgrades (i.e., lighting, air distribution units, terminal air units, chillers, boilers, pumps) are all included in the same measure, plus anything else in a building that uses energy: snow melting, data center control systems, etc.
3	Reduce equipment runtime	Changing an equipment availability schedule to reduce its runtime relative to the building occupancy schedule (i.e., time-based reduction in availability time).
4	Reduce lighting schedule	Reduce the lighting runtimes based on need.
5	Adjust photocell/occupancy/ daylight sensor	Installing or adjusting a photocell (exterior lighting daylight sensor), occupancy sensor and/or daylight sensor (interior lighting) to reduce lighting levels and runtime of electric lighting.
6	Reduce valve leakage	Make repairs to a leaking valve (valve doesn't seal properly, allowing water to pass even when is it in the closed position).
7	Reduce AHU/RTU air leakage	Make repairs to a leaking AHU/RTU or downstream ducting.
8	Reduce AHU/RTU fan static by coil cleaning	Reduce fan motor break horsepower by coil cleaning procedures.
9	Restore VFD to 'auto'	Restore automatic control of a VFD.
10	Reduce equipment/actuator cycling	Make repairs to equipment/actuator controls to reduce short cycling (turning on and off).
11	Relocate/shield temp sensor	Locate temp sensor in an area suitable for accurate sensing.
12	Increase dead band	Increase the space temperature dead band (range of temperature acceptable without cooling or heating conditioning) to reduce the number of hours you have to heat or cool a space.
13	Eliminate simultaneous heating and/or cooling	Repair leaky heating or cooling valves to eliminate simultaneous heating and/or cooling: Improve control of terminal units and reheat units to keep from heating and cooling at the same time.
14	Add/replace/repair damper, linkage and/or actuators	Repair leaky or broken dampers.
15	Heating plant enable	This measure pertains to outside air enabling of the heating plant. The enable temperature is the temperature at which the heating plant activates and hot water is circulated to the building. The water may be heated by district steam (hot water) or a local boiler plant. Lowering the outside air enabling temperature will save boiler and pump energy.
16	Waterside economizer and cooling plant enable	This measure pertains to outside air enabling of the cooling plant. The enable temperature is the temperature at which the cooling plant activates and chilled water is circulated to the building. The water may be cooled either by the cooling tower with water side economizer or a chiller. In a system with a waterside economizer, a higher enable temperature will save pump and cooling tower energy. In a system without a waterside economizer, a higher enable temperature will save chiller, pump, and cooling tower energy. This measure will also calculate the savings from adding or optimizing a waterside economizer. Optimizing a waterside economizer can be going from dry bulb to wet bulb control or changing the enable set point.
17	Revise control sequence	Modify or change an AHU/RTU control sequence to improve energy efficiency.

	Measure	Description
18	Optimize airside economizer	Set the mixed air economizer control in an AHU/RTU so as to get maximum use of outdoor air free cooling (e.g., fix mixed air dampers, replace damper actuators, modify economizer control sequence, etc.).
19	Add/optimize SAT reset	Control the supply air temperature based on either outside air temperature or space loads, to improve the cooling or heating plant efficiency.
20	Lower/reset VAV box flow	Reduce the air flow rates through a VAV terminal unit to match the real load.
21	Adjust space static controls	Adjust the space static pressure set point to reduce fan energy consumption (not the same as reducing duct static pressure set point).
22	Adjust OA min flow setpoint	Reduce the minimum outdoor air ventilation rate setpoint in compliance with codes, to reduce heating and cooling loads.
23	Add/optimize demand control ventilation	Add or optimize the minimum outdoor air method control in the AHU/RTUs to be based on the difference between outdoor air CO2 and return/space air CO2. This is called Demand Control Ventilation (DCV). Other methods of reducing needed outdoor air ventilation also exist, such as room motion sensors.
24	Add/optimize zone setup/ setback	Add or optimize controls of the zone VAV or other terminal units to provide better control of space temperatures or allow spaces temperatures to drift more during unoccupied hours (e.g., convert pneumatic VAV controls to DDC, adjusting zonal setpoints to decrease AHU/RTU fan run time, which also results in less cooling and time etc.).
25	Add/optimize optimum start/ stop	Control the AHU/RTUs to allow the supply fans and cooling and heating equipment to be enabled or disabled based on the minimum time needed to restore space temperatures to occupied set points.
26	Reduce/reset DSP set point	Run the fan at the lowest possible duct pressure that will meet the air distribution needs, to reduce the kW load on the supply fan motor.
27	Trim pump impeller	Reduce pump head by trimming impeller and balancing valve losses.
28	Pump flow reduction	Changing the pump speed by changing the VFD control or reduction bypass no heating/cooling savings, assumes load was being met previously.
29	Pressure differential change	Same concept as reduced head pressure, includes option for reset.
30	Reduce/reset the differential pressure set point	Reduce/reset the differential pressure (dP) set point across a water loop pump to reduce the load on the pump.
31	Add/optimize chiller staging	Reduce energy use of the chilled water system by modifying the chiller's staging sequence controls.
32	Optimize waterside economizer	Add or optimize the waterside economizer to allow chilled water return to reject heat directly to the condenser water loop (saves energy by keeping the chiller disabled at lower outdoor air wet-bulb temperatures).
33	Add/optimize chiller lockout	Add or optimize control of a chilled water system to enable the chiller when the outside air dry-bulb temperature exceeds a specified temperature set point.
34	Add/optimize cooling tower staging	Add or optimize control of the condenser water system by modifying the cooling tower staging control (i.e., turning cooling tower fans on to meet the building heating load while maintaining optimum part-load performance)—allows tower fans stage to more closely match the load, saving fan kW.
35	Add/optimize CWST reset	Control the condenser water supply temperature based on either outside air wet-bulb temperature or chiller load to allow the most efficient chiller operation.
36	Add/optimize CHWST reset	Control the chilled water supply temperature based on either outside air temperature or cooling load to allow the highest possible chilled water temperature that will maintain space temperatures.
37	Add/optimize HWST reset	Add or optimize control of the heating water supply temperature based on either outside air temperature or heating load.
38	Add/optimize boiler lockout	Add or optimize control of a heating water system to disable the boiler when the outside air dry-bulb temperature exceeds a specified temperature set point.

Vendor Tips

About the Recommissioning Calculator Tool

Xcel Energy developed the Recommissioning Calculator Tool—an energy savings calculation template—to provide study providers with a helpful, one-stop resource for calculating study data. The tool is not only meant to standardize and simplify the study preparation, but also to streamline the review process.

The Excel worksheet-based tool swiftly and efficiently calculates energy and cost savings for inclusion in the final report with consistent savings estimates.

As of publication date, half of the measures in Addendum A can be found in the tool, with more being added in the future.

Top 10 Recommissioning Tips

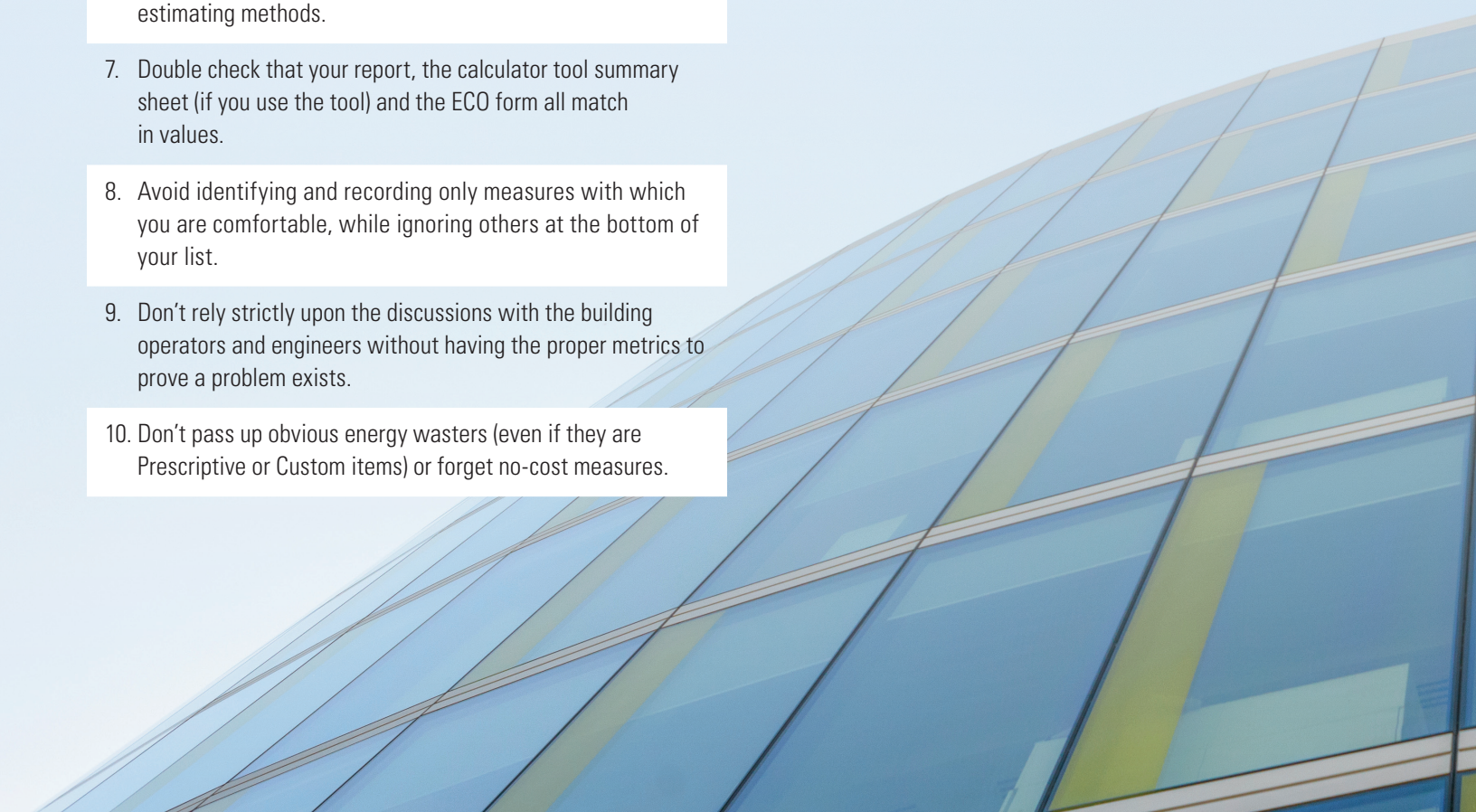
1. Focus on accuracy and thoroughness to facilitate good investment decisions.
2. Collect real field data and perform trending to avoid estimates and rules of thumb.
3. Perform functional and point-to-point testing of controlled and EMS-connected points.
4. Utilize the Xcel Energy Recommissioning Calculator Tool.
5. Use the most current Xcel Energy ECO form, located on the Xcel Energy Recommissioning Trade Partner website.
6. Document the sources of uncommon formulas and estimating methods.
7. Double check that your report, the calculator tool summary sheet (if you use the tool) and the ECO form all match in values.
8. Avoid identifying and recording only measures with which you are comfortable, while ignoring others at the bottom of your list.
9. Don't rely strictly upon the discussions with the building operators and engineers without having the proper metrics to prove a problem exists.
10. Don't pass up obvious energy wasters (even if they are Prescriptive or Custom items) or forget no-cost measures.

Preparation for Study

- Focus first on planning for no/low-cost, quick-payback opportunities.
- Don't pass up obvious energy wasters (even if they are Prescriptive or Custom items) or forget no-cost measures.
- Refrain from estimating your customer's study rebate. Xcel Energy computes a unique rebate for every building: up to 75 percent of the study cost and up to $25,000.
- Include a short narrative description in your proposal with the application, which contains a listing of opportunities you expect to find based on the walkthrough conducted with the owner.

Performing the Study

- Focus on accuracy and thoroughness to facilitate good investment decisions.
- Collect real field data and perform trending to avoid estimates and rules of thumb.
- Collect and use measurement data to sufficiently identify measures and calculate the energy and demand reductions.
- Take measurements at seasonal/diurnal periods that will yield the most accurate and revealing results for the equipment and systems under study. For example, DX air conditioning units are better measured in the heat of the summer.
- Use building meter data and EMS data to help uncover recommissioning measures to keep the study costs within budget.
- Perform functional and point-to-point testing of controlled and EMS-connected points.



- For items of large quantities, such as VAV boxes, rely upon sampling.
- Measure light levels, combustion efficiency, refrigeration temperatures or pressures and RPM if the opportunity is appropriate.
- Avoid identifying and recording only measures with which you are comfortable, while ignoring others at the bottom of your list.
- Don't rely strictly upon the discussions with the building operators and engineers without having the proper metrics to prove a problem really exists.
- Avoid having to measure real flows by estimating fan and pump flows with equipment curves, pressure drops and power measurements.
- Don't take the design and nameplate value for granted.

Completing the Report

- Utilize the Xcel Energy Recommissioning Calculator Tool when appropriate.
- To capture the summer peak savings for column C of the ECO form:
  1) Use the value at a design temperature of 95°F in CO or 92°F in MN if the measure is weather dependent.
  2) Use the peak demand that occurs in the following window: June to September, Monday to Friday, 2 p.m. to 6 p.m. if the measure is not weather dependent.
- Ensure you are using the most current Xcel Energy ECO form, located on the Recommissioning Trade Partners website.
- Don't inflate measure implementation costs to earn Recommissioning rebates.
- Document the sources of uncommon formulas and estimating methods.
- The minimum acceptable estimating method for climate-dependent measures is the temperature bin method.
- Don't use parametric data from "similar" buildings to build your case for a measure. There are too many variables to justify an accurate recommendation.
- Consider all fuels when filling out the ECO form. Add in the natural gas in the "Natural Gas" column even if not an Xcel Energy gas customer.
- Check the square check boxes on the ECO form below name and address ONLY if the electricity or natural gas is served by Xcel Energy as a retail supplier.
- Double check that your report, the calculator tool summary sheet (if you use the tool) and the ECO form all match up.
- If your customer uses a third-party central plant:
  1) Capture the chilled water, steam or hot water energy savings in columns P–S.
  2) Capture the cost savings in the natural gas savings.

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