



Natural Resources
Canada

Ressources naturelles
Canada

Improving Energy Performance in Canada



Report to Parliament
Under the *Energy Efficiency Act*
2013–2015



Canada



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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

This twenty-first Report to Parliament under the *Energy Efficiency Act* (the Act) outlines the actions taken by the Government of Canada on energy efficiency and alternative transportation fuels covering the period from April 1, 2013, to March 31, 2015. Some statistics used in the report from the National Energy Use Database (NEUD) are cumulative, and as such cover a longer period. The most recent year for which data is available from NEUD is 2013.

The Act empowers the Minister of Natural Resources to promote the efficient use of energy and alternate 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 these 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.

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.

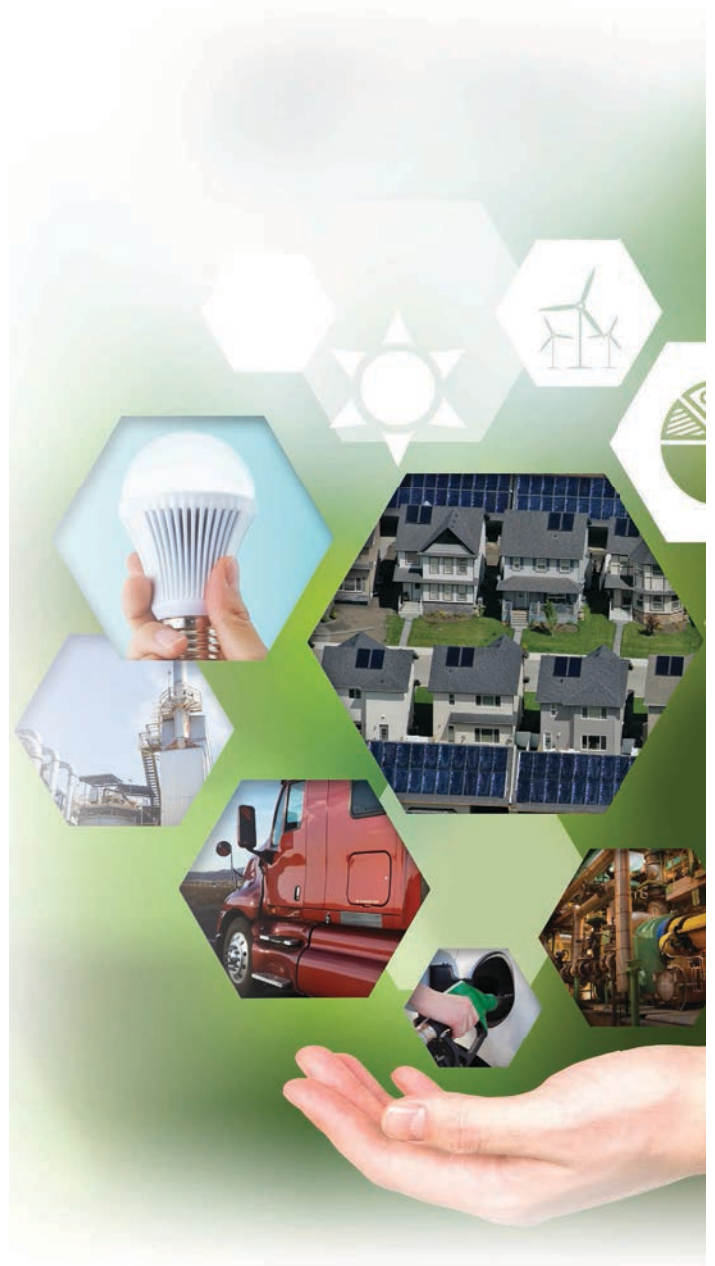
Chapter 2 discusses the role played by NRCan in the promotion of energy efficiency through the development and enforcement of regulations, standards and codes, the administration of voluntary certification, benchmarking and information-based programs, and domestic and international partnerships.

Chapters 3–7 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.

The **Appendix** provides a comparative analysis of Canada's energy performance standards in relation to select other North American jurisdictions prescribed by the Act.

For more detailed program information, please refer to NRCan's *Departmental Performance Report*.

For more detailed regulatory information, please refer to the *Canada Gazette*.



Message from the Minister OF NATURAL RESOURCES

I am pleased to present the twenty-first edition of the *Report to Parliament on Improving Energy Performance in Canada*. This report highlights the importance of energy efficiency in combating climate change.

On April 22, 2016, Canada was among 175 parties to sign the *Paris Agreement on Climate Change*, which commits participating countries to limiting global warming to less than two degrees Celsius. We are determined to do our part, and investments in energy efficiency will be key in reaching our climate goals. As the International Energy Agency has found, energy efficiency can achieve almost half of the total reductions in greenhouse gas (GHG) emissions required to meet the two-degree Celsius target.

We are also working closely with provinces and territories to address climate change. On March 3, 2016, Canada's First Ministers signed the *Vancouver Declaration on Clean Growth and Climate Change*. This declaration is a testament to our belief that sustainable economic development and long-term job creation are possible through meaningful collaboration.

Energy efficiency is an area where collaboration is already strong. The federal government has in place national product standards and innovative tools such as EnerGuide, ENERGY STAR and model building codes that provinces and territories use to implement energy efficiency programs. We will continue to strengthen this collaboration.

The importance of energy efficiency is further underscored through our work with international partners. Improving collaboration on energy efficiency is a key element of the *Memorandum of Understanding Concerning Climate Change and Energy Collaboration* that I signed with my American and Mexican counterparts in Winnipeg earlier this year, and we committed to aligning energy efficiency standards in the *Joint Statement on Climate, Energy and Arctic Leadership* agreed to by Canada and the United States during the Prime Minister's state visit to Washington.

Through Budget 2016, we are moving forward on our commitments in a very significant way.

We plan to invest:

- \$121.6 million over five years to deliver energy efficiency policies and programs; and
- \$62.5 million over two years for infrastructure to support electric vehicles and alternative transportation fuels.

We will continue to work with provincial and territorial colleagues and international counterparts, as well as businesses, industry and other key partners, to improve energy efficiency. By investing in clean technology and innovation, Canada will be at the forefront of the transition to a low-carbon, clean-growth economy.



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



FROM **1990 TO 2013**
ENERGY EFFICIENCY IN CANADA
IMPROVED BY **24%** OVERALL

ENERGY EFFICIENCY IMPROVEMENTS AVOIDED
85.4 MEGATONNES
OF GHG EMISSIONS IN 2013

CANADIANS
SAVED \$37.6 BILLION
ON ENERGY BILLS IN 2013 AS A RESULT OF ENERGY EFFICIENCY IMPROVEMENTS

CANADIANS SAVED APPROXIMATELY **8.3 PETAJOULES**
OF ENERGY FROM USING ENERGY STAR CERTIFIED PRODUCTS, EQUAL TO ENERGY USED BY
1.8 MILLION CARS FOR ONE YEAR

THE **ECOENERGY EFFICIENCY PROGRAM SUITE** IS ON TRACK TO ACHIEVE
\$1 BILLION IN COST SAVINGS
FOR CANADIAN INDUSTRY AND CONSUMERS

The Government of Canada is committed to building a low-carbon, clean growth economy. Energy efficiency is among the least costly and most effective methods to achieve this objective. Once known as the “hidden fuel” because of its lack of visibility, energy efficiency is increasingly recognized as the “first fuel” – the largest, most readily accessible and lowest impact energy resource available.

Energy efficiency means getting the same levels of service, comfort and performance we need from our homes, cars, appliances and businesses while using less energy. The opportunities for using energy more efficiently are all around us and, if seized, offer multiple simultaneous benefits: reduced energy demand now and in the future, lower utility bills and costs, reduced greenhouse gas (GHG) emissions and improved air quality, and more innovative energy-efficient technologies and jobs.

As the “first fuel,” recognition of the potential of energy efficiency to mitigate climate change is increasing. 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 global temperature increase to less than two degrees Celsius.¹ This makes energy efficiency investments the single largest intervention that can be taken collectively to address climate change.

From 1990 to 2013, energy efficiency in Canada improved by 24 percent overall, which avoided 85.4 megatonnes (Mt) of GHG emissions in 2013. This is the equivalent of approximately 16 percent of Canada’s 2013 GHG emissions. As a result of energy efficiency improvements since 1990, Canadians saved \$37.6 billion on their energy bills in 2013, the equivalent of more than 2.1 percent of Canada’s gross domestic product (GDP).²

Energy efficiency also helps Canadian businesses reduce operating costs. NRCan estimates that businesses lowered their energy costs by over \$15 billion in 2013 alone through investments made between 1990 and 2013.³ The drive to increase energy efficiency also stimulates continuous improvement and technological innovation. For example, advanced clothes dryer criteria announced in 2012 for ENERGY STAR’s 2013 Emerging Technology Award resulted in a 30-percent efficiency increase, the first energy efficiency advance in clothes dryers since the 1990s.

The recent five-year ecoENERGY Efficiency program suite (2011–2016) was developed to improve energy efficiency in housing, commercial and institutional buildings, consumer and commercial equipment, industry, and vehicles across

Canada. The program is on track to deliver on its targets to achieve \$1 billion in cost savings for Canadian industry and consumers and 4 Mt of GHG emission reductions in 2016, the equivalent of the emissions generated by approximately 1 million passenger vehicles in a single year.

This report highlights how Canada has made important progress in all sectors to improve the efficiency of energy use. The following are some notable accomplishments:

- During the 2013–2015 reporting period, Canadians saved approximately 8.3 petajoules (PJ) of energy from using ENERGY STAR certified products – equivalent to the energy used by 1.8 million cars for one year. By March 31, 2015, more than 70,000 efficient new homes had been built since the inception of the ENERGY STAR for New Homes and R-2000 initiatives, consuming 20 to 50 percent less energy than typical homes.
- As of March 31, 2015, building owners saved \$44 million per year from the new *National Energy Code of Canada for Buildings* 2011, which is 25 percent more efficient than the previous 1997 model energy code and reflects advances in design and technology. These savings are cumulative and will continue to grow over time.
- Since the introduction of the ISO 50001 Energy Management Systems Standard in Canada in 2011, significant energy and cost savings of up to \$2 million annually per facility have been achieved by Canadian industrial facilities that have adopted this standard.
- More than 1 million new vehicles sold each year in Canada display the EnerGuide Label, which informs purchasers of vehicle fuel consumption rates. Over 180,000 new drivers per year learn fuel-efficient driving techniques that can save them up to 25 percent on fuel costs.
- Over 32,000 freight trucks register annually in the SmartWay Transport Partnership Program in Canada, saving more than \$180 million in annual fuel costs.

In 2014, the IEA estimated that the global energy efficiency market was valued at over \$300 billion, a market expected to grow to \$550 billion by 2035.⁴ 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 strong targets to gain 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 2030,⁵ and in 2015, the U.S. Department of Energy committed to doubling the country's energy productivity from 2010 levels by 2030.⁶

The *G20 Energy Efficiency Action Plan* in 2014 represented a significant milestone in international energy efficiency collaboration. Vehicle efficiency and emissions performance, networked devices, and the increased flow of capital to efficiency investments were identified as priorities for new work. Improving building metrics and performance and making industrial processes and electricity generation more efficient were also identified as priorities. Moving forward, G20 leaders recognized that “improving energy efficiency, increasing investments in clean energy technologies, and supporting related research and development activities will be important in tackling climate change and its effects.”⁷

Within the context of this global framework for action, working with stakeholders at all levels, the Government of Canada continues to work to strengthen and expand its own policies and programs in support of energy efficiency. Current efforts have resulted in important energy, financial and GHG savings. As Canada looks forward, it is with the knowledge that the “first fuel” can be a key pillar in Canada's climate, economic and innovation plans.





CHAPTER 1

Why Energy Efficiency Matters

SUMMARY

- Energy efficiency is essential for the long-term decarbonization of the Canadian economy.
- According to the IEA, energy efficiency can provide 49 percent of GHG emission reductions needed by 2030, and the majority of its potential is undeveloped.
- As a result of energy efficiency improvements since 1990, Canadians saved \$37.6 billion on their energy bills in 2013, the equivalent of more than 2.1 percent of Canada's GDP.
- Energy efficiency improvements support economic growth and clean jobs in a global market where the value of energy efficiency products was estimated to be over \$300 billion in 2012 (U.S. dollars).

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, online at: oee.nrcan.gc.ca/corporate/statistics/neud/dpa/home.cfm

DID YOU KNOW?

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

Energy efficiency programs and investments generate multiple benefits. As outlined in the IEA's 2014 report, *Capturing the Multiple Benefits of Energy Efficiency*, energy efficiency simultaneously saves consumers and businesses money, creates jobs, stimulates economic growth, enhances productivity and competitiveness, and improves environmental performance.⁸ In the context of climate change, energy efficiency is a cost-effective means of reducing GHG emissions.

Energy efficiency is essential to both the long-term decarbonization of the economy and the short-term reduction of GHG emissions. As countries strive to meet their GHG reduction commitments, the IEA forecasts that US\$13.5 trillion will need to be spent on clean energy between 2015 and 2030, representing almost 40 percent of total energy sector investment. Of this \$13.5 trillion, \$8.3 trillion is forecast to be spent on energy efficiency alone.⁹ In the face of growing energy demands, energy efficiency policies are seen as a key strategy to mitigate climate change by reducing GHGs, save Canadians money by lowering energy bills, and increase economic growth and industrial competitiveness.

While Canadians are among the highest per capita users of energy in the world, overall energy efficiency in Canada improved by 24 percent between 1990 and 2013. As demonstrated in Figure 1, this translates into a total reduction of GHG emissions of 85.4 Mt between 1990 and 2013, saving 1,613.2 PJ.¹⁰ During this period, Canada's energy intensity (the amount of energy used per unit of economic activity) improved 25 percent per unit of GDP over the same period. The result is economy-wide savings of \$37.6 billion in 2013 as a result of energy efficiency improvements made since 1990.

CLIMATE CHANGE

The energy used by consumers across all sectors of the economy, defined as secondary energy use, is responsible for 68 percent of Canada's total GHG emissions.¹¹ Because energy efficiency measures lessen energy demand, energy efficiency has a significant and tangible impact on reducing GHG and other emissions associated with energy use. The IEA has estimated that energy efficiency can provide 49 percent of the GHG emission reductions needed by 2030 to limit the rise in average global temperature to less than two degrees Celsius – the

Figure 1. Secondary Energy Use, With and Without Energy Efficiency Improvements, 1990–2013

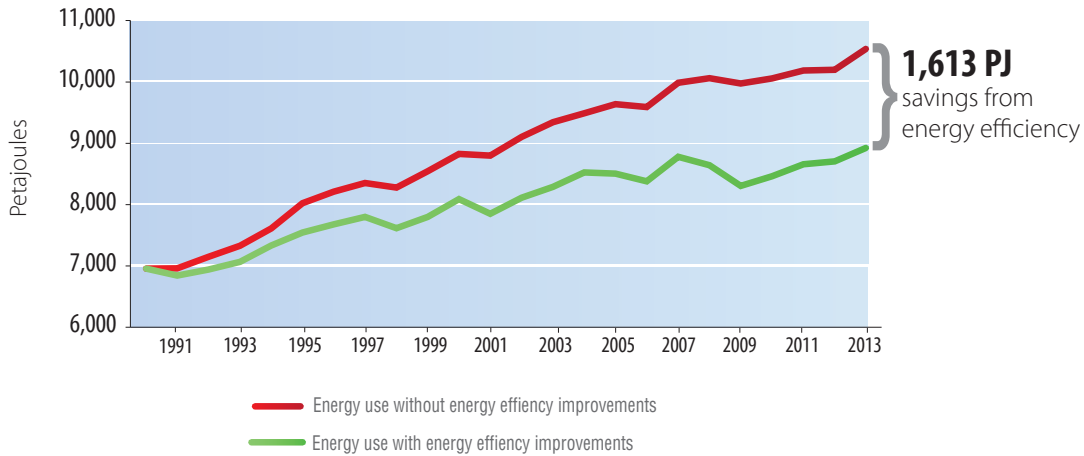


Figure 1 illustrates that energy use would have been 1,613 PJ higher in 2013 without the energy efficiency improvements made since 1990.

international objective that governments have adopted.¹²

ECONOMIC GROWTH

Energy efficiency improvements support economic growth and clean jobs. Canada’s per capita energy use is among the highest in the world, with energy bills representing the fifth largest Canadian household expense. Energy efficiency improvements helped Canadians save \$12 billion on their home energy bills in 2013, increasing their disposable income and stimulating economic growth. For example, despite being much larger, a new refrigerator purchased in 2013 used 56 percent less energy than one purchased in 1990.¹³

When energy users retrofit their homes or replace outdated equipment in their factories, they contribute to the demand for energy-efficient products and services. For example, Canada’s efficient-home construction industry (comprising over 2,000 builders) generates \$3.8 billion in annual sales. The global market for energy efficiency products was estimated to be over US\$300 billion in 2012, and growing rapidly.¹⁴

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, reduce resource use and pollution, 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 and increases affordability and market adoption of clean technology. For example, advanced clothes dryer criteria announced in 2012 for ENERGY STAR’s 2013 Emerging Technology Award resulted in a 30-percent efficiency increase, the first energy efficiency advance in clothes dryers since the 1990s. This then led to an additional efficiency level set for the 2014 award requiring dryers to be 40 percent more efficient, resulting in the development and adoption of heat pump technology for the North American market.

DID YOU KNOW?

While total energy used by final consumers in Canada increased by **28 percent** between 1990 and 2013, it would have increased by **51 percent** without energy efficiency improvements.

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 the inception of the initiative 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.



CHAPTER 2

Delivery of Federal Energy Efficiency Programming

SUMMARY

- NRCan's five-year program suite spanning 2011 to 2016 is designed to improve the energy efficiency of consumer and commercial products, residential, commercial and institutional buildings, industry, and vehicles across Canada.
- NRCan supports a number of voluntary tools targeting all sectors of the economy. These include the ENERGY STAR tools for products, buildings and homes, the ISO 50001 Energy Management System Standard for industry, and the SmartWay Transport Partnership for commercial fleets.
- NRCan has 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.

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.

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

NRCan delivers federal energy efficiency programs through the Office of Energy Efficiency. The current five-year [program suite](#) spans the 2011 to 2016 period and is designed to improve the energy efficiency of consumer and commercial products, homes, commercial and institutional buildings, industry, and vehicles across Canada.

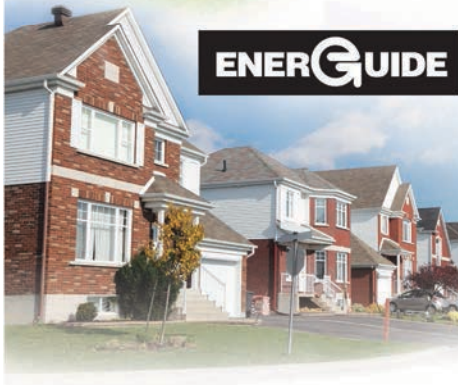
Many Canadian consumers and businesses are interested in reducing their energy use but can experience barriers to taking action such as a lack of awareness and capacity and split incentives (common in some landlord/tenant lease structures). To achieve its objectives, NRCan employs a number of policy instruments, including standards and codes, as well as voluntary certification, benchmarking systems and information tools. Close collaboration with domestic and international partners 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, with the objective of eliminating the least efficient products from the Canadian market. These *Energy Efficiency Regulations* (the Regulations) apply to energy-using products imported into Canada or shipped from one province to another for the purpose of sale or lease.

The Regulations are administered by NRCan and are amended on a regular basis to strengthen existing performance standards or to introduce energy efficiency standards for new products. Requirements in the Regulations are typically aligned with those in the U.S. to minimize the regulatory burden on business and afford 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.

R-2000



ISO 50001 Energy Management System Standard certification



SmartWay®



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.

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*.

VOLUNTARY CERTIFICATION, BENCHMARKING AND INFORMATION TOOLS

NRCan supports a number of voluntary tools targeting all sectors of the economy. Certification and benchmarking systems – such as ENERGY STAR for products, buildings and homes, the ISO 50001 Energy Management System Standard for industry, and the SmartWay Transport Partnership for commercial fleets – recognize the highest performers and help to drive the market for innovative energy efficiency products and services. In addition, labels, energy monitoring and rating tools, training and workshops, information guides, networks and online data help consumers and industry to build

awareness and capacity and to identify reliable energy-saving opportunities.

PARTNERSHIPS

Domestic partnerships

Energy efficiency is an area of shared jurisdiction, and success depends on strong collaboration. 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 recent study found that two thirds of provincial and territorial spending on energy efficiency incentive programs leveraged federal standards and certifications in 2012.¹⁵ At the same time, NRCan closely collaborates with a range of stakeholders in delivering 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

NRCan's membership in the **Consortium for Energy Efficiency**, a binational consortium of gas and electric efficiency program administrators (primarily utilities), enables Canada to learn from and inform the policy direction of Canadian and U.S. decision makers with regard to the commercialization and deployment of highly efficient products.

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

Bilateral and trilateral partnerships

NRCan works bilaterally with the U.S. to align energy efficiency and alternative transportation fuel standards, and with the U.S. and Mexico to advance green freight through the SmartWay Transport Partnership. Under the **Regulatory Cooperation Council**, NRCan and the U.S. Department of Energy are working towards aligning new and updated energy efficiency product standards and test methods for energy-using equipment and codes and standards for the use of natural gas as a transportation fuel.

In addition, the federal government jointly administers with the U.S. government tools such as ENERGY STAR. NRCan maintains strong working relationships with the U.S. Department of Energy and the U.S. Environmental Protection Agency to support joint program development and policy administration.

Multilateral partnerships

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

For example, NRCan is actively participating in the **Global Superior Energy Performance Partnership**, 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 to high-efficiency equipment and appliances through standards and labels.

NRCan works with international partners in a number of 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 & Energy Efficiency Partnership
- Asia Pacific Economic Cooperation Energy Working Group
- Energy and Climate Partnership of the Americas





CHAPTER 3 Consumer and Commercial Products

HIGHLIGHTS

- ENERGY STAR is the most recognized symbol for high-efficiency products, and 88 percent of Canadians use it 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.
- During the 2013–2015 reporting period, the ENERGY STAR products program generated approximately 8.3 PJ of energy savings through the promotion of ENERGY STAR certified appliances, electronics 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 \$28.5 billion per year in energy bills, while the commercial/institutional sector spends an estimated \$20.6 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 40 different product categories, while ENERGY STAR covers 70 types of residential and commercial products. EnerGuide provides energy consumption information for an additional eight mandatory and five voluntary products.¹⁷

DESCRIPTION OF PROGRAM ACTIVITIES AND RESULTS

NRCan programs improve the efficiency of energy-using consumer and commercial 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 \$870 per household in 2013 (compared to 1990).

The Canada-U.S. Regulatory Cooperation Council [Joint Forward Plan](#) released in August 2014 committed to the alignment of new and updated energy efficiency standards and test methods for energy-using equipment through enhanced information sharing and their cooperative development and implementation.

The [EnerGuide Label](#) helps Canadians compare appliance energy consumption across product models in their respective categories. This label is mandatory for all major household appliances and room

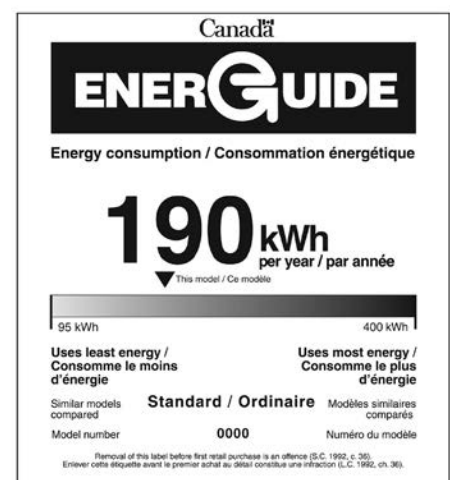


Figure 2. Average Energy Consumption of New Appliances (kilowatt hour/year), 1990 and 2013 Models

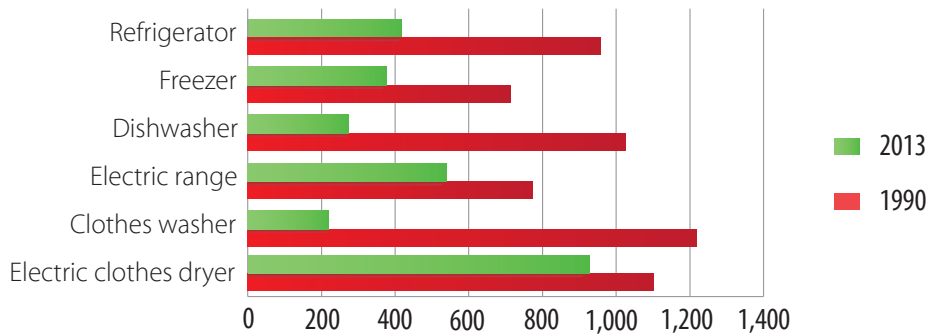


Figure 2 shows the decrease in energy consumption among major appliances in Canada between 1990 and 2013. Source: National Energy Use Database, 2013.

air-conditioners. A voluntary EnerGuide labelling program is available for manufacturers of gas furnaces, central air conditioners, heat pumps, oil furnaces, gas fireplaces and domestic water heaters. EnerGuide helps consumers to make better purchasing decisions in highly competitive and technical product categories. In 2013, in an effort to help Canadians make informed purchase choices, NRCan introduced a voluntary EnerGuide label for water heaters, in partnership with two manufacturer associations, the Canadian Institute of Plumbing and Heating and the Heating, Refrigeration and Air Conditioning Institute of Canada.

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

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. During the 2013–2015

reporting period, the ENERGY STAR products program generated approximately 8.3 PJ of energy savings through the promotion of ENERGY STAR certified appliances, electronics and equipment.

Efficiency initiatives in 10 provinces and 2 territories across Canada use ENERGY STAR as a foundation for consumer rebate and incentive programs worth almost \$1 billion per year. As of 2015, 56 Canadian utilities servicing 90 percent of the population were also ENERGY STAR participants and promoted ENERGY STAR to Canadians through energy efficiency rebate and information programs.

In addition, the ENERGY STAR Initiative introduced two new high-efficiency specifications for information technology products used in the commercial and institutional sector during the 2013–2015 reporting period and has updated eight others. These ENERGY STAR specifications are used by procurement professionals to source large scale purchases of products using a life-cycle costing method, contributing to significant energy savings over time. For example, Dalhousie University's ENERGY STAR purchasing policy saves them approximately \$65,000 per year on their energy bills.¹⁸



Canada and the U.S. work together to strengthen ENERGY STAR labelling for equipment and appliances by offering a distinction for the highest-efficiency products in the marketplace. Through the use of the “ENERGY STAR Most Efficient” designation, both jurisdictions identify the very best performers in each calendar year, providing elite-level recognition for top energy efficiency performers.



CHAPTER 4 Residential Buildings

HIGHLIGHTS

- Over 115,000 EnerGuide home evaluations were conducted between 2013 and 2015.
- Over 33,000 new homes were issued EnerGuide, ENERGY STAR or R-2000 labels from 2013 to 2015.
- Overall, more than 70,000 efficient new homes have been built to the ENERGY STAR for New Homes and R-2000 standards, NRCan’s premium home initiatives that are 20 percent and 50 percent more energy-efficient, respectively, than typical new homes.

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 13.82 million households in Canada, spending \$28.5 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 6.5 percent between 1990 and 2013, it would have increased an additional 44.5 percent without energy efficiency efforts.²⁰

Energy efficiency in residential buildings improved 45 percent between 1990 and 2013, saving Canadians \$12 billion in energy costs and more than 639.2 PJ of energy. The sector saved 27.9 Mt of GHG emissions, and energy intensity improved by 35 percent between 1990 and 2013.²¹

Figure 3. Residential Energy Use, 2013

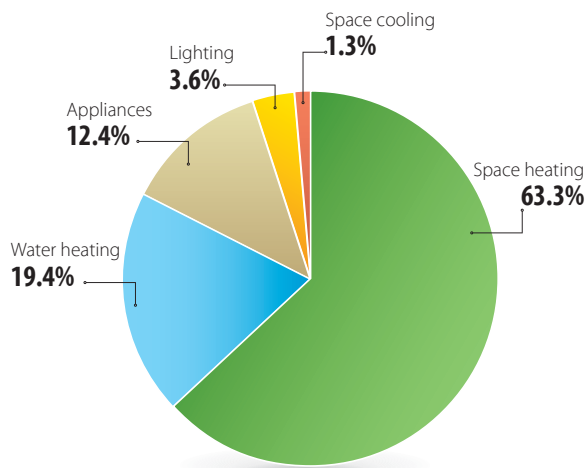


Figure 3 shows the breakdown of Canada’s residential energy use in 2013, with almost two thirds (63.3 percent) of all energy devoted to space heating because of our northern climate.

Source: National Energy Use Database, 2013.

DESCRIPTION OF PROGRAM ACTIVITIES AND RESULTS

NRCan programs encourage the retrofit and construction of energy-efficient, low-rise residential housing, thereby supporting 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 can work with energy advisors to estimate the annual energy usage of new homes and select potential energy efficiency upgrades.

As of March 2015 there were more than 50 provincial, territorial, municipal, utility and industry home labelling programs and regulations across Canada supported by the EnerGuide Rating System infrastructure.

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

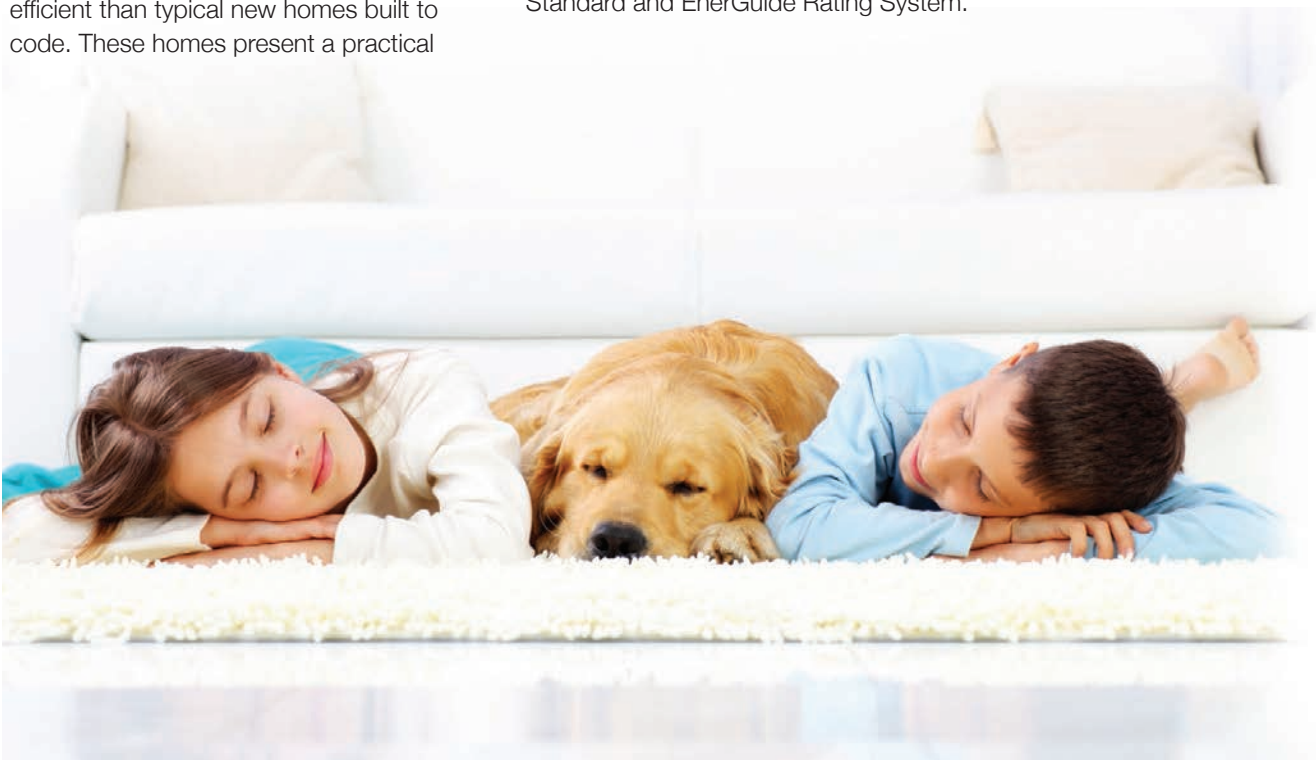
choice for homeowners looking for a new home that is energy-efficient. The ENERGY STAR for New Homes Standard also provides builders with flexibility so they can build these homes in a simple, cost-effective manner using common building practices.

[R-2000](#) is an industry-endorsed technical performance standard for energy efficiency, indoor air tightness quality, and environmental responsibility in new home construction. 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 Government of Canada. R-2000 homes are on average 50 percent more energy-efficient than typical new homes.

NRCan is also overseeing the R-2000 NetZero Energy Pilot. A net zero energy house produces at least as much energy with on-site renewable energy as it consumes on an annual basis. The R-2000 NetZero Energy Pilot is designed to recognize the builders and homes that reach net-zero energy performance in Canada and to pilot the updated R-2000 Standard and EnerGuide Rating System.

DID YOU KNOW?

More than **70,000 efficient new homes** have been built since the inception of the ENERGY STAR for New Homes and R-2000 initiatives.





CHAPTER 5 Commercial and Institutional Buildings

HIGHLIGHTS

- The 2011 *National Energy Code of Canada for Buildings* is among the most stringent in North America and is being adopted by 12 provinces and territories.
- Building managers are using the ENERGY STAR Portfolio Manager benchmarking tool to track more than 162 million square metres of floor space, six times more than the floor space originally targeted through the program.
- From 2013–2015, almost 4,000 building sector participants attended customized Dollars to \$ense workshops, which help facilities lower their operating and production costs 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 743.1 million square metres of space in 2013 and spent \$20.6 billion on commercial/institutional energy during the same year.²²

Commercial and institutional buildings accounted for 10 percent of domestic energy use and

9 percent of GHG emissions. While energy use in non residential buildings increased 23 percent between 1990 and 2013, it would have increased an additional 33 percent without energy efficiency efforts.²³

Between 1990 and 2013, energy efficiency saved Canadians \$5.4 billion in energy costs. Commercial and institutional buildings saved 11 Mt of GHG emissions, and energy intensity improved by 15 percent between 1990 and 2013.²⁴

Figure 4. Commercial and Institutional Building Energy Use, 2013

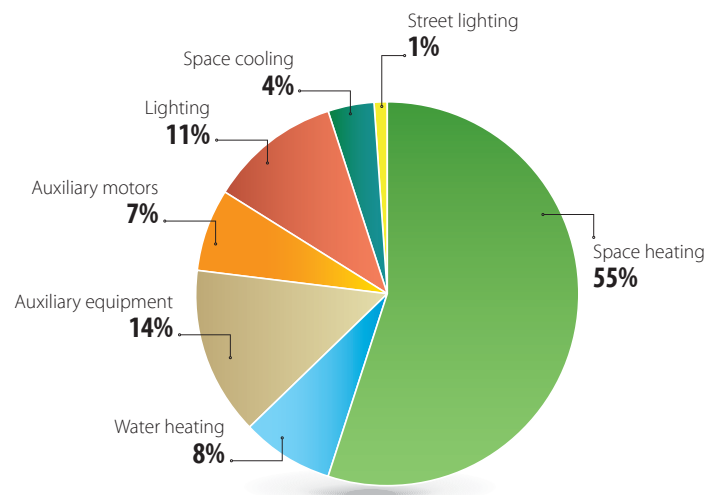


Figure 4 shows the breakdown of energy use in Canada's commercial and industrial buildings in 2013, with slightly more than half of all energy use devoted to space heating (55 percent).

Source: National Energy Use Database, 2013.

DESCRIPTION OF PROGRAM ACTIVITIES AND RESULTS

NRCan programs set energy performance standards for new commercial and institutional buildings and encourage retrofits and energy management practices in the existing stock, supporting private- and public-sector building owners and managers.

The *2011 National Energy Code of Canada for Buildings*, which provides model standards for new buildings and additions, established a 25-percent improvement in energy efficiency over the previous code. The new code, with its higher standards, places Canada on a level footing with countries that lead the world in energy-efficient building construction. All provinces and territories have adopted or plan to adopt the code into law, with the exception of the Northwest Territories, which already has equivalent standards in place. The code will result in \$70 million in cost savings for building owners in 2016 by improving energy performance in 24,000 buildings.

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 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 2015, over 10,000 Canadian buildings, representing 17 percent of commercial and institutional building floor space, had registered with the tool. This translates into more than 162 million square metres of floor space tracked by the benchmarking tool, six times more than the floor space originally targeted through the program. This has generated an estimated \$26 million per year in energy cost savings for building managers, owners and operators starting in April 2015.

From 2013–2015, almost 4,000 building sector participants attended customized *Dollars to \$ense* workshops, which help facilities lower their operating and production costs while reducing GHG emissions. The one-day seminars are specifically designed 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.

DID YOU KNOW?

Toronto CivicAction's *Race to Reduce* energy office challenge, with **175 participating buildings** representing one third of commercial office buildings in the Greater Toronto-Hamilton area, is **using ENERGY STAR Portfolio Manager** as its official data capture and reporting tool.





CHAPTER 6 Industry

HIGHLIGHTS

- Since the adoption of the ISO 50001 Energy Management Systems Standard in Canada in 2011, significant energy and cost savings of up to \$2 million annually per facility have been achieved by Canadian industrial facilities.
- The Canadian Industry Program for Energy Conservation supports a network of over 2,400 facilities and more than 50 trade associations who work together to cut costs, improve energy efficiency and reduce industrial GHG emissions.
- From 2013–2015, approximately 1,000 industry participants attended customized Dollars to \$ense workshops, which help facilities lower their operating and production costs while lowering GHG emissions.

The Canadian industrial sector is comprised of mining, construction, forestry and manufacturing, including a number of sub-sectors such as chemicals and pulp and paper. The sector employs 3.4 million Canadians across the country and is responsible for 26 percent of national GDP. In 2013, Canadian industry spent \$47.6 billion on energy use.²⁵

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 30 percent between 1990 and 2013, it would have increased an additional 8 percent without energy efficiency efforts.²⁶

Energy efficiency improved 8.1 percent between 1990 and 2013, saving Canadians \$3 billion in energy costs and more than 220 PJs of energy. The sector avoided 10.8 Mt of GHG emissions, and energy intensity improved by 9 percent between 1990 and 2013.²⁷

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 major countries representing 60 percent of the world's energy use, ISO 50001 helps Canadian industry establish the systems and processes necessary 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 see their energy use drop by 20 percent on average in the first four years of

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. During the 2013–2015 reporting period, close to 1,000 industry participants took part in these workshops.

Figure 5. Industrial Energy Use, 2013

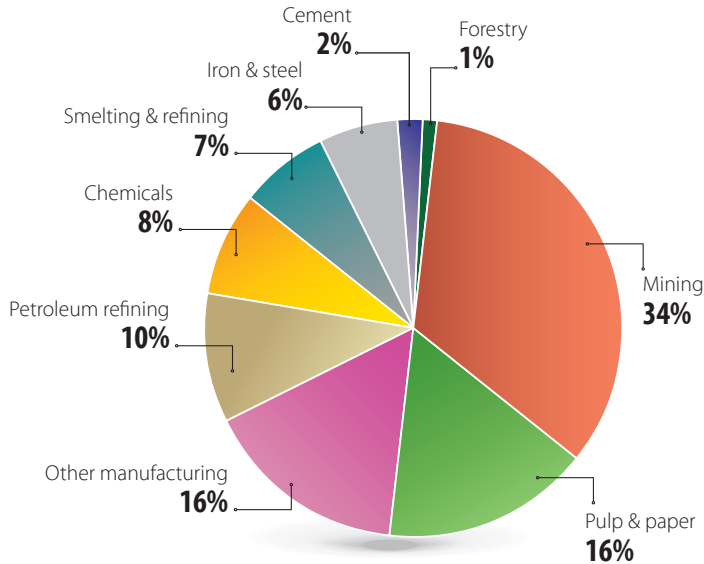


Figure 5 shows the breakdown of energy use in Canada by industrial sector in 2013. Source: National Energy Use Database, 2013.

certification. Since the adoption of ISO 50001 Energy Management Systems Standard in Canada in 2011, significant energy and cost savings of up to \$2 million annually per facility have been achieved by Canadian industrial facilities.

The [Canadian Industry Program for Energy Conservation \(CIPEC\)](#) offers a range of opportunities to help companies in over 20 industrial sectors cut costs and increase profits, including the following: cost-shared assistance for pilots, projects, and studies; workshops and toolkits; technical information and newsletters; and networking opportunities to share 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.

Investments in Forest Industry Transformation program

The 2014 federal budget renewed the Investments in Forest Industry Transformation (IFIT) program, committing to an additional \$90.4 million in funding over four years. IFIT helps Canada's forest sector become more economically competitive and environmentally sustainable through targeted investments in innovative technologies.

Some projects funded under the IFIT program include energy efficiency or alternative fuel components. To date, the IFIT program has funded 14 projects, eight of which are world-first technologies. Once completed, the projects will generate approximately 75 new jobs and secure 2,500 others. In addition, the projects will reduce GHG emissions by 60 kilotonnes per year and increase Canada's low-carbon electricity capacity by 7.2 megawatts.

IFIT PERFORMANCE REPORT 2010–2014

In July 2015, the IFIT program released its first performance report to provide a summary of the program and examples of the projects it funded between 2010 and 2014. This is the first report to provide an update of the new technologies, innovation and transformations that have occurred as a result of the program.



CHAPTER 7 Vehicles and Alternative Fuels

HIGHLIGHTS

- Over 1 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.
- Three outdated codes for natural gas in transportation were revised to include advances in technology and to better align with the U.S.
- Two new binational standards for liquid natural gas as a transportation fuel were developed. These help facilitate deployment by reducing delays for industry seeking approvals for natural gas refuelling infrastructure and natural gas vehicles.
- Fleets accounting for 26 percent of all on-road freight 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 is comprised of passenger and freight vehicles. In 2013, passenger light-duty vehicles travelled 15,552 kilometres per year on average per vehicle for a total of 519.7 billion passenger kilometres. In 2013, there were 4.5 million freight trucks, including 400,000 classified as heavy trucks. On average, heavy trucks travelled 92,296 kilometres.²⁸

Overall, the sector accounted for 30 percent of Canada's energy use and 38 percent of GHG emissions. While energy use in the sector increased 43 percent between 1990 and 2013, it would have increased an additional 27 percent without energy efficiency efforts.²⁹

Energy efficiency in the sector improved 29 percent between 1990 and 2013, saving Canadians \$17.1 billion in energy costs and more than 512 PJ of energy over this period. The sector also avoided 35.4 Mt of GHG emissions over this period.³⁰

As a result of better vehicle fuel performance, energy intensity for passenger transportation improved by 21 percent between 1990 and 2013. In the context of freight transportation, all modes of freight transport became more energy-efficient.³¹

DESCRIPTION OF PROGRAM ACTIVITIES AND RESULTS

NRCan's energy efficiency and alternative fuel transportation programs are designed to improve fuel efficiency and reduce emissions from passenger and commercial transportation in Canada. The programs 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 such as natural gas vehicles and encourage the development of a competitive renewable fuels industry in Canada.

Figure 6. Transportation Sector Energy Use, 2013

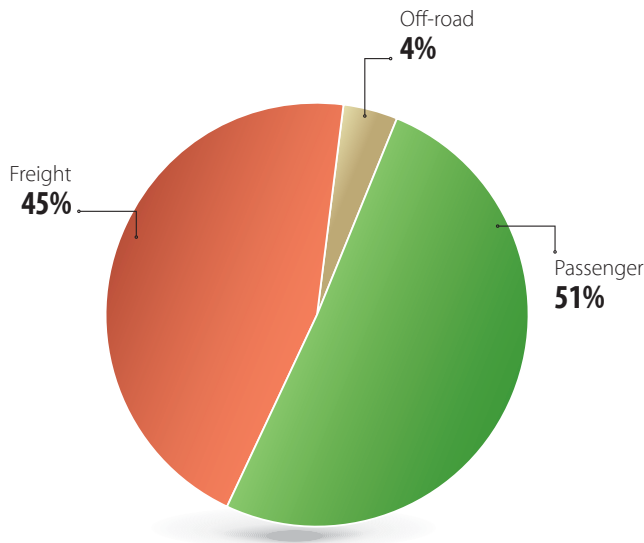


Figure 6 shows the breakdown of energy use in Canada within the transportation sector in 2013. Source: National Energy Use Database, 2013.

Commercial Vehicles

FleetSmart offers training and information on technologies and best practices that encourage the reduction of fuel and related GHG emissions. In particular, FleetSmart's SmartDriver training covers all aspects of fleet energy management, including how to choose the right vehicle, how to maintain vehicles and how to apply driving techniques that promote fuel efficiency. This can translate into fuel savings of up to 10 percent. The training also offers information and advice on the latest in fuel-saving transportation technologies.

NRCan jointly administers with the U.S. Environmental Protection Agency the SmartWay Transport Partnership – a freight supply-chain network that complements FleetSmart's activities. 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. The SmartWay network is used by more than 270 Canadian fleets, representing more than 32,000 trucks,

which compete for contracts to move freight in Canada and the U.S. More than 115 large international companies such as Gap, Home Depot, Toyota and Walmart ship exclusively with SmartWay carriers. SmartWay fleets are saving over 5,000 litres of fuel per truck per year, or more than \$180 million in annual fuel costs.

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 help purchasers compare the fuel consumption rates of different models, making it easier to select the most fuel-efficient vehicle that meets their needs. Over 1 million vehicles sold annually in Canada display the EnerGuide Label, which informs purchasers of energy consumption rates.

Five provinces and territories and hundreds of private driver educators use NRCan's AutoSmart driver training curriculum to teach over 180,000 new drivers each year 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.

WHAT ARE ALTERNATIVE FUELS?

Fuels such as propane, natural gas, ethanol and biodiesel produce fewer carbon emissions upon combustion than gasoline and diesel.

BIOFUELS

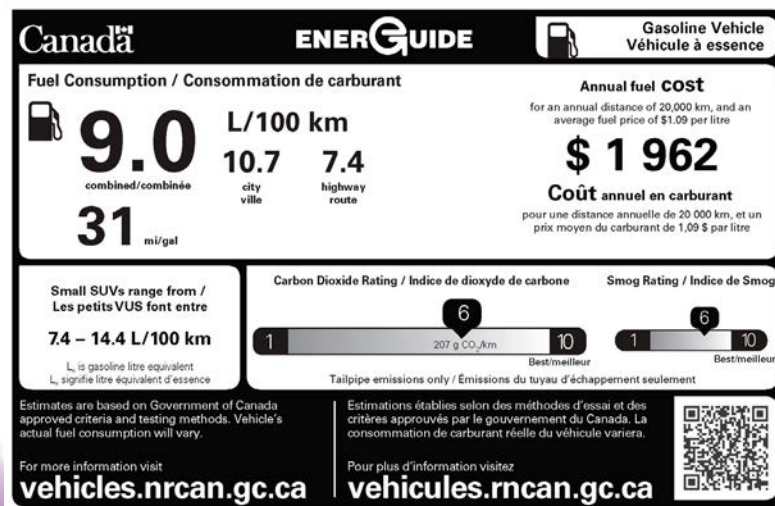
NRCan's [biofuels program](#) was allocated up to \$1.4 billion from 2008–2017 to provide incentives to producers of ethanol and biodiesel and encourage the long-term growth of a domestic renewable fuels industry. To date, the program has invested over \$900 million, and this figure is expected to reach nearly \$1 billion by 2017. In 2014, program producers generated over \$1.66 billion in annual revenues and supported 653 jobs.

With the support of federal and provincial programs, as well as various policy interventions in the U.S., Canada's biofuel industry has grown considerably. Canada is now ranked as the world's fifth-largest producer of biofuels.

Alternative Fuels

NRCan advances the deployment of natural gas in transportation through its [alternative fuels program](#), which facilitates market-relevant codes and standards, and supports education and outreach efforts. Together with the U.S., the program has developed three codes and two standards for natural gas in transportation – a priority that was highlighted in the Canada-U.S. Regulatory Cooperation Council's 2014 Joint Forward Plan.

As of 2015, three local information offices have been established across Canada, providing “on-the-ground” resources for medium- and heavy-duty fleet operators and other stakeholders who want information about options for fuelling their vehicles with natural gas. Fleets can get this information through the website www.gowithnaturalgas.ca, by phone, through workshops or in person at one of the information office locations.



The *Energy Efficiency Act* requires that once every three years, the Minister of Natural Resources demonstrate the extent to which the energy efficiency standards prescribed under the Act are as stringent as comparable standards established by a province, the United Mexican States, the U.S or a U.S. state. This analysis was last conducted in the 2010–2011 Report to Parliament under the *Energy Efficiency Act*.

To address this requirement for the 2013–2014 time period, an internal analysis evaluated the minimum energy performance standards for 44 of Canada’s federally regulated products in effect as of March 31, 2014, and comparable standards in all North American jurisdictions currently possessing an energy efficiency regulatory regime. While there have been many standards developed in the U.S. at the state level, U.S. federal standards pre-empt state standards. Consequently, the stringency comparison was made on a national basis. The analysis determined the differences in the level of stringency between many Canadian provinces and territories, Mexico and the U.S. at the federal level.

Of the jurisdictions reviewed as of March 31, 2014, eight had regulations that are comparable with those in Canada (see the table below). These were as follows: Mexico, U.S., British Columbia (BC), Quebec (QC), New Brunswick (NB), Nova Scotia (NS), Manitoba (MB) and Ontario (ON). For all regulated products in Canada, when covered by regulations in the jurisdictions reviewed, Canadian standards were at least as stringent in 89 percent of cases as of March 31, 2014. However, between 2014 and 2016, jurisdictions such as the U.S. have introduced new or updated standards. As a result, NRCan estimates that as of January 2016, Canada’s regulations align with less than 50 percent of the product categories regulated in the U.S.

ENERGY SAVINGS AND GHG EMISSION REDUCTIONS

In preparing amendments to the Regulations, NRCan analyses the impact of the proposed amendment on society, the economy and the environment. It is estimated that Canada’s energy performance standards from 12 amendments have resulted in a reduction of 26.03 Mt in aggregate annual GHG emissions in 2010 (see table below). These same amendments will result in more than \$8 billion in energy cost savings to Canadians in 2020.

DID YOU KNOW?

Canada’s *Energy Efficiency Regulations*, in place since 1995, saved Canadians approximately \$5 billion in energy costs in 2013. These regulations have also contributed to significant reduction in overall national greenhouse gas emissions, totalling 30Mt in 2013.

COMPLIANCE AND ENFORCEMENT

The Regulations outline the responsibilities of dealers of prescribed products that are imported into Canada or shipped from one Canadian province to another for the purpose of sale or lease. NRCan relies on several monitoring strategies: dealer self-monitoring; energy efficiency and import reporting; product testing; collaboration; and tips and complaints.

To monitor compliance with the Regulations, NRCan collects data from energy efficiency reports submitted by dealers before a product enters the market and from import documents provided to the Canada Border Services Agency at the time of importation. When a regulated product enters Canada, the import data is compared with the energy efficiency report data to confirm that the product meets the required energy performance levels. Information on the data requirements of the energy efficiency and import reports can be found by visiting NRCan’s [Guide to Canada’s Energy Efficiency Regulations web site](#).

Between April 1, 2013, and March 31, 2015, NRCan processed almost 5.4 million records relating to the importation of regulated energy-using products to Canada. More than 23 million new or revised model numbers were submitted to NRCan for entry into the department’s equipment database from dealers’ energy efficiency reports.

Estimated Impact of the *Energy Efficiency Regulations* (Aggregate Annual Savings)

Product (amendment number in brackets)	Energy saving (PJ)			GHG reductions (Mt)		
	2010	2020	2030	2010	2020	2030
Residential appliances (1)	117.20	133.84	133.84	13.26	15.60	15.60
Lamps – fluorescent/incandescent (2)	11.60	13.40	13.40	7.55	9.80	9.80
Motors (3)	16.30	17.70	17.70	2.03	2.14	2.14
Commercial heating, ventilating, and air conditioning (4)	6.40	7.50	7.50	0.43	0.57	0.57
Refrigerators (5)	4.92	10.96	10.96	0.25	0.67	0.67
Ballast/room air conditioners, PAR lamps (6)	3.96	9.44	9.44	0.60	1.20	1.20
Clothes washers, domestic water heaters, exit signs, chillers (8)	16.12	42.59	57.57	1.28	3.60	4.93
Air conditioners, commercial refrigeration (9)	1.64	5.51	8.51	0.16	0.55	0.84
General service lighting, commercial and industrial gas unit heaters, traffic and pedestrian signals, ceiling fan lighting, torchiere lamps, commercial clothes washers, residential wine chillers, commercial ice-makers, residential dishwashers, residential dehumidifiers, residential gas furnaces (10)	6.09	88.10	116.32	0.40	9.67	11.89
Residential boilers, dry-type transformers, commercial three-phase induction motors, external power supplies, large air conditioners and heat pumps, room air conditioners, standby power, commercial reach-in refrigerators, digital television adaptors, residential general service incandescent reflector lamps, industrial three-phase induction motors, commercial general service incandescent reflector lamps (11)	0.55	7.20	10.59	0.07	0.92	1.35
Change to implementation dates for general service lighting (12A)	0.00	-0.07	0.00	0.00	-0.01	0.00
Change to minimum energy performance standard for general service lighting (12B)	0.00	-13.82	-15.90	0.00	-2.24	-2.57
TOTAL	184.77	322.35	369.93	26.03	42.47	46.43

END NOTES

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- ⁵ 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
- ⁶ U.S. Department of Energy, *Accelerate Energy Productivity 2030: A Strategic Roadmap for American Energy Innovation, Economic Growth, and Competitiveness*, 2015, p. II www.energy2030.org/roadmap
- ⁷ Government of Canada, G20 Leaders’ Communiqué – Antalya Summit, 15–16 November 2015. pm.gc.ca/eng/news/2015/11/16/g20-leaders-communique
- ⁸ IEA, *Capturing the Multiple Benefits of Energy Efficiency*, 2015. www.iea.org/publications/freepublications/publication/Captur_the_MultiplBenef_ofEnergyEfficiency.pdf
- ⁹ IEA, *World Energy Outlook Special Briefing: Energy and Climate Change*, 2015, p. 4. www.iea.org/media/news/WEO_INDC_Paper_Final_WEB.PDF
- ¹⁰ Total emissions are from secondary energy use only, which excludes emissions from industrial processes and non-energy use.
- ¹¹ End-use sectors include residential, commercial/institutional, industrial, transportation, electricity generation and agriculture.
- ¹² IEA, *World Energy Outlook Special Report: Energy and Climate Change* 2015.
- ¹³ Annual appliance shipment data for the six major household appliance categories (refrigerators, freezers, dishwashers, electric ranges, clothes washers and electric clothes dryers) collected through the co-operation of the Association of Home Appliance Manufacturers Canada (AHAM Canada).
- ¹⁴ IEA, *World Energy Investment Outlook – Special Report*, 2014.
- ¹⁵ IndEco Strategic Consulting, *Leveraging Office of Energy Efficiency Funding*, 2015.
- ¹⁶ National Energy Use Database.
- ¹⁷ National Energy Use Database.
- ¹⁸ Mohsin Khan, *Commercial Kitchen Project*, Dalhousie University Office of Sustainability. www.dal.ca/content/dam/dalhousie/pdf/sustainability/Commercial%20Kitchen%20Report%20Final%20%20nov%202012.pdf
- ¹⁹ National Energy Use Database.
- ²⁰ National Energy Use Database.
- ²¹ National Energy Use Database.
- ²² National Energy Use Database.
- ²³ National Energy Use Database.
- ²⁴ National Energy Use Database.
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- ³⁰ National Energy Use Database.
- ³¹ National Energy Use Database.