



ecoENERGY Efficiency for Buildings

Building Commissioning and Recommissioning

The way we do business in Canada today is changing: Climate change is transforming how we operate and is affecting the bottom line. The Canadian buildings sector can rise to the challenge by finding innovative ways to improve operations while reducing costs.

Natural Resources Canada (NRCan) – through its **ecoENERGY Efficiency for Buildings** for new, existing and federal buildings – has a solution to optimize your building's energy performance while minimizing risks. Often overlooked, building commissioning ensures that your building systems are functioning as designed and are meeting current operational requirements.

Why is commissioning important?

Traditionally underutilized, building commissioning is a rapidly growing practice that could be the single-most cost-effective strategy for reducing energy, costs and greenhouse gas (GHG) emissions in buildings today.

Building commissioning is a low-cost, low-risk energy management strategy. Its benefits extend beyond operational efficiencies and cost savings to include the following:

- improved occupant comfort, productivity and indoor air quality
- reduced maintenance and operating expenses
- extended service life of equipment
- increased property values

What is commissioning?

Commissioning (Cx) is a quality management process applied to buildings during their design, construction and operation. It ensures that building systems and equipment are installed and operating correctly. Traditionally considered a “final systems check,” building commissioning has evolved to a more progressive process that includes systematic verification and testing, staff training and thorough documentation of all systems.

A well-commissioned building will perform better and use energy more efficiently. By helping to ensure that buildings are constructed and operate as intended and designed, commissioning supports the energy-efficient design goals of the *National Energy Code of Canada for Buildings* and emerging provincial and municipal building energy codes.

Commissioning yields impressive results

A comprehensive study done in 2009¹ found that commissioning yields significant savings:

- For new buildings: Energy savings of 13 percent, with a typical payback of 4.2 years
- For existing buildings: Energy savings of 16 percent, with a typical payback of just over one year

Recommissioning: commissioning of existing buildings

Changing occupant needs, space reprogramming, building renovations and obsolete systems can wreak havoc on the efficiency of a building's energy-using systems. But you can avoid these problems through recommissioning.

Recommissioning (RCx) is a re-optimization process that ensures that existing equipment and systems operate optimally. It provides a rigorous investigative approach to identifying problems and systems integration issues.

¹ Mills, Evan, *Building Commissioning: A Golden Opportunity for Reducing Energy Costs and Greenhouse Gas Emissions*. Lawrence Berkeley National Laboratory, July 21, 2009, p. 22, cx.lbl.gov/2009-assessment.html.



Before proceeding with costly building retrofits, consider **recommissioning** first. Typical measures include fixing ventilation dampers, adjusting chiller operations, aligning zone temperature set-points, eliminating simultaneous heating and cooling, and using persistence strategies such as training, monitoring energy bills, energy management information systems and automatic diagnostics.

Case Study – Office Tower: Royal Bank Office, Winnipeg, Manitoba

Built in 1965, the 17-storey, 20 000-square metre Royal Bank office building in downtown Winnipeg accommodates 1000 employees. Its annual energy bill before RCx was about \$294,000. Completed in 2009, RCx reduced the bill by about 20 percent and focused on the following electromechanical systems:

- two natural gas boilers of 2930 kilowatts each (299 horsepower)
- 10 air handling units with a total capacity of 69 500 litres per second
- two chillers with a total capacity of 430 tonnes (t)

After the RCx implementation phase, the measurement and verification carried out during the year resulted in discoveries that generated additional electrical savings of 800 gigajoules (GJ).

Results

- Energy savings:^a (75 percent natural gas, 25 percent electricity): 6652 GJ/yr (25 percent)
- Monetary savings:^b \$59,000 per year
- GHG reduction (equivalent to 66 cars): 363 t of carbon dioxide equivalent per year
- Simple payback:^c 3.3 years

For more information on the Royal Bank office and for other case studies on recommissioning, visit canmetenergy.nrcan.gc.ca.

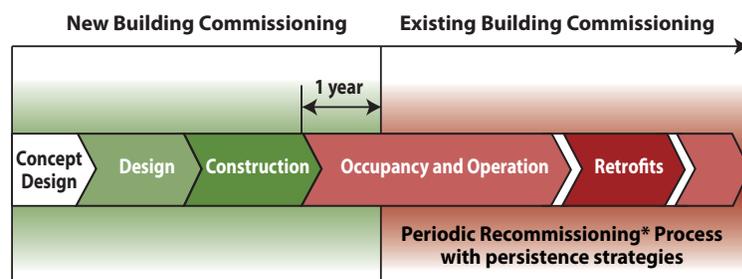
^a Savings verified by an independent third party in accordance with the International Performance Measurement and Verification Protocol and standardized according to weather conditions.

^b Monetary savings do not include non-energy impacts, such as extended service life of equipment or increased comfort for tenants.

^c Includes all costs for the four phases of the project.

Life-cycle commissioning

Rather than viewing commissioning as a one-time event, view it as a process that is integrated throughout your building's life cycle. You can maintain optimum building performance by commissioning new buildings or recommissioning existing buildings and then using ongoing commissioning to ensure the persistence of benefits – from initial concept to occupancy. Regardless of your building's phase in its life cycle, it is never too late to start.



* 3 to 5 years, depending on ongoing commissioning rigour and changes in building use.

For more information

NRCan's **ecoENERGY Efficiency for Buildings** can help you get started no matter where you are in the building life cycle. We provide training, technical support, information and other resources, including the following:

- Dollars to \$ense Energy Management workshop on recommissioning (oe.e.nrcan.gc.ca/industrial/training-awareness/2442)
- NRCan's CanmetENERGY's *Commissioning Guide for New Buildings* (canmetenergy.nrcan.gc.ca/buildings-communities/energy-efficient.buildings/optimization/503)
- CanmetENERGY's *Recommissioning Guide for Building Owners and Managers* (canmetenergy.nrcan.gc.ca/buildings-communities/energy-efficient%20buildings/optimization/recommissioning/publications/1554)
- a commissioning case study database (canmetenergy.nrcan.gc.ca)
- research and software developed by the CanmetENERGY laboratory (canmetenergy.nrcan.gc.ca)

Take advantage of the potential savings now! Visit NRCan's Office of Energy Efficiency at oe.e.nrcan.gc.ca or e-mail to info.services@nrcan-nrcan.gc.ca for more information or to share your experiences with building commissioning.

Additional resources on building commissioning

- The Canadian Standards Association's *Building Commissioning Standard (CSA Z320)*, csa.ca
- American Society of Heating, Refrigerating and Air-Conditioning Engineers Inc.'s (ASHRAE's) *Guideline 0-2005: The Commissioning Process*, ashrae.org
- The Building Owners and Managers Association of Canada Inc.'s (BOMA Canada's) *Existing Building Commissioning (EBCx) for Commercial Real Estate Owners and Managers*, bomacanada.ca
- Building Commissioning Association's *Existing Building Commissioning RFP Template*, bcxa.ca/resources.html
- Incentives and other information may be available from your local electrical and gas utilities.

Natural Resources Canada's Office of Energy Efficiency
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