

Borgen Precourt Center for Sustainability



General Information

Building: BorgenPrecourtCenter for Sustainability

Location: Avon, CO

Type: Business / Educational / Storage

Size: 7,762 sf

Year Completed: 2019

Project Team:

Developer- Walking Mountains Science Center

Architect- Berglund Architecture

Mech. Eng.- Rader Engineering

Struct. Eng.- Jirsa Hedrick

Civil Eng.- Kerrigan Engineering

Contractor- RA Nelson

"Gas service was discussed as a potential backup, but the team decided to make a statement and let the systems of the building speak for themselves."

-Barry Monroe, RA Nelson

Project Goals

Walking Mountains Science Center needed another building to increase organizational capacity. A perfect embodiment of the Walking Mountains mission statement, the BorgenPrecourtCenter for Sustainability (BPC) was built to be **all-electric**, efficient, and net-zero capable. It is a multi-purpose building containing office, classroom, and storage space.

Initial Analysis

An energy performance simulation for all-electric systems was conducted by Rader Engineering. It determined cost by fuel type and cost savings acquired with each additional LEED v4 EA credit. The addition of solar PV was also modeled. Total modeled annual energy use for the proposed site was 61,432 kWh, with a cost of \$2,297. This equated to an **80.4% savings** in both energy use and cost from the baseline, low-efficiency scenario. Gas service was discussed as a backup energy source, but the line was not installed. This saved an additional **\$10,000**.

Electrification Work Accomplished

Equipment	Total Costs	Notes
2 Thermolec Electric Boilers	\$8,200	For radiant floor heating and cooling in offices
Radiant Heat System (heat loops, pumps)	\$62,736	
Carrier Air Source Heat Pump, FCUs, and Branch Controller	\$58,182	Connection to Honeywell Redlink Thermostat
3 RenewAireEnergy Recovery Ventilators	\$43,427	~\$14,475 / ERV
2 Bradford White Electric Water Heaters	Est. \$5,000	Includes heater and plumbing lines
Demand Controller	\$11,970	Includes labor costs
42.21kW Solar PV on roof	\$87,462	Can produce 55,140kWh/yr
LED Lighting System	\$15,000	Lutron App for programmable lights / shades
ChargePoint Level 2 EV Charger	\$6,180	SemaConnect Series 6
Total Equipment Costs	\$293,157	

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Total Rebate Amounts: \$30,360

Holy Cross Energy Solar PV Rebate:
\$26,065

Holy Cross Energy LED Rebate:
\$2,695

**ChargeAhead Grant Savings for Level
2 EV Charger:** \$1,600

Project Results

Efficiency Gains

The boiler only needs to operate at 75% capacity to successfully heat the building. Optimization of the building envelope, including continuous insulation on the walls and the roof, and high-performance windows make the building extremely energy efficient. There is also a Demand Control device set to 15kW, but that kW demand is rarely needed. Additionally, programmable Wi-Fi thermostats help to control energy usage.

Electrical submetering, connected to the utility dashboard, and an eGaugesystem for front-end management helps guide building performance and detect any issues with the equipment.

Energy Costs

From April 2019 to April 2020, the building **used 45.6 MWh** and **generated 31.5 MWh**. This resulted in electricity cost savings of **~\$4,092.25**. Average monthly costs for non-winter months was **\$19.93**.

Lessons Learned

Monthly bills went up significantly in winter months due to snow covering the solar panels. Efforts to clear that snow must be made to maximize power generation in the cold season.

The conference rooms are not cooled by the HVAC system so they can get stuffy. Fans had to be installed and the shades must be utilized for cooling during hotter months.

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