Bridging the Climate Action Gap using Solar Thermal Energy: A Study on Feasibility

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Background

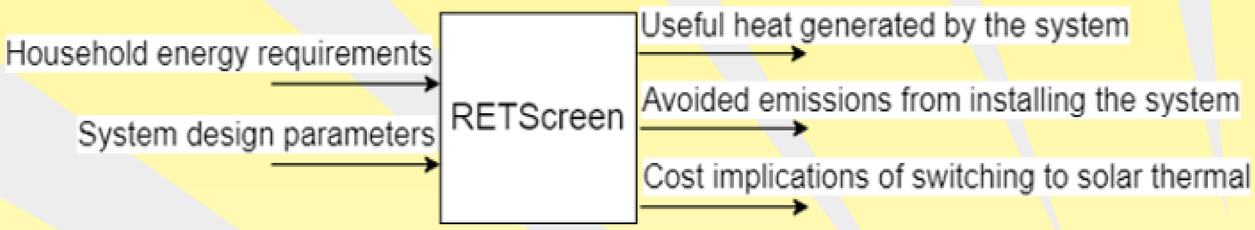
- In September 2021, in partnership with Environment and Climate Change Canada (ECCC) and Natural Resources Canada (NRCan), the Impact and Innovation Unit launched PARCA, a multi-year program of research on climate change.
- Wave 6 (2022) results indicated the following key insights:
  - Canadians consistently underestimate the prevalence of pro-climate attitudes nationally;
  - There is a persistent disparity between Canadians' **high willingness to take pro-climate action**, and their **lower perceptions of social norms and the potential impact of their actions**.

Hence the need to investigate potential ways Canadians can effectively contribute to climate change while concretely observing the effects of their actions.

Study Scope

- To evaluate the impacts of using **solar-thermal power** for **residential heating** in Calgary and Edmonton and;
- To determine how worthwhile this implementation would be in fostering effective **public climate action.**

Methodology



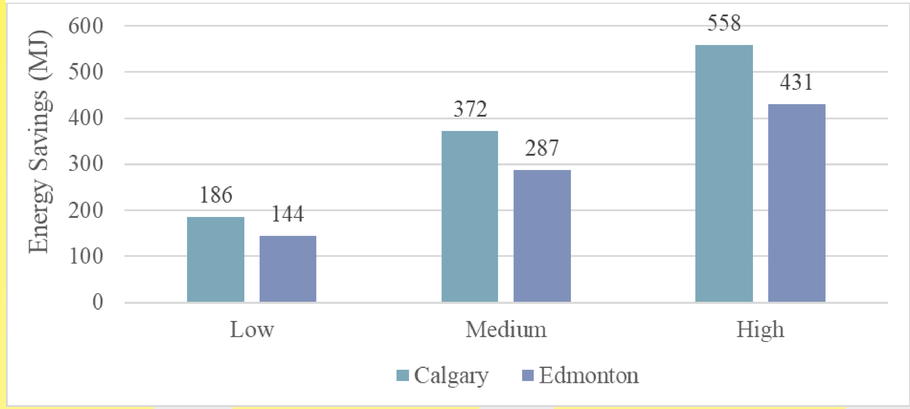
Summary of Results

	Parameter (per year)	Natural gas		Electricity	
		Calgary	Edmonton	Calgary	Edmonton
Domestic Hot Water (DHW)	Energy savings (kWh)	2,466	2,467	2,466	2,467
	GHG emissions offset (tCO_2e)	0.45	0.40	1.65	1.65
	Cost savings (CAD)	42	42	410	410
Space Heating	Energy savings (kWh)	6,737	7,305	**6,737**	**7,305**
	GHG emissions offset (tCO_2e)	1.65	1.75	**6.1**	**6.5**
	Cost savings (CAD)	155	168	**1,491**	**1,617**

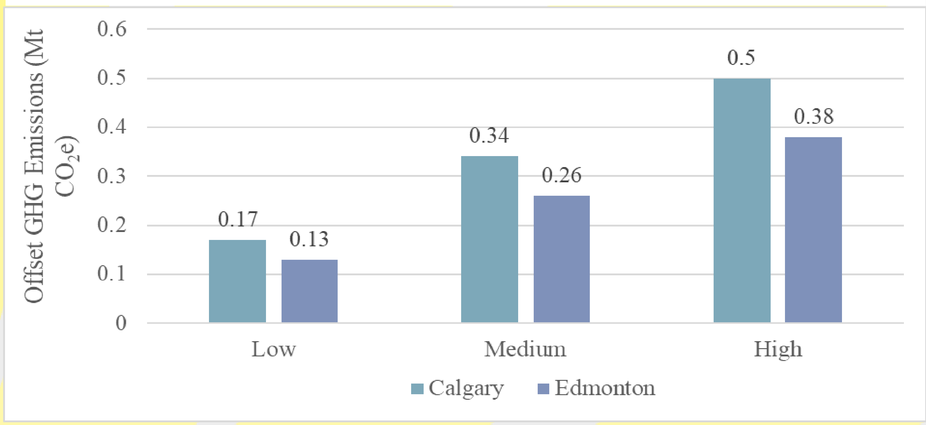
Summary of Results (cont'd)

- Subsequent analysis involved only homes using electricity due to the increased potential in energy, emissions and cost savings.
- Analysis is based on fuel rates of 4.78 CAD/GJ for natural gas and 46.11 CAD/GJ for electricity.

Energy Savings based on Adoption Rate



Offset GHG Emissions based on Adoption Rate



Conclusions

- **Energy source** is a significant determinant on whether a homeowner should consider adopting a solar thermal technology in their home due to differences in fuel price.
- If using electricity, the recommended solar thermal application is **space heating** as it results in:
  - ✓ More impactful GHG emissions reductions
  - ✓ Higher annual savings
- On a provincial context, there are **low annual energy savings** to be obtained when compared to Alberta's space heating use.
- However, in terms of offset GHG emissions, the **low adoption scenario** results in a **6% reduction of provincial emissions** while the **high adoption case** results in an **18% reduction** (the medium adoption case results in a 12% reduction).
- Federal and provincial cost saving initiatives contribute significantly to aiding homeowners in their solar thermal technology investment and produce reasonable payback periods.
- **More efficient solar thermal systems** are needed to increase overall performance and cost savings.