



Natural Resources
Canada

Ressources naturelles
Canada

Improving Energy Performance in Canada



Report to Parliament
Under the *Energy Efficiency Act*
2015–2016





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Natural Resources Canada's Office of Energy Efficiency
Leading Canadians to Energy Efficiency at Home, at Work and on the Road

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FOREWORD

At its foundation, energy efficiency is about reducing the amount of energy used to deliver the same or a better level of services. Energy efficiency is a critical part of the Government of Canada's effort to address climate change. Because saving energy saves money, it is one of the only climate change measures that can pay for itself. Energy efficiency supports innovation and clean growth while enhancing economic development and industrial productivity. The investments of today will help expand and grow thousands of jobs now and in the future.

The *Energy Efficiency Act* empowers the Minister of Natural Resources to promote the efficient use of energy and alternative fuel sources. It also gives the Government of Canada the authority to make and enforce regulations concerning minimum energy performance levels, labelling requirements and the collection of data on energy use for energy-using products and products that affect energy use.

Natural Resources Canada's (NRCan) Office of Energy Efficiency administers the *Energy Efficiency Regulations* and provides other programs and information that promote energy efficiency in the major energy-using sectors of the economy, including commercial and consumer products, residential, commercial and institutional buildings, industry, and transportation and alternative fuels.

This twenty-second Report to Parliament under the *Energy Efficiency Act* outlines the actions taken by the Government of Canada on energy efficiency and transportation and alternative fuels from April 1, 2015, to March 31, 2016.¹

Chapter 1 provides an overview of the importance of energy efficiency in meeting growing energy demands while mitigating climate change, stimulating economic growth, and fostering innovation and competitiveness.

Chapter 2 discusses the role played by NRCan in the promotion of energy efficiency through the development and enforcement of regulations, standards and codes, the administration of voluntary certification, benchmarking and information-based programs, and domestic and international partnerships.

Chapters 3 to 7 highlight the results of program activities across the following areas: consumer and commercial products, residential homes, commercial and institutional buildings, industry, and vehicles and alternative fuels.

For more detailed program information, see NRCan's *Departmental Performance Report*.

For more detailed regulatory information, see the *Canada Gazette*.



Message

FROM THE MINISTER OF NATURAL RESOURCES

Imagine if a breakthrough could get Canada halfway to meeting its targets under the Paris Climate Change Agreement. According to the International Energy Agency, that breakthrough already exists — energy efficiency.

For too long, energy efficiency has been overlooked and underappreciated. Energy efficiency is not something that just affects climate change on the margins — it can strike at its very heart. It is also something that can improve the health of Canadians, strengthen our economy, create jobs and enhance the security of our energy supply.

Our government understands the importance of energy efficiency. Budget 2017 invested more than \$380 million in a wide range of initiatives, including electric vehicle charging stations and natural gas and hydrogen refuelling stations.

Among these initiatives is the EnerGuide program, which helps Canadians understand their energy use and save money on their utility bills. It also includes ENERGY STAR® — an instantly recognizable symbol that lets consumers identify high-efficiency products in lighting, appliances, electronics and new homes.

Over the last three years, Canadians saved enough energy using ENERGY STAR® products to fuel almost two million cars for a year. That is the power of energy efficiency.

In this, the twenty-second edition of the Report to Parliament on Improving Energy Performance in Canada, we outline the many ways in which energy efficiency is helping Canadians to move toward a clean energy future — and to move Canada closer to its climate change goals.

The Honourable Jim Carr, P.C., M.P.
Canada's Minister of Natural Resources



WHILE ENERGY USE IN CANADA INCREASED 31 PERCENT BETWEEN **1990** AND **2014**, IT WOULD HAVE INCREASED **55 PERCENT** WITHOUT ENERGY EFFICIENCY IMPROVEMENTS.

IN **2014**, ENERGY EFFICIENCY IMPROVEMENTS AVOIDED **90.5 MEGATONNES** OF GHG EMISSIONS.

CANADIANS **SAVED \$38.5 BILLION** ON ENERGY BILLS IN **2014** AS A RESULT OF ENERGY EFFICIENCY IMPROVEMENTS.

THE **ENERGY EFFICIENCY PROGRAM SUITE** (2011–2012 TO 2015–2016) ACHIEVED **\$1 BILLION IN COST SAVINGS** FOR CANADIAN INDUSTRY AND CONSUMERS.

OVER THE COURSE OF THE ENERGY EFFICIENCY PROGRAM SUITE, CANADIANS SAVED APPROXIMATELY **16.7 PJ** OF ENERGY BY USING ENERGY STAR[®] CERTIFIED PRODUCTS, EQUAL TO THE ANNUAL ENERGY USED BY APPROXIMATELY **30,000 HOUSEHOLDS**.

EXECUTIVE SUMMARY

The Government of Canada is committed to a sustainable and prosperous Canada. Energy efficiency offers a significant opportunity to support both these commitments – to help realize Canada’s domestic and international obligations to address climate change, while also supporting economic growth and jobs.

Energy efficiency means using less energy while maintaining the same or better level of service, comfort and performance we expect from our homes, cars, appliances and buildings. Energy efficiency programs and measures reduce greenhouse gas (GHG) emissions and air pollutants, stimulate technological innovation, generate jobs, reduce energy demand thereby freeing energy for other purposes, and lower utility bills and costs for Canadians and the Canadian economy.

Energy efficiency represents one of the least costly and most effective interventions that can be taken collectively to address the global challenge of climate change. In 2015, the International Energy Agency (IEA) estimated that energy efficiency can achieve 49 percent of the GHG emission reductions needed by 2030 to limit the global temperature increase to less than 2°C,² a goal established by the international community in December 2015 at the United Nations Climate Change Conference in Paris, France.

In July 2015, Canada’s premiers identified energy efficiency as a key priority of the Canadian Energy Strategy. In March 2016, the prime minister and premiers emphasized their joint commitment to energy efficiency in the *Vancouver Declaration on Clean Growth and Climate Change*, which strengthens the collaboration between governments to transition to a low-carbon economy, one with energy efficiency as a key pillar.

It is easy to see the tangible benefits offered by energy efficiency. From 1990 to 2014, energy efficiency in Canada improved by 25 percent overall. The benefits of this improvement can be measured three ways. First, the improvement allowed Canada to avoid 90.5 megatonnes (Mt) carbon dioxide equivalent of GHG emissions in 2014, the equivalent of approximately 17 percent of all of Canada’s energy-based GHG emissions in that year. Second, in monetary terms, energy efficiency improvements since 1990 saved Canadians \$38.5 billion on their energy bills in 2014, the equivalent of approximately 2.1 percent of Canada’s gross domestic product (GDP).³ Of this amount,

NRCan estimates these energy efficiency improvements help Canadian businesses reduce operating costs by lowering their energy bills by over \$15.6 billion in 2014.⁴

Energy efficiency improvements are also better positioning Canada to take advantage of a global energy efficiency market. The IEA estimated the value of the energy efficiency market at over \$300 billion in 2014, and it is expected to grow to \$550 billion by 2035.⁵ Energy efficiency measures can support the commercialization of new technologies and practices, offering Canada the opportunity to expand its share of the global clean technology market over both the short and long term. Key jurisdictions are setting ambitious targets to reap the benefits of energy efficiency. In 2014, the European Union agreed to an energy efficiency target of at least 27 percent compared with a business-as-usual scenario by 2030.⁶ In 2015, the United States (US) Department of Energy committed to doubling the country’s energy productivity from 2010 levels by 2030.⁷

Fiscal year 2015–2016 marked a transition period with regard to the Government of Canada’s activities in the area of energy efficiency. It represents the final year of the five-year energy efficiency program suite introduced in 2011, which improved energy efficiency in the areas of consumer and commercial products, homes, commercial and institutional buildings, industry, and vehicles across Canada. The result is a \$1 billion reduction in Canadian energy bills by the end of March 2016, representing 4 Mt of GHG emission reductions in 2016, equivalent to the emissions generated by approximately 1 million passenger vehicles in a single year. It also leaves a legacy of ongoing energy savings that future programming can build upon.

Moving forward, Budget 2016 allocated \$121.6 million over five years for the Office of Energy Efficiency to deliver energy efficiency and alternative transportation fuels programs. The programs are an integral component of Canada’s climate change, clean growth and innovation strategies. They will contribute directly toward the de-carbonization of the Canadian economy by building and expanding on the energy efficiency actions detailed in this report.

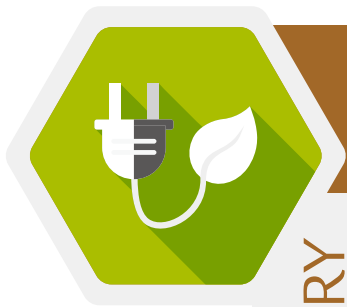
This report highlights the important progress made across all sectors of the Canadian economy in the efficient use of energy. Notable accomplishments over the 2011 to 2016 period include:

- Canada's ENERGY STAR for Products program updated 45 specifications and introduced a further 9 specifications, bringing the total product types available for certification to 70 and delivering energy savings of 16.7 petajoules (PJ).
- NRCan issued 670,000 labels using home rating products such as the EnerGuide Rating System, ENERGY STAR for New Homes, and R-2000. Excluding the impact of federal retrofit grants that ended in 2012, these rating products contributed an estimated 5.4 PJ in energy savings and GHG emission reductions of 0.5 Mt.
- Dollars to \$ense energy management workshops were delivered in Canada to more than 10,300 participants – 7,600 representing commercial and institutional facilities and 2,700 representing industrial facilities. The workshops are estimated to have resulted in a reduction of 3.32 PJ of energy use annually.

- The Canadian Industry Program for Energy Conservation helped companies in over 20 industrial sectors cut costs and increase profits, resulting in energy use reductions of 8.2 PJ and GHG emission reductions of 0.1 Mt.
- Over 5.9 million new vehicles sold in Canada displayed the EnerGuide label, helping consumers to make fuel-efficient decisions.

These and many similarly positive results are strengthening our economy and helping our environment. Working with stakeholders at all levels, both domestically and internationally, the Government of Canada continues to strengthen and expand its own policies and programs in support of energy efficiency. Current efforts have resulted in important energy, financial and GHG emissions savings. Canada will continue to build on past accomplishments to maximize the many economic and environmental benefits offered by energy efficiency.





CHAPTER 1

Why Energy Efficiency Matters

SUMMARY

- Energy efficiency is key to the government meeting its domestic and international commitment to reduce GHG emissions by 30 percent below 2005 levels by 2030.
- Energy efficiency simultaneously saves consumers and businesses money, creates jobs, stimulates economic growth, enhances productivity and competitiveness, and improves environmental performance.
- According to the IEA, globally, US\$8.3 trillion will need to be invested in energy efficiency measures between 2015 and 2030 to meet climate pledges. This offers significant opportunity for growth and innovation, for financial savings, and to combat climate change.
- As a result of energy efficiency improvements since 1990, Canadians saved \$38.5 billion on their energy bills in 2014, the equivalent of approximately 2.1 percent of Canada's GDP.

Did you know?

One **petajoule** (PJ) is a standard unit of energy, equivalent to the energy used by more than **9,000 households in one year** (excluding transportation).

As Canada and other countries strive to meet domestic and international GHG reduction commitments, the benefits of energy efficiency are clear.

Energy efficiency programs and investments generate important environmental and economic benefits. By facilitating a reduction in the energy requirements of energy-using equipment, homes, buildings and vehicles, these programs and investments reduce GHG emissions. They also lead to economic growth and stimulate innovation and competitiveness. By reducing energy needs overall, Canadians save money on their energy bills.

Nevertheless, there are significant challenges. To achieve Canada's economic and environmental objectives in light of growing energy demands, energy efficiency policies, practices and behaviours will need to be embedded into Canadian society as part of a fundamental shift toward a more environmentally conscious mindset.

Canadians remain among the highest per capita users of energy in the world. Despite Canada's northern climate, vast territory, industrial base and high standard of living, energy efficiency improved overall energy use by 25 percent between 1990 and 2014. As demonstrated in Figure 1, energy efficiency improvements reduced GHG emissions by 90.5 Mt between 1990 and 2014, saving 1669.3 PJ of energy.⁸ The result is economy-wide savings of \$38.5 billion in 2014 as a result of energy efficiency improvements made since 1990.

Figure 1. Secondary energy use, with and without energy efficiency improvements, 1990–2014

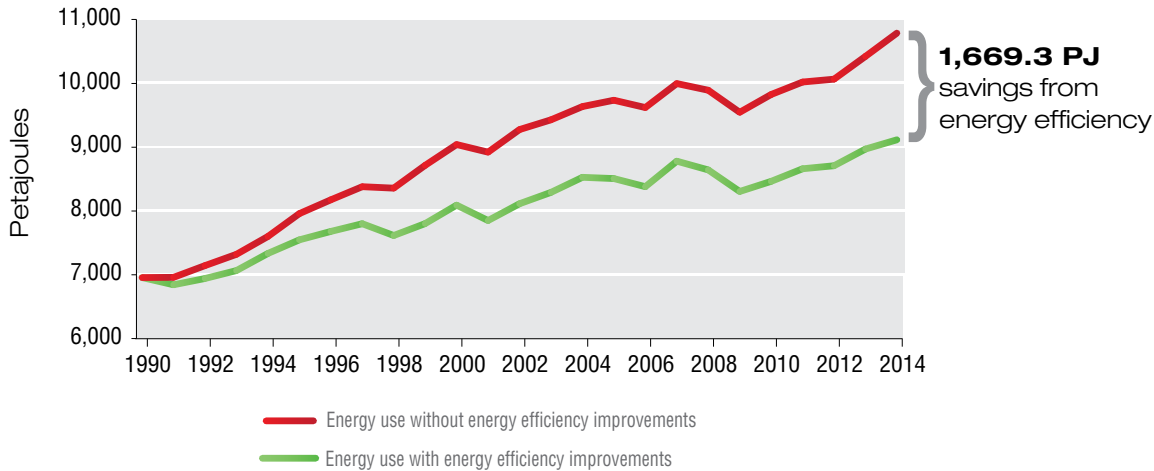


Figure 1 illustrates that energy use would have been 1,669.3 PJ higher in 2014 if not for the energy efficiency improvements made since 1990.

DATA COLLECTION AND ANALYSIS

In 1991, NRCan launched the National Energy Use Database. The database provides unique, reliable, Canada-wide information on energy consumption across all sectors over the long term. Data are available to the public, free of charge, on-line at www.oeo.nrcan.gc.ca/corporate/statistics/neud/dpa/home.cfm.

CLIMATE CHANGE

Climate change represents one of the most significant challenges facing the country today. As a result, the Government of Canada has placed climate action as one of its highest priorities.

As part of the climate change negotiations of the twenty-first Conference of the Parties (COP21), hosted in Paris, France, in December 2015, the prime minister pledged that Canada would do more in the fight against climate change. This commitment included a pledge to work collaboratively within the Canadian federation with those in leadership roles and to use the challenge as an opportunity to build a sustainable, low-carbon economy that fosters growth.

The March 2016 *Vancouver Declaration on Clean Growth and Climate Change* saw the federal government, in partnership with the provinces and territories, pledge to reduce national GHG emissions by 30 percent below 2005 levels by 2030 and to transition toward a low-carbon and clean growth economy. Recognizing the importance of energy efficiency,

first ministers agreed to cooperate on a number of mitigation measures, including energy efficiency.

Energy efficiency reduces energy use, which in turn lowers GHG emissions that contribute to climate change. The impact of energy efficiency can have such a positive effect in reducing energy use that it is increasingly seen as the “first fuel” by the IEA and other experts in the field. In fact, the IEA estimates efficiency can provide 49 percent of the GHG emission reductions needed by 2030 to help countries meet their COP21 objectives.

The energy used by consumers across all sectors of the economy, defined as secondary energy use, generates 69 percent of all GHG emissions.⁹ Past policies and programs have improved energy efficiency in the economy, and new policies and programs will result in even more efficient use of energy, contributing to a cleaner economy.

The energy and transportation sectors are Canada’s largest sources of emissions. Renewed collaborative efforts between the federal, provincial and territorial

governments are underway to improve efficient practices in these two areas. With 195 national governments agreeing to the objective of limiting the rise in average global temperature to less than 2°C to mitigate the effects of climate change, energy efficiency efforts are needed more than ever.

ECONOMIC GROWTH

As outlined in the IEA's 2014 report, *Capturing the Multiple Benefits of Energy Efficiency*, energy efficiency saves consumers and businesses money, creates jobs, stimulates economic growth, enhances productivity and competitiveness, and improves environmental performance.¹⁰ Energy efficiency improvements support economic growth, while encouraging the growth of the clean jobs that are increasingly in demand. According to the IEA, globally, US\$8.3 trillion must be invested in energy efficiency measures between 2015 and 2030 to meet climate pledges.¹¹

With a global market for energy efficiency products estimated at over US\$300 billion in 2012 and continuing to grow, there are significant opportunities for Canadian

industry to export products and expertise to new markets.¹²

Canada's per capita energy use is among the highest in the world. Energy efficiency represents an opportunity to reduce the costs associated with energy use while maintaining the level of energy services Canadians expect. Energy efficiency improvements help Canadians save on their home energy bills, increasing their disposable income and stimulating economic growth. One source of energy efficiency improvements stems from the cycles of continuous improvement motivated by ENERGY STAR, a driving force behind technological innovations that led to more efficient products being available on the Canadian market.

For instance, in 2010, only 18 percent of the dishwashers sold in Canada would have qualified for ENERGY STAR version 5.0, which was published in April 2011 and came into effect in January 2012. By 2013, 93 percent of the market either met or surpassed these new ENERGY STAR efficiency levels.¹³ The greater availability of high-efficiency products such as these makes it easier for Canadians to access the products that save them money on their energy bills.

Did you know?

While total energy used by final consumers in Canada increased 31 percent between 1990 and 2014, **it would have increased 55 percent** without energy efficiency improvements.

Figure 2. Residential Dishwashers Shipments meeting 2012 ENERGY STAR v5.0

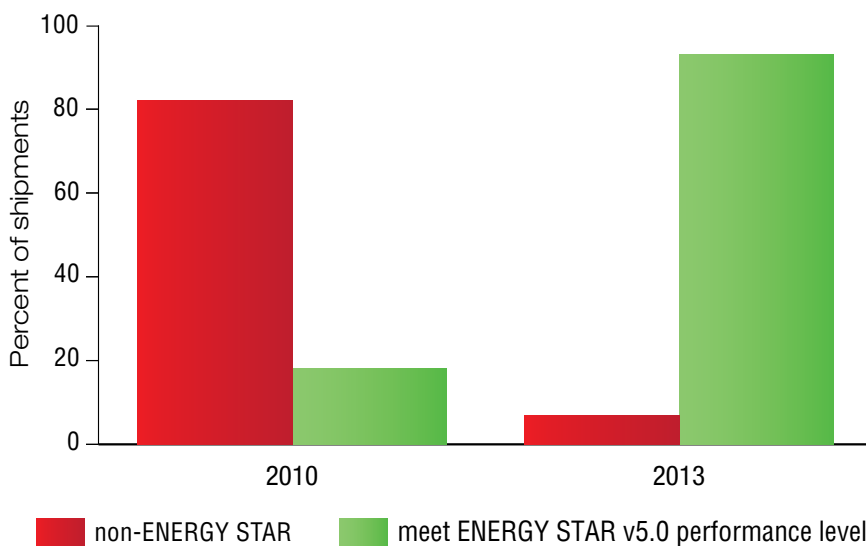


Figure 2 shows how the introduction of ENERGY STAR v5.0 in 2012 dramatically increased the number of shipments in the dishwasher market that surpassed the ENERGY STAR efficiency level.

LEADING BY EXAMPLE IN FEDERAL OPERATIONS

The **Federal Buildings Initiative** provides knowledge, training and expertise that support energy efficiency retrofit projects in buildings owned by federal government organizations. Since its inception in 1991, over 80 retrofit projects have been carried out, attracting \$364 million in private sector investments and generating more than \$47 million in annual energy cost savings. These projects have demonstrated on average 15 to 20 percent energy savings.

INNOVATION AND COMPETITIVENESS

Canadian industry and businesses can reduce their operating costs through energy efficiency improvements, which enhance their productivity and ability to compete domestically and globally. In addition to energy cost savings, energy efficiency investments can increase product quality, improve the work environment, and reduce the cost of maintenance and environmental compliance – all of which contribute to improved productivity and value creation.

Energy efficiency also drives technological innovation, while also increasing affordability and market adoption of clean technology. For example, the 2011 *National Energy Code of Canada for Buildings*, which is among the most stringent in North America, imposes lower heat loss targets for building envelope components such as windows.

These targets challenge designers and contractors to develop new innovations for the market that will make it easier for building owners to meet lower effective heat loss targets and to enhance the energy efficiency of buildings built to the standard.





CHAPTER 2

Delivery of Federal Energy Efficiency Programming

SUMMARY

- NRCan's five-year energy efficiency and alternative fuels program suite was designed to improve the energy efficiency of consumer and commercial products, residential, commercial and institutional buildings, industry, and vehicles across Canada.
- Initiatives delivered through the program suite that ended March 31, 2016, have resulted in \$1 billion in energy bill savings for Canadians. NRCan is currently building on these and other accomplishments to further the long-term energy efficiency efforts vital to support the transition to a clean economy.
- NRCan has consistently developed and leveraged strong working relationships with key international organizations and works bilaterally with the U.S. to align energy efficiency and alternative fuel standards. These efforts have strengthened the department's ability to work collaboratively with other governments, which is essential because energy efficiency is an area of shared jurisdiction.

NRCAN'S OFFICE OF ENERGY EFFICIENCY

Established in 1998, the Office of Energy Efficiency has a mandate to strengthen and expand Canada's commitment to energy efficiency and alternative fuels. The Office of Energy Efficiency uses regulations, standards, certification and information to help meet the Government of Canada's policy goals, such as delivering energy cost savings, helping to achieve Canada's climate change targets, and supporting clean innovation and green infrastructure objectives.

The Government of Canada has a unique role in promoting energy efficiency. By working with provinces and territories, as well as with other stakeholders across the economy including those in the private sector, the government catalyzes action and provides tools that partners and energy users can use, rely upon and trust.

The government's energy efficiency initiatives are delivered through NRCan's Office of Energy Efficiency.

The 2015–2016 year marked a transition period for the Office of Energy Efficiency as the five-year energy efficiency and alternative fuels program suite introduced in 2011 drew to a close. The programs delivered results by improving energy efficiency in the areas of consumer and commercial products, homes, commercial

and institutional buildings, industry, and vehicles across Canada. The result is a \$1 billion reduction in Canadian energy bills by the end of the program suite in March 2016, with a legacy of ongoing savings.

Moving forward, Budget 2016 has allocated \$121.6 million over five years in renewed funding for the Office of Energy Efficiency to deliver energy efficiency and alternative transportation fuels programs. The programs are an integral component of Canada's climate change, clean growth and innovation strategies. They will contribute directly toward the de-carbonization of the Canadian economy by building on and expanding on past energy efficiency actions.

SELECT ACHIEVEMENTS, 2011–2016

Consumer and Commercial Products

- Established an agreement with the U.S. Department of Energy under the Canada-U.S. Regulatory Cooperation Council to work together toward the goal of aligned and regulated standards for energy efficiency products; and
- Introduced the ENERGY STAR Most Efficient product designation for the “best of the best,” in collaboration with the U.S.

Residential Buildings

- Worked with National Research Council Canada to add the first-ever energy efficiency requirements for housing in the *National Building Code of Canada*; and
- Supported home energy efficiency programs and regulations from provincial, territorial, municipal, utility and industry sources across Canada with the EnerGuide Rating System, ENERGY STAR for new Homes and R-2000.

Commercial and Institutional Buildings

- Published the 2015 *National Energy Code of Canada for Buildings* and completed the technical analysis for an update to the code;
- The 2011 *National Energy Code of Canada for Buildings* is currently in force in five provinces (British Columbia, Alberta, Manitoba, Ontario, Nova Scotia) and two cities (Vancouver, Whitehorse), representing approximately 70 percent of new commercial floor space in Canada; and
- Adopted the U.S. ENERGY STAR building energy benchmarking tool, and almost 20 percent of commercial floor space is now registered.

Industry

- Canada was the first country to adopt ISO 50001 as its national energy management standard to improve industrial competitiveness. Facilities that implement the standard decrease their energy use by up to 20 percent in four years.

Vehicles and Alternative Fuels

- Introduced the SmartWay® Transport Partnership, giving Canadian fleets access to energy savings and contracts with companies that seek fuel-efficient freight services;
- Developed three natural gas vehicle and infrastructure codes and the first two Canada-U.S. standards;
- Introduced a new EnerGuide Label for Vehicles that saves consumers over \$18 million in fuel costs each year;
- Revised and updated codes and standards for compressed natural gas fueling stations, natural gas vehicles, and liquid natural gas fueling stations; and
- Developed two new binational performance-based technical standards.

The programs improve energy efficiency in all sectors, reduce GHG emissions, save Canadian consumers and businesses money on their energy bills, and foster the deployment of clean technology. Specifically, the programs will:

- Increase the energy efficiency of consumer and commercial products through regulations and product standards;
- Enhance the performance of the commercial, institutional and residential building sectors;
- Enhance energy productivity and competitiveness in the industry sector; and
- Support low carbon options for the on-road transportation sector.

While Canadian consumers and businesses are interested in reducing their energy use, they can experience barriers such as a lack of awareness and capacity challenges. To address these barriers, NRCan employs several policy instruments, including standards and codes, voluntary certification, benchmarking systems, and information tools. Close collaboration with domestic and international partners further increases the effectiveness of these measures.

REGULATIONS, STANDARDS AND CODES

The *Energy Efficiency Act* provides for the making and enforcement of regulations that establish energy efficiency standards for a wide range of energy-using products. The objective is to eliminate the least efficient products from the Canadian market. They apply to products imported into Canada or shipped from one province to another for the purpose of sale or lease.

The *Energy Efficiency Regulations* are administered by NRCan and are amended on a regular basis to strengthen existing standards and to introduce standards for new energy-using products. Requirements in the *Energy Efficiency Regulations* are typically aligned with those in the U.S.

to minimize the regulatory burden on businesses and to provide Canadian consumers the same energy savings as those in the U.S. NRCan also works with provinces and territories to maximize harmonization across the country.

NRCan works with the [National Research Council Canada](#) and the Canadian Commission on Building and Fire Codes to establish energy efficiency requirements within Canada's model energy code for buildings and to update the *National Building Code of Canada*.

NRCan also works to harmonize standards and codes for the use and deployment of alternative fuels with standards in the U.S. and encourages industry to adopt the changes into regulations. This cross-border harmonization assists Canadian companies that operate in both countries by reducing administrative burden and simplifying training by standardizing methods of operation in both jurisdictions.

VOLUNTARY CERTIFICATION, BENCHMARKING AND INFORMATION TOOLS

Energy benchmarking acts as a powerful trigger for energy use improvement by recognizing the highest performers and helping to drive the market for innovative energy efficiency products and services. NRCan supports several voluntary tools targeting all sectors of the economy.

Certification and benchmarking systems include the ISO 50001 Energy Management System standard for industry, the ENERGY STAR Portfolio Manager® energy benchmarking tool for commercial and institutional buildings, the ENERGY STAR for New Homes Standard for residential buildings, and the SmartWay Transport Partnership for commercial fleets. In addition, labels, energy monitoring and rating tools, training and workshops, information guides, networks, and online data all help consumers and industry build awareness and capacity to identify reliable energy-saving opportunities.

MINIMUM ENERGY PERFORMANCE STANDARDS

Minimum energy performance standards are a key component of energy efficiency policies in **almost 50 countries**, representing over **75 percent of the world's population**, and are considered one of the most cost-effective approaches to reducing energy consumption in countries around the world, including Canada.

CANADIAN GOVERNMENTS WORKING TOGETHER

The primary vehicle for federal-provincial-territorial engagement on energy efficiency is the Steering Committee on Energy Efficiency, which reports annually to the [Energy and Mines Ministers' Conference](#).

By facilitating multijurisdictional discussions of shared challenges and priorities, the steering committee seeks to establish a coordinated and complementary agenda for energy efficiency in Canada. It works toward significantly increasing the contribution of energy efficiency within each jurisdiction as part of a long-term, coordinated approach to accelerating both energy efficiency and demand-side management in Canada.

The ENERGY STAR program is a key success story in the area of energy efficiency. It is a voluntary labelling information tool that helps Canadian consumers identify and purchase the best performing products with respect to energy use. In Canada, NRCan administers and promotes the program, which is credited as the driving force behind the adoption of technological innovations in energy efficiency such as power management systems for office equipment and low standby energy use.¹⁴

PARTNERSHIPS

Domestic Partnerships

Recognizing the significant challenges presented by climate change, national, provincial-territorial and municipal governments are working together, as well as engaging stakeholders, to find innovative solutions that benefit all Canadians now and in the future.

Collaboration with provinces and territories is very important when pursuing energy efficiency in Canada as an area of shared jurisdiction. Provinces and territories rely on the federal government to support nationally and internationally aligned measures, which help to avoid a costly patchwork of policy instruments across the country. A 2015 study indicated that, in 2012, two-thirds of provincial and territorial spending on energy efficiency incentive programs leveraged federal standards and certifications.¹⁵

At the same time, NRCan closely collaborates with a range of stakeholders to deliver its programs, which helps to extend their reach and impact. In addition to the provinces and territories, key stakeholders include municipal governments, energy utilities, standards development and certification

organizations, industry associations, energy efficiency product and service providers, Indigenous peoples, academic and non-profit organizations, and other federal departments and agencies.

Bilateral and Trilateral Partnerships

NRCan engages both bilaterally and trilaterally to advance energy efficiency initiatives. This is especially the case within the context of North American energy cooperation.

Bilaterally, NRCan works with the U.S. to align standards for energy efficiency and alternative fuel use in transportation. Under the [Regulatory Cooperation Council](#), NRCan and the U.S. Department of Energy established the goal of working toward aligning new and updated energy efficiency product standards, test methods for energy-using equipment, and codes and standards for the use of alternative fuels in transportation, where it is practical to do so.

Trilaterally, NRCan works with the U.S. and Mexico in several areas. One example of this collaboration is the adoption of green freight through the SmartWay Transport Partnership. Another example is joint efforts furthering the adoption of energy management systems as a part of the Clean Energy Ministerial, a global forum to promote policies and share best practices to accelerate the global transition to clean energy. There are also efforts underway on the development of codes and standards for electric vehicles.

In addition, the federal government administers the ENERGY STAR program under agreement with the U.S. Environmental Protection Agency, one way that NRCan's strong working relationship supports joint program development and policy administration.

WORKING WITH PROVINCES AND TERRITORIES ON THE CANADIAN ENERGY STRATEGY

In July 2015, Canada's provincial and territorial premiers released a Canadian Energy Strategy through the Council of the Federation, signaling their commitment to a common framework for shaping Canada's energy future. The Government of Canada has made a strong commitment to work with provinces and territories to advance the strategy.

Through the March 2016 Vancouver Declaration, first ministers tasked federal, provincial and territorial energy ministers to collaborate on specific actions under the Canadian Energy Strategy that would support the pan-Canadian framework. To that end, energy ministers are collaborating to drive progress in the following areas:

- **Energy efficiency** – aligning standards and updating building codes and energy management systems standards;
- **Energy infrastructure** (e.g. electricity) – exploring new and enhanced electricity interconnections, smart electricity grids, natural gas infrastructure, and regulatory review processes;
- **Energy technology and innovation** – increasing energy research, development and demonstration cooperation and investment and reducing reliance on diesel in remote communities; and
- **International energy collaboration** – deepening collaboration on international energy priorities.

Multilateral Partnerships

The department has developed and leveraged strong working relationships with a number of key international bodies. These organizations compile comparable and rigorous data on energy efficiency and alternative fuels, assemble experts to share lessons learned, develop guidance on best practices, and prepare analytical reports. Their work is predicated on principles of partnership and engagement.

For example, NRCan is actively participating in the [Clean Energy Ministerial Energy Management Working Group](#), focused on energy management systems for industry (e.g. ISO 50001) and the [Super-efficient Equipment and Appliance Deployment](#) initiative that seeks to accelerate market transformation of high-efficiency equipment and appliances through the use of standards and labels.

The successful implementation of commitments made at COP21 negotiations in Paris, France, in December 2015, will require strong multilateral partnerships to achieve the objective to limit the rise of global temperatures to less than 2°C.

The Prime Minister has indicated his desire to work with other countries and to make Canada a climate leader. NRCan is well placed to contribute positively to the promotion of energy efficiency as an effective instrument to reduce GHG emissions. Canada engages with other countries to share best practices, collect and report on data and scientific observations, and track progress to ensure the international community is taking effective measures to mitigate climate change. In these ways, Canada is taking concrete action to address its international obligations.

COLLABORATIVE EFFORTS TOWARD ENERGY EFFICIENCY

NRCan is a member of the [Consortium for Energy Efficiency, Inc.](#), a binational consortium of gas and electric efficiency program administrators (primarily utilities). NRCan's membership enables Canada to learn from and inform the policy direction of Canadian and U.S. decision makers and actors, to accelerate the deployment and availability of highly efficient products.

INTERNATIONAL COOPERATION

NRCan works with international partners in several organizations, including the following:

- International Energy Agency
- International Partnership for Energy Efficiency Co-operation
- Clean Energy Ministerial
- Major Economies Forum on Energy and Climate
- Renewable Energy and Energy Efficiency Partnership
- Asia-Pacific Economic Cooperation Energy Working Group
- Energy and Climate Partnership of the Americas

LOOKING FORWARD

The Government of Canada takes the challenge of climate change seriously. By engaging with domestic and international stakeholders, the government is deeply committed to taking action.

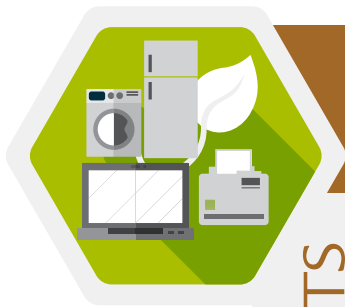
Energy efficiency remains a key, cost-effective way of mitigating the effects of climate change, and efforts to improve energy efficiency will play an important role in the government's plans.

Demonstrating its continued support for energy-efficient measures, the government

announced new initiatives as part of Budget 2016 that will build on past accomplishments and find innovative ways to ensure that the environmental and economic benefits of energy efficiency are fully realized.

These initiatives represent the next step in a long-term transition to a low-carbon economy and a new way of living. The transition offers opportunities for growth, technological advancement, domestic and international collaboration, and a way to manage our energy resources for the benefit of future generations.



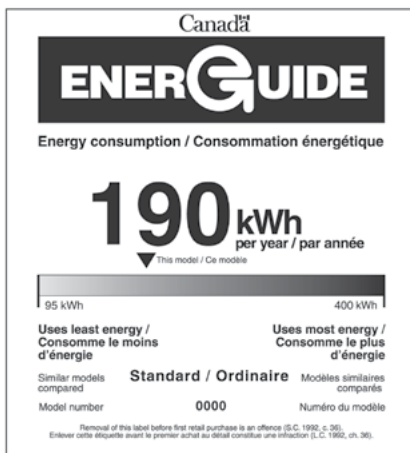


CHAPTER 3

Consumer and Commercial Products

HIGHLIGHTS

- ENERGY STAR is the most recognized symbol for high-efficiency products, and 88 percent of Canadians consider it one of the most useful tools to make better energy decisions.
- Through the Canada-U.S. Regulatory Cooperation Council Joint Forward Plan released in August 2014, both countries established the goal of aligning new and updated energy efficiency standards and test methods for energy-using equipment.
- In 2015–2016, the ENERGY STAR products program generated approximately 4.0 PJ of energy savings through the promotion of ENERGY STAR certified appliances, electronics, lighting and equipment.



Consumer and commercial products that consume energy are used in residential homes, commercial buildings and in the industrial sector. These products range from small electronics to appliances to motors used in production processes. Products covered by NRCan's *Energy Efficiency Regulations* and labelling programs are found in all houses, businesses and industries. Households spend \$28.8 billion per year in energy bills, while the commercial and institutional sector spends an estimated \$20 billion per year on energy.¹⁶

It is estimated that regulated products use 74 percent of the energy consumed in the residential sector, 30 percent of the energy in the commercial sector and 8 percent of the energy in the industrial sector. Regulations cover more than 40 different product categories, while ENERGY STAR covers 70 types of residential and commercial products. The EnerGuide label provides energy consumption information for 12 energy-using products.

DESCRIPTION OF PROGRAM ACTIVITIES AND RESULTS

NRCan programs improve the efficiency of energy-using products through initiatives supporting manufacturers, retailers and consumers.

Regulated minimum energy performance standards have been established to reduce energy consumption across more than 40 product categories. These standards have contributed to Canadian household annual energy savings of approximately \$886 per household in 2014 (compared to 1990).¹⁷

The Canada-U.S. Regulatory Cooperation Council *Joint Forward Plan* was released in August 2014. In it, NRCan and the U.S. Department of Energy established the goal of aligning new and updated energy efficiency standards and test methods for energy-using equipment. This will be accomplished through enhanced information sharing and cooperative development and implementation, to the extent practicable and permitted by law. A regulatory partnership statement published in May 2015 formalized the relationship between both departments. The 2015–2016 joint work plan published at the same time outlined information-sharing activities and joint projects to support future regulations.

On March 31, 2016, NRCan published its 2016–2018 Forward Regulatory Plan for the *Energy Efficiency Regulations*. The plan indicated that three amendments to the energy efficiency regulations, covering

Figure 3. Average energy consumption of new appliances (kilowatt hour/year), 1990 and 2014 models

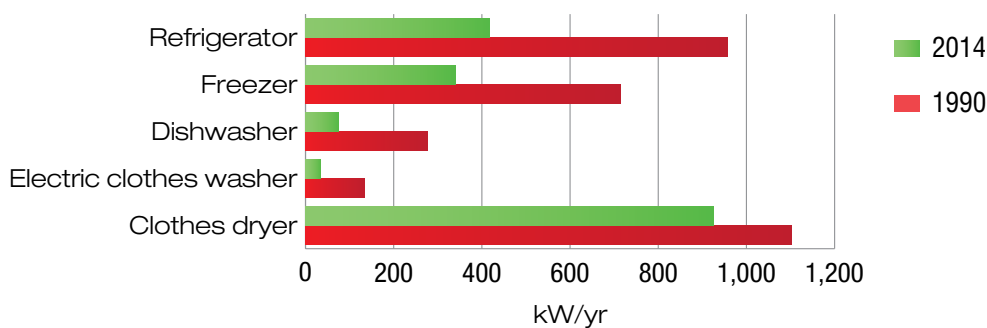


Figure 3 shows the decrease in energy consumption among major appliances in Canada between 1990 and 2014.

Source: National Energy Use Database, 2014.



approximately 50 product categories, would be republished by 2018.

Canada's EnerGuide program for energy-using products is a rating and labelling system that allows consumers to find the most efficient products in their class. It provides verified data about a product's energy performance. The *EnerGuide Label* is mandatory for all major household appliances and room air-conditioners. A voluntary EnerGuide labelling program is available for manufacturers of gas furnaces, central air conditioners and heat pumps, oil furnaces, gas fireplaces and domestic water heaters. EnerGuide helps consumers make better purchasing decisions.

NRCan administers the *ENERGY STAR program* in Canada under a letter of agreement with the U.S. Environmental Protection Agency. The program assures consumers that they are buying a product model that will use less energy without compromising other aspects of performance.

An ENERGY STAR certified product is typically in the top 15 to 30 percent of its class for energy performance. Over 1,000 ENERGY STAR manufacturer, retailer and utility participants promote 70 types

of products, ranging from consumer electronics to commercial equipment.

The ENERGY STAR program consistently updates product specifications to ensure that they are keeping up with technology and marketplace evolutions. During the 2015–2016 fiscal year, ENERGY STAR certified dryers were added as a new product category, while 15 other product specifications were updated. During the 2015–2016 reporting period, the ENERGY STAR products program generated approximately 4.0 PJ of energy savings through the promotion of ENERGY STAR certified appliances, electronics, lighting and equipment.

Efficiency initiatives in every province and territory across Canada use ENERGY STAR as a foundational component of demand-side management programs, including consumer rebates and incentives, worth approximately \$825 million in 2014.¹⁸ Canadian utilities are among the strongest and most active supporters of NRCan's ENERGY STAR program, describing its role as a cornerstone for their own consumer-facing programs. Six of these entities received ENERGY STAR Canada Participant of the Year awards for their promotional efforts in 2015.



CHAPTER 4 Residential Buildings

HIGHLIGHTS

- Over 56,000 EnerGuide pre- and post-evaluations for existing homes were conducted in 2015–2016.
- Close to 15,000 new homes were issued EnerGuide, ENERGY STAR or R-2000 labels in 2015–2016.
- Over the 2011–2016 period, NRCan issued 670,000 labels using home rating products such as the EnerGuide Rating System, ENERGY STAR for New Homes, and R-2000. Excluding the impact of federal retrofit grants that ended in 2012, these rating products contribute an estimated 5.4 PJ in energy savings and GHG reductions of 0.5 Mt.

Did you know?

More than
800,000 retrofits
have resulted from
EnerGuide home
evaluations.

The Canadian residential sector is comprised of homeowners and rental property owners (condominiums and apartments) who purchase services and materials from builders, renovators, designers and manufacturers. There are almost 14 million households in Canada, spending \$28.8 billion on home energy use.¹⁹

The residential sector accounted for 17 percent of Canada's domestic energy use and 14 percent of GHG emissions. While energy use in the sector increased 9.5 percent between 1990 and 2014, it would have increased an additional 47 percent without energy efficiency efforts.²⁰

Figure 4. Residential energy use, 2014

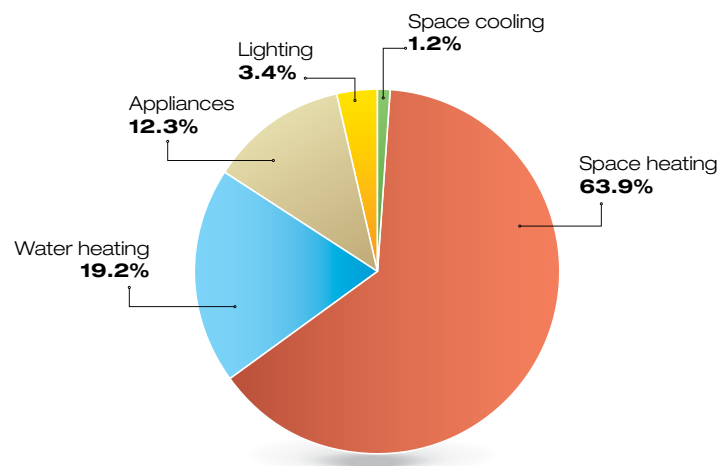


Figure 4 shows the breakdown of Canada's residential energy use in 2014, with almost two thirds (63.9 percent) of all energy devoted to space heating because of our northern climate.

Source: National Energy Use Database, 2014.

Did you know?

More than 80,000 efficient new homes

have been built since the inception of the ENERGY STAR for New Homes and R-2000 initiatives.

The same size house today uses one-third less energy than it did in 1990. Energy efficiency in residential buildings improved 47 percent between 1990 and 2014, saving Canadians \$12.4 billion in energy costs and more than 671.6 PJ of energy. The sector saved 30.1 Mt of GHG emissions, and energy intensity improved by 33.8 percent between 1990 and 2014.²¹

DESCRIPTION OF PROGRAM ACTIVITIES AND RESULTS

NRCan programs encourage the retrofit and construction of energy-efficient, low-rise residential housing. In doing so, they support homeowners, homebuyers, builders and industry professionals.

The [EnerGuide Rating System](#) is a national rating tool that assesses the energy performance of homes. An EnerGuide home evaluation and rating can help homeowners make informed decisions about home retrofits that will increase energy efficiency and lower utility bills. Builders work with energy advisors to estimate the annual energy use of new homes and select potential energy efficiency upgrades.

As of March 2016, more than 50 provincial, territorial, municipal, utility and industry home labelling programs and regulations across Canada were supported by the EnerGuide Rating System infrastructure.

In 2015–2016, NRCan completed the development of a revised version of the EnerGuide Rating System, which provides homeowners with more detailed information about how their home uses energy and about potential energy savings.



ENERGY STAR for New Homes is a voluntary residential home labelling program that identifies new homes that are on average 20 percent more energy-efficient than typical new homes built to code. These homes present a practical choice for homeowners looking for a new home that is energy-efficient. The ENERGY STAR for New Homes standard also provides builders with flexibility so they can build these homes in a simple, cost-effective manner using common building practices.

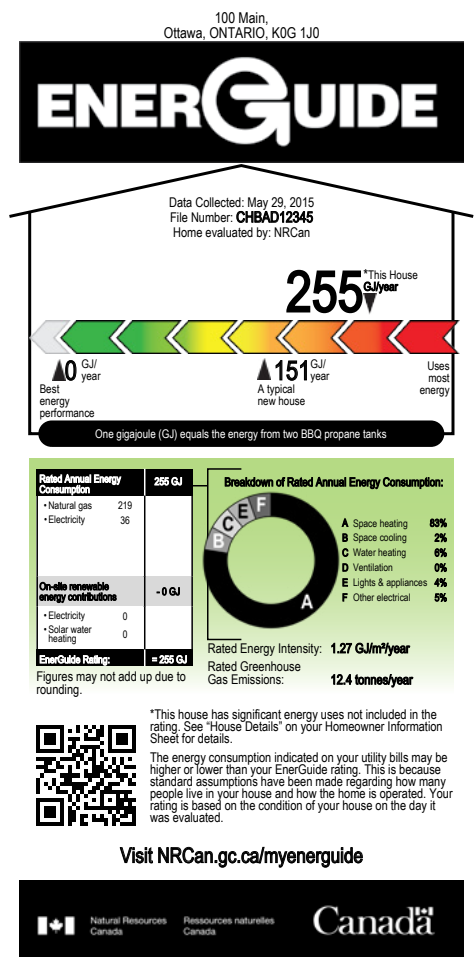
R-2000 is a voluntary best-in-class energy performance standard and has been the key to encouraging, recognizing and supporting innovation in energy efficiency for new residential housing. Every R-2000 home is constructed by a trained builder who is licensed by the Government of Canada. Each home is evaluated, inspected and tested by an independent third-party inspector and certified by the federal government. R-2000 homes are on average 50 percent more energy-efficient than typical new homes and include high levels of insulation, clean air features and measures to help protect the environment. This translates into energy savings, increased comfort, and a healthier environment for the homeowner.

Altogether, 670,000 home energy labels were issued using the EnerGuide Rating System, ENERGY STAR for New Homes and R-2000 during the 2011–2016 reporting cycle. Together, this resulted in an estimated 5.4 PJ in energy savings and GHG reductions of 0.5 Mt.²² In 2015–2016 specifically, over 56,000 EnerGuide pre- and post-evaluations for existing homes were conducted, and close to 15,000 new homes were issued an EnerGuide, ENERGY STAR or R-2000 label.

In an effort to move the market toward net zero energy homes, NRCan is involved in net zero energy home research, development and demonstration activities with industry. A net zero energy house produces at least as much energy with on-site renewable energy as it consumes on an annual basis.

For example, the R-2000 Net Zero Energy pilot was launched in Canada in 2013. Its goal is to recognize the builders and homes reaching net zero energy performance, to pilot the next generation of NRCan's R-2000 standard and EnerGuide Rating System in net zero energy applications, and to disseminate research on net zero energy homes. NRCan anticipates that six builders will achieve net zero energy performance under the pilot.

Through the demonstration project in the 2011–2016 program suite, \$1.9 million in contribution funds (47% of total project costs) were provided to Owens Corning Canada. The goal is to increase the market adoption of net zero energy homes by demonstrating the feasibility of net zero housing on a community scale. Five homebuilders in four provinces participated. They built 25 homes that are net zero energy or are net zero energy-ready. The latter is a high performance home that is so energy-efficient that its renewable energy system can offset all or most of its annual energy consumption. The participants used the tools and methods developed under the R-2000 Net Zero Energy Pilot, listed above, to measure net zero energy performance.





CHAPTER 5

Commercial and Institutional Buildings

HIGHLIGHTS

- The 2015 *National Energy Code of Canada for Buildings* was published and the technical analysis for an update to the code was completed.
- The *National Energy Code for Buildings 2011* is currently in force in five provinces (British Columbia, Alberta, Manitoba, Ontario, Nova Scotia) and two cities (Vancouver, Whitehorse), representing approximately 70 percent of new commercial floor space in Canada.
- Building managers are using the ENERGY STAR Portfolio Manager benchmarking tool to track more than 169 million square metres (m²) of floor space, more than six times more than the floor space originally targeted through the program.
- Over the duration of the program from 2011 to 2016, more than 7,600 participants representing commercial and institutional facilities attended **Dollars to Sense** workshops designed to lower the operating and production costs of facilities while reducing GHG emissions.

Commercial and institutional buildings are the workplace of 13.1 million Canadians across the country. There are approximately 500,000 commercial and institutional buildings in Canada.

These buildings occupied approximately 754.7 million m² of space in 2014 and accounted for \$20.0 billion in spending on commercial and institutional energy during the same year.²³

Figure 5. Commercial and institutional building energy use, 2014

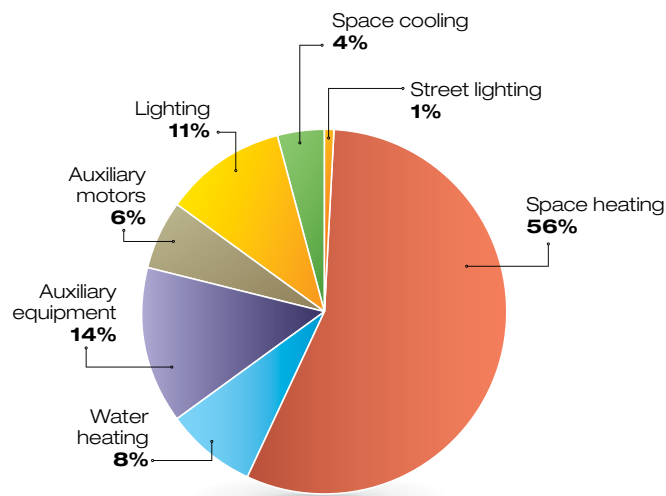


Figure 5 shows the breakdown of energy use in Canada's commercial and industrial buildings in 2014, with slightly more than half of all energy use devoted to space heating (56 percent).

Source: National Energy Use Database, 2014.

Commercial and institutional buildings accounted for 11 percent of final energy use and 9 percent of GHG emissions. While energy use in non-residential buildings increased 32 percent between 1990 and 2014, it would have increased an additional 29 percent without energy efficiency efforts.²⁴

Between 1990 and 2014, energy efficiency saved Canadians \$4.4 billion in building energy costs. Commercial and institutional buildings saved 10 Mt of GHG emissions, and energy intensity per square meter improved by 11 percent between 1990 and 2014.²⁵

DESCRIPTION OF PROGRAM ACTIVITIES AND RESULTS

In support of private- and public-sector building owners and managers, NRCan programs set energy performance standards for new commercial and institutional buildings and encourage retrofits and energy management practices in the existing stock. The *2011 National Energy Code of Canada for Buildings* provides model standards for new buildings and additions. The code established a 25 percent improvement in energy efficiency over the previous code and, with its higher standards, it builds on Canada's recent improvements in the area of energy-efficient building construction. The code was updated in 2015, and further energy enhancements will be included in the 2017 code interim update. Furthermore, the 2015 *National Energy Code of Canada for Buildings* has been published, and the technical analysis for an update to the code has been completed.

Five provinces, representing 70 percent of new building construction across Canada, have now adopted the code. The majority of the remaining provinces and territories are considering adoption.²⁶ By 2016, an estimated 24,000 buildings will have been built under the code in adopting provinces,

and the improved energy performance of buildings is expected to collectively save building owners over \$80 million in energy costs.

The U.S. Environmental Protection Agency's *ENERGY STAR Portfolio Manager* benchmarking tool was adapted to meet Canadian requirements and was officially launched in Canada in 2013. The free on-line tool provides building owners with an ongoing review of their building's energy consumption to track performance over time in comparison to other buildings and prompts them to make improvements where necessary. As of March 2016, almost 14,400 Canadian buildings, representing nearly 21 percent of commercial and institutional building floor space, were registered with the tool. This means that 169 million m² of floor space are tracked by the benchmarking tool, six times more than the floor space originally targeted through the program. The improved management resulting from the information provided by the tool has generated an estimated \$37 million per year in energy cost savings for building managers, owners and operators, starting in April 2016.

More than 7,600 participants representing commercial and institutional facilities attended customized *Dollars to \$ense* workshops through the duration of the program from 2011 to 2016. The workshops were meant to lower the operating and production costs of facilities while reducing GHG emissions. The one-day seminars are designed specifically for the building sector to provide the knowledge and skills needed to lower operating and production costs while improving business competitiveness and creating a better work environment.





CHAPTER 6 Industry

HIGHLIGHTS

- Since the adoption of the ISO 50001 Energy Management Systems standard in Canada in 2011, cost savings of up to \$2 million annually per facility have been achieved by Canadian industrial facilities.
- The Canadian Industry Program for Energy Conservation (CIPEC) supports a network of close to 2,400 facilities and more than 50 trade associations that work together to cut costs, improve energy efficiency and reduce industrial GHG emissions.
- Over the duration of the program from 2011 to 2016, approximately 2,700 industry participants attended customized Dollars to \$ense workshops, which help facilities lower their operating and production costs while lowering GHG emissions.

DOLLARS TO \$ENSE MANAGEMENT WORKSHOPS FOR INDUSTRIAL, COMMERCIAL AND INSTITUTIONAL ORGANIZATIONS

Since their inception in 1997, more than 30,000 representatives of organizations from across Canada have enrolled in NRCan's **Dollars to \$ense** management workshops to increase their knowledge of energy-efficient practices, such as energy monitoring. Over the course of the program from 2011 to 2016, more than 10,300 participants attended these workshops.

The Canadian industrial sector comprises mining, construction, forestry and manufacturing, including several subsectors such as chemicals and pulp and paper. The sector employs 3.5 million Canadians across the country and is responsible for 27 percent of the national GDP. In 2014, Canadian industry spent \$44.9 billion on energy use.²⁷

The industrial sector accounted for 40 percent of domestic energy use and 36 percent of GHG emissions. While energy use in the industrial sector increased 33 percent between 1990 and 2014, it would have increased 41 percent without energy efficiency efforts.²⁸

Energy efficiency in the industrial sector improved 8 percent between 1990 and 2014, enabling Canadian industry to avoid about \$2.6 billion in purchased energy in 2014 and more than 210 PJ of energy use. The sector avoided 10.6 Mt of GHG emissions, and energy intensity improved by 10 percent between 1990 and 2014.²⁹

DESCRIPTION OF PROGRAM ACTIVITIES AND RESULTS

NRCan programs are helping Canadian industries reduce their energy consumption by providing them with the strategies, tools and information to become more productive and competitive through energy efficiency improvements.

Canada was the first country to adopt the ISO 50001 Energy Management System standard as its national standard in 2011. Developed by 43 countries representing 60 percent of the world's energy use, and subsequently adopted by 20,000 organizations worldwide, ISO 50001 helps Canadian industry establish systems and processes to improve energy efficiency, use, consumption and intensity. The implementation of ISO 50001 can reduce GHG emissions, provides recognition for sustainable action, and helps to counter rising energy costs. Industrial facilities that adopt ISO 50001 can see their energy costs decrease by 10 percent on average within 18 months of certification. Since the adoption of ISO 50001 in 2011, significant energy and cost savings of up to \$2 million annually per facility have been achieved by Canadian industrial facilities.

Figure 6. Major industry grouping energy use, 2014

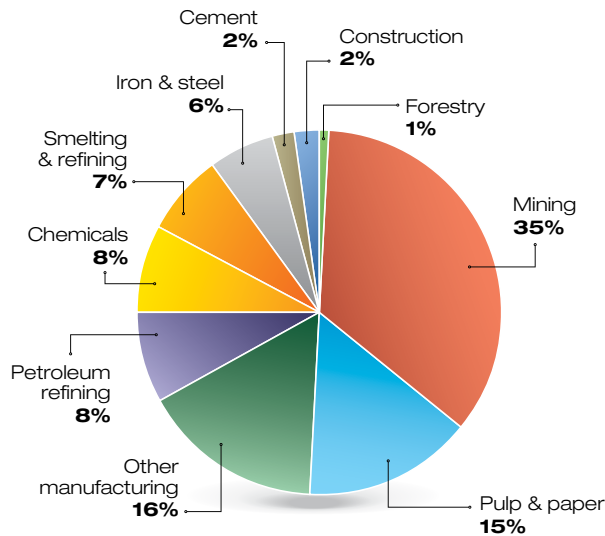


Figure 6 shows the breakdown of energy use in Canada by major industrial grouping sector in 2014.

Source: National Energy Use Database, 2014

Canada is an active member of the Energy Management Working Group, an initiative of the Clean Energy Ministerial that drives global dialogue on ISO 50001. Canada co-sponsored the ISO 50001 Lead Auditor Certification Program with the U.S. This certification establishes a standard, high level of knowledge and skills for ISO 50001 auditors globally to strengthen the effectiveness of ISO 50001 conformity assessments.

Canada, the U.S. and Mexico are committed to advancing ISO 50001 adoption in North America. The North American Energy Ministers signed a Memorandum of Understanding on Climate Change and Energy Collaboration in February 2016 that will expand the energy relationship between the three countries. This agreement will see Canada, Mexico and the U.S. collaborate and share information on key areas such as energy efficiency, where energy management is specifically mentioned as an area of cooperation.

In the spirit of this Memorandum of Understanding, NRCan, Mexico's *Comisión Nacional para el Uso Eficiente de la Energía* and the U.S. Department of Energy are partnering with private- and public-sector facilities in North America. This project is sponsored by the Commission for Environmental Cooperation to accelerate the adoption of ISO 50001 certifications in North America. Nineteen North American industrial facilities have joined the project and are proceeding to implement ISO 50001 energy management systems.

CIPEC offers a range of opportunities to help companies in over 20 industrial sectors lower energy costs and increase profits. For example, 10 cost-shared assistance agreements for ISO 50001 implementation pilots, special projects, and energy studies were delivered. CIPEC also provides technical information, the *Heads Up* CIPEC newsletter and networking opportunities to share energy efficiency information and best practices. This voluntary government-industry partnership

has been helping organizations improve energy efficiency since 1975 and has played a key role in stabilizing energy intensity in Canadian industry.

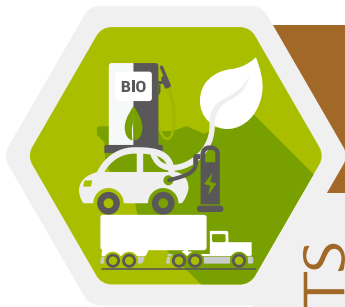
In 2015–2016, 195 industry sector participants attended Dollars to Sense workshops and more than 2,700 attended through the duration of the program from 2011 to 2016. The workshops were meant to lower the operating and production costs of facilities while reducing GHG emissions. Most of these workshops were customized for the industry sector to provide the knowledge and skills needed to lower operating and production costs while improving business competitiveness and creating a better work environment.

Investments in Forest Industry Transformation program

With \$190.4 million available from 2010 to 2018, the Investments in Forest Industry Transformation (IFIT) program accelerates the commercialization of highly innovative, first-in-kind technologies at Canadian forest industry facilities. Some projects funded under the program include energy efficiency or alternative fuel components. Since the program's inception, IFIT's three calls for proposals funded 25 projects across Canada, with 80 percent of the projects creating new products or diversifying proponents' product offerings.

Once completed, IFIT's 30 signed projects are expected to generate 215 direct innovation-related jobs and secure approximately 4,300 jobs in the forest sector. In addition, the projects will increase Canada's green electricity by 40 megawatt-hours per year and decrease GHG emissions by more than 135 kilotonnes per year.





CHAPTER 7

Vehicles and Alternative Fuels

HIGHLIGHTS

- Over 1.2 million vehicles sold annually in Canada display the EnerGuide Label, which informs purchasers of energy consumption rates.
- Over 180,000 new drivers per year learned energy-saving driving and vehicle-maintenance techniques using NRCan's fuel efficiency training curricula.
- Nearly 2,200 commercial truck drivers received driver training associated with the re-developed SmartDriver for Highway Trucking (SDHT) curriculum on fuel efficiency.
- Fleets accounting for approximately 26 percent of for-hire freight trucking activity in Canada register annually with the SmartWay Transport Partnership. These fleets are saving over \$180 million in annual fuel costs – more than initially expected.

Canada's on-road fleet comprises passenger and freight vehicles. In 2014, passenger light-duty vehicles travelled 14,831 kilometres (km) per year on average per vehicle for a total of 517.8 billion passenger kilometres. In 2014, there were 4.8 million freight trucks, including 455,000 classified as heavy trucks. On average, heavy trucks travelled 91,279 km.³⁰

Overall, the sector accounted for 29 percent of Canada's energy use and 37 percent of GHG emissions.³¹ While energy use in the sector increased 43 percent between 1990 and 2014, it would have increased an additional 30.6 percent without energy efficiency efforts.³²

Energy efficiency in the transportation sector improved 32 percent between 1990 and 2014, saving Canadians \$19.2 billion in energy costs and more than 574 PJ of energy over this period. The sector also avoided 39.7 Mt of GHG emissions over this period.³³

As a result of better vehicle fuel performance, energy intensity for passenger transportation improved by 21 percent between 1990 and 2014. In the context of freight transportation, all modes of freight transport became more energy-efficient.³⁴

DESCRIPTION OF PROGRAM ACTIVITIES AND RESULTS

NRCan's energy efficiency and alternative transportation fuel initiatives are designed to lay the foundation for longer term climate change objectives by increasing the awareness, availability and uptake of lower carbon transportation options. The initiatives offer tools and information to support fuel-efficient vehicle choices and fuel-efficient driving and encourage freight companies to make their operations as energy-efficient as possible. Programs also work to advance the deployment of alternative fuels and vehicles such as electric, hydrogen and natural gas and encourage the development of a competitive renewable fuels industry in Canada.

Figure 7. Transportation sector energy use, 2014

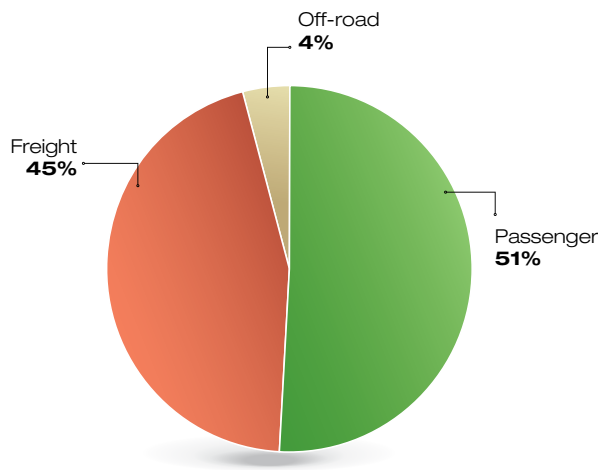


Figure 7 shows the breakdown of energy use in Canada within the transportation sector in 2014.

Source: National Energy Use Database, 2014

BIOFUELS

NRCan's *ecoENERGY for Biofuels Program* was allocated up to \$1.4 billion from 2008–2017 to provide incentives to producers of ethanol and biodiesel and encourage the long-term growth of a domestic renewable fuels industry. To date, the program has invested over \$920 million. In 2014, program producers generated over \$1.66 billion in annual revenues and supported 653 jobs.

Canada's biofuel industry has grown considerably with the support of federal and provincial programs. Canada is now ranked as the world's fifth-largest producer of biofuels.

Commercial Vehicles

The *SmartWay Transport Partnership* is a freight supply-chain network. NRCan jointly administers the partnership with the U.S. Environmental Protection Agency. SmartWay is a government-industry collaboration used by companies that hire or provide freight transportation services. The program helps fleets to benchmark, track and improve their fuel efficiency and emissions performance. It also helps businesses with an interest in greening their operations to connect with a list of fuel-efficient freight transporters and improve and better measure their GHG emissions.

In January 2016, the Canadian Fuels Association committed to joining the SmartWay Partnership to improve the efficiency of their freight shipments, as well as securing the participation of companies who make up their transportation supply chains. In March 2016, Suncor became the first member of the Canadian Fuels Association to join the SmartWay Partnership Program as a shipper.

In 2015–2016, the SmartWay network was used by more than 300 Canadian fleets, representing more than 34,000 trucks that compete for contracts to move freight in Canada and the U.S. More than 110

large international companies such as Gap Inc., The Home Depot, Toyota and Walmart ship exclusively with SmartWay carriers. SmartWay fleets are saving over 5,000 litres (L) of fuel per truck per year, or more than \$180 million in annual fuel costs.

SDHT presents fuel-efficient driving strategies for drivers of heavy-duty vehicles operating in a market characterized by growing demands for environmental responsibility and economic uncertainty created by fluctuating fuel prices. SDHT provides a flexible package of on-line, in-class and on-road training materials that can be used independently or as part of a blended learning program. The course content, design and delivery for both in class and on-line have recently been updated, based on stakeholder input, industry pilot-testing and feedback from the U.S. Environmental Protection Agency.

In 2015–2016, nearly 2,200 commercial truck drivers received driver training using the updated SDHT curriculum on fuel efficiency. Early results from on-line, in-class, and on-road instruction have demonstrated an average decrease in fuel consumption of 1.22 L/100 km with an annual potential fuel savings of \$1,220 per driver, based on 100,000 km per year at \$1.00/L of diesel.

Passenger Vehicles

The *Fuel Consumption Guide* and the *EnerGuide Label for Vehicles* are produced in co-operation with vehicle manufacturers. The tools provide specific information that helps purchasers compare the fuel consumption rates and GHG emissions of different models, making it easier to select the most fuel-efficient vehicle that meets their needs.

Thanks to NRCan's fuel consumption programming, all major manufacturers use a standardized approach to determine the fuel consumption and emissions information that can be displayed on their websites and vehicles and included in their information products. This standardization enables purchasers to compare the fuel efficiency of vehicles prior to purchasing. Over 1 million vehicles sold annually in Canada display the EnerGuide Label, which lists energy consumption rates.


In 2015, five provinces and territories and hundreds of private driver educators used NRCan's *Auto\$mart driver training* curriculum to teach over 180,000 new drivers simple techniques to help them use less fuel, save hundreds of dollars and reduce their vehicle's GHG emissions by as much as 25 percent.

Alternative fuels

March 2016 saw the conclusion of the program suite's Alternative Fuels Initiative, which aimed to increase awareness and use of alternative transportation fuels. This initiative resulted in several information and awareness products, including:

- three new regional information centres in Montréal, Ottawa and Vancouver;
- a website providing the latest information about the use of natural gas in transportation; and
- a myriad of training guides, technical courses, information sheets and workshops for end-users considering switching to natural gas.

The program also supported the development and publication of three new codes and two new binational component standards for natural gas vehicles and refueling infrastructure. This code and standards activity was included in the 2014 Joint Forward Plan of the Canada-U.S. Regulatory Cooperation Council. An independent evaluation of the initiative concluded that it was highly relevant, met stakeholders' needs and had been effective, impactful, and efficient.



Canada **ENERGUIDE** **Gasoline Vehicle / Véhicule à essence**

Fuel Consumption / Consommation de carburant

9.0 L/100 km
combined/combinée

10.7 L/100 km
city/ville

7.4 L/100 km
highway/route

31 mi/gal

Annual fuel COST
for an annual distance of 20,000 km, and an average fuel price of \$1.27 per litre

\$ 2 286

Coût annuel en carburant
pour une distance annuelle de 20 000 km, et un prix moyen du carburant de 1,27 \$ par litre

Small SUVs range from / Les petits VUS font entre
7.4 – 14.7 L_e/100 km

L_e is gasoline litre equivalent / L_e signifie litre équivalent d'essence

Carbon Dioxide Rating / Indice de dioxyde de carbone

1 — **7** — 10
216 g CO₂/km Best/meilleur

Smog Rating / Indice de Smog

1 — **6** — 10
Best/meilleur


Tailpipe emissions only / Émissions du tuyau d'échappement seulement

Estimates are based on Government of Canada approved criteria and testing methods. Vehicle's actual fuel consumption will vary.

Estimations établies selon des méthodes d'essai et des critères approuvés par le gouvernement du Canada. La consommation de carburant réelle du véhicule variera.

For more information visit **vehicles.nrcan.gc.ca**

Pour plus d'information visitez **vehicules.nrcan.gc.ca**



ENDNOTES

- ¹ Some statistics used in the report from the National Energy Use Database are cumulative and, as such, cover a longer period. The most recent year for which data is available from the National Energy Use Database is 2014.
- ² IEA, *World Energy Outlook Special Report: Energy and Climate Change*, 2015, p. 74. www.iea.org/publications/freepublications/publication/WEO2015SpecialReportonEnergyandClimateChange.pdf
- ³ NRCan, Office of Energy Efficiency, National Energy Use Database. oee.nrcan.gc.ca/corporate/statistics/neud/dpa/data_e/databases.cfm
- ⁴ National Energy Use Database
- ⁵ IEA, *World Energy Investment Outlook – Special Report*, 2014. www.iea.org/publications/freepublications/publication/WEIO2014.pdf
- ⁶ European Commission, *G20 Energy Ministers meeting focuses on sustainable energy access, energy efficiency and renewables*. ec.europa.eu/energy/en/news/g20-energy-ministers-meeting-focuses-sustainable-energy-access-energy-efficiency-and-renewables
- ⁷ U.S. Department of Energy, *Accelerate Energy Productivity 2030: Executive Summary of a Strategic Roadmap for American Energy Innovation, Economic Growth, and Competitiveness*, 2015, p. II. www.energy2030.org/roadmap
- ⁸ Total emissions are from secondary energy use only, which excludes emissions from industrial processes and non-energy use.
- ⁹ End-use sectors include residential, commercial/institutional, industrial, transportation, electricity generation and agriculture.
- ¹⁰ IEA, *Capturing the Multiple Benefits of Energy Efficiency*, 2015. www.iea.org/publications/freepublications/publication/capturing-the-multiple-benefits-of-energy-efficiency.html
- ¹¹ IEA, *World Energy Outlook Special Briefing for COP21: Energy and Climate Change*, 2015, p. 4. www.iea.org/media/news/WEO_INDC_Paper_Final_WEB.PDF
- ¹² IEA, *World Energy Investment Outlook: Special Report*, 2014. www.iea.org/publications/freepublications/publication/WEIO2014.pdf
- ¹³ NRCan, Office of Energy Efficiency, *Energy Consumption of Major Household Appliances Shipped in Canada, Trends for 1990–2011*. oee.nrcan.gc.ca/publications/statistics/aham/2011/pdf/aham2011.pdf
- ¹⁴ www.energystar.gov/about/history
- ¹⁵ IndEco Strategic Consulting Inc., *Leveraging Office of Energy Efficiency Funding*, 2015.
- ¹⁶ National Energy Use Database
- ¹⁷ National Energy Use Database
- ¹⁸ https://library.cee1.org/sites/default/files/library/12628/CEE_2015_Annual_Industry_Report.pdf
- ¹⁹ National Energy Use Database
- ²⁰ National Energy Use Database
- ²¹ National Energy Use Database
- ²² This excludes savings from federal retrofit grants, which ended in 2012.
- ²³ National Energy Use Database
- ²⁴ National Energy Use Database
- ²⁵ National Energy Use Database
- ²⁶ The exceptions are the Northwest Territories (which already has equivalent standards in place) and Yukon (in which the City of Whitehorse has independently adopted the code).
- ²⁷ National Energy Use Database
- ²⁸ National Energy Use Database
- ²⁹ National Energy Use Database
- ³⁰ National Energy Use Database
- ³¹ National Energy Use Database
- ³² National Energy Use Database
- ³³ National Energy Use Database
- ³⁴ National Energy Use Database