

SOLARWALL CASE STUDY

Free Heat from Alberta Sunshine: A Full Heating Season of SolarWall Performance

Henry Kroeger Regional Water Services Commission Water Treatment Plant • Hanna, Alberta



The 2-stage SolarWall® transpired solar collector on the south wall of the HKRWSC water treatment plant.

156 kW

Peak Collector Power

658 GJ

Total Heat Delivered during
2025/26 Heating Season

\$13,984

Estimated Natural Gas Cost
Savings

45.5°C

Peak Temperature Rise

Project Overview

Facility	Henry Kroeger Regional Water Services Commission (HKRWSC) Water Treatment Plant
Location	Hanna, Alberta, Canada
System	2-Stage SolarWall® transpired solar air heating collector by Conserval Engineering
Installed	2022
Collector area	1,710 ft ² , south-facing wall
Application	Preheats outdoor ventilation air for 2 of 4 makeup air units (MUA-1 & MUA-2), 3,000 CFM each — 6,000 CFM combined
Monitoring period	October 1, 2025 – April 30, 2026 (full 2025–26 heating season)

The Challenge

Water treatment plants operate their makeup air units nearly year-round to maintain safe indoor air quality and stable process conditions. HKRWSC must run the MUA systems even through Hanna's harsh winters, where outdoor temperatures regularly fell below -20°C and dipped as low as -28.7°C during the 2025–26 heating season. Heating outdoor air from ambient temperature with natural gas is a significant, continuous operating cost for the facility.

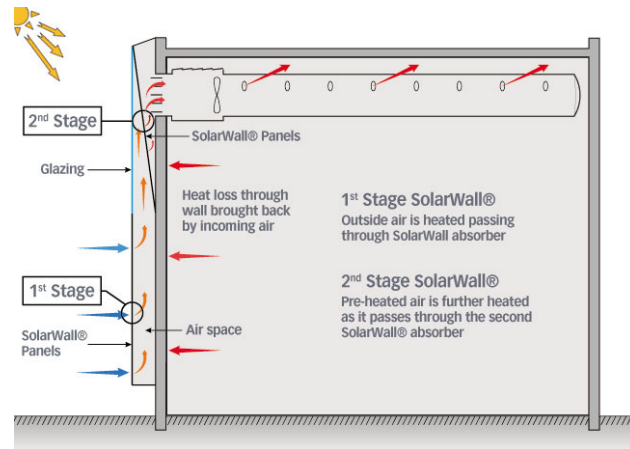
The Henry Kroeger Regional Water Services Commission wanted a way to reduce the natural gas load on its ventilation system without compromising the airflow rates the plant depends on for safe operation.

The Solution

In 2022, HKRWSC installed a 1,710 ft² 2-stage SolarWall® transpired solar collector (Conserval Engineering) across the south-facing wall of the treatment plant. The perforated metal cladding absorbs solar radiation and draws outdoor air through thousands of tiny perforations, preheating it before it reaches two of the facility's four rooftop makeup air units (MUA-1 and MUA-2, 3,000 CFM each — 6,000 CFM combined).

The two-stage configuration routes the preheated air through an air gap behind the polycarbonate shield before entering through the second stage perforated panels for an additional temperature boost before it enters the MUA intake delivering a higher temperature rise than a standard single-stage system. This system configuration is particularly valuable during cold, sunny and windy conditions that are common on the Alberta prairies during the winter months.

System Schematic

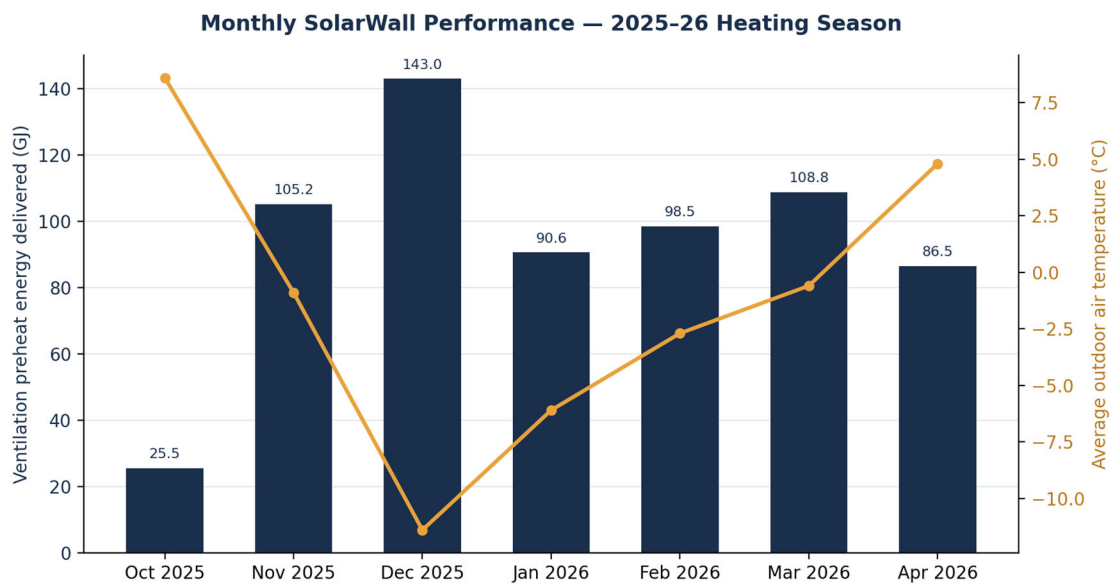


The 2-stage SolarWall® transpired solar collector as installed on the HKRWSC water treatment plant.

A Full Heating Season of Measured Performance

The data shown below was collected from HKRWSC's monitoring system, logging collector temperature, outdoor air temperature, and makeup air unit run status every 5 minutes. The results cover the complete 2025–26 heating season, from October 1, 2025 through April 30, 2026.

Monthly Energy Delivered



Monthly ventilation preheat energy delivered by the SolarWall system, plotted against average outdoor air temperature. December — the coldest month — was also the strongest performer.

Month	Energy Delivered (GJ)	Coldest OA Temp (°C)	Avg. ΔT (°C)	Est. Gas Savings
Oct 2025	25.5	-8.5	9.1	\$542
Nov 2025	105.2	-25.2	16.0	\$2,236
Dec 2025	143.0	-28.7	21.8	\$3,039
Jan 2026	90.6	-28.3	17.4	\$1,924
Feb 2026	98.5	-27.5	16.8	\$2,093
Mar 2026	108.8	-20.8	15.4	\$2,311
Apr 2026	86.5	-15.8	12.0	\$1,838

Note: ΔT is the temperature rise across the collector while ventilation air is being drawn through the wall. Gas savings are calculated from measured heat gain, with an assumed 80% burner efficiency, and natural gas valued at \$17/GJ.

Performance in Extreme Cold

Coldest morning of the season — December 28, 2025

Outdoor air temperature: -28.7°C

Temperature rise across the collector: +25.0°C

Air entering the makeup air units: -3.7°C

Even on the coldest morning of the year, the SolarWall closed more than 85% of the gap between outdoor conditions and freezing.

Season Highlights

- 658.1 GJ (182,792 kWh) of ventilation preheat energy delivered over the monitored season
- \$13,984 in estimated natural gas cost savings (658.1 GJ delivered ÷ 80% furnace efficiency × \$17/GJ)
- System (both MUA-1 and MUA-2) operated for 2,953 hours — 58% of the monitored period
- Average temperature rise across the collector while operating: 18.0°C; peak rise: 45.5°C
- Best single day: December 11, 2025, with 2,833 kWh of preheat energy delivered
- December 2025 was the standout month: 143.0 GJ (39,722 kWh) delivered and \$3,039 in estimated savings, despite an average outdoor temperature of -11.5°C

Environmental Impact

42.0 tonnes of CO₂ avoided this season

Roughly equivalent to the carbon absorbed by 14.8 acres (6.0 hectares) of mature Boreal forest in a year. Over the system's 40-year expected life, that's 1,681 tonnes of CO₂e avoided.

GHG reduction figure per RETScreen Expert financial analysis, SolarWall® by Conserval (Professional edition). Forest equivalency based on a sequestration rate of ~7 tonnes CO₂/hectare/year for mature (200+ year old) forest (Nature United).

Investment Analysis

The SolarWall system was installed in 2022 at a total project cost of \$83,000. Along with the cost of the SolarWall design, material and installation, this cost includes upgrades to the aging HVAC system and the upgrade of the monitoring and control system.

Metric	Value
Installed cost	\$83,000
2025-2026 net cash flow (fuel savings)	\$13,984
Simple payback	5.9 years
Pre-tax IRR (equity / assets)	20.3%
Net Present Value (40-year, 5% discount rate)	\$303,473
GHG reduction	42 tCO ₂ e/yr (1,681 tCO ₂ e over 40 yrs)
GHG reduction cost	-\$421/tCO ₂ e

With a simple payback of 5.9 years (5.4 years on an equity basis) against a 40-year expected service life, the system spends the large majority of its operating life generating positive net cash flow. Even after discounting all future savings back to present-day dollars at a 5% rate — a standard assumption for public infrastructure investment — the system returns a net present value of \$303,473, more than three and a half times its original installed cost.

Assumptions: 3% annual fuel cost escalation; 0% general inflation; 5% discount rate; 0% reinvestment rate; 40-year project life; no debt financing, incentives, or income tax analysis applied.

System in the Field



*Left: The plant's south-facing wall, with the SolarWall system spanning the full height of the building.
Right: close-up of the two-stage collector and outer glazing layer.*

Client Outlook

HKRWSC has been pleased with the SolarWall system's performance through its first fully monitored heating season — delivering meaningful preheat energy even through a winter that saw outdoor temperatures fall below -28°C for multiple weeks. Based on these results, the Commission is now evaluating an expansion of the system to cover the remainder of the South-facing wall, providing preheated ventilation air for one of the remaining two makeup air units. This expansion would increase solar preheating to 9,000 CFM of ventilation capacity.

This additional area would be expected to add more than 35% of the facility's current SolarWall-delivered energy and natural gas savings, while further reducing the plant's exposure to natural gas price volatility during Alberta's coldest months.