The energy intensity of the Canadian residential sector becomes more efficient

Canada is located in latitudes where climate change is particularly felt, however in 2016, its greenhouse gas (GHG) emissions in the residential sector decreased despite an increase in energy consumption. This improvement in the carbon intensity of the energies used makes it possible to compensate for the residential choices of a growing population. It is largely due to the dynamic normative framework of Natural Resources Canada encouraging non-state actors to develop more efficient products and buildings across the country. Beyond certifications and several incentive programmes, local initiatives – most often carried out in partnership between actors – also play a dynamic role in this trend, which should increase in the coming years.

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CONTENTS

1 • CANADA'S RESIDENTIAL SECTOR: LOWER EMISSIONS AND INCREASED ENERGY CONSUMPTION

	2011	2012	2013	2014	2015	2016
Total residential GHG emissions (not including electricity) (Mt eq. CO_2)	46	42	44	46	43	39

TABLE 1. CHANGE BETWEEN 2011 AND 2016 IN GHG EMISSIONS (NOT INCLUDING ELECTRICITY) IN CANADA'S RESIDENTIAL SECTOR

(National Inventory Report, Environment and Climate Change Canada, 2018).

Canada's residential sector is comprised of individual and collective owners of houses and apartment buildings that purchase services and materials from builders, home improvement contractors, designers and manufacturers. In 2016, the energy consumption of approximately 14 million Canadian households was $28 billion. Total residential GHG emissions (excluding electricity) decreased by 46 Mt CO_2 eq to 39 Mt CO_2 eq between 2014 and 2016. (Table 1)

More precisely, the Canadian residential sector reduced its GHG emissions including electricity by 19% between 2003 and 2015 (Table 2). After a peak at 80.6 Mt CO_2 eq in 2003, there has been a gradual decrease to 65.4 Mt CO_2 eq in 2015, which represented 9% of Canada's total GHG emissions (OEE, 2016). In 2015, emissions in the residential sector were mainly from natural gas (33.6 Mt CO_2 eq, i.e. 51%) and electricity (22.2 Mt CO_2 eq, i.e. 34%). Since 2003, there has been a downward trend in the relative share of electricity in residential sector emissions and a stabilisation of the relative share of gas.

Over the same period, the total energy consumption of the Canadian residential sector increased by 2% between 2003 and 2015 from 1514.5 PJ to 1544 PJ in 2015 with a peak of 1608.7 PJ in 2014. Along with the decrease in GHG emissions, the increase in total energy consumption therefore highlights the measures undertaken in the residential sector that have improved the greenhouse gas intensity – GHG emissions per unit of energy consumed – decreasing it by 20% between 2003 and 2015 (Table 2).

	2003	2011	2012	2013	2014	2015
Total GHG emissions including electricity (Mt eq. CO_2)	**80,6**	71,7	66,3	69,0	69,1	65,4
By energy source						
Electricity	33,4	25,5	23,5	24,8	23,4	22,2
Natural gas	33,5	33,8	31,2	33,7	35,9	33,6
Heating oil	8,7	7,2	6,1	5,4	5,1	4,9
Firewood	4,1	4,1	4,1	4,1	3,7	3,8
Other (including coal and propane)	0,8	1,2	1,3	1,0	0,9	0,9
Total Energy Consumption (PJ)	1514,5	1574,0	1508,2	1572,0	**1608,7**	1544,0
GHG intensity (tonnes/TJ)	**53,2**	45,6	43,9	43,9	42,9	42,4

TABLE 2. CHANGE BETWEEN 2003 AND 2015 IN GHG EMISSIONS INCLUDING ELECTRICITY, TOTAL ENERGY CONSUMPTION AND GHG INTENSITY IN CANADA'S RESIDENTIAL SECTOR

(Office of Energy Efficiency, Natural Resources Canada, 2016).

• POPULATION GROWTH AND ENERGY EFFICIENCY, THE MAIN INFLUENCING FACTORS • There is a number of factors influencing the evolution of total energy consumption in Canada's residential sector and therefore the GHG emissions: internal factors relating to the structure (activity and level of service), external factors such as type of accommodation (house or apartment), building envelope (energy efficiency) and weather conditions. Between 1990 and 2013, activity measured in the number of households and floor area led to an increase of 30 Mt CO_2 eq while energy efficiency led to a drop of 27 Mt CO_2 eq (Table 3).

Factors	Details	GHG (Mt CO_2 eq)
Activity	Measured by combining the number of households and the floor area.	+ 30
Level of service	Increased penetration rate of appliances and increased climatised floor area.	+ 3,7
Structure	Decrease in the relative share of individual houses.	- 0,06
Energy efficiency	Improvements to the thermal envelope of houses and the energy efficiency of appliances, room and water heating.	- 27
Weather conditions	In 2013, the winter was colder and the summer warmer than in 1990.	+ 0,6 (2013)

TABLE 3. CHANGE BETWEEN 1990 AND 2013 IN GHG EMISSIONS IN CANADA'S RESIDENTIAL SECTOR LISTED BY THE FIVE MAIN INFLUENCING FACTORS

(Office of Energy Efficiency, Natural Resources, 2016).

The increase in total energy consumption in the residential sector between 1990 and 2015 is explained by the 29% increase in the Canadian population (+8 million) and 43% increase in the number of households (+4.2 million) (Statistics Canada, 2018). In addition, Canadians made new choices in living space that resulted in a 17% increase in average living space (in m^2) between 1990 and 2013. At the same time, the average number of people per household decreased from 2.8 in 1990 to 2.5 in 2013. The combination of these three trends explains the construction of more homes and, as a result, an increase in energy consumption (Table 4).

	1990	2003	2011	2012	2013	2014	2015
Population (millions)	27,79	31,68	34,48	34,99	35,16	35,54	35,85
Total floor area (millions of m^2)	1208	1597	1881	1910	1967	1997	2026
Total number of households (thousands)	9895	12189	13551	13706	13858	13969	14137

TABLE 4. CHANGE IN POPULATION, TOTAL FLOOR AREA AND TOTAL NUMBER OF HOUSEHOLDS BETWEEN 1990 AND 2015

(Office of Energy Efficiency, Natural Resources Canada, 2016).

• CORRELATION WITH THE ANNUAL WEATHER CONDITIONS • Weather conditions have a strong influence on energy consumption in Canada's residential sector. Although Canada's major cities are at a latitude similar to its European counterparts, the country is characterised by a humid continental climate with severe winters. As a result, GHG emissions in the residential sector are correlated with annual weather conditions. This means that the colder winter of 2013 resulted in an overall increase in energy consumption for temperature control and therefore an increase in GHG emissions. Conversely, the drop in GHG emissions (excluding electricity) observed in 2016 in the residential sector can be correlated with the national average temperature 2.1°C higher that

year than the reference average (1961 to 1990), making it the fourth warmest year since the start of nationwide temperature surveys in 1948 (Environment and Climate Change Canada, 2017). The future data for the year 2017, one of the hottest years ever recorded, will undoubtedly confirm the correlation by showing a decrease in GHG emissions in the residential sector.

• CONSUMPTION INFLUENCED BY HEATING ROOMS AND WATER • Due to the harsh Canadian climate, the Office of Energy Efficiency of Resources Canada estimates that in 2015, 62.4% of residential energy consumption was attributable to room heating and 18.7% to heating water. Also in 2015, the other energy expenditure items were home appliances (13%), lighting (3.8%) and air conditioning (2.1%). These data show the influence of a changing climate as the energy consumption for room heating is decreasing and the consumption for cooling is increasing due in particular to the increase in the number of more intense heat waves during the summer period. These trends translated into a similar change in GHG emissions between 2011 and 2015 (Table 5).

	2011	2012	2013	2014	2015
Heating of premises	45,0	40,7	43,6	44,7	41,5
Water heating	14,3	13,7	13,6	13,4	13,2
Household appliances	8,5	8,1	8,3	7,8	7,5
Lighting	2,5	2,3	2,4	2,2	2,1
Air conditioning	1,4	1,5	1,1	0,9	1,2

TABLE 5. CHANGE BETWEEN 2011 AND 2015 IN TOTAL GHG EMISSIONS (INCLUDING ELECTRICITY) IN THE CANADIAN RESIDENTIAL SECTOR BY END-USE (MT CO_2 EQ)
SOURCE: OFFICE OF ENERGY EFFICIENCY, NATURAL RESOURCES CANADA, 2016

• CONTINUOUS REDUCTION OF ENERGY INTENSITY[1] • The energy intensity of the residential sector is usually expressed as energy consumption per household and energy consumed per square metre of living space. Energy intensity per household decreased by 6% between 2011 and 2015, from 116.2 GJ to 109.2 GJ, despite an increase in the number of household appliances used by the average household, the increase in living space and the use of air conditioners. Energy consumption per square metre decreased by 9.5% from 0.84 GJ to 0.76 GJ (Table 6).

	2011	2012	2013	2014	2015
Energy intensity (GJ/household)	116,2	110,0	113,4	115,0	109,2
Energy intensity (GJ/m2)	0,84	0,79	0,80	0,81	0,76

TABLE 6. EVOLUTION OF ENERGY INTENSITY BY HOUSEHOLD AND BY LIVING SPACE BETWEEN 2003 AND 2015 (OFFICE OF ENERGY EFFICIENCY, NATURAL RESOURCES CANADA, 2016).

2 • AN EFFECTIVE NORMATIVE FRAMEWORK FOR ENERGY EFFICIENCY

Improvements in the energy efficiency of products in the residential sector are guided mainly by establishing standards that limit the energy consumption of each appliance, by the continual tightening of technical specifications or by information initiatives to help consumers identify the most energy-efficient products on the market. In this range of initiatives, several standards and label programmes are based on the requirements of the Energy Efficiency Regulations (EER).

1 - Energy intensity is defined as the amount of energy consumed per unit of activity

Following the 1992 Energy Efficiency Act, the Government of Canada has the authority to enforce regulations for performance and labeling requirements for energy-consuming products, including appliances that are imported into Canada or shipped from one province or territory to another.

The EER uses performance standards established by consensus at the national level by standards-writing organisations such as the Canadian Standards Association. Covered products that do not meet the minimum energy performance standards (MEPS) stipulated in the EER cannot be imported into Canada or shipped from one province to another. Natural Resources Canada regularly changes the EER to tighten the minimum energy performance requirements for the affected products as the market moves toward a higher level of performance. The EER is also being amended to cover new products, harmonise minimum energy efficiency requirements with other regions and update testing methods and labeling requirements. In addition to the EER, other standards such as the voluntary R-2000 standard accelerate energy efficiency requirements in residential buildings (Text box 1).

• THE IMPETUS OF INCENTIVE PROGRAMMES • The directory of energy efficiency programs of Natural Resources Canada comprises 78 initiatives in the residential sector including financial assistance to change doors and windows or to purchase more energy-efficient appliances, programmes that encourage homeowners to work with certified contractors to increase energy efficiency as well as energy-efficient renovation programmes. These results are due to the partnership initiatives between the federal government and non-state actors including construction businesses, local governments and various non-profit organisations and groups. Together, they push for a real sustainable building sector that aims to improve energy efficiency in response to climate change and move towards better environmental practices while continuing to stimulate the real estate market and the underlying economic growth.

R-2000 as a normative framework for buildings

R-2000 is a 1982 standard amended in 2012 developed by Natural Resources Canada in partnership with the Canadian Home Builders' Association (CHBA). R-2000 is a voluntary standard that exceeds building code requirements for energy efficiency, indoor air quality and environmental responsibility. Homes built to the new standard are, on average, 50% more energy efficient than typical new homes built under the building code. An independent certified inspector assesses and tests the compliance of each new R-2000 home with high technical specifications on the insulation level of walls, ceilings and basements; windows, doors and high-efficiency heating; mechanical ventilation for the entire house; minimal air leaks as well as water-saving appliances.
The R-2000 Net Zero Energy pilot was launched in 2013 and aims to identify builders and homes that achieve net zero energy efficiency, which means producing at least as much energy on-site from renewable sources that it consumes. In the autumn of 2016, 23 net zero energy homes were built by 6 builders in 3 provinces. Other provincial energy efficiency initiatives for home construction include Novoclimat (Quebec), Built Green (British Columbia and Alberta), Power Smart New Homes and Energy Star for new homes.

TEXT BOX 1

3 • MEASURES AT PROVINCIAL AND CITY LEVEL

In addition to the federal level, Canada comprises 10 provinces and 3 territories that enjoy broad autonomy thanks to their own governments, budgets and courts. Local governance rests solely with the provincial legislatures and each province or territory has its own system of territorial administration and subdivisions. As a result, the provinces and large cities (12 cities have more than 500,000 inhabitants as of 2016) play a key role in the implementation of the measures to reduce GHG emissions, but the collaboration between the federal level and the different levels of governance are also inevitable in the success of the country's policies.

• THE PAN-CANADIAN FRAMEWORK, SYMBOL OF A MULTIPLE PARTNERSHIP • The Pan-Canadian Framework on Clean Growth and Climate Change was launched in 2016 following consultations with the public and with manufacturers and developed together with the provinces and territories (Text box 3). It is an example of this culture of partnership between state and non-state actors, and it helps to achieve national GHG emission reduction targets. The built environment approach (residential and commercial) aims to: 1) Make new buildings more energy efficient; 2) Modernise existing buildings and support the transition to cleaner fuels; 3) Improve the energy efficiency of household appliances; 4) Adhere to building codes and support the construction of energy efficient homes in indigenous communities.

The Pan-Canadian Framework fits into three categories of equipment

As part of the priorities presented at the Energy and Mines Ministers' Conference Ministers in August 2017, local governments agreed to collaborate and focus on transforming the housing market in three categories of equipment based on their current energy consumption and their potential to reduce GHG emissions: residential windows (responsible for nearly 35% of the heat loss from homes), space heating (between 56% and 64% of energy consumption in homes and buildings), water heating (8% to 19% of energy consumption in homes and buildings).

From these observations, the announced long-term objectives are the propagation of high-performance residential windows with a U-factor (heat transfer rate calculated in watts per square metre per Kelvin – W/m2 K) of 0.8% by 2030 (currently 1.4 to 2.0% depending on the geographic area), as well as the propagation of heat pumps and space heating and water heating technologies achieving 100% or more efficiency by 2035

TEXT BOX 2

In 2017, several initiatives were launched across the country. In this way, British Columbia has adopted a new Energy Code that allows adherent localities to make a gradual shift to net zero energy buildings, providing significant opportunities for reducing emissions. The "Green Ontario Fund" was launched in August 2017 to support the implementation of technologies to reduce GHG emissions from buildings and the production of goods. As part of Ontario's Climate Change Action Plan, it is funded by provincial revenues from the carbon market and the pollution cap (Text box 3). The fund is worth $377 million and other investments are planned over the next four years. The organisation's first programme called GreenON Installations provides free installation of a smart thermostat to family houses as well as advice on saving on energy costs. Manitoba has created a new agency that promotes conservation and energy efficiency. Newfoundland and Labrador continues to require new buildings and large-scale renovations to be built sustainably, for which it receives provincial assistance. Finally, other key measures are currently underway including the new federal furnace standards, a federal-provincial-territorial strategy to make equipment more energy efficient, and new standards for product efficiency.

Ontario's Action Plan for the residential sector

The Province of Ontario is proposing several measures for the residential sector in its five-year Climate Change Action Plan 2016–2020 including support for the real estate sector and homeowners to implement measures to reduce GHG emissions. Three measures aim to improve energy efficiency in residential buildings: 1) Renovation of ageing social housing and installing energy-saving technologies (heating, lighting), 2) protecting tenants from rising energy prices and 3) providing incentives for renovating buildings.
Four measures are planned to help homeowners reduce their carbon footprint: 1) Financial incentives for homeowners for purchasing low-carbon technologies, 2) removing old wood furnaces, 3) discounts for new homebuyers or builders of low carbon homes and 4) keeping the price of electricity affordable. Ontario also plans to update the Real Estate Code, promote low-carbon products and energy to businesses and concerned sectors and train the construction industry workforce in renovation techniques and energy management. Finally, Ontario intends to support individuals and businesses in managing their energy through three measures: 1) Free audits when purchasing a home; 2) expanding Ontario's Green Button programme stat serves to share data on household energy use to better advise on savings opportunities and 3) boost public access to the existing tools on the right climatic actions so that the public can set up their own measures.

TEXT BOX 3

• LOCAL DYNAMISM LED BY CITIES AND NGOS • Several initiatives have emerged across Canada for residential building renovation programmes. Some Canadian cities are among the most active in terms of initiatives in the residential sector, such as Vancouver (Text box 4). The sustainable building actors behind these measures also include influential groups such as the Pembina Institute (Text box 5) or the Canadian branch of the Green Building Council (CaGBC), which has been working since 2002 to lead and accelerate the transformation to sustainable, healthy and high-performance buildings, homes and communities across Canada. CaGBC implements the LEED (Leadership in Energy and Environmental Design) global certification programme in Canada and works in collaboration with its network of members from more than 1,200 businesses involved in the design, construction and management of buildings. Finally, the Real Estate Foundation of British Columbia (REFBC) is a philanthropic organisation that supports sustainable land and real estate practices through two measures: grants to research policies, standards and educational reforms to be carried out to achieve these objectives, as well as initiatives and pilot projects to fill gaps in research and collaboration.

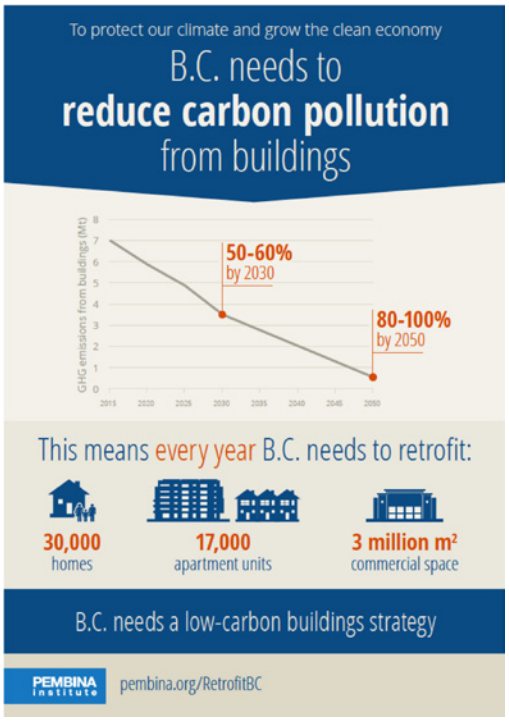
The City of Vancouver's Greenest City Programme

Vancouver launched its 2015–2020 Greenest City Action Plan to remain the reference city for sustainable urban planning. For several years now, the city has received many awards including an award for the most sustainable city in North America in 2016. In 2011, it set itself the goal of becoming the greenest city in the world by 2020. The action plan states that the authorities work together with residents, the private sector and other levels of governance. Regarding the green buildings sector, the objective is clear: to be a world leader in the design and construction of sustainable buildings.

The action plan comprises two targets: 1) Require all buildings built from 2020 to be carbon neutral in operations and 2) reduce energy use and emissions of CO_2 eq in existing buildings by 20% from 2007 levels. In the

2016–2017 update of the plan, a 43% reduction in CO_2 eq in new buildings compared to 2007 was observed. In addition, a new objective has just been adopted: in July 2016, Vancouver became the first major city in North America on the way to eliminate CO_2 eq emissions in new buildings by 2030 thanks to the Zero Emissions Building Plan. This plan does not focus on the prohibition of certain types of energy but rather on better insulation by using zero carbon and passive energy standards. The largest passive house in Canada is located in east Vancouver.

TEXT BOX 4



The influence of the Pembina Institute

The Pembina Institute is a Canadian not-for-profit think tank founded in 1985 specialising in energy issues. The Pembina Institute is composed of multi-disciplinary experts to provide expert reports, situation analyses and recommendations to inform public policies and practices. It also launches awareness campaigns. The Pembina Institute launched a campaign in the residential sector in 2018 to raise awareness of the need for a more ambitious rehabilitation strategy in British Columbia based on the following data: aiming for a reduction of 80% to 100% in CO_2 emissions by 2050, British Columbia would have to renovate 30,000 houses and 17,000 apartments each year.

TEXT BOX 5

4 • IMPROVING ENERGY EFFICIENCY BY TRANSFORMING THE MARKET

Industrial and economic players in the residential sector are required to develop their products throughout the building sector in line with the evolving normative framework aimed at transforming the market. The increased energy efficiency of the residential sector is thus attributable to changes in the thermal envelope of homes (insulation, windows, etc.) and to the energy efficiency of energy-using appliances such as furnaces, home appliances, lighting fixtures and air-conditioners, while having to cope with the continued penetration of new small appliances. Between 1990 and 2013, the energy efficiency of the residential sector improved by 45%, which in 2013 enabled Canadians to reduce their energy bill and energy consumption by C$12 billion and 639 PJ (Office of Energy Efficiency, Natural Resources Canada, 2016).

• RELYING ON THE NORMATIVE TOOL TO TRANSFORM THE MARKET • Improving energy efficiency is enabled by the willingness of state and non-state actors in the Canadian residential sector to transform the market. Natural Resources Canada works with non-state actors (manufacturers, energy efficiency advocates, consumer associations, academics) to accelerate the penetration of high-performance equipment into the marketplace. This initiative aims to stimulate new technologies from manufacturers' R&D to respond to consumer demand for more energy-efficient

products, and give access to various incentives and discounts offered by local governments. **The market transformation in the residential sector is thus stimulated by a virtuous cycle of activities in which non-state actors take part:**

1. The Energy Efficiency Regulations (EER) establish mandatory minimum energy performance standards for a product;
2. Product specifications (such as ENERGY STAR) are moving towards high energy efficiency standards;
3. Manufacturers and retailers provide a range of product models;
4. Local public services provide financial incentives to encourage the purchase of products;
5. Information initiatives (such as the EnerGuide programme) and consumer labeling increase awareness;
6. A large number of consumers choose certified models.

Once this step is completed, the EER and the product technical specifications become more rigorous, leading to a new cycle.

The case of large residential buildings

In partnership with WSP, a leading Canadian engineering firm, CaGBC and REFBC have launched a roadmap for the renovation of large buildings (over 2300 m²), including multi-residential buildings of five or more storeys. Four measures have been identified which could lead to a reduction of 21 Mt CO_2 eq: 1) Optimising the technical systems of building management and performance control, 2) undertaking major renovations to achieve high quality standards such as LEED in terms of energy reduction, envelopes or lighting, 3) integrating solar panels or other renewable energy systems and 3) working with the legal and private sectors to focus on low-carbon energy sources

In 2016, CO_2 emissions for large multi-residential buildings were 3 Mt, corresponding to 8% of total emissions from large Canadian buildings (WSP 2016). 41% of Canada's large residential buildings use electric heat (NRCan, 2014).

TEXT BOX 6

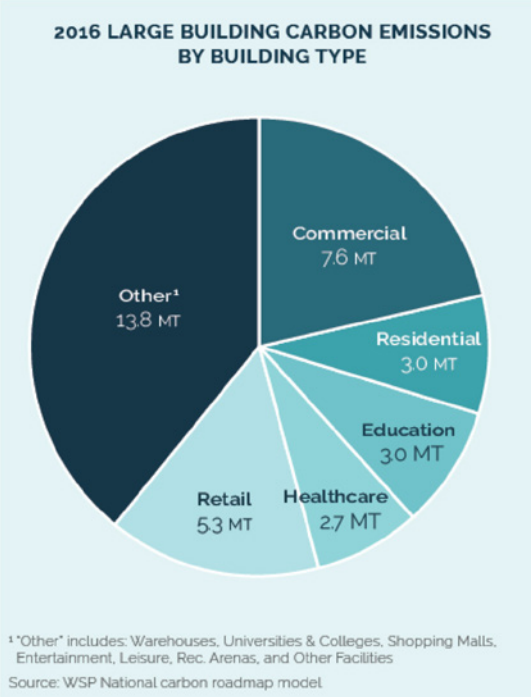


FIGURE 1. GHG EMISSIONS (MT) OF LARGE BUILDINGS BY TYPE OF BUILDING

(Source: WSP, 2016).

• CONTINUOUS TECHNOLOGICAL IMPROVEMENT OF HOME APPLIANCES AND HEATING •

The decrease in room heating energy intensity is mainly due to energy efficiency gains due to replacing low-efficiency appliances with regulated models with average and higher efficiency. In 2013, 98% of oil heating equipment had an average yield compared to just 2% in 1990. In terms of water heating, more Canadians have shifted from oil water heaters to appliances running on natural gas, which are generally more energy-efficient, resulting in a 9% reduction in energy use per household to heat water since 1990. Between 1990 and 2013, the number of large household appliances (washing machines, dryers, refrigerators, freezers, dishwashers, and electric stoves) used in Canada increased by 53%, while their total energy use decreased by 26% during the same period. Nevertheless, the energy consumption of small household appliances has more than

doubled (+ 178%), mainly due to the rapid growth of cell phones, video transmission systems and video game consoles. The occupied floor area has tripled from 268 million m^2 (22%) in 1990 to 906 million m^2 (46%) in 2013, increasing energy needs by 95% despite the improved energy efficiency of individual and central air conditioners. The energy needed to provide light to all Canadian homes has increased due to the increase in the number of households, while the energy required to provide light to each individual Canadian home has decreased due to the increased use of compact fluorescent lamps (CFL) and light-emitting diode (LED) bulbs that consume less energy to produce the same light intensity..

The influence of the ENERGY STAR® certification

The electricity consumption of a common set of household appliances purchased by a household in 2015 was on average 2600 kilowatt hours per year (kWh/year), which is approximately a half of the consumption of a set of appliances purchased in 1990. In 2015, 65% of all refrigerators, 96% of dishwashers and 67% of washing machines were ENERGY STAR® certified. The ENERGY STAR® symbol is a tool used to transform the market. It makes it easier for consumers to identify and choose products that consume less energy than regular models. In 2001, Canada officially adopted the ENERGY STAR® registered mark to identify the most energy-efficient appliances. "ENERGY STAR® Most Efficient" is a new part of the programme designed to identify and promote products on the market with superior performance. This new designation tested by the American Environmental Protection Agency (EPA) and Natural Resources Canada in 2010 and 2011 recognises the most energy-efficient products among ENERGY STAR® certified products over the course of each year (Office of Energy Efficiency, Natural Resources Canada, 2016).

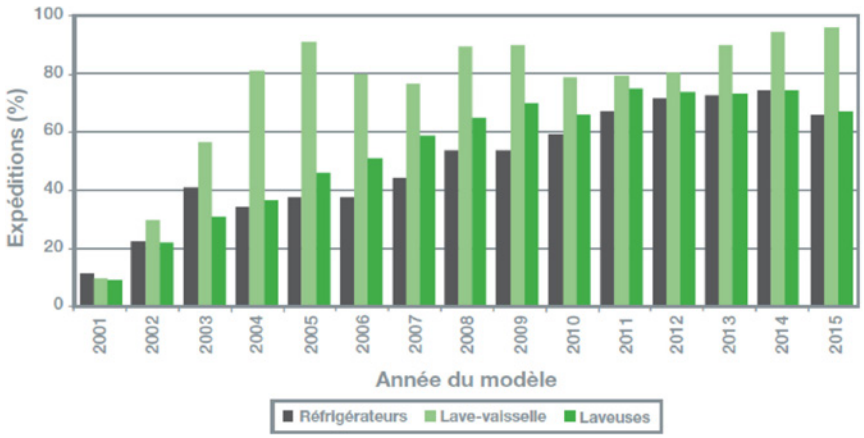


FIGURE 2. EVOLUTION OF ENERGY STAR® QUALIFIED APPLIANCES AS A PERCENTAGE OF TOTAL SHIPMENTS TO CANADA BETWEEN 2001 AND 2015

(OEE, NRCan, 2016)

TEXT BOX 7

CONCLUSION

Thanks to the dynamic partnerships between the various players in the expanding sustainable building sector who take action to advance both the legislation and technical innovation, GHG emissions in Canada's residential sector in recent years are falling despite the increase in the total energy consumption of a growing population with growing energy requirements. Local initiatives for zero-emission residential buildings, although still not encompassing more than a small number of all buildings, are nevertheless expanding. The continuous improvement in the energy efficiency of building standards, heating appliances and household appliances plays a major role in this decrease, as well as the changing weather conditions, given the country's northern location. In view of these dynamics, the evolution of GHG emissions in the Canadian residential sector will have to be carefully monitored in the coming years by analysing the share that can be contributed to these measures and the share contributable to global warming.

PLEASE DO NOT HESITATE TO REACT TO THIS STUDY, AND NOTIFY US COMPLEMENTARY REPORTS AND DATA VIA THIS ADDRESS : CONTRIBUTION@CLIMATE-CHANCE.ORG

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