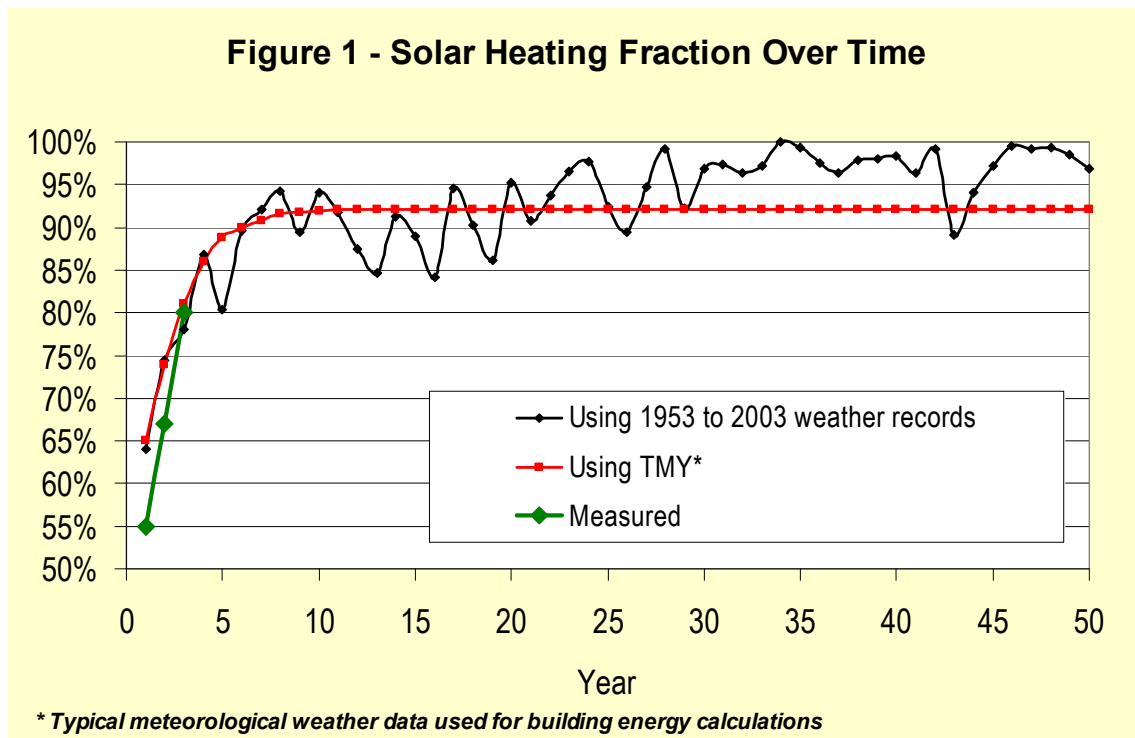




World Record 80% Solar Heating Fraction Set in Year 3

Solar system performance for the third year and the first half of Year 4 has recently been analyzed for the Drake Landing Solar Community (DLSC). Results confirm that the system is performing extremely well and could reach the 90% annual solar fraction target this year, one year ahead of expectations.

With improvements in controls completed in January 2010, the DLSC solar district heating system finished the second half of Year 3 at 90% solar fraction resulting in an annual solar fraction of 80% (70% for the first 6 months). As summarized in Table 1, 2026 GJ of solar energy were delivered to the homes during Year 3 (39 GJ/home). With the solar fraction reaching 80% after three years of system operation, the Drake Landing Solar Community is the first in the world to achieve such a high solar fraction. This achievement highlights Canada's leadership in solar assisted district heating systems. Figure 1 provides a summary of the yearly solar fraction as originally designed with a typical reference weather year TMY (in red) and multiple years of continuous historical weather data (in black) as well as measured (in green).



When compared to conventional new homes in the same area, natural gas savings are estimated to be about 90 GJ/Year per home for Year 3. Table 1 summarizes the energy performance of the DLSC system for the past two years.

Table 1 – DLSC Space Heating Summary (GJ/Year)

	Solar energy delivered to homes	Boiler energy delivered to homes	Natural gas (NG) saved by all DLSC houses	Average NG saved by each DLSC house	DLSC homes average NG consumption	Average NG saved compared to a conventional (non-R2000) house
Year 2	1792	1172	1991	38	25	75
Year 3	2026	519	2251	43	11	90

All Systems Go for Year 4 – 97% Solar Heating Fraction so far!

With Year 4 well underway, the system is closing in on greater than 90% solar fraction for the first six months. Currently (as of December 20), the solar fraction is 97%. It was 92% for November, which was one of the coldest Novembers in the last 20 years and included a period of ten days in a row (November 16-25) with no solar collection due to snow build-up on the collectors and very cold temperatures. So far in December (as of December 20), the system has provided 99% solar fraction.

Live Display of DLSC System Performance

Live system performance information on the Drake Landing solar district heating system is now available on the web at www.dlsc.ca. By simply clicking on the “*System’s Current Conditions*” icon, you can ‘see’ the system in action, as well as review various operational aspects of the system as displayed in Figure 2.

In the upper part of Figure 2, fluid temperatures (in degree Celsius) as well as flow rates (in litres per second) are reported up to the last 10 minutes for all of the three main loops of the solar district heating system. The three loops include the collector loop (top right), district heating loop (top left) and the borehole thermal energy storage (BTES) loop (bottom centre). The temperature of the solar heated water in the short term thermal storage tanks (STTS) located in the Energy Centre is measured at six locations inside the two interconnected tanks. Temperatures are reported in the middle left under the STTS label. Lateral temperatures at the top part of the BTES field are reported at the bottom of the borehole schematic.

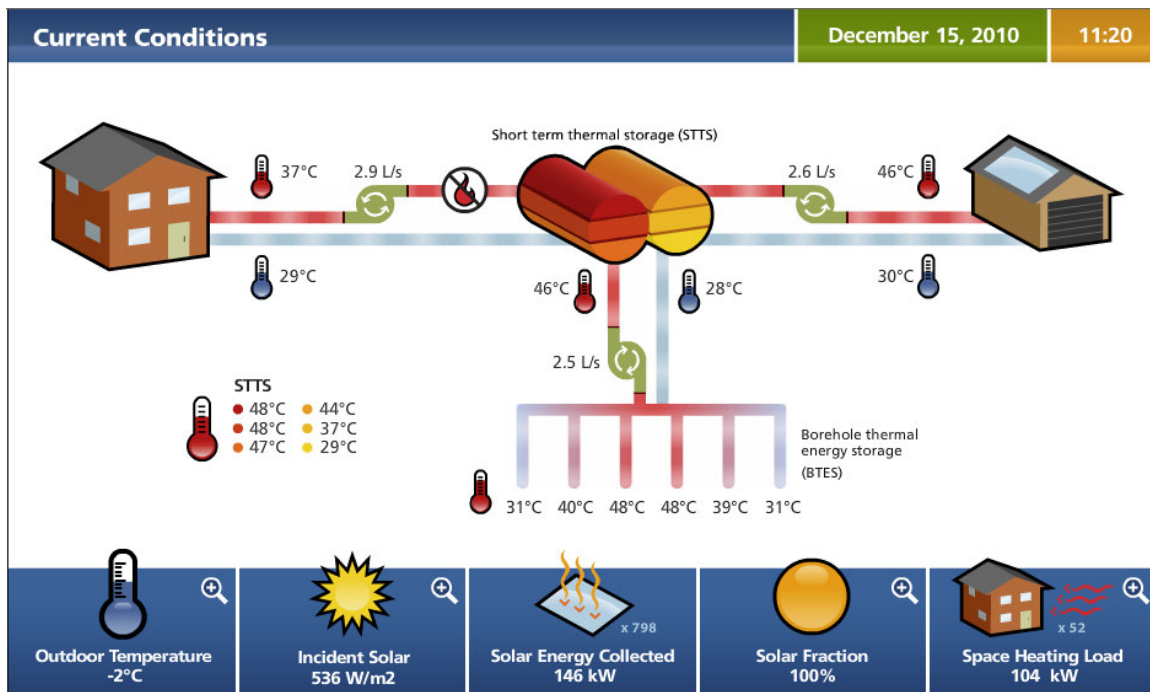
At the bottom of Figure 2 in blue is a band containing weather and system performance information; outdoor air temperature (in degree Celsius), solar radiation (in watts per square meters), solar energy collected by the 798 solar collectors (in kilowatts), solar fraction of the heat supplied to the district heating system (percent of total heat) and the amount of heat supplied to the district heating system (in kilowatts).

Cumulative energy values and 24 hour trends may be seen by clicking on the magnifying glass icons. The past 24 hour trend may be displayed for both outdoor temperature and incident solar radiation. Cumulative values starting from midnight for daily, monthly and annual (starting July 1st)

for both solar fraction and district space heating load may also be seen by clicking on the related magnifying glass icons.

In the example of December 15th at 11:20 AM MST, shown in Figure 2, the outdoor temperature was -2°C and the incident solar was 536 W/m². The solar collectors were running at 2.6 L/s heating the fluid from 30°C to 46°C resulting in a total amount of heat collected of 146 kW transferred to the STTS Tanks. The district heating loop was operating at 2.9 L/s delivering 37°C heated water to the air handlers in the 52 homes. The solar fraction of the total heat delivered of 104 kW was 100%. The BTES loop was also operating at 2.5 L/s delivering 46°C heated water from the borehole thermal storage field to the top of the warm STTS tank.

Figure 2: Live Performance Display of DLSC System for December 15, 2010 at 11:20 MST



Project Updates

Inspections of the residential air handling units as well as the individual solar domestic hot water systems have been scheduled and are currently ongoing. This service inspection is expected to be completed in January 2011.

For more information:

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