Drake Landing Solar Community

Okotoks

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Drake Landing Solar Community

The Drake Landing Solar Community (DLSC) is a master-planned neighbourhood of 52 homes in the Town of Okotoks, Alberta, Canada that has successfully integrated Canadian energy efficient technologies with a renewable, unlimited energy source – the sun.

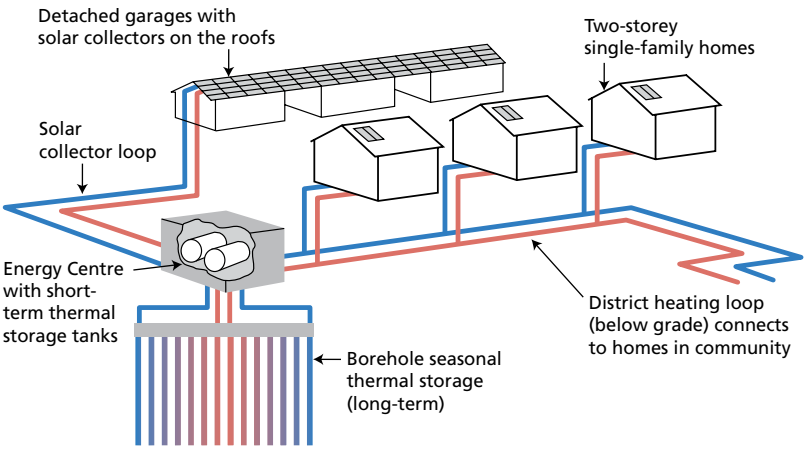
DLSC is heated by a district energy system designed to store abundant solar energy underground during summer months and distribute the energy to each home for space heating needs during winter months.

The community is unprecedented in the world:

- Establishing the largest subdivision of R-2000 single-family homes in Canada, each being 30% more efficient than conventional housing;
- Fulfilling 90% of each home's space heating requirements from solar energy and resulting in less dependency on fossil fuels;
- Reducing greenhouse gas (GHG) emissions per home by 5 tonnes annually.

How it works

Solar Seasonal Storage and District Loop



Solar Collection

The solar thermal collection system consists of 800 single-glazed flat plate solar panels organized into four rows mounted on the detached garages behind the homes.

An antifreeze fluid – a mixture of water and non-toxic glycol – is pumped through the solar collectors and heated whenever the sun is out. The 800 collectors are connected via an insulated, underground pipe that carries the heated fluid to the community's Energy Centre.

The solar collectors generate 1.5 megawatts of thermal power during a typical summer day.

Energy Centre

The Energy Centre for the Drake Landing Solar Community (DLSC) is the heart of the district heating system.

Located in the corner of the community park, it houses the two 120m^3 short-term heat storage tanks, the back-up gas boiler, and most of the mechanical equipment such as pumps, heat exchangers, and controls.

The solar collector loop, the district heating loop, and the borehole thermal energy storage loop pass through the Energy Centre.

District Heating System

Heated water is circulated from the Energy Centre to each home through an insulated, underground piping network.

At each home the heated water passes through an air handler unit located in the basement replacing the need for a conventional furnace. Heat is transferred from water to air and then distributed throughout the house via ductwork.

Borehole Thermal Energy Storage

The Borehole Thermal Energy Storage (BTES) system is an underground structure for storing large quantities of solar heat collected in summer for use later in winter.

Solar-heated water is pumped into the centre of the BTES field through a series of U-pipes. Heat is transferred to the surrounding soil and rock which reaches a temperature of 80°C by the end of summer.

The Homes

Each home is certified to Natural Resources Canada's R-2000 Standard and the Built Green™ Alberta Gold Standard. Both programs advocate quality, comfort, energy efficiency and responsible resource use.

Each home is 30% more energy efficient than a conventionally built house, with low-impact landscaping, a solar domestic hot water appliance, and a specialized air handler unit that replaces the need for a conventional furnace.

Solar Domestic Hot Water

To meet hot water demands, every home is equipped with two unique, self-regulated solar panels on the roof of the house. These solar panels are connected to a solar hot water tank in the basement.

On an annual basis, up to 60% of the home's domestic hot water requirements are met using solar energy. When solar energy is not available, the hot water demands are supplemented by a back-up natural gas, power-vented hot water unit.

Home Performance

A typical Canadian home's energy needs can be broken down into 60% for space heating, 20% for domestic hot water heating and 20% for appliances, lights, and other demands.

Space Heating: For homes in the Drake Landing Solar Community, in a typical year, over 90% of the energy used for space heating comes from solar energy. Even in an unusually cold winter and spring, 85% of the required heat comes from the sun.

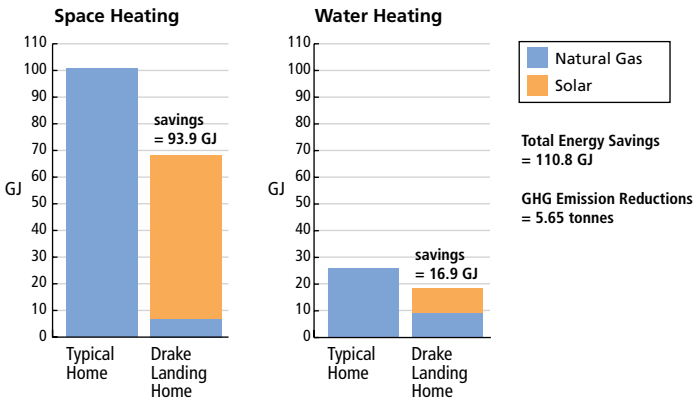
Domestic Water Heating: Combined with the higher efficiency power-vent, natural gas water heater and low water consumption devices in the homes, each home will use 65-70% less natural gas to heat water than a typical new home. This alone will save 1 tonne of greenhouse gas (GHG) emissions each year per home.

Benefits of DLSC

The DLSC is an energy showcase, modeling how an environmentally friendly residential community can be accomplished. The community draws on a clean, unlimited energy source – the sun – and significantly reduces dependency on fossil fuels.

The most immediate benefit of this project is a decrease in greenhouse gas (GHG) emissions. An average Canadian home produces approximately 6 to 7 tonnes of GHG per year. Each DLSC home will produce approximately 5 tonnes fewer GHG emissions per year.

Energy Consumption Comparison



The DLSC sets the stage for future large-scale projects. As conventional energy prices rise and replication grows, solar systems such as the one used in this project are expected to become an increasingly affordable option for consumers and builders alike. The environmental benefits will also be multiplied by the broader implementation of solar use.

Project Participants

The DLSC project was conceived by Natural Resources Canada (NRCan), a department of the Government of Canada. NRCan established partnerships with innovative, environmentally conscious companies that have long-standing, credible reputations within their industries.

Funding Partners

- Program of Energy Research and Development, Government of Canada
- Renewable Energy Deployment Initiative, Natural Resources Canada
- Technology Early Action Measures, Government of Canada
- Green Municipal Fund, Federation of Canadian Municipalities
- Climate Change Central
- ATCO Gas
- Innovation Program, Government of Alberta
- Sustainable Development Technology Canada
- United Communities
- Sterling Homes Ltd.
- Alberta Environment, Government of Alberta

Project Participants

- CANMET Energy Technology Centre, Natural Resources Canada – project leader
- SAIC Canada – project coordinator
- United Communities – developer
- Sterling Homes Ltd. – homebuilder
- ATCO Gas – utility operator
- Town of Okotoks – project facilitator
- Climate Change Division, Atlantic Region, Environment Canada – thermal storage design
- IFTech International – thermal storage design
- Enermodal Engineering Ltd. – solar and heating system design
- Bodycote Materials Testing Canada Inc. – design support and solar equipment testing
- Thermal Energy System Specialists – computer modeling and simulation
- EnerWorks Inc. – solar equipment supplier
- Nu-Air Ventilation Systems Inc. – air-handler unit supplier
- Sunbow Consulting Ltd. – subdivision design
- Hurst Construction Management Inc. – energy centre building and system construction
- Howell-Mayhew Engineering Inc. – performance monitoring

For more information on the Drake Landing Solar Community, visit **www.dlsc.ca**.