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Snow cover trends in Canada

This article examines the average area covered by snow (snow cover extent) nationally for the 39 year period from 1972 to 2010 and is the fifth in an ongoing series of short analytical articles featuring climate related data. This and future articles in the series are the product of ongoing collaboration among Statistics Canada, Environment Canada and Natural Resources Canada.

Environmentally friendly behaviours of Canadian households and the impact on residential energy consumption

This study uses the 2007 Households and the Environment Survey and its Energy Use Supplement to analyze the relationship between "environmentally friendly" behaviours in general and energy consumption in Canadian households. The results indicate that residential energy consumption in Canada is largely related to factors such as type of dwelling, heated area and number of persons in the household and that environmentally friendly behaviours had little effect on households' annual energy consumption.

Statistics Canada Statistique Canada

Canada

Selected Canadian environment, economic and social indicators

This table highlights a few environment, economic and social indicators. Setting them side-by-side starts to illuminate the relationships that exist among these three areas. More indicators can be found in the section "Canadian environment, economic and social indicators."

Table 1
Selected Canadian environment, economic and social indicators

	Period	Percentage change
		percent
Population	2010 to 2011	1.0
Gross domestic product, monthly	January 2012	0.1
Greenhouse gas emissions	2008 to 2009	-5.7
Particulate matter ($PM_{2.5}$) [1]	2000 to 2009	..
Ground-level ozone (median percentage change per year)	1990 to 2009	0.5
Natural resource wealth	2009 to 2010	23.4

1. Trend not statistically significant.

Source(s): Statistics Canada, CANSIM tables 051-0001 and 378-0005 (accessed February 22, 2012). Statistics Canada, 2012, *Gross Domestic Product by Industry*, Catalogue no. 15-001-X. Environment Canada, 2011, *National Inventory Report 1990-2009: Greenhouse Gas Sources and Sinks in Canada - Executive Summary,* Catalogue no. En81-4/1-2009E-PDF. Environment Canada, 2012, *Environmental Indicators*, *www.ec.gc.ca/indicateurs-indicators/default.asp?lang=En&n=ED311E59-1&offset=6&toc=show* (accessed February 22, 2012).

Snow cover trends in Canada

Mark Henry, Environment Accounts and Statistics Division

This article examines the average area covered by snow (snow cover extent) nationally for the 39 year period from 1972 to 2010. Snow cover extent is examined annually and for the months of October and November, the period that marks the onset and expansion of snow cover for much of Canada, and April, May, and June, the spring snow melt period (see textbox "Background and methodology").

An ongoing data collaboration

This article is the fifth of an ongoing series of articles in *EnviroStats* showcasing data related to Canada's climate and the impacts of climate change. The series focuses on short statistical analyses of climate-related data. To date, the series has included trend analysis on glacier mass balance, temperature, precipitation and sea-ice. Previous articles can be found at *www.statcan.gc.ca/bsolc/olc-cel/olc-cel?catno=16-002-X&chropg=1&lang=eng*.

The articles in the series are the product of an ongoing collaboration between Statistics Canada, Environment Canada and Natural Resources Canada.

Data featured in the articles will be made available through the Statistics Canada website, both in free CANSIM data tables and through new articles re-examining trends in the data every few years.

Snow cover extent is considered an essential climate variable by the World Meteorological Organization-Global Climate Observing System.[1] Snow cover is also one of several variables used to support the work of the United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC).[2]

Background and methodology

Time series data used for this article were derived from the National Oceanic and Atmospheric Administration (NOAA - USA) Climate Data Record (CDR) Northern Hemisphere gridded weekly snow chart dataset maintained by Rutgers University, and based on manual analysis of satellite imagery.[3] Rutgers University processes the weekly data into monthly series of snow cover fraction at each grid point (percent of days in month with snow cover) that were used to compute the monthly average snow cover extent over the Canadian land mass in each year over the 1972 to 2010 period.[4] The snow charts were compiled into a time series by the Climate Processes Section of the Climate Research Division at Environment Canada.[5,6]

Snow cover extent is expressed in square kilometers.

The time series data were tested for the presence of serial correlation and for anomalous observations (outliers). A Statistical Analysis Software (SAS) procedure, PROC ARIMA, was used to compute the overall trend. The PROC ARIMA process produces a linear trend and the associated significance level adjusted for any existing serial correlation and anomalous observations.[7] All linear trends shown are statistically significant unless otherwise noted.[8]

Results

Snow cover extent

Annual

The mean annual area of snow cover in Canada has declined by 5.1% from 1972 to 2010 (Chart 1).[9]

1. Global Climate Observing System, 2011, *Global Climate Observing System*, *www.wmo.int/pages/prog/gcos/index.php?name=EssentialClimateVariable* (accessed June 1, 2011).
2. Global Observing Systems Information Center, 2011, *GCOS Essential Climate Variables (ECV) Data & Information Access Matrix*, *http://gosic.org/ios/MATRICES/ECV/ecv-matrix.htm* (accessed June 20, 2011).
3. D.A. Robinson, K.F. Dewey, and R.R. Heim, 1993, "Global snow cover monitoring: an update," *Bulletin of the American Meteorological Society*, Vol. 74, no. 9, pages 1689 to 1696.
4. Rutgers University Global Snow Lab, 2011, *Weekly Snow Cover Charts*, *http://climate.rutgers.edu/snowcover/index.php* (accessed in September 2011).
5. R. Brown, C. Derksen and L. Wang, 2010, "A multi-data set analysis of variability and change in Arctic spring snow cover extent, 1967-2008," *Journal of Geophysical Research*, Vol. 115, D16111.
6. Time series data for this article were produced by Ross Brown of the Climate Research Division of Environment Canada.
7. To enquire about the statistical analysis used in this article, contact the Information Officer (613-951-0297; *environ@statcan.gc.ca*), Environment Accounts and Statistics Division.
8. Statistically significant linear trends at the 95% confidence level or above.
9. The annual snow covered area is calculated as the average of the January to December monthly snow cover extents.

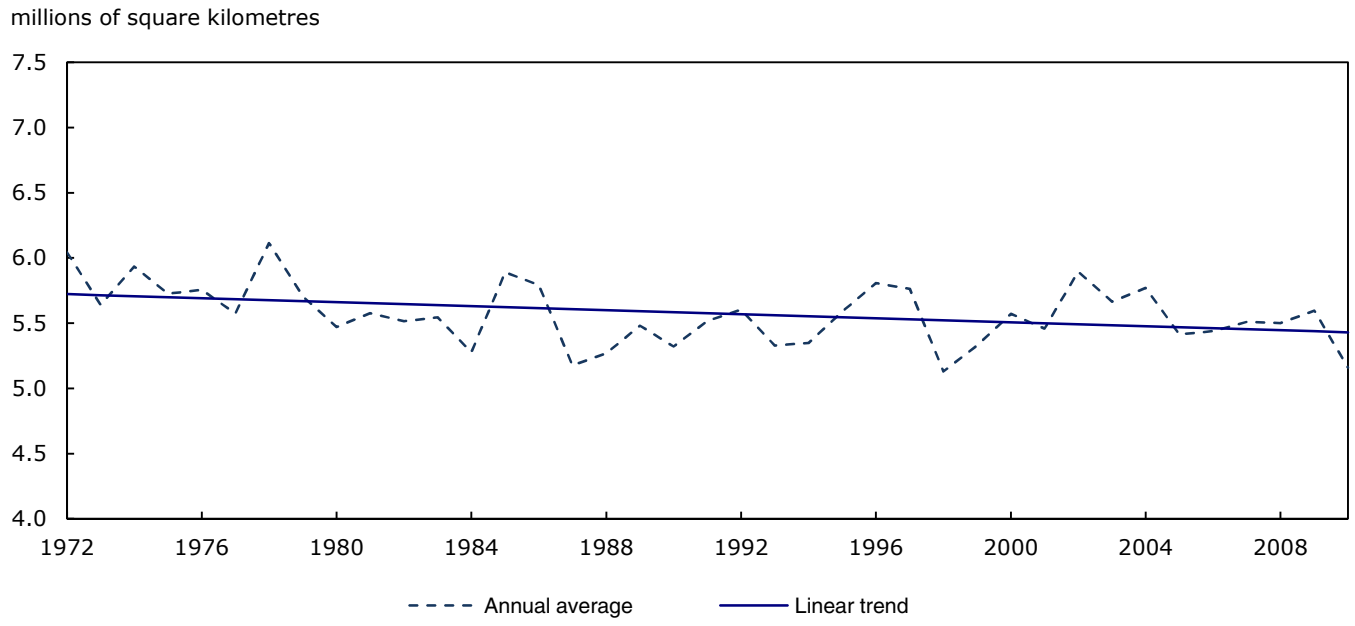
The year with the lowest average snow cover occurred in 1998, followed closely by 2010. The two highest averages occurred in 1972 and 1978 and were the only times the yearly averages exceeded 6 million square kilometers or about 62% of the area of Canada.

Monthly

For October and November, months of snow cover onset and expansion, results did not indicate statistically significant trends (Chart 2).

The month of June has seen the largest decline in average snow cover extent, decreasing by 34% over the 39 year study period. Average May snow cover has declined by 13%[10] and April snow cover declined by 7% (Chart 3).

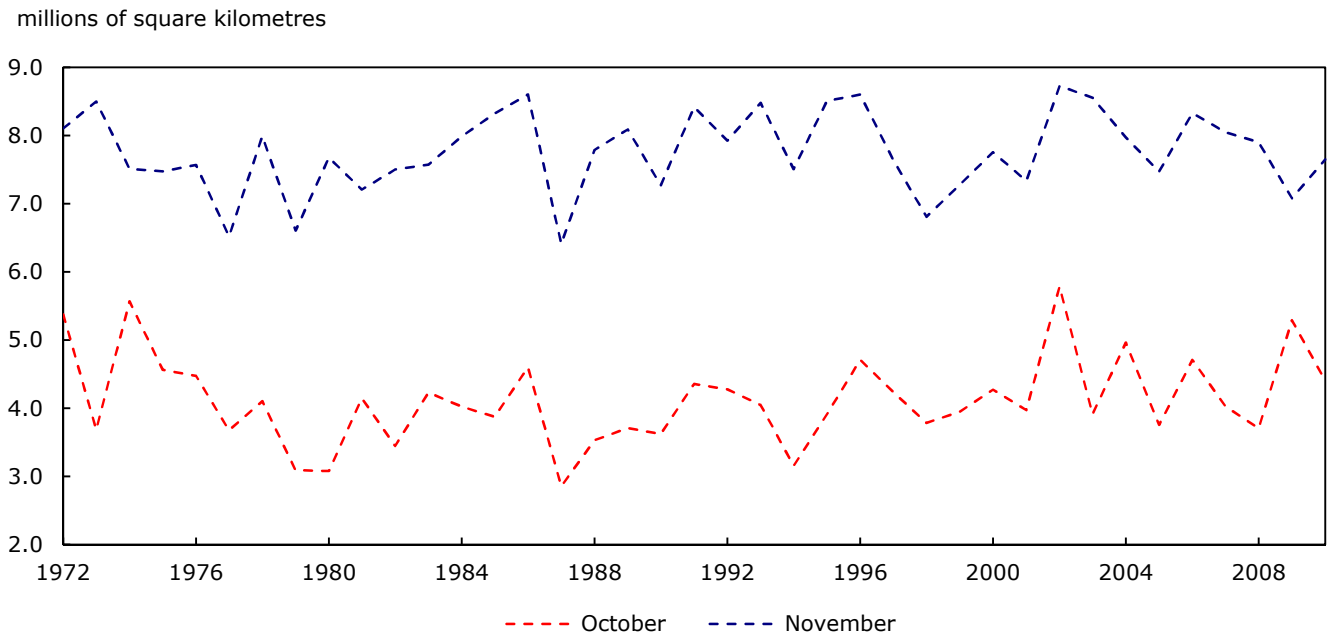
Chart 1
Average annual snow cover extent from 1972 to 2010



Source(s): Time series compiled by the Climate Processes Section of the Climate Research Division, Environment Canada from National Oceanic and Atmospheric Administration (NOAA - USA) Climate Data Record (CDR) Northern Hemisphere weekly snow chart dataset maintained by Rutgers University (accessed September, 2011).

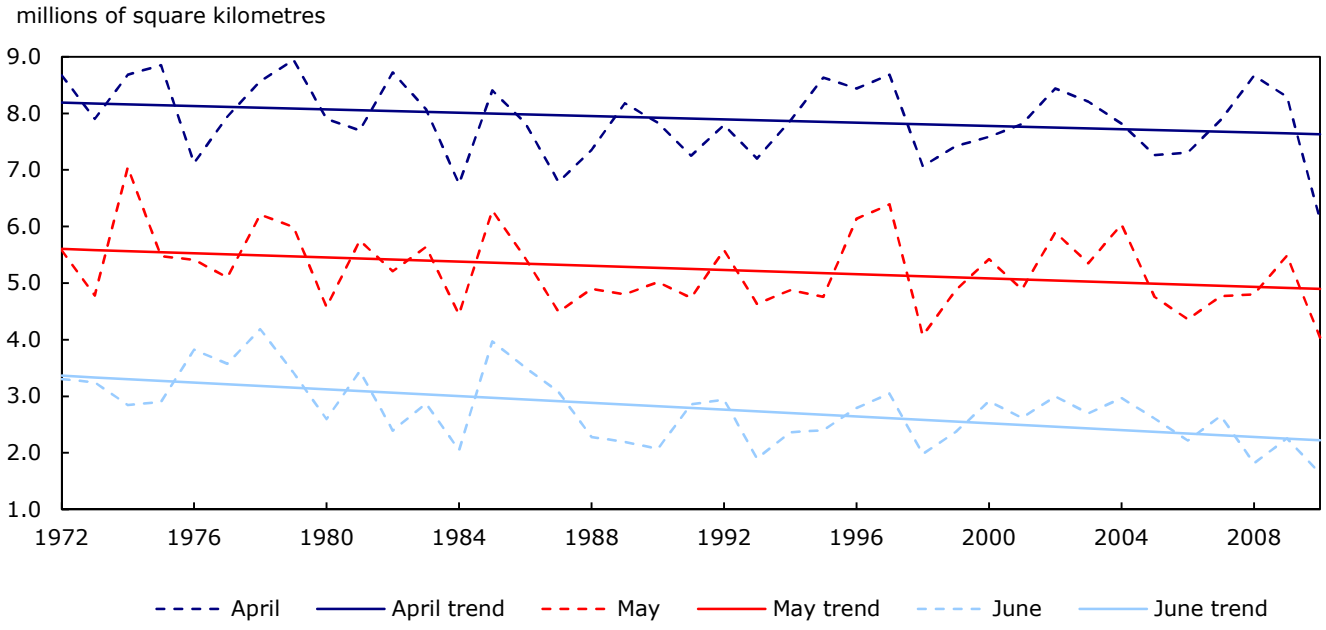
10. The May time series had a linear trend that was statistically significant at a 94.7% confidence level.

Chart 2
Monthly snow cover extent from 1972 to 2010 during onset and expansion of snow cover



Source(s): Time series compiled by the Climate Processes Section of the Climate Research Division, Environment Canada from National Oceanic and Atmospheric Administration (NOAA - USA) Climate Data Record (CDR) Northern Hemisphere weekly snow chart dataset maintained by Rutgers University (accessed September, 2011).

Chart 3
Monthly snow cover extent from 1972 to 2010 during spring melt period



Note(s): The May time series had a linear trend that was statistically significant at a 94.7% confidence level.
Source(s): Time series compiled by the Climate Processes Section of the Climate Research Division, Environment Canada from National Oceanic and Atmospheric Administration (NOAA - USA) Climate Data Record (CDR) Northern Hemisphere weekly snow chart dataset maintained by Rutgers University (accessed September, 2011).

Environmentally friendly behaviours of Canadian households and the impact on residential energy consumption

Serge Legault, Special Surveys Division

In the past decade, Canadian households have increasingly engaged in activities that could be considered "environmentally friendly,"[11] yet residential energy consumption has grown during the same period.

Intuitively, it might be expected that households reporting a higher level of environmentally friendly activities would also be those with a smaller impact on energy consumption. Until recently, this hypothesis was difficult to validate or refute due to a lack of available information. However, thanks to the 2007 Households and the Environment Survey (HES), it is now possible to test this hypothesis for Canadian households.

What you should know about this study

The 2007 Households and the Environment Survey (HES) and its Energy Use Supplement were used to conduct this study. The 2007 cycle of the HES had two components. First, a telephone survey was conducted to collect information on Canadian households' environmental practices and behaviours. Second, all respondents to the telephone component were sent a paper questionnaire on dwelling characteristics, household appliances, electrical devices, the heating and cooling system and residential energy consumption for the 2007 calendar year. The final size of the probability sample is 11,241 households.

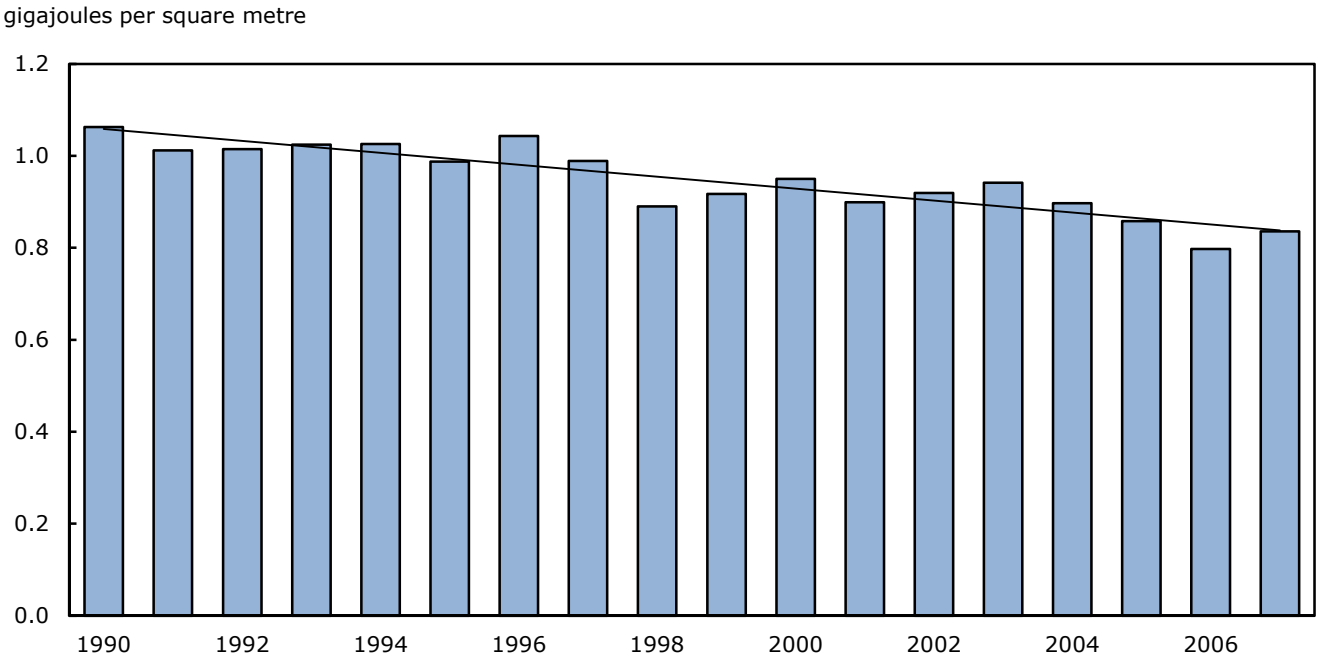
The HES combined with its supplement provides the necessary information to analyze the relationship between environmentally friendly behaviour and energy consumption in Canadian households.

Trends in residential energy consumption in Canada, 1990 to 2007

Energy intensity is the total amount of energy consumed per unit of heated area in gigajoules per square metre (GJ/m^2). Since the early 1990s, Canadian households have reduced their energy intensity by approximately 20% (Chart 4). This phenomenon is probably related to increased consciousness, awareness campaigns, economic incentives and the greater availability of energy-efficient products. However, residential energy consumption rose just over 10% despite the efficiency gains achieved from 1990 to 2007 (Chart 5). A similar finding was presented to the OECD, in a report by Kriström,[12] that indicated efficiency improvements are often eclipsed by increasing demand.

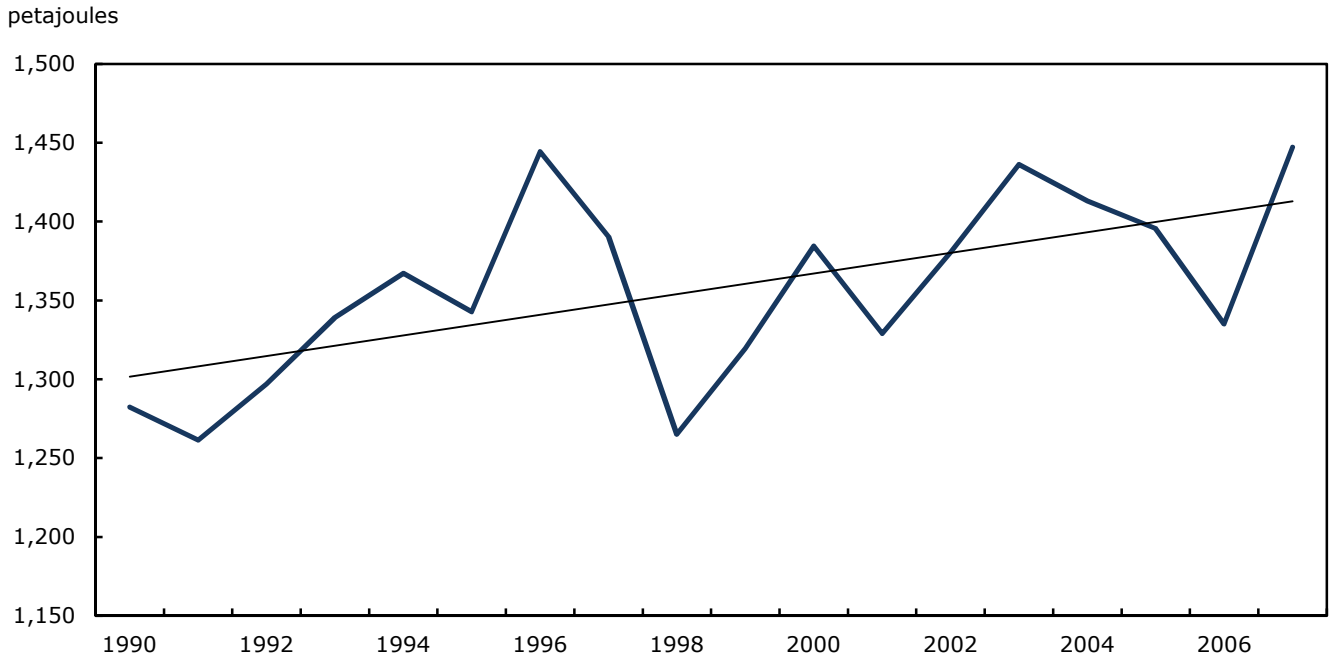
11. Statistics Canada, 2009, *Households and the Environment, 2007*, Catalogue no. 11-526-X.
12. B. Kriström, 2008, "Residential Energy Demand," *Household Behaviour and the Environment: Reviewing the Evidence,* OECD, Paris.

Chart 4
Residential energy intensity, Canada



Source(s): Natural Resources Canada, 2009, *Residential End-Use Model*, Ottawa.

Chart 5
Residential energy consumption, Canada



Source(s): Natural Resources Canada, 2009, *Residential End-Use Model*, Ottawa.

Development of the green index and identifying green households

A household's contribution to environmentally friendly behaviour is measured using an index (green index). The green index used in this study was calculated using 36 variables drawn from the 2007 HES. It consists of variables on various ecological practices or behaviours, such as water conservation, composting and recycling, transportation decisions, purchasing decisions and actions regarding home heating and cooling (see the list "Components of the green index" at the end of this article for more details).

A household's green index is determined by calculating the ratio of the sum of the environmentally friendly behaviours reported (each "good" response is worth one point) and the number of questions for which the household was eligible. For example, households with no recycling program in their area are not "penalized" if they do not recycle. Households are then sorted in ascending order in the resulting green index. Units in the upper quartile are designated as green households, that is, households with more environmentally friendly behaviour.

The development of such an index is necessarily subjective in nature. However, it is partly based on other similar indexes such as National Geographic's Greendex$_{TM}$.[13] This index has been used since 2008 to make international comparisons of environmentally friendly behaviour in 17 countries (including Canada).

Respondent profile according to the green index

The following variables are most often mentioned in studies[14,15] to try to explain energy consumption: type of dwelling, income, education level and family size. In addition to these variables, dwelling size and tenure are considered in this study. Table 2 presents a profile of households based on the result obtained by calculating the green index.

13. National Geographic and Globescan, 2010, *Greendex 2010: Consumer Choice and the Environment – A Worldwide Tracking Survey*, *http://environment.nationalgeographic.com/environment/greendex/* (accessed February 6, 2012).
14. E. de Groot, M. Spiekman and I. Opstelten, 2008, "Dutch Research into User Behaviour in Relation to Energy Use of Residences," *PLEA 2008 - 25th Conference on Passive and Low Energy Architecture*, Dublin, October 22 to 24, 2008, *http://architecture.ucd.ie/Paul/PLEA2008/content/papers/oral/PLEA_FinalPaper_ref_361.pdf* (accessed January 10, 2012).
15. B. Gatersleben, L. Steg and C. Vlek, 2002, "Measurement and determinants of environmentally significant consumer behaviour," *Environment and Behaviour*, Vol. 34, no. 3, pages 335 to 362.

Table 2
Selected variables by type of household

	Green households [1]	Other households
	percent	
Type of dwelling		
Single house	72 [2]	54
Double house, row house or duplex	15	16
Apartment	12 [2]	28
Mobile home	1	2
Owner	**83** [2]	**67**
Level of education		
0 to 8 years or some secondary	6 [2]	12
Grade 11 to 13, graduate	10 [2]	14
Some postsecondary or postsecondary certificate	44	41
University	39 [2]	33
	number of persons	
Household size	**3** [2]	**2**
	percent	
Household income		
Less than $20,000	6 [2]	13
$20,000 to less than $40,000	17 [2]	20
$40,000 to less than $60,000	17	17
$60,000 to less than $80,000	18 [2]	13
$80,000 to less than $100,000	11	9
$100,000 to less than $150,000	17 [2]	12
$150,000 and over	9 [2]	7
	square metres	
Average heated area per household	**139** [2]	**125**
	gigajoules	
Annual energy consumption per household	**118** [2]	**102**

1. Units in the upper quartile are designated as green households, that is, households with better ecological behaviour than the other units.
2. Indicates a significant difference between green households and other households ($p<0.05$).

Source(s): Statistics Canada, Households and the Environment Survey, 2007, special tabulation.

An analysis of Table 2 reveals several broad trends. As may be seen, green households have a different socio-economic profile from other households. More specifically, green households could be described as being more educated, wealthier, larger in size, with a majority of them owning their home and living in a single house with a larger-than-average heated area. Green households also consume 15% more energy for their dwellings than other households. The latter finding may seem contradictory, but the research conducted by Gatersleben et al.[16] concludes that the relationship between environmentally friendly behaviours and energy consumption is generally weak.

Households' energy consumption therefore appears to be attributable to socio-economic factors, and environmentally friendly behaviour would seem to have little impact. For example, the most conscientious households are often those with above-average income and hence a higher level of energy consumption owing to their lifestyle.

16. B. Gatersleben, L. Steg and C. Vlek, 2002, "Measurement and determinants of environmentally significant consumer behaviour," *Environment and Behaviour*, Vol. 34, no. 3, pages 335 to 362.

The results of empirical studies[17] show that despite the fact that people agree that more must be done to protect the environment, the environmentally friendly behaviours most often adopted are ones that require little investment of time or money, and they usually have only a minor impact on energy consumption.

Links between environmentally friendly behaviour and energy consumption

There are many factors that may explain energy consumption. One of the best tools for isolating the effects of these factors is multiple regression.

A multiple regression model was developed to try to identify the main factors that may "explain" energy consumption at the household level and determine whether environmentally friendly behaviour based on the green index is significant (Table 3, Model 1).

The dependent variable is annual energy consumption as obtained by the HES.

The independent or explanatory variables are the following:

- type of dwelling
- income
- highest level of education attained by a member of the household
- household size
- heated area of the dwelling
- tenure (owner or renter).

In addition to these variables, an independent variable indicating whether the household is green was added to the model. Multiple regression was performed on the basis of the HES probability sample design.

17. A. Kollmuss and J. Agyeman, 2002, "Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behaviour?," *Environment Education and Research*, Vol. 8, no. 3, pages 239 to 260.

Table 3
Multiple regression models on energy consumption and energy intensity

	Model 1		Model 2	
	Annual energy consumption per household		Energy intensity per household	
	coefficient	*p* value [1]	coefficient	*p* value [1]
Variable				
Constant	59.09	0.000	0.657	0.000
Income (under $40,000)	-1.98	0.296	0.039	0.055
Income ($80,000 and over)	2.59	0.152	-0.039	0.007
Green household	-0.71	0.703	-0.047	0.005
Single dwelling	33.98	0.000	0.245	0.000
Multiple dwelling	-30.77	0.000	-0.225	0.000
Own residence	20.69	0.000	0.104	0.000
Dwelling area exceeding 186 square metres	31.01	0.000	-0.432	0.000
Household size	5.36	0.000	0.044	0.000
High school graduate	1.47	0.652	0.049	0.094
College graduate	3.37	0.265	0.059	0.023
University graduate	-2.80	0.335	-0.015	0.573

1. The model tests the hypothesis that the regression coefficients are significantly different from zero. The *p* value refers to the probability that the calculated coefficient is solely due to chance. A *p* value near 0 therefore means that the contribution of the independent variable to the model is statistically significant and is not based on chance.

Source(s): Statistics Canada, Households and the Environment Survey, 2007, special tabulation.

The results of the multiple regression on energy consumption (Model 1) indicate that the significant independent variables (*p* value<0.01) are type of dwelling, heated area, number of persons in the household and tenure. Education level and household income do not appear as significant variables, and being a green household has no affect on the consumption level according to the proposed model.

The second multiple regression model uses households' energy intensity rather than annual consumption as the dependent variable (Table 3, Model 2).

The results of the multiple regression on energy intensity reveal relationships that are different from those that emerge from the regression on total consumption. As may be seen in this second model, as in the first model, the main independent variables are type of dwelling, heated area, number of persons in the household and tenure. However, being a higher-income household or a green household also has some influence on the household's level of energy intensity (such households exhibit better energy efficiency). In both cases, the contribution is modest but significant according to the model.

In summary, the modelling results appear to show that residential energy consumption in Canada is largely related to factors such as type of dwelling, heated area and number of persons in the household. Environmentally friendly behaviour has little effect on households' annual energy consumption.

However, being a green household does have an impact on *energy intensity* (tending to lower it), as the second model shows. One interpretation of these results would be that the households are aware that there may be economic benefits in conserving residential energy, but these benefits are often offset by the desire to maintain their quality of life. It can also be assumed that since there is a relationship between being a green household and income level, green households are more able to bear the costs related to installing more energy-efficient systems.

The results of the modelling agree with those of the study by Jeeninga et al.,[18] which concludes that "an intensive lifestyle in an energy-efficient household usually results in greater energy demand than a less intensive and less efficient household." [translation]

18. H. Jeeninga, M. Uyterlinde and J. Uitzinger, 2001, *Energy use of energy efficient residences (*in Dutch: *Energieverbruik van energiezuinige woningen)*, Energy Research Centre of the Netherlands (ECN) report ECN-C-01-072, Petten, Netherlands.

Components of the green index

Behaviour or activity	Eligible respondents
Lower the temperature when asleep	Respondents who have at least one thermostat
Use energy-saving lights	All respondents
Use dimmers on lights	All respondents
Unplug electronics for extended absences	All respondents
Reduce heating in certain rooms	All respondents
Use a clothesline or drying rack	All respondents
Use fans in the summer	All respondents
Close the curtains on hot days	All respondents
Apply weather-stripping around windows	All respondents
Dress warmer instead of increasing the temperature	All respondents
Use a low-flow shower head	All respondents
Use a low-flow toilet	All respondents
Use sprinklers on a timer (lawn)	Respondents who do not live in an apartment, who had a lawn last summer and reported watering it with a sprinkler or sprinkler system
Use sprinklers on a timer (garden)	Respondents who do not live in an apartment, who had a garden last summer and reported watering it with a sprinkler or sprinkler system
Turn off the tap when brushing teeth	All respondents
Ensure that the washing machine is full before turning it on	All respondents
Ensure that the dishwasher is full before turning it on	All respondents
Rain barrel or cistern	Respondents who do not live in an apartment
No chemical fertilizers applied to lawn	Respondents who do not live in an apartment and had a lawn or a garden last summer
No chemical pesticides applied to lawn	Respondents who do not live in an apartment and had a lawn, garden or outdoor plants last summer
Amount of paper recycled per week	Respondents who have access to a recycling program for paper
Amount of plastic recycled per week	Respondents who have access to a recycling program for plastic
Amount of glass recycled per week	Respondents who have access to a recycling program for glass
Amount of metal recycled per week	Respondents who have access to a recycling program for metal
Items taken to hazardous waste depot	Respondents who have access to a municipal, provincial, or private household hazardous waste depot
Separate kitchen waste from the rest of garbage	All respondents
Separate yard waste from the rest of garbage	Respondents who do not live in an apartment and had a lawn or a garden last summer
Windows - other natural cleaners	All respondents
Purchase energy or water-saving household appliances	Respondents who purchased any major appliance in the last five years
Purchase better-quality items even though they may be more expensive	All respondents
Purchase organic foods	All respondents
Purchase green cleaning products	All respondents
Use reusable grocery bags	All respondents

Importance of fuel efficiency

Ecological principal method of travel to work during the colder months
Ecological principal method of travel to work during the warmer months

Respondents who leased or bought a motor vehicle for personal use in the past 12 months
Respondents who worked outside the home during the last 12 months
Respondents who worked outside the home during the last 12 months

Quick fact

Maintenance of furnace filters

Regular maintenance of a forced air furnace system includes periodic cleaning or replacement of the furnace filter. Available in several different varieties, the furnace filter was originally designed to protect the furnace and fans from dust, but now is used to remove particles that can affect human health.[19]

In 2009, 52% of Canadian households had a forced air furnace. Most (87%) households that had a furnace reported that they had changed or cleaned the filter in their furnace at least once during the previous year: 43% of households with a furnace changed or cleaned it at least four times in the previous year, another quarter of these households changed or cleaned it every six months, and 19% had changed it once during the previous year. Five percent of households that had a furnace had not changed or cleaned their filter during the previous year, with the remainder indicating they did not know when the filter was changed or cleaned.

Table 4
Maintenance of furnace filters, 2009

	Had a furnace	Had a furnace					
		Changed or cleaned filter at least once during the past year	Changed or cleaned filter every three months or more frequently	Changed or cleaned filter every six months	Changed or cleaned filter once in the past year	Did not change or clean filter in the past year	Did not know
	percent						
Canada	**52**	**87**	**43**	**25**	**19**	**5**	**7**
Newfoundland and Labrador	23	61	22 E	F	24 E	F	F
Prince Edward Island	42	56	F	18 E	28 E	F	F
Nova Scotia	32	74	18 E	18 E	37	F	F
New Brunswick	22	89	31	25 E	34	F	F
Quebec	16	79	33	21	25	4 E	14 E
Ontario	73	88	46	25	18	4	7
Manitoba	67	94	53	28	13 E	F	F
Saskatchewan	79	89	56	19	15	5 E	5 E
Alberta	80	89	44	27	17	6 E	4 E
British Columbia	48	82	32	24	26	8	9 E

Note(s): The criteria for inclusion of a given value were that the result had to have a coefficient of variation (CV) no higher than 33.3 and at least 20 records had to have contributed to the result.
Source(s): Statistics Canada, Environment Accounts and Statistics Division, Households and the Environment Survey (survey number 3881), 2009.

19. Canadian Mortgage and Housing Corporation, 1999 (revised 2008), *Your Furnace Filter*, *www.cmhc-schl.gc.ca/en/co/maho/gemare/gemare_008.cfm* (accessed January 9, 2012).

Canadian environment, economic and social indicators

Table 5
Population indicators

	2005	2006	2007	2008	2009	2010
Population [1]						
Persons	32,245,209	32,576,074	32,929,733	33,319,098	33,729,690	34,126,181
Percent change from previous year	1.0	1.0	1.1	1.2	1.2	1.2
Aged 65 and over (percent of total)	13.1	13.3	13.5	13.7	13.9	14.1
Density (per square kilometre)	3.6	3.6	3.7	3.7	3.7	3.8

1. Population data is based on the Estimates of Population program.

Source(s): Statistics Canada, CANSIM table 051-0001 (accessed February 22, 2012). Statistics Canada, 2007, *Population and Dwelling Count Highlight Tables, 2006 Census*, Catalogue no. 97-550-X2006002.

Table 6
Economy indicators

	2005	2006	2007	2008	2009	2010
Gross Domestic Product (GDP)						
GDP (millions of chained 2002 dollars)	1,247,807	1,283,033	1,311,260	1,320,291	1,283,722	1,324,993
Percent change from previous year	3.0	2.8	2.2	0.7	-2.8	3.2
Per capita (chained 2002 dollars)	38,697	39,386	39,820	39,626	38,059	38,826
Consumer Price Index (2002 = 100)	**107.0**	**109.1**	**111.5**	**114.1**	**114.4**	**116.5**
Unemployment rate (percent)	**6.8**	**6.3**	**6.0**	**6.1**	**8.3**	**8.0**

Source(s): Statistics Canada, CANSIM tables 380-0017, 051-0001, 326-0021 and 282-0002 (accessed April 2, 2012).

Table 7
Social indicators

	2005	2006	2007	2008	2009	2010
Average household spending [1]						
Total (current dollars)	65,575	67,736	69,946	71,364	71,117	..
Water and sewage (current dollars)	211	221	253	251	259	..
Electricity (current dollars)	1,070	1,111	1,147	1,162	1,183	..
Food (current dollars)	6,978	7,046	7,305	7,435	7,262	..
Gasoline and other motor fuels (current dollars)	2,024	2,079	2,223	2,233	2,218	..
Personal expenditure on consumer goods and services (millions of chained 2002 dollars)	**723,146**	**753,263**	**787,765**	**811,157**	**814,215**	**841,466**
Residential waste						
Production [2] (tonnes)	..	12,616,337	..	12,897,396	..	..
Production per capita (kilograms)	..	387	..	387	..	..
Disposal (tonnes)	..	8,893,494	..	8,536,891	..	..
Disposal per capita (kilograms)	..	273	..	256	..	..
Diversion (tonnes)	..	3,722,843	..	4,360,505	..	..
Diversion per capita (kilograms)	..	114	..	131	..	..
Diversion rate (percent of waste production)	..	30	..	34	..	..
Distance driven by light vehicles [3] (millions of kilometres)	**289,717**	**296,871**	**300,203**	**294,361**	**303,576**	**..**

1. Data on average household spending is based on the Survey of Household Spending (SHS). For information on the difference between the SHS and personal expenditure data please see: Statistics Canada, 2008, *Guide to the Income and Expenditure Accounts*, Catalogue no. 13-017-X.
2. The estimates presented in this table refer only to material entering the waste stream and do not cover any waste that may be managed on-site by a household. In addition, these data do not include materials that were processed for reuse and resale, (for example, whole sale of scrap metal or used clothing), nor those materials that are collected through deposit-return systems and therefore not processed at a material recovery facility.
3. Distance driven for vehicles weighing less than 4.5 tonnes, excluding the territories.

Source(s): Statistics Canada, CANSIM tables 203-0001, 203-0003, 203-0002, 203-0007, 380-0017, 153-0041, 153-0042, 051-0001 and 405-0063 (accessed February 27, 2012).

Table 8
Energy indicators

	2005	2006	2007	2008	2009	2010
Primary energy availability (terajoules)	**11,307,113**	**11,176,879**	**11,969,050**	**11,179,124**	**10,962,914**	**..**
Primary and secondary energy						
Exports (terajoules)	9,641,137	9,833,549	10,308,635	10,265,704	8,816,828	..
Residential consumption (terajoules)	1,296,644	1,243,425	1,336,452	1,356,259	1,316,207	..
Established reserve						
Crude bitumen (closing stock, [1] millions of cubic metres)	1,620	3,340	3,500	4,300	4,216	4,130
Crude oil (closing stock, [1] millions of cubic metres)	752.3	712.6	721.8	688.8	622.5	..
Natural gas (closing stock, [1] billions of cubic metres)	1,553.7	1,577.7	1,534.3	1,671.2	1,700.9	..
Recoverable reserves						
Coal (closing stock, [1] millions of tonnes)	4,560.4	4,468.8	4,395.2	4,322.0	4,347.1	..
Uranium (closing stock, [1] tonnes)	431,000	423,400	482,000	447,000	383,000	..
Electricity generation						
Total (megawatt hours)	597,810,875	585,097,531	603,572,420	601,278,688	577,500,519	566,759,687
Hydro-electric (percent of total)	60.1	60.0	60.6	62.0	62.8	61.3
Nuclear (percent of total)	14.5	15.8	14.6	14.7	14.8	15.0
Fossil fuel and other fuel combustion (percent of total)	25.4	24.2	24.8	23.3	22.4	23.7

1. The size of the reserve at year-end.

Source(s): Statistics Canada, CANSIM tables 128-0009, 153-0012, 153-0013, 153-0014, 153-0017, 153-0018, 153-0019, 127-0001 and 127-0002 (accessed February 27, 2012).

Table 9
Environment and natural resources indicators

	2005	2006	2007	2008	2009	2010
Greenhouse gas (GHG) emissions (megatonnes of carbon dioxide equivalent (CO_2 eq))	**731**	**719**	**748**	**732**	**690**	**..**
GHG emissions per capita (tonnes of CO_2 eq)	**22.7**	**22.1**	**22.7**	**22.0**	**20.5**	**..**
GHG emissions by final demand						
Total household [1] (megatonnes of CO_2 eq)	415	412	432	..	..	..
Total household per capita (tonnes of CO_2 eq)	12.9	12.6	13.1	..	..	..
Direct household [2] (megatonnes of CO_2 eq)	111	109	115	..	..	..
Indirect household [3] (megatonnes of CO_2 eq)	305	303	317	..	..	..
Exports (megatonnes of CO_2 eq)	275	263	271	..	..	..
Value of selected natural resources						
Land (millions of current dollars)	1,367,002	1,532,193	1,708,196	1,832,780	1,905,946	2,004,683
Timber (millions of current dollars)	283,572	265,747	245,187	232,562	191,317	170,892
Subsoil resource stocks (millions of current dollars)	805,761	931,530	944,379	1,551,785	747,185	987,342
Average farm pesticide expenditures (current dollars)	**7,792**	**8,268**	**9,147**	**11,361**	**11,647**	**11,232**
Air quality [4]						
Ozone (population weighted, parts per billion)	40	38	39	38	37	..
$PM_{2.5}$ (population weighted, micrograms per cubic metre)	10	8	8	8	7	..

1. Total household greenhouse gas emissions are the sum of direct plus indirect household greenhouse gas emissions.
2. Direct household greenhouse gas emissions include all greenhouse gas emissions due to energy use in the home and for private motor vehicles.
3. Indirect household greenhouse gas emissions are those business-sector emissions due to the production of the goods and services purchased by households. An estimate of the greenhouse gas emissions from foreign companies due to the production of the imported goods purchased by Canadian households is included.
4. Ground level ozone and fine particulate matter ($PM_{2.5}$) are two key components of smog that have been linked to health impacts ranging from minor respiratory problems to hospitalizations and premature death. Exposure studies indicate that adverse health effects can occur even with low concentrations of these pollutants in the air. Annual data are revised, based on the latest release of the Canadian Environmental Sustainability Indicators report.

Source(s): Statistics Canada, CANSIM tables 051-0001, 153-0046, 378-0005 and 002-0044 (accessed April 3, 2012). Environment Canada, 2011, *National Inventory Report 1990-2009: Greenhouse Gas Sources and Sinks in Canada - Executive Summary*, Catalogue no. En81-4/1-2009E-PDF. Environment Canada, 2012, *Environmental Indicators*, *www.ec.gc.ca/indicateurs-indicators/default.asp?lang=en&n=B1385495-1#air1_en* (accessed February 22, 2012). Statistics Canada, Environment Accounts and Statistics Division, Material and Energy Flow Accounts.

Updates

New releases

Environment Accounts and Statistics Product Catalogue

Environment Accounts and Statistics Division is Statistics Canada's focal point for the collection, analysis and dissemination of environmental information. This reference guide briefly describes the division's programs, as well as all publications and electronic products offered on a quarterly, annual, biennial and occasional basis.

Released March 21, 2012 (Statistics Canada Catalogue no. 16-257-X).

Industrial Water Use, 2009

The information collected for the Industrial Water Survey measures, by volume, the sources of water used, the purposes of water use, whether or not water was re-circulated or re-used, where the water was discharged, the types of treatments applied to intake water prior to use and the types of treatments applied to wastewater prior to discharge. Water acquisition costs, treatment costs and operating and maintenance expenses related to water intake and discharge are also collected.

The results of this survey are used in the development of environmental accounts, aid in tracking the state of stocks of water and contribute to national indicators of water quality.

Released March 5, 2012 (Statistics Canada Catalogue no. 16-401-X).

CANSIM tables and updates

CANSIM is Statistics Canada's key socio-economic database.

Updates have been made to the following CANSIM tables:

CANSIM table 153-0047, Water use parameters in manufacturing industries, by North American Industry Classification System (NAICS)

CANSIM table 153-0048, Water use parameters in manufacturing industries, by provinces, territories and drainage regions

CANSIM table 153-0049, Water intake in manufacturing industries, by month of intake and North American Industry Classification System (NAICS)

CANSIM table 153-0050, Water intake in manufacturing industries, by source and North American Industry Classification System (NAICS)

CANSIM table 153-0051, Water intake in manufacturing industries, by source and by provinces, territories and drainage regions

CANSIM table 153-0067, Intake water treatment in manufacturing industries, by North American Industry Classification System (NAICS)

CANSIM table 153-0068, Water intake in manufacturing industries, by purpose of initial use and North American Industry Classification System (NAICS)

CANSIM table 153-0069, Water recirculation in manufacturing industries, by purpose and North American Industry Classification System (NAICS)

CANSIM table 153-0070, Water discharge in manufacturing industries, by point of discharge and North American Industry Classification System (NAICS)

CANSIM table 153-0071, Water discharge in manufacturing industries, by point of discharge and by provinces, territories and drainage regions

CANSIM table 153-0072, Water discharge in manufacturing industries, by type of final treatment and North American Industry Classification System (NAICS)

CANSIM table 153-0073, Water discharge in manufacturing industries, by type of final treatment and by provinces, territories and drainage regions

CANSIM table 153-0074, Water acquisition costs in manufacturing industries, by North American Industry Classification System (NAICS)

CANSIM table 153-0075, Water acquisition costs in manufacturing industries, by provinces, territories and drainage regions

CANSIM table 153-0076, Total water costs in manufacturing industries, by water cost component and North American Industry Classification System (NAICS)

CANSIM table 153-0077, Total water costs in manufacturing industries, by water cost component and by provinces, territories and drainage regions

CANSIM table 153-0078, Water use parameters in mineral extraction industries, by North American Industry Classification System (NAICS)

CANSIM table 153-0079, Water use parameters in mineral extraction and thermal-electric power generation industries, by region

CANSIM table 153-0080, Water intake in mineral extraction and thermal-electric power generation industries, by month of intake and region

CANSIM table 153-0081, Water intake in mineral extraction industries, by source and North American Industry Classification System (NAICS)

CANSIM table 153-0082, Water intake in mineral extraction and thermal-electric power generation industries, by source and region

CANSIM table 153-0083, Intake water treatment in mineral extraction industries, by type of treatment and North American Industry Classification System (NAICS)

CANSIM table 153-0084, Intake water treatment in mineral extraction and thermal-electric power generation industries, by type of treatment and region

CANSIM table 153-0085, Water intake in mineral extraction industries, by purpose of initial use and North American Industry Classification System (NAICS)

CANSIM table 153-0086, Intake water treatment in mineral extraction and thermal-electric power generation industries, by purpose of initial use and region

CANSIM table 153-0087, Water recirculation in mineral extraction industries, by purpose and North American Industry Classification System (NAICS)

CANSIM table 153-0088, Water recirculation in mineral extraction and thermal-electric power generation industries, by purpose and region

CANSIM table 153-0089, Water discharge in mineral extraction industries, by point of discharge and North American Industry Classification System (NAICS)

CANSIM table 153-0090, Water discharge in mineral extraction and thermal-electric power generation industries, by point of discharge and region

CANSIM table 153-0091, Water discharge in mineral extraction and thermal-electric power generation industries, by point of discharge and type of final treatment

CANSIM table 153-0092, Water discharge in mineral extraction industries, by type of final treatment and North American Industry Classification System (NAICS)

CANSIM table 153-0093, Water discharge in mineral extraction industries and thermal-electric power generation industries, by type of final treatment and region

CANSIM table 153-0094, Water acquisition costs in mineral extraction industries, by North American Industry Classification System (NAICS)

CANSIM table 153-0095, Water acquisition costs in mineral extraction and thermal-electric power generation industries, by region

CANSIM table 153-0096, Total water costs in mineral extraction industries, by water cost component and North American Industry Classification System (NAICS)

CANSIM table 153-0097, Total water costs in mineral extraction and thermal-electric power generation industries, by water cost component and region

CANSIM table 153-0102, Selected glacier mass balance in Canada

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Symbols

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.	not available for any reference period
..	not available for a specific reference period
...	not applicable
0	true zero or a value rounded to zero
0s	value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
p	preliminary
r	revised
x	suppressed to meet the confidentiality requirements of the *Statistics Act*
E	use with caution
F	too unreliable to be published
*	significantly different from reference category ($p < 0.05$)

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