CASE STUDY

# EXISTING BUILDING COMMISSIONING

## Recommissioning (RCx) of the Sept-Îles Airport Facilities

### General Building Description

**Nature of the Building:** Regional airport

**Location:** 1000 Laure E. Blvd., Sept-Îles, Quebec, Canada G4R 4K2

**Project Year:** 2019

**Main Project Objective:** Greenhouse gas (GHG) emissions reduction

**Commissioning Scope:** The mandate covered all the buildings on the Sept-Îles Airport site: the airport terminal, the integrated services building, and the pumping station. All the electromechanical systems, centralized control system and lighting controls were included in the mandate's scope.

**Size of Commissioned Area:** 6,389 $m^2$

**Total Commissioning Investment:**

- RCx services: $90,000
- Measures implementation: $388,000

### Measured Results

**COST SAVINGS (2020-2021)**
Negligible

**SIMPLE PAYBACK**
N/A

**ENERGY SAVINGS**
-289,648 kWh of electricity
60,477 L of fuel oil
Total of 1,289 GJ
(9% per year)

**GHG EMISSIONS SAVINGS**
164.8 tonnes of $CO_2$eq per year
(83% per year)

### WHAT IS RCx?

Recommissioning (RCx), along with other terms such as retro-commissioning (Re-Cx) and ongoing commissioning (OCx), are part of a broader concept known as existing building commissioning (EBCx).

The RCx process represents a cost-effective investment to ensure that a building operates optimally and as intended based on its current use. RCx:

- Provides a better environment for occupants
- Reduces indoor air quality issues
- Reduces the number of occupant complaints
- Reduces contractor call-backs and warranty issues
- Reduces energy consumption and operational costs

# Project Overview and Background

The Sept-Îles Airport site includes two distinct main buildings: the airport terminal and the integrated services building (ISB).

Built in 1978, the terminal accommodates approximately 140,000 travellers each year. The building houses a terminal and office spaces on three floors, and a control tower and a mechanical room in the basement.

Built in 1973, the ISB is used by the technical staff responsible for the airport's operation and maintenance. The building includes two vehicle storage and maintenance garages, workshops, some offices, locker rooms, a rest area, and a mechanical room.

Both these buildings are heated by a hydronic heating system powered by a combination of natural gas and electric hot water boilers. The cooling needs during summer are met by a group of semi-hermetic compressors connected to a chilled water loop and condensers on the roof. The ISB is not air-conditioned.

# Project Scope of Work

The RCx project covered all the buildings on the Sept-Îles Airport site and focused mainly on the following systems:

- Main ventilation systems
- Heating water boilers and systems
- Chillers and chilled water system
- Variable air volume boxes (sampling)
- Hot-water convectors (sampling)
- Extractor fans
- Lighting controls
- Water heaters
- Direct digital control systems (Honeywell)

The project covered all four phases of the RCx process, including Planning, Investigation, Implementation and Hand-Off & Persistence. The Investigation phase was carried out in two stages: during winter and during mid-season and summer.

The Hand-Off & Persistence phase was carried out by internal staff at Transport Canada and was spread out over a little more than two years.

# Project Management

Natural Resources Canada (NRCan) managed every aspect of the RCx project in support of Transport Canada throughout this process, which was the first RCx experience for Transport Canada staff and for the Sept-Îles Airport operators involved. The Planning and Investigation phases were performed by a RCx provider. The provider was also responsible for producing the documents required for implementation as well as the hand-off & persistence plan.

The addition of experienced staff to the maintenance and operations team during the Implementation phase was beneficial to Transport Canada, enabling it to properly assimilate the investigation recommendations set out in the implementation plans and specifications. The Implementation phase was spread out over a longer period than anticipated, as some of the measures were combined with more significant retrofits and upgrades.

# Challenges Encountered

- The upgrade of the centralized control system had to be carried out for some of the proposed recommendations to be implemented, especially those concerning the addition of new control points.
- Seeing as the airport terminal equipment was old, most of the technical documentation was not readily available.
- The boilers' fuel oil consumption is not continually measured. It remains difficult to establish monthly amounts, thereby requiring an energy simulation to assess the potential for converting to electricity.
- The site is in a remote area, and as a result, labour resources are limited, which caused maintenance, such as cleaning the air ducts, to be deferred.

| Stages | Start Date | End Date | Duration |
|---|---|---|---|
| **Planning** | January 2019 | February 2019 | 1 month |
| **Investigation** | February 2019 | August 2019 | 6 months |
| **Implementation** | December 2019 | May 2022 | 2.5 years |
| **Hand-Off & Persistence** | April 2020 | April 2022 | 2 years |

# Implemented Measures

**Only some of the identified measures were implanted (10/18). Here are the ones that were selected:**

- Changing the modulation sequence of the airport terminal's electric boiler to maximize its contribution to the building's heating when the actual output is less than the targeted or reached maximum monthly demand in the current month.
- Identifying and repairing various air and water leakages.
- Changing the hours of operation of different ventilation systems to correspond with the hours of occupation.
- Changing the control sequence of several ventilation and heating systems.
- For the terminal's main ventilation system, resetting the supply temperature setpoint to 19°C when the outside temperature is below 0°C.
- Cleaning all the ventilation system ducts.
- Updating the building's control system. Several upgrades have been added because the versions must be the most recent ones and compatible with the new controls.
- Changing the rate of the pumping station's electricity bill that was billed at rate G to rate M.
- Integrate all the CVAC equipment (pumps, fans, flowmeter) into the site's centralized control system and update the sequences according to the building's needs to optimize the entire system's programming.
- Restarting various stopped or broken-down equipment.

# Project Benefits

Reduction of the site's greenhouse gas emissions due to a decrease in fuel oil consumption

Enhanced comfort in the office spaces and airport terminal near the baggage loading docks

Decrease in service calls associated with restarting the boilers

Improved system and equipment monitoring capacity

Improvements in the documentation and the operations and maintenance team's knowledge of the site's electromechanical systems

# Lessons Learned

- Use RCx as a greenhouse gas reduction strategy and to extend the lifespan of old equipment.
- Quickly implement the measures that improve the site's occupant comfort.
- Document all the problems that arose with the control system to optimize the RCx work of future projects.
- RCx could allow for the financial justification of retrofits/upgrades of the control system used by the site's operations and maintenance team.

## PROJECT PARTNERS/TEAM:

**Client (building owner):** Transport Canada – Sept-Îles Airport
- Management team
- Operations and maintenance

**Coordination:** Transport Canada – Environmental protection

**Technical support:** Natural Resources Canada – Greening Government Operations
**Implementation support:** Public Services and Procurement Canada (PSPC) – Contract management (operational staff)
**Recommissioning Provider:** WSP Canada Inc.

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