

# PART 1 PROJECT DESCRIPTION

Use for all categories. Projects are judged based on criteria of sustainable design, architectural merit and innovation.

2021

## CANADIAN GREEN BUILDING AWARDS

THE NATIONAL PROGRAM OF  
SUSTAINABLE ARCHITECTURE  
& BUILDING MAGAZINE

**SABMag**

## Project categories

Identify which Award category you are entering

☐

### 1. Residential [small]

Open to new or renovated buildings less than 600m<sup>2</sup> in area, of which a minimum of 75% is dedicated to single-family or multi-family residential uses.

☐

### 2. Residential [large]

Open to new or renovated buildings [typically multi-unit buildings or groups of related buildings] greater than 600m<sup>2</sup> in area, of which at least 75% is dedicated to residential uses.

☐

### 3. Commercial/Industrial [small]

Open to new or renovated buildings up to 2,000m<sup>2</sup> in area, of which more than 75% is dedicated to commercial or industrial uses.

☐

### 4. Commercial/industrial [large]

Open to new or renovated buildings [or groups of related buildings] greater than 2,000m<sup>2</sup> in area, of which at least 75% of the floor area is dedicated to commercial or industrial uses.

☐

### 5. Institutional [small]

Open to new or renovated buildings up to 2,000m<sup>2</sup> in area, of which more than 75% is dedicated to institutional uses.

☐

### 6. Institutional [large]

Open to new or renovated buildings [or groups of buildings] greater than 2,000m<sup>2</sup> in area, of which at least 75% of the floor area is dedicated to institutional uses.

☐

### 7. Mixed Use

Open to new or renovated buildings [or groups of related buildings] of any size, in which no individual use exceeds 75% of the overall floor area.

☐

### 8. Existing Building Upgrade

Open to buildings of any size or type in which the primary focus of the work has been to enhance the performance or extend the life of an existing structure. Entries in this category are required to respond only to the submission criteria appropriate to the project.

☐

### 9. Interior Design

Open to interior design projects of any size or type. Entries in this category are required to respond only to the submission criteria appropriate to the project.

**An award will be given in each category at the discretion of the jury.**

## PROJECT DETAILS

Project name: \_\_\_\_\_

Address: \_\_\_\_\_

Year completed: \_\_\_\_\_

## PROGRAM AND CONTEXT

**Project type:** [Identify all uses occupying 10% or more of gross floor area]

\_\_\_\_\_

\_\_\_\_\_

**Project site:** [Check all that apply]

☐ Previously undeveloped land

☐ Urban

☐ Rural

☐ Previously developed land

☐ Suburban

**Other Building description:** [Check only one]

☐ New

☐ Renovation

☐ Both [If both, list \_\_\_% new and \_\_\_% renovation]

**STATISTICS\*** Provide the following metrics as applicable to your project.

• Site Area: \_\_\_\_\_ m<sup>2</sup>

• Building gross floor area: \_\_\_\_\_ m<sup>2</sup>

• Energy Intensity: \_\_\_\_\_ KWhr/m<sup>2</sup>/year [Include both base building and process energy]

[optional: report energy intensity separately as follows:

• Energy Intensity, base building: \_\_\_\_\_ KWhr/m<sup>2</sup>/year

• Energy Intensity, process energy: \_\_\_\_\_ KWhr/m<sup>2</sup>/year

• Reduction in energy intensity: \_\_\_\_\_ %.

• State the reference standard on which the % reduction is based: MNECB, NECB or ASHRAE 90.1

[include version]: \_\_\_\_\_

• Recycled materials content: \_\_\_\_\_ % by value

• Water consumption from municipal source: \_\_\_\_\_ litres/occupant/year

[Include both base building and process consumption]

• Reduction in water consumption: \_\_\_\_\_ %

• State the reference on which the % reduction is based: LEED ☐ or other ☐

• Construction materials diverted from landfill: \_\_\_\_\_ %

• Regional materials by value: \_\_\_\_\_ %

**\*NOTE FOR PART 9 RESIDENTIAL PROJECTS: PROVIDE THE STATISTICS ABOVE IF AVAILABLE.** Include in the Executive Summary [see next page] the EnerGuide or the Home Energy Rating System [HERS] ratings if available, and the WalkScore rating [see [www.walkscore.com](http://www.walkscore.com)]. Also, a qualitative assessment of project performance should be included in the appropriate sections of the narrative.



# Indigenous Ecological Knowledge: A Blanket of Warmth



<https://sdgs.un.org/go>

## Indigenous Ecological Knowledge: A Blanket of Warmth

### Project Summary

With the guidance of the United Nations 17 Goals of Sustainable Development, this opportunity is to work with Indigenous Peoples across Canada to improve building standards and energy efficiency for First Nations on-reserve housing that incorporates Indigenous Knowledge. **The Blanket of Warmth** Project broadens Indigenous Knowledge of the tipi using five of the Sustainable Development Goals: Partnerships; Responsible Consumption and Production; Industry, Innovation and Infrastructure; Good Health and Well Being; and Quality of Education, for two 50-year-old residential homes.

Historically, the tipi was one of the first built structures in North America to use the concept of radiation. Rocks were collected to encircle the fire in the middle of the tipi which would activate the thermal mass of the rocks. It was a system of responsible consumption and production.

**The Blanket of Warmth** Project conceptualized this Indigenous Knowledge by retrofitting the existing heating system with a hybrid radiant heating system similar to the thermal mass of the rocks. This project brought two homes that did not meet compliance with ASHRAE Standard 55 – Thermal Environmental Conditions of Human Occupancy, to homes that did.



## Main Project Description

### Strategic Decisions

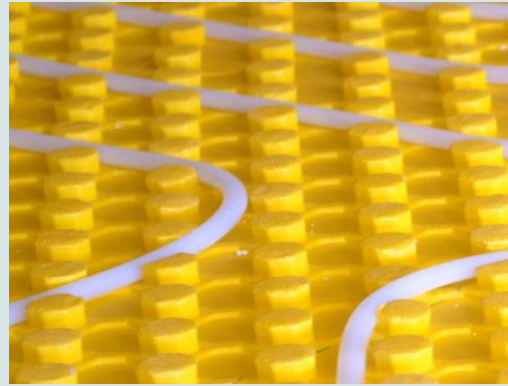


Upon a chance meeting with one member of a local First Nation, he brought to our attention the mold in his home caused health concerns; and, the expense of running a dehumidifier and space heaters which he eventually had to replace with silicone bags.

To address the mold issue, we undertook the strategic decision to form a partnership with Universities, industry leaders, psychologists, Knowledge Keepers, engineers, and businesses. The project needed to be affordable, ecofriendly, incorporate Indigenous knowledge, and create positive social values - inclusion, cooperation, and respect.

**The Blanket of Warmth** Project broadened responsible consumption and production by the installation of the hybrid heating system onto approximately 75% of the perimeter basement concrete walls similar to the thermal mass of the rocks encircling the fire within a tipi. Aligning with the United Nation goals, the retrofitting of the traditional HVAC system increased sustainable efficiency with a system that was simple to install and operate.

A comparison study was done, to prove that radiant heating is a feasible solution to address air quality, thermal comfort, energy usage, and humidity problems in a home with a traditional HVAC system as compared to a home with the hybrid heating system. The result – **The Blanket of Warmth** project is a feasible solution.



## Community

The collaborative **The Blanket of Warmth** Project demonstrated the benefits of a modernized sustainable development that took advantage of the activating the building's thermal mass to achieve:

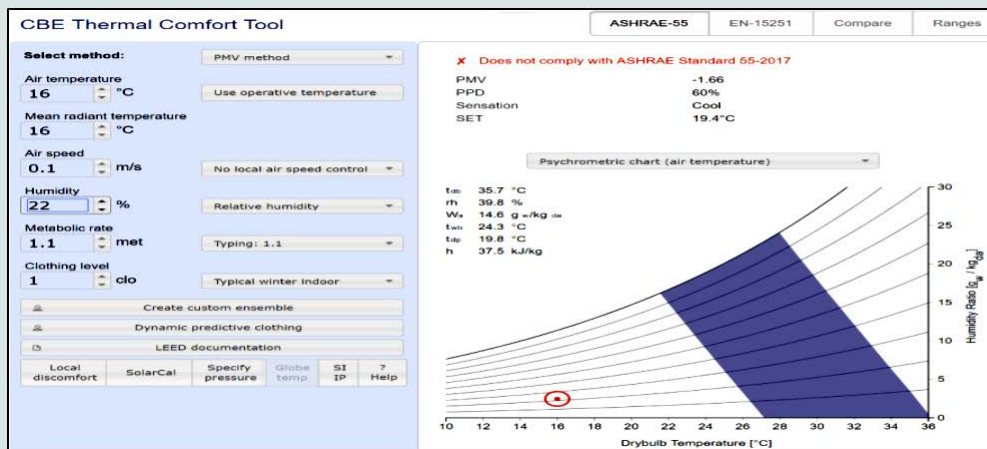
- reduction of mold growth,
- two homes in compliance with ASHRAE Standard 55,
- reduced the financial hardship (the occupants will save \$780 per year in power bills),
- created comfort,
- ease of maintenance,
- additional 900 square feet of livable space,
- payback period is 9.6 years,
- renewed First Nation's on-reserve homes that are 50 years old,
- renovated the existing housing stock supporting community resiliency,
- provided 12.9 hours of build-in energy depletion supporting the occupants through power outages in a time of climate change builds in adaptation and resiliency,
- reduced carbon footprint,
- removed electric space heaters and the potential fire hazard (According to NFPA, 79% of deadly home heating fires are due to electric space heaters). Reference: <https://www.nfpa.org/news-and-research/news-and-media/press-room/news-releases/2010/space-heaters-involved-in-79-percent-of-fatal-home-heating-fires>



## Wellness

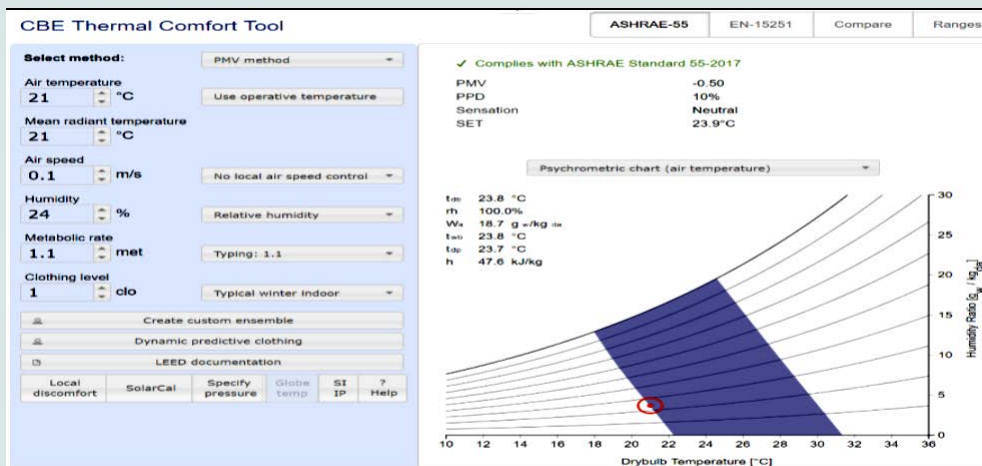
The **Blanket of Warmth** project is viable to achieve good health and well-being. The impact of mold growth in homes located on First Nations reserves in Canada is part of a **national** housing crisis. The First Nation occupants' physical and mental health improved and gave them confidence to transform their basement into a fitness room, and the other home utilizing the livable space for an extra bedroom. Using the ASHRAE Standard 55 CBE Thermal Comfort Tool we demonstrated that we brought an existing home into compliance.

### Traditional HVAC System



### Traditional HVAC System

Hybrid system that activated the thermal mass of the basement concrete walls, resulting in ASHRAE Standard 55 compliance





### **Operating Energy**

We activated the thermal mass of the basement's concrete walls by applying radiant heat to the inside surfaces. Using the furnace as the heat source for radiant wall heating, we eliminated the need for electric space heaters and achieved ASHRAE Standard 55 compliance with energy savings resulting in a simple payback period of 9.6 years.

#### **Data Measurement Information:**

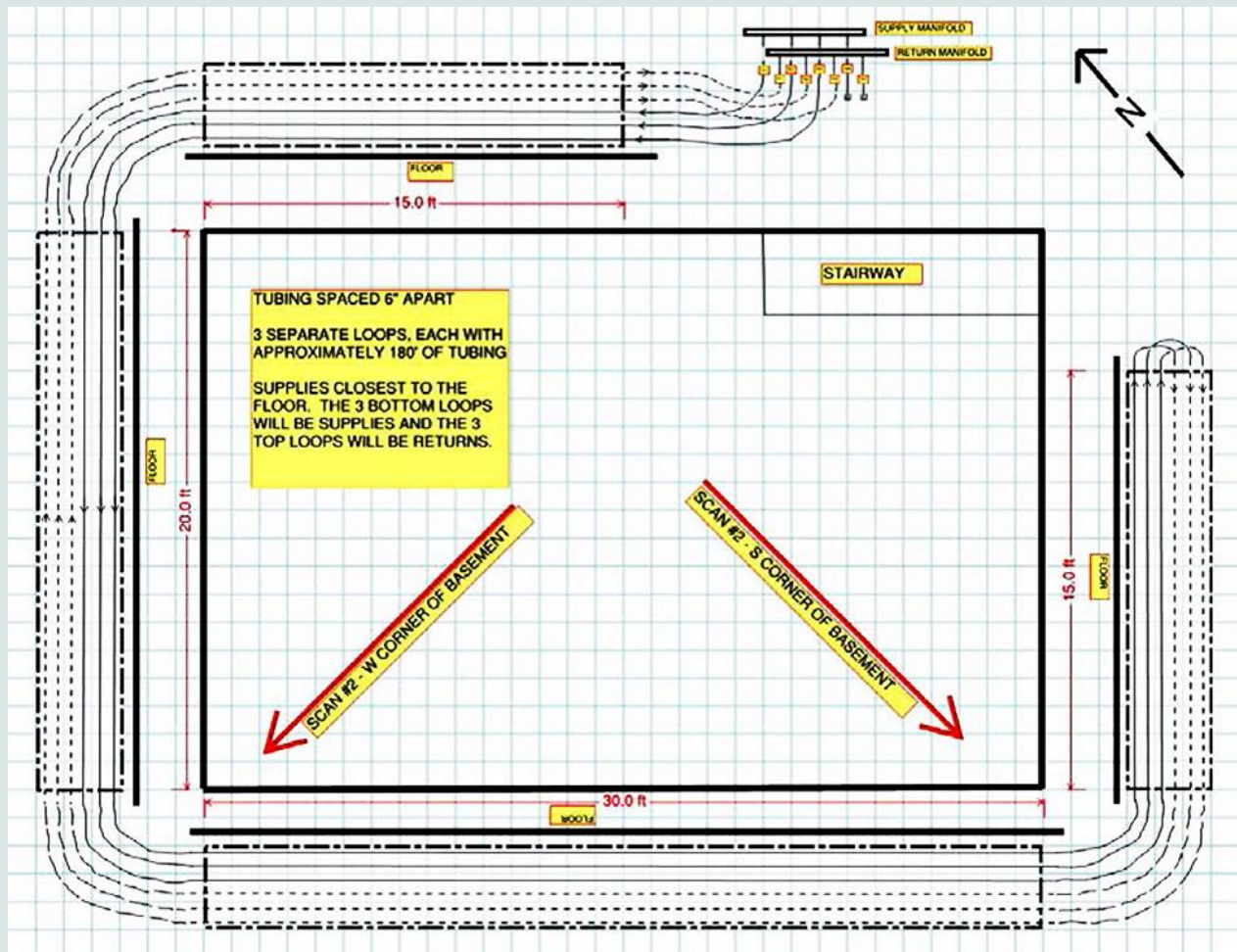
		Basement Floor Corner Surface Temperature		
		N	W	S
<b>1 Feb 2018 10am</b>	System Not Activated	56.2 F	54.2 F	57.4 F
<b>2 Feb 2018 4pm</b>	System Activated			
<b>4 Feb 2018 11am</b>		72.0 F	63.7 F	64.5 F

*Note: slab temperature will continue to rise as thermal mass is warmed*

When furnace is in heating mode:

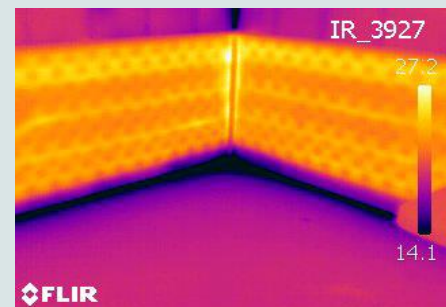
- Outside Temperature: -10 F
- Glycol supply temperature to radiant wall loops: 105 F
- Glycol return temperature to RadiantLink coil: 95 F
- Glycol flowrate: 6 gpm
- Heat radiated from walls to basement: 27,000 BTUH (8 kW)

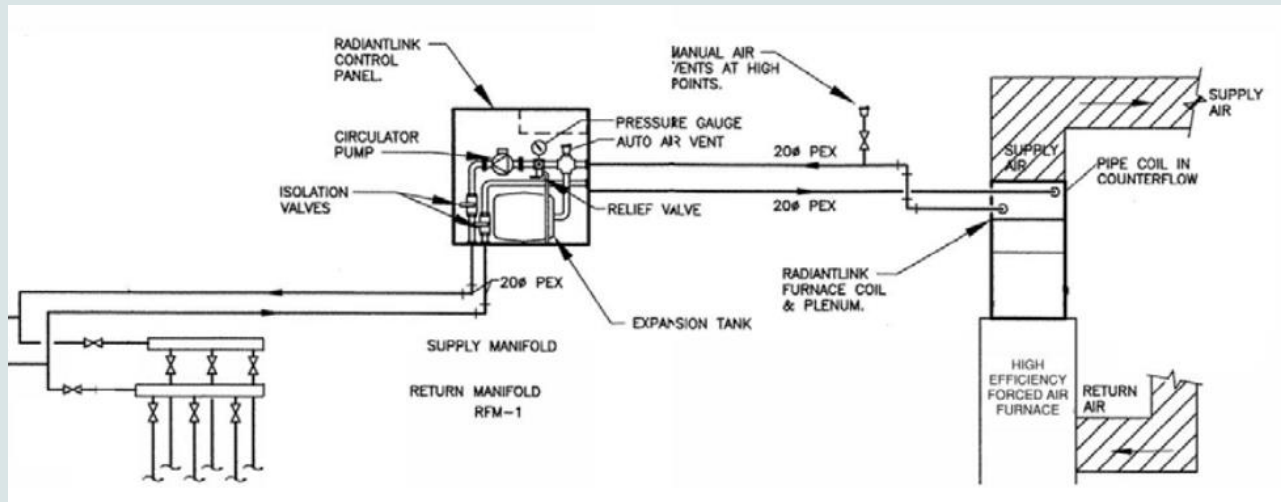
## Basement Radiant Wall Heating Plan



## Thermographic Scans of Radiant Walls

Scan #1- South  
Corner of Basement



**Schematic for the heating system**

- The system is made in Ontario.
- First Nation's Plumbing Company was used to install the system.
- Materials were purchased from local businesses.
- Canadian made materials were given priority.

**Adaptation and resiliency – Time of Energy Depletion in a power outage 12.9 hours**

$$Ra = Pr * Gr_{plate} = 2.97 * 10^9 * 0.713 = 2.12 * 10^9$$

$$Nu = 0.15 * Ra^{1/3} = 0.15 * (2.12 * 10^9)^{1/3} = 193$$

$$h_c = Nu * k / L_c = 193 * (0.0256 \text{ W/mK}) / 2.16 \text{ m} = 2.29 \text{ W/m}^2\text{K}$$

$$h_t = (2.29 + 4.67) \text{ W/m}^2\text{K} = 6.95 \text{ W/m}^2\text{K}$$

$$\text{Power for the Flooring Area, } P = h_t * A * \Delta T$$

$$P = 6.95 \text{ W/m}^2\text{K} * 81.3 \text{ m}^2 * (17.5 - 15) \text{ K} = 1413 \text{ W}$$

$$\text{Time, } t = \text{Energy} / \text{Power} = 65.6 * 10^6 \text{ J} / 1413 \text{ W} = 46461 \text{ s} = 12.9 \text{ hrs}$$



## Education

On February 13, 2019 the University of Regina Capstone students and industry partners shared the project particulars with students from a neighboring First Nation that lead to a conversation about addressing healthy First Nation homes using Indigenous Ecological Knowledge about the Tipi.

A video was also made about this project. Please note company names and products are used.

<https://www.youtube.com/watch?v=KUNcj5WBHiU>





## Conclusion

We have generated interest by attending First Nations Housing Conferences and meetings with other First Nations in Saskatchewan and Alberta. **The Blanket of Warmth** project can foresee this viable project to provide education of sustainable development among First Nations, and to train them to maintain systems in their respective communities.

