

# DRAKE LANDING SOLAR COMMUNITY



OKOTOKS, ALBERTA

**The Drake Landing Solar Community (DLSC) was a project conceived by Natural Resources Canada (NRCan), a federal department of the Government of Canada.**

**To help have the project realized, NRCan established partnerships with innovative, environmentally conscious companies that had longstanding, credible reputations within their industries.**



# Project Participants

- **CanmetENERGY, Natural Resources Canada – project leader**
- **Leidos Canada – project coordinator and performance monitoring**
- **United Communities – developer**
- **Sterling Homes Ltd. – homebuilder**
- **ATCO – 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**
- **Exova – design support and solar equipment testing**
- **Thermal Energy System Specialists – computer modeling and simulation**
- **EnerWorks Inc. – solar collector and solar domestic hot water system 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**



# Drake Landing Solar Community Funding Partners

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

**Ground was broken in the spring of 2005 and was the first major implementation in North America of a technology known as seasonal solar thermal energy storage.**

**The system started operating in the summer of 2007.**



**A unique feature of DLSC was that more than 90 per cent of space heating needs for the community's 52 single-detached homes was met by solar thermal energy - a feat unprecedented anywhere else in the world, at the time.**

**The community drew on a clean, unlimited energy source – the sun – which significantly reduced dependency on limited fossil fuels.**



*An excerpt from original planning documents:*

**"A commercial objective of the DLSC project was to obtain sufficient grants to fully fund all costs during construction and for a period of 4 years of operation following substantial completion, including construction, operation, maintenance and decommissioning of the project (if required, following a 4-year testing period)."**

*An excerpt from original planning documents:*

"Although the system's costs will not be competitive with today's price for fossil fuels such as natural gas, the scale of the demonstration will be large enough to make it competitive with higher-priced conventional heating sources such as electricity. Moreover, as the size of these projects expand and fossil fuel prices increase, the costs of such systems become more competitive."



An excerpt from original planning documents:

"The longer-term benefits of this project are dependent on how often and how quickly this system – or even parts of this system – is replicated, in Canada and other countries."



**Drake Landing Solar Community, in Okotoks Alberta was the first of its kind in North America and was Canada's largest subdivision of energy-efficient and environmentally-responsible homes, and the continent's first major implementation of seasonal solar thermal energy storage.**

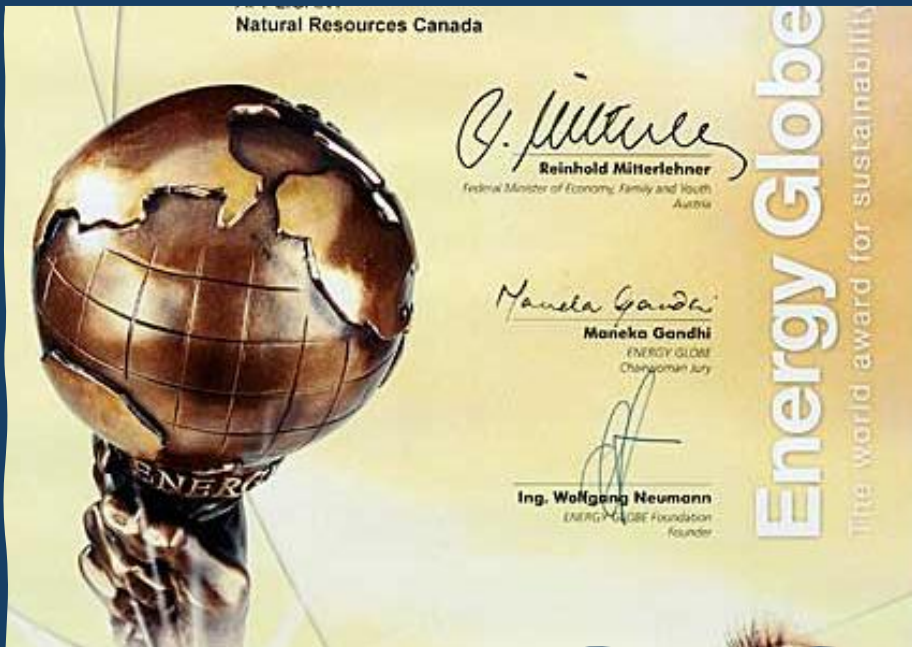




**AWARD WINNING PROJECT**



- Energy Agency Solar Heating and Cooling Award, 2013
- Energy Globe World Award, 2011
- Solar Thermal Project of the Year: CanSIA Solar Award, 2007
- Emerald Award for Climate Change from the Alberta Emerald Foundation, 2006
- Federation of Canadian Municipalities Sustainable Communities Award for Energy/Renewable Energy, 2006
- Best New Idea - Sales and Marketing Award, Alberta Home Builders Association, 2005
- Gold Award in Environmentally Sustainable Project - International Awards for Livable Communities, 2005 (endorsed by the United Nations in 2013)



An aerial photograph of a residential development. In the foreground, a large array of solar panels is installed on a roof. The panels are arranged in a grid pattern and are dark in color. In the background, several houses with light-colored walls and dark roofs are visible. The houses are arranged in a row, and there are trees and a road between them. The sky is clear and blue.

**After nearly 17 years of continuous monitoring, performance analysis and improvements, a significant body of knowledge and experience has been learned about the system for Canadian applications.**

An aerial photograph of a residential development. In the foreground, a large array of solar panels is installed on a roof. The panels are arranged in a grid pattern and are dark in color. In the background, several houses with light-colored walls and dark roofs are visible. The houses are arranged in a row, and there are some trees and greenery between them. The sky is clear and blue. The overall scene is a mix of modern technology and traditional housing.

**With a strong educational component with frequent site visits by professionals and students, the DLSC project helped inform and inspire new ideas for communities in Canada, China, United States and several European countries.**

17 years  
of successful  
operation...

...far exceeding the  
initial 4 year "test  
period".



**COMPLETE  
FUNCTIONING SYSTEM**

**2015 - 2016**

100% solar fraction in the heating season, meaning all the heat required by the houses for space heating was supplied by solar energy.



**SYSTEM  
DETERIORATION**

**2020 - 2021**

Significant maintenance issues emerging related to aging of the control system, solar collectors' expansion bellows o'rings, and water quality in the open tank short term storage tank loop. Controller failure caused a period of no heat for a few hours during the heating season.



**SYSTEM  
FAILURE**

**2023 - 2024**

During the heating season, heat to homes was 100% reliant on natural gas boilers located at the energy centre.



2020 - 2024

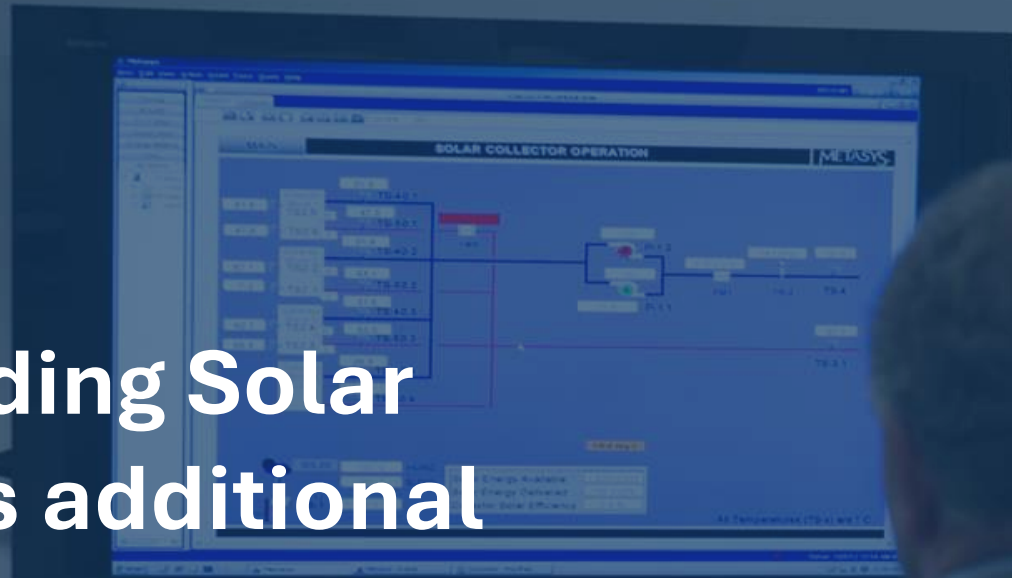
**System components, knowledge, and technical expertise for repairs becoming increasingly challenging to find, leaving some homeowners reliant on supplementary space heaters in their homes.**

# 2020 - 2024: Noted Deficiencies

BTES	Energy Centre	Solar Collection	Home System
Issues starting in 2020 have progressively worsened.	All boiler units are end of life – parts failures since 2022.	Issues starting in 2017 and have progressively worsened.	Air handlers concerns began in 2020, with a shortage of replacement parts.
Failure of borehole loop temperature-sensor sending units.	Scaling on storage tanks.	Solar collection panels failing	Downstream delivery pipe system condition unknown.
Underground sensors are inaccessible/irreplaceable due to access/location. Liquid quality and piping flow abilities are not known.	Extensive corrosion on steel water piping.	Garage foundations have shifted creating breaks in solar collector piping.	Some customer flow control valves failing.
No longer able to verify thermal intake.	Hydronic delivery fluid requires flushing (replacing).	Flexible bellows connecting each panel have been failing since 2010. Sourcing a custom solution is hundreds of thousands of dollars. Current fitting was custom designed at time of install (replacement estimated over \$150,000).	Individual system control boards no longer available.
	Circulating pumps near end of life.	Solar panel trim-related failures creating a hazard.	Original air handler hydronic coil unit no longer available.
	Control software/system needs upgrading.		
	Heat Exchangers near end of life.		
	Difficulty obtaining critical parts.		

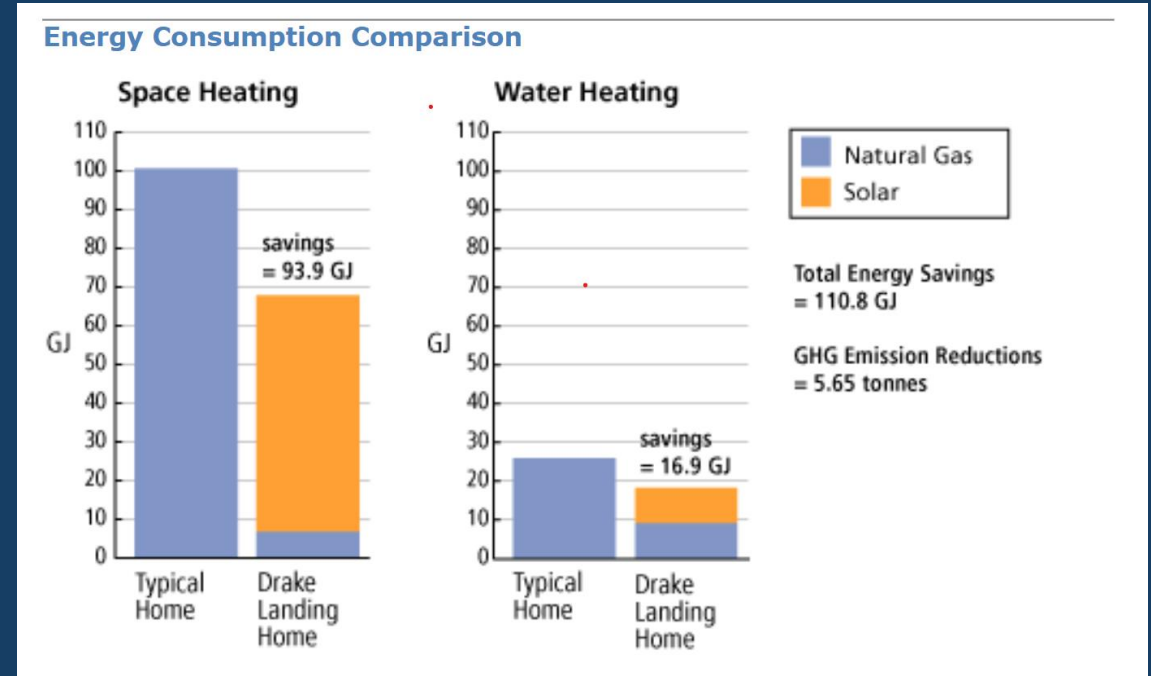
2020 - 2024

**The Drake Landing Solar Company adds additional redundancies to support heat delivery to homes while investigating options to repair, replace, or decommission the system.**



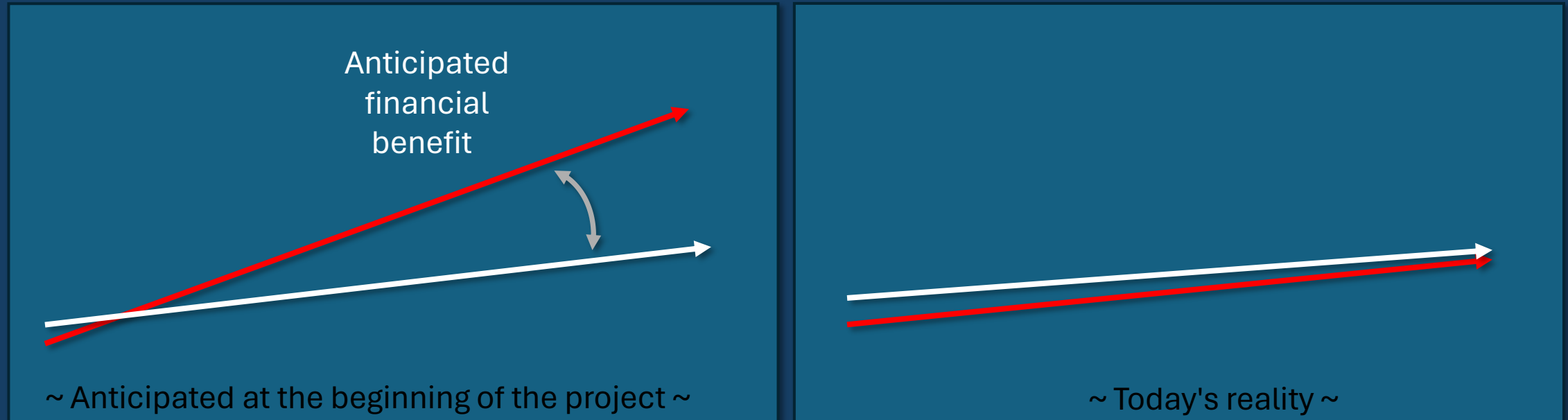
*An excerpt from original planning documents:*

"As energy prices rise the economics of this type of system will become more attractive, and as replication does occur, the design and construction costs will decrease. As this happens, the environmental benefits will be multiplied."



2007

However, the DL Solar project did not have the anticipated outcome related to operating costs vs. cost of natural gas.



*\*chart for visual demonstration only – not based on actual numbers*

LEGEND:

- Cost to homeowner for operating the solar system
- Cost to heat a similar home with natural gas

## 2022 – 2024: Financial Implication

52 Homes in the Drake Landing Solar Community

\$85.00 / month per home cost (recent)  
= \$53,040 / year income to DLSC

Cost to run DLSC (recent):

\$95,000 - \$115,000 / year

Resulting in \$41,960 - \$61,960

**loss per year**

Annual financial loss is funded by the members of the company board and is unsustainable.



2024

**Sterling Homes and Anthem  
exit the Drake Landing Solar  
Company.**

**ATCO and the Town of  
Okotoks are the only  
remaining board members  
of the Company.**



**The Company required time to investigate and consider different alternatives and options for the system – with homeowner comfort and heating reliability as a primary driver.**

**At the end of day, the Company has a responsibility to provide an effective heat solution to homeowners, so that when heat is needed, heat is available. Unfortunately, the significant reinvestment required to have the district system operate is simply something that neither the board nor the collective community can afford.**

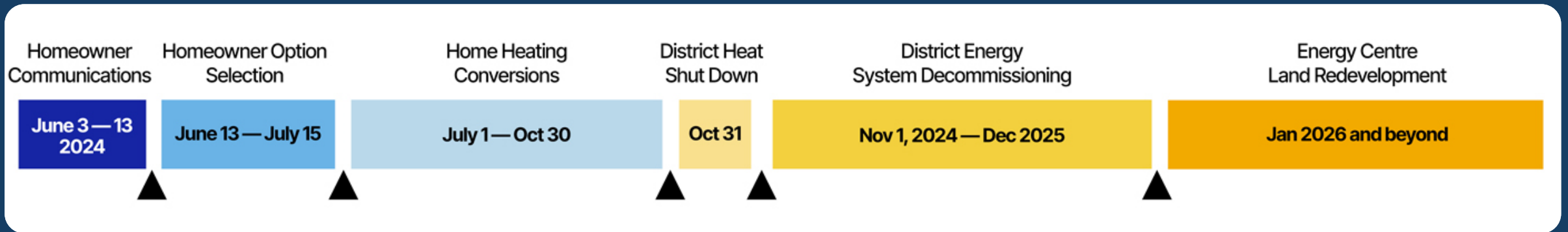


*June 2024*

**Due the declining health of the system, and the limited number of homes (52) to create a sustainable solution, the Board has made the difficult decision to cease operations effective, 2024.**



# System Decommissioning Timeline



**Over its lifetime, the Drake Landing Solar Community inspired new ideas and proved what was possible for sustainable energy. Unprecedented in the world, the innovative project garnered support from industry, academia, and government – all while drawing attention and prestigious accolades from around the globe.**

**Although the time has come to wind the project down, our sincere thanks go to the homeowners and residents who have been a part of this success story – none of which would have been possible without your unwavering belief in a better energy alternative.**

**For that, we thank you.**

***Drake Landing Company Board of Directors***

