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Socioeconomic and dwelling characteristics of Canadian households using alternative energy sources

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The use of renewable energy sources by Canadian households reflects national priorities and international commitments to sustainability. As part of the United Nations (UN) 2030 Agenda for Sustainable Development, Canada has pledged to advance climate action, expand access to clean energy and foster sustainable communities (UN, n.d.). These objectives align directly with the Sustainable Development Goals (SDGs)—particularly SDG 7 (affordable and clean energy), with its focus on expanding the use of renewable energy, and SDG 11 (sustainable cities and communities). Examining the socioeconomic and dwelling-related characteristics of households that use renewable energy provides insight into how adoption is distributed across the population, helps identify which groups are more or less likely to adopt alternative energy and offers context for understanding Canada's progress toward these goals (see Statistics Canada, 2023).

A recent systematic review by Elasu et al. (2023) found that there were several studies of household transitions to clean energy across various countries, but Canada-specific research on this topic remains scarce. Despite limited research, Yang and Arhonditsis (2022) examined key covariates of pro-environmental attitudes and behaviours of Canadians. They found general support for environmentalism, with pro-environmental behaviours more common among those with higher levels of education, those with higher incomes and families with children; however, household- and societal-level barriers may interfere in actualizing these beliefs in the form of a failure to “walk the talk” (p. 13). Other household-level factors—such as dwelling type and energy poverty, defined as limited access to adequate home energy services (Riva et al., 2021)—may also shape Canadians' environmental practices. For example, residents of detached homes often have greater opportunities for environmental stewardship (Huddart-Kennedy et al., 2009). Extending this work, Leanage et al. (forthcoming) demonstrated that household engagement in sustainable practices, including composting, hazardous waste disposal and environmentally conscious purchasing, varies across sociodemographic, dwelling and geographic characteristics, as well as levels of community environmental engagement activities.

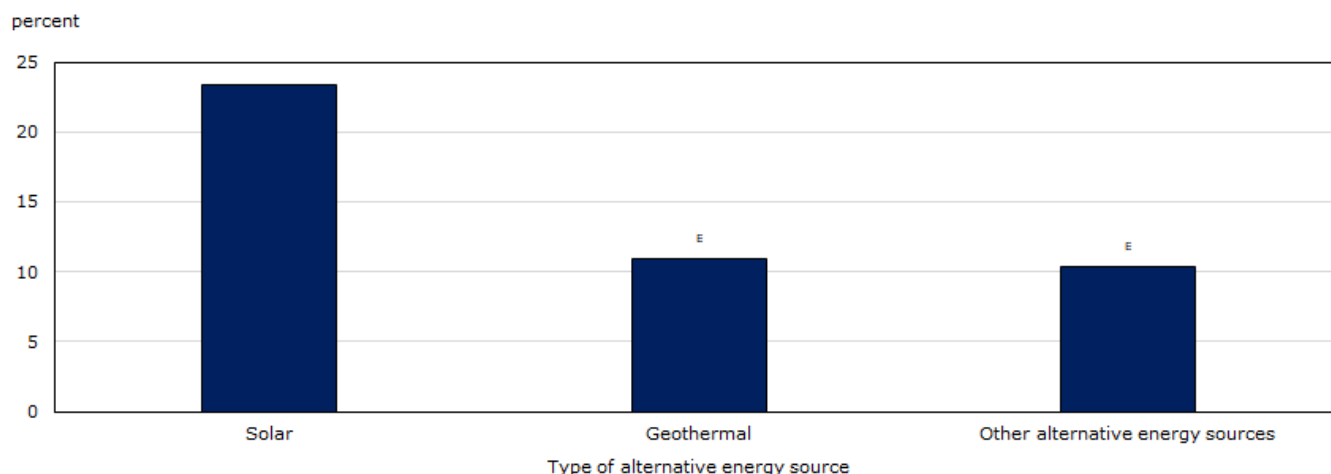
Building on this literature and addressing the limited Canada-specific evidence on household alternative energy adoption, this article draws on data from the 2021 Households and the Environment Survey (HES)¹ to examine the population socioeconomic and dwelling-related characteristics of Canadian households that adopt alternative energy sources. The HES is a biennial, cross-sectional survey that collects information on alternative energy use, sociodemographic and dwelling characteristics, and a wide range of environmental practices and behaviours, with the dwelling as the sampling unit.²

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1. The analysis relied on the 2021 HES as it allowed for disaggregation by geothermal source, which would not be possible with the 2023 HES data.
 2. The 2021 HES covers Canadian households in the 10 provinces and excludes households in the territories.

Approximately 1% of Canadian households reported using alternative energy sources

Figure 1 shows that in 2021, 1% of Canadian households reported using at least one form of alternative energy, a percentage consistent with earlier HES cycles. Fewer than 1% reported alternative energy use in 2007, and about 1% did so in 2011 (Statistics Canada 2007; 2011). Among the 1% of households that used alternative energy in 2021, 23% used solar energy; 11% used geothermal energy; and 10% used other sources, such as wind or biofuels. The remaining households reported none, or the source was unknown.

Chart 1
Use of alternative energy sources in Canadian households by type



^E use with caution

Notes: Percentages for specific alternative energy sources are based only on households that reported using at least one form of alternative energy (approximately 1% of all households) in 2021. Households may have reported multiple types of energy sources or none, or their responses may be classified as unknown. As a result, the percentages in the chart do not add up to 100.

Source: Statistics Canada, Households and the Environment Survey, 2021.

Households reporting any use of alternative energy were primarily composed of seniors only and those residing in single-detached houses

Households using alternative energy were more likely to be composed of seniors only (Table 1),³ accounting for about 36% of users compared with about 22% of non-users. By contrast, households composed of adults with children represented a smaller share of alternative energy users (18%) than non-users (28%). There were no statistically significant differences in other socioeconomic characteristics, including educational attainment and household income, when comparing households using alternative energy with those not using it.

Alternative energy use also varied across regions and population centre and urban area sizes. Regional differences were most pronounced in Ontario—this province accounted for the largest share of users (41%), while it represented about 23% of non-users. A similar pattern was observed in Atlantic Canada, which accounted for 18% of users and 8% of non-users. An opposite trend was observed in the Prairies (21% of users versus 38% of non-users) and Quebec (8% of users versus 19% of non-users).

3. For comparisons (shown in Table 1), households were restricted to those that provided a “yes” or “no” response to the alternative energy source question, and valid skips were excluded.

By population centre and urban area size, alternative energy users tended to live in non-urban areas (34% of users versus 18% of non-users). Users were less likely to be located in large census metropolitan areas⁴ (CMAs) (20% of users versus 30% of non-users).

Housing characteristics and tenure differed markedly between alternative energy users and non-users. Nearly 9 in 10 users (89%) lived in single-detached dwellings, compared with 73% of non-users. Additionally, 7 in 10 users (68%) had lived in their dwelling for 10 years or more, compared with just over half of non-users (53%).

Considering broader environmental practices, households that used alternative energy were more likely to grow vegetables, herbs, fruits or flowers for personal use (79% of users versus 69% of non-users); compost kitchen or bioplastic waste (86% of users versus 81% of non-users); and use controlled methods for hazardous waste disposal (75% of users versus 66% of non-users).^{5,6} However, participation in outdoor activities and visits to parks or public green spaces did not differ between users and non-users.

Overall, households using alternative energy were more likely to be senior-only households and less likely to be households composed of adults with children. They were more likely to reside in Ontario, Atlantic Canada and non-urban areas, and less likely to be in the Prairies, Quebec and large CMAs. Alternative energy users were also more likely to live in single-detached dwellings, to have longer residential tenure and to engage in selected household-based environmental practices.⁷

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4. Census Metropolitan Areas (CMAs) categories were based on the coding of Gure & Hou (2022) study, where areas were coded into six groups: the three gateway cities of Toronto, Montréal and Vancouver; medium-sized CMAs with populations over 500,000 (Ottawa, Calgary, Edmonton, Hamilton, Winnipeg and Québec); small CMAs with populations between 100,000 and 500,000 (e.g., Victoria, Saskatoon and Halifax); and small urban areas (CAs).
 5. Some households did not have any hazardous waste items to dispose of; this was included as a separate category in the analysis.
 6. Among those who reported having any hazardous waste, materials included pharmaceuticals and medicines (including medical sharps), pesticides and chemical products (e.g., paint, solvents, oil, antifreeze, pesticides), electronic waste (e.g., computers, printers, televisions, audiovisual equipment, gaming consoles, cell phones, microwaves), and textiles and fabrics (e.g., mattresses).
 7. Initial analyses considered alternative energy use by ownership status (renter, even if no cash rent is paid, versus owner, even if the dwelling is still being paid for) and by environmentally sustainable purchasing behaviour. However, these variables were not included in the final analysis because the vast majority of households reported being owners and engaging in sustainable purchasing (over 9 in 10 in each case).

Table 1
Characteristics of households using alternative energy sources

	Users	Non-users
	percent	
Total	1.7	98.3
Sociodemographic characteristics		
Household composition		
Adults only	34.1	37.7
Adults with children	17.9 *	27.6
Seniors only	35.9 *	21.6
Other compositions	12.1	13.1
Education		
High school or less	16.7	20.0
Diploma or certificate below a bachelor's degree	40.6	36.0
Bachelor's degree (e.g., B.A., B.A. (Hons), B.Sc., B.Ed., LL.B.)	20.9	25.7
University certificate, diploma or degree above the bachelor's level	21.8	18.3
Income		
Less than \$40,000 (includes income loss)	18.2	15.5
\$40,000 to \$59,999	14.4	13.8
\$60,000 to \$79,999	11.0 ^E	12.6
\$80,000 to \$99,999	13.5	11.8
\$100,000 to \$149,999	17.5	21.7
\$150,000 and over	25.4	24.6
Region		
Atlantic	18.3 *	7.7
Quebec	7.8 ^E *	19.1
Ontario	40.6 *	22.6
Prairies	20.9 *	37.6
British Columbia	12.4 ^E	13.0
Population centre or urban area size		
Large census metropolitan areas (CMAs)	20.1 *	29.7
Medium-sized CMAs	8.5 ^E *	18.9
Small CMAs	23.5	18.4
Small urban areas	13.6	14.8
Non-urban areas	34.3 *	18.2
Dwelling characteristics		
Year dwelling was originally built		
Before 1960	20.5	22.6
1961 to 1983	28.7	27.9
1984 to 2000	21.4	22.5
2001 or later	29.4	27.0
Dwelling type		
Single-detached	88.5 *	72.7
Other ¹	11.5 ^E *	27.3
Time lived in dwelling		
Less than 5 years	18.2 *	26.2
5 to 9 years	13.9 ^E *	20.4
10 years or more	67.9 *	53.4
Environmental engagement (in past 12 months)		
Visited parks and public green spaces close to home²		
Yes	75.4	79.8
No or did not have a park or public green space close to home	24.6	20.2
Grew vegetables, herbs, fruits or flowers for personal use		
Yes	78.7 *	68.6
No	21.3 *	31.4
Composted kitchen or bioplastic waste		
Yes	86.3 *	80.5
No	13.7 ^E *	19.5
Used controlled hazardous waste disposal methods³		
Yes	75.4 *	65.5
No	11.4 ^E *	17.0
Did not have hazardous waste	13.2 ^E	17.5
Participated in outdoor activities close to home²		
Yes	80.0	79.9
No	20.0	20.1

^E use with caution* significantly different from reference category ($p < 0.05$)

1. "Other" dwelling types include double, row or terrace, and duplex dwellings.

2. "Close to home" means within a 10-minute walk or drive.

3. Controlled disposal methods include returning the waste to a supplier or retailer, or taking or sending waste to a depot or drop-off centre. For medical sharps, this includes using a medical sharp program or returning them to a pharmacy or doctor.

Source: Statistics Canada, Households and the Environment Survey, 2021.

Conclusion

This article shows that households' use of alternative energy remains limited in Canada, with about 1% of households reporting such use—a proportion that is similar to and consistent with findings from 2007 and 2011 (Statistics Canada, 2007; 2011). Among users, solar energy was the most commonly reported alternative source.

Despite the overall low prevalence, alternative energy adoption varied across household socioeconomic and dwelling characteristics, indicating that use is concentrated within specific segments of the population rather than evenly distributed across households. Alternative energy use was more common among senior-only households, households with longer residential tenure and households living in single-detached properties. Geographic variation was also evident, with higher concentrations of users in Ontario, Atlantic Canada and non-urban areas and lower representation in the Prairies, Quebec and large CMAs. These patterns suggest that the type of dwelling, the duration of residence in that dwelling and the geographic context are important factors to consider when examining household alternative energy use. By contrast, socioeconomic outcomes such as educational attainment and household income did not differ significantly between users and non-users. Beyond these characteristics, alternative energy users also demonstrated higher engagement in other household-based environmental practices, such as composting and controlled hazardous waste disposal, indicating that alternative energy use may be embedded within broader patterns of environmental engagement.

This article provides valuable evidence on household characteristics associated with alternative energy use in Canada, contributing to a limited body of research (Elasu et al., 2023) and informing the monitoring of Canada's progress toward UN SDG 11 (sustainable cities and communities). Although household adoption remained limited in 2021, recent policy initiatives suggest growing participation; for example, the Canada Greener Homes Initiative programs have supported over 520,000 pre-retrofit evaluations and more than 269,000 heat pump installations (Government of Canada, 2025; Natural Resources Canada, 2025a, 2025b). Future cycles of the HES may allow monitoring to determine whether recent program initiatives are associated with broader household adoption and changes in energy consumption and conservation over time (Statistics Canada, 2025).

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