Natural Resources Canada
Ressources naturelles Canada

ENERGY EFFICIENCY AND CANADA'S NET-ZERO FUTURE

REPORT TO PARLIAMENT UNDER THE *ENERGY EFFICIENCY ACT*

2020–2021

Canada

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Aussi disponible en français sous le titre : *Efficacité énergétique et avenir carboneutre pour le Canada : rapport au parlement en vertu de la Loi sur l'efficacité énergétique 2020-2021.*

Cat. No. M141-37E-PDF
ISSN 2562-1408

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MESSAGE FROM THE MINISTER OF NATURAL RESOURCES

Canada has committed to achieving net-zero emissions by 2050 to build a stronger, more resilient and more sustainable Canada.

Enhancing energy efficiency is a cornerstone of the government's ambitious climate plan to achieve these goals. According to some estimates, energy efficiency actions could reduce energy demand and get us almost one-third of the way to our Paris targets.

To do this, we need to take thoughtful and decisive action now to increase Canadian competitiveness, drive growth and ensure prosperity for communities across Canada in the low-carbon future.

The benefits of taking decisive action go far beyond combatting the changes in our climate. Energy efficiency supports more than 436,000 existing jobs in the sector and can create even more of them in communities right across the country — all while reducing greenhouse gas emissions and improving energy affordability for Canadians.

And this, too, must be central to our actions. If we act to seize the economic opportunities that the energy transition will enable, we will improve our natural environment and continue to build a prosperous, sustainable and equitable society.

This report provides an overview of actions to advance energy efficiency in homes, buildings, industry, transportation and the use of appliances and other equipment, as well as those that promote the use of alternative energy sources, including clean fuels. It also outlines how the government is leading by example in its own operations, including enhancing energy efficiency through increasingly stringent national standards, codes and practices, as well as its ongoing collaboration with key partners such as the provinces and territories, international counterparts, businesses and industry.

All of these efforts are making a difference. Since 2000, Canada has boosted its energy efficiency by over 12 percent annually — saving Canadians more than $26 billion in energy costs.

Canada is also leading on the international stage, joining like-minded countries that make up the Three Percent Club — a group of nations committed to a three-percent improvement in global energy efficiency every year.

While this report demonstrates real and significant progress, we know that more needs to be done to meet and exceed Canada's 2030 climate goals. We continue to call on all levels of government to enhance their ambition on climate action and on businesses, industries and Canadians to answer this call to action.

We must work together to develop a competitive economy based on the sustainable use of our natural resources — an economy that creates wealth and jobs in every region of this country while ensuring we preserve our environment and achieve our ambitious climate goals.

Energy efficiency is key to this goal. By using less energy in our homes and businesses, as well as cleaner fuels in the vehicles we drive, all of us can contribute to a cleaner, healthier, more prosperous Canada for generations to come.

We collectively have the tools and the will to make this happen.

The Honourable Jonathan Wilkinson, P.C., M.P.
Minister of Natural Resources

MAXIMIZING CANADA'S ENERGY EFFICIENCY POTENTIAL

Over the past 20 years, Canada has demonstrated the significant impact that energy efficiency measures can have on the environment and the economy. Technology advancements, policies, programs, and consumer and business choices have successfully lowered greenhouse gas (GHG) emissions by nearly 55 megatonnes (Mt) and saved Canadians more than $26 billion in energy costs in a year.

In 2020, Canada joined the Three Percent Club with international partners, including 15 other countries, committing to working toward a 3% improvement in global energy efficiency every year. This goal requires federal departments, provinces, territories, municipalities, communities, businesses and others to keep working together to achieve the full potential and benefits of energy efficiency.

ENERGY EFFICIENCY GAINS IN 2018

1,002 of PJ energy saved

$26.2 billion of avoided energy costs

54.7 Mt of avoided emissions

Since 2000, Canada has boosted its efficiency by

12.3%

WE ARE FOCUSING CANADA'S EFFORTS IN KEY AREAS

- Supporting high-performance renovations and new construction of homes and buildings to transform the built environment
- Driving industrial energy efficiency to help industry become more productive and competitive, while stimulating innovation and decarbonization
- Making zero-emission vehicles more accessible and reducing emissions from medium- and heavy-duty vehicles
- Leading by example through energy-efficient federal operations and domestic and international partnerships

ENERGY EFFICIENCY ACTIONS IN 2020–2021

Committed **$2.6 billion** to help homeowners make energy efficient retrofits to their homes by providing up to **700,000** grants of up to $5,000, supported by EnerGuide energy assessments. Support for recruitment and training of EnerGuide energy advisors will create new jobs across Canada. This effort will be complemented by a future low-cost loan program.

As of March 2021, Canada's National Housing Strategy had committed over **$14.5 billion** to support the creation and repair of over **143,500** energy efficient, accessible and socially inclusive housing units.

Made improvements to the EnerGuide Rating System to better reflect energy-efficient construction and renovation practices, including the introduction of an energy consumption-based rating scale and new renovation recommendation reports for homeowners.

Published a Model National Framework for energy benchmarking, labelling and disclosure for commercial and institutional buildings to provide best practices and guidelines to other jurisdictions and organizations. To date, funding has been provided for **13** initiatives that help provinces, territories, municipalities and others to benchmark, label and disclose energy use.

Worked with the Canadian Standards Association to develop and offer training materials, videos, and tools on the National Energy Code of Canada for Buildings, and to publish the new standard for existing building commissioning, Z5001.

Canada became Chair of Energy Efficient End-Use Equipment (4E) Technical Cooperation Program. This International Energy Agency program involves a group of 15 countries promoting standard alignment internationally and collaborating in the field of energy-efficient appliances and equipment.

Committed **$1.5 billion** for the Green and Inclusive Community Buildings program, with at least **$150 million** allocated to Indigenous projects. Retrofit projects must obtain at least a 10% energy savings and demonstrate an expected reduction in GHG emissions. New builds are required to be net-zero-carbon or net-zero carbon ready.

Launched the Canada Infrastructure Bank's **$6-billion** Growth Plan, with **$2 billion** dedicated to building retrofits. Eligible retrofit projects will use ENERGY STAR® Portfolio Manager® to support energy and GHG performance reporting.

Directed funding through the Municipalities, Universities, Schools and Hospitals (MUSH) Retrofit stream of the Climate Action Incentive Fund to support energy efficiency projects in schools. Students in about **422** schools in Canada will benefit from cleaner air, better insulation, and newer heating and cooling systems.

Initiated development of the next amendment to the *Energy Efficiency Regulations* (the Regulations). Amendment 17 updates energy efficiency standards and testing standards for products used in our homes and helps Canadians to benefit from lower energy bills associated with higher energy efficiency products (see Annex I).

Continued to set the direction for the building construction industry through higher performance energy codes set for publication in late 2022.

Delivered **44** events and training sessions across Canada and developed tools, such as a cost-benefit tool for net-zero-energy ready (NZER) housing, under the Local Energy Efficiency Partnerships initiative.

Launched the third call for proposals under the **$48.3-million** Energy Efficient Buildings RD&D Program, focusing on deep retrofits and support to provincial, territorial, and municipal initiatives that will accelerate development and adoption of local building codes.

ENERGY EFFICIENCY ACTIONS IN 2020–2021

Supported the launch of **2** new funding streams under the Federation of Canadian Municipalities' Green Municipal Fund, enabled by a $950-million federal investment in 2019. The Community Efficiency Financing stream supports innovative municipal residential energy programs, and the Sustainable Affordable Housing initiative funds energy efficiency projects in new and existing affordable, social, and market housing units.

The Green Municipal Fund of the Federation of Canadian Municipalities established **6** Low Carbon Cities Canada (LC3) centres in the Calgary, Edmonton, Greater Toronto and Hamilton area, Halifax, Ottawa and Montréal, enabled by a federal endowment. LC3 supports cities and communities in reaching their carbon emissions reduction potential.

Announced an investment of **$8 billion** over five years for the new Strategic Innovation Fund – Net Zero Accelerator Initiative. This initiative will rapidly expedite decarbonization projects with large emitters, scaling up clean technology and accelerating Canada's industrial transformation across all sectors.

Announced an additional **$150 million** (bringing total investments to $280 million over five years) for the Zero Emission Vehicle Infrastructure Program (ZEVIP). This will establish more charging and hydrogen refuelling stations across Canada, such as in public places, on the street, in multi-unit residential buildings, and in workplaces. Support is also available for on-road light-, medium- and heavy-duty vehicle fleets.

Provided over **$200,000** to support training opportunities for Canadians in the energy efficiency sector, including the creation of a training hub to help Canadians better understand how to transition into the in-demand energy efficiency workforce.

Published a self-assessment tool and guide to provide feedback on the impact of efficient heating, ventilation and air conditioning (HVAC) operation strategies during and after a pandemic. The guide highlights key areas and best practices for efficient HVAC operation and helping building operation teams to respond with greater confidence.

Funded **3** projects to support implementation of energy management systems in First Nations communities in British Columbia, including one with Kaska Dena Council that resulted in the implementation of an ISO 50001-compliant energy management system for 25 band buildings and facilities in three communities.

Supported **6** energy efficiency projects in **6** northern communities through the Northern REACHE program. The program has supported **23** unique energy efficiency projects in **22** communities since its inception in 2016.

Updated the Greening Government Strategy, setting new targets to reduce operational GHG emissions to reach net-zero by 2050 in federal buildings, conventional fleets, national safety and security operations, and procurement and ensuring assets are climate resilient. More ambitious targets have been set to reach a **40%** reduction in GHG emissions from federal facilities and conventional fleets by 2025 and have net-zero emissions by 2050.

Committed an additional investment of **$287 million** to continue the Incentives for Zero-Emission Vehicles Program (iZEV). The program provides a point of sale incentive of up to $5,000 for the purchase or lease of eligible light-duty zero-emission vehicles, making it easier for consumers and businesses to adopt this clean technology. As of August 2020, over 56,000 Canadians had purchased an eligible vehicle through the program, totalling more than $239 million in rebates.

ENERGY EFFICIENCY BY THE NUMBERS

2020–2021 RESULTS

Nearly
10,000
new homes have received EnerGuide, ENERGY STAR® or R-2000 labels, saving **20%** to **50%** more energy than typical new homes.

60,000
existing homes evaluated with the EnerGuide Rating System.

In 2020, ENERGY STAR certified products saved over **40 PJ** of energy and avoided about **4 Mt** of GHG emissions.

2020 public opinion research showed that **73%** of Canadians are aware of the ENERGY STAR brand, up **23%** from 2018.

Amendments made to Canada's *Energy Efficiency Regulations* since 1995 saved **331 PJ** of energy and avoided over **43 Mt** of GHG emissions in 2020.

Over
26,000
commercial and institutional buildings – representing **324 million m²** - were captured in the ENERGY STAR Portfolio Manager benchmarking tool.

177
commercial and institutional buildings ENERGY STAR certified in 2020.

12
projects were supported to date under the Energy Efficient Buildings RD&D Program.

27
industrial facilities were registered in the ENERGY STAR for Industry Challenge to date, committing to reduce their energy use by 10% within 5 years.

20
facilities were certified as high-performing through the ENERGY STAR for Industry certification program since it launched in 2018 – **17** in 2020–2021 alone.

Over
160
Canadian industrial, commercial and institutional facilities are ISO 50001-certified.

Co-funded **15** Industrial Energy Management Program projects to support adoption of energy management systems and energy efficiency solutions for industry in Canada.

Over
48,000
trucks from over **580** private sector firms are benchmarking their fuel consumption through the SmartWay Partnerships program.

More than
6,000
medium- and heavy-duty truck assessments and over **2,900** fuel-saving retrofits supported by the Green Freight Assessment Program.

69% of eligible federal light-duty fleet vehicle purchases were zero-emission vehicles or electric hybrid vehicles, bringing the total in the federal fleet to **1,493**.

29 projects were supported to date under the Electric Vehicle Infrastructure Demonstration program.

The Electric Vehicle and Alternative Fuel Infrastructure Deployment Initiative and the Zero Emission Vehicle Infrastructure Program supported projects that will result in **4,852** fast chargers for electric vehicles, **1** additional natural gas station on key freight routes, and **7** hydrogen stations in metropolitan centres.

THE MULTIPLE BENEFITS OF ENERGY EFFICIENCY

This year has taught us that swift and decisive action is possible and necessary to achieve a healthy and prosperous future for all Canadians. Beyond tackling climate change, energy efficiency supports the health of Canadians, the environment and the economy in other important ways.

THE ENVIRONMENT

1,002 PJ of energy were saved in 2018, equivalent to the energy use of

9.8M homes for one year.

- Plays a significant role in climate change mitigation
- Improves air quality and climate resiliency

THE ECONOMY

$355B GDP net growth is projected from energy efficiency measures between 2017 and 2030.

- Savings are reinvested in the economy and support recovery.
- Incentivizes investments to improve aging building stock
- Increases industrial productivity

SKILLED WORKFORCE

436,000 Canadians work in the energy efficiency sector.

- Rapidly growing sector that supports well-paying, local jobs
- Opportunities for upskilling, reskilling and increasing participation by underrepresented groups

HEALTH & WELL-BEING

4:1 benefit-cost ratio for health impacts from efficiency measures

- Improves physical and mental health
- Makes homes more comfortable
- Reduces the burden on healthcare systems

GLOBAL COMPETITIVENESS

$300B global energy efficiency market and growing

- Enables compliance with increasingly stringent regulations and societal expectations
- Supports Canada's position as a global provider of choice for clean energy and related technology

ENERGY SECURITY

50% potential reduction in home heating costs

- Cuts energy waste and helps reduce energy poverty
- Lowers energy bills for customers
- Reduces the impact of energy price fluctuations on households

COMMUNITIES

$526 savings in the energy use of the average annual household from energy efficiency improvements in 2018

- Supports affordable housing
- Helps reduce the reliance on diesel in remote communities
- Eases pressure on energy infrastructure

THE ROLE OF CLEAN FUELS IN DRIVING A NET-ZERO FUTURE

As the world strives to achieve net-zero emissions by 2050, countries and businesses will make a major shift to cleaner and non-emitting fuels. Clean fuels are essential to reach our net-zero goals. They will enable deep GHG reductions, drive economic opportunities, help Canada's energy sector pivot toward low-carbon growth, and enhance our energy security. Canada has the resources and expertise to be a leader in the clean energy transition.

Activities to promote the use of alternative energy sources – including clean fuels – are enabled under the *Energy Efficiency Act*.

CLEAN FUELS ACTIONS IN 2020–2021

Invested **$1.5 billion** to establish a Clean Fuels Fund to support building new clean fuel production capacity, to establish sustainable biomass supply chains, and to develop essential codes and standards.

Released proposed regulations for the *Clean Fuel Standard*, which will reduce the carbon intensity of liquid fossil fuels produced in or imported into Canada. It is proposed for 2022.

Launched the *Hydrogen Strategy for Canada*, which is a call to action for all levels of government, the private sector, and Indigenous groups, to seize the economic and environmental opportunities that hydrogen offers across the country, while positioning Canada as a supplier of choice to the world for clean hydrogen and the technologies that use it.

Committed **$750 million** to support Canada's growing cleantech sector by recapitalizing Sustainable Development Technology Canada. This initiative will continue to support Canadian companies with the potential to become world leaders in their efforts to develop and demonstrate new environmental technologies. Such technologies address climate change, clean air, clean water and clean soil. The initiative will also support more larger-scale technology projects focused on achieving significant decarbonization in Canadian sectors. The projects may include first-of-kind, large demonstration-scale facilities for the production of next-generation renewable fuels.

SHOWCASING OUR COLLECTIVE ACTIONS IN 2020–2021

VALIDATING NET-ZERO ENERGY READY CONSTRUCTION, TECHNOLOGY, AND DESIGN IN THE BUILDINGS SECTOR

The Energy Efficient Buildings RD&D program announced $2.4 million for the Canadian Home Builders' Association. The funds will be used to validate the use of panelized/modular construction and integrated mechanical systems on net-zero energy ready and net-zero energy multi-unit residential buildings (MURBs). Up to six demonstration projects encompassing over 100 residential units are being undertaken in British Columbia, Alberta, Saskatchewan and Ontario to address all major Canadian climate zones. The projects will track building performance through one full year and help build market confidence in net-zero energy ready construction.

SUPPORTING JOB CREATION AND GHG EMISSIONS REDUCTIONS THROUGH ENERGY MANAGEMENT IN NUNAVUT

In August 2020, Canada announced an $18.3-million investment through the Low Carbon Economy Leadership Fund to support Nunavut's South Baffin Energy Management Project. The project will help improve energy efficiency and will introduce renewable energy in 45 buildings owned by the Government of Nunavut in the six communities that make up the South Baffin region. Retrofits include upgrading lighting, mechanical and control-system upgrades, building envelope measures such as air sealing, and installing solar panels. The project is expected to create 300 jobs and reduce GHG emissions equivalent to taking 7,000 cars off the road for a year.

INNOVATION IN HEATING FEDERAL BUILDINGS

The Department of National Defence and the Canadian Armed Forces (DND/CAF) launched the Green Heat Challenge in early 2021, seeking a large-scale, low-carbon energy generation system for heating existing federal buildings. A test building has been selected in Kingston, Ontario, for a design-build team to design and install an innovative system. The challenge is to find ways to convert the building to low-carbon heating without requiring a major building retrofit, which would be cost prohibitive. Currently, 60% of the energy requirements in DND facilities is for space heating, 90% of which is generated from fossil fuels. With more than 10,000 buildings in DND's portfolio, addressing the GHG emissions of these buildings is essential. The Green Heat Challenge is run under the Innovation for Defence Excellence and Security (IDEaS) program.

COLLABORATING TO STRENGTHEN INDUSTRIAL COMPETITIVENESS, LOWER OPERATING COSTS AND MAXIMIZE PROFITS, WHILE REDUCING POLLUTION

The Government of Canada and the Province of Alberta are implementing a $1.8-million multi-year investment to support Strategic Energy Management among a group of the biggest energy users and industrial emitters in the province. The pilot project is implementing energy management systems such as ISO 50001 and facilitating training and peer-to-peer knowledge sharing. The 13 facilities engaged in this initiative have reported over 300,000 tonnes of GHG emissions reductions, 9 petajoules (PJ) of energy savings, and over $20 million in annual operational cost savings. Other benefits include job creation, increased competitiveness, improved employee engagement, workforce upskilling, and safety and production improvements. The project is ongoing, and results are expected to continue growing.

SUPPORTING JOBS AND BUILDING CANADA'S GREEN ECONOMY

In October 2020, the Government of Canada and the Province of Ontario each invested $295 million in the Ford Motor Company of Canada to renovate its Oakville Assembly Complex to produce battery-electric vehicles (BEV). This $1.8-billion project will help secure 5,400 jobs in Canada and grow our green economy, especially in southern Ontario. This project will allow us to position the innovative Canadian automotive industry as a global leader in BEV manufacturing.

PROMOTING DATA-DRIVEN DECISION-MAKING AND INVESTMENTS IN FUEL SWITCHING

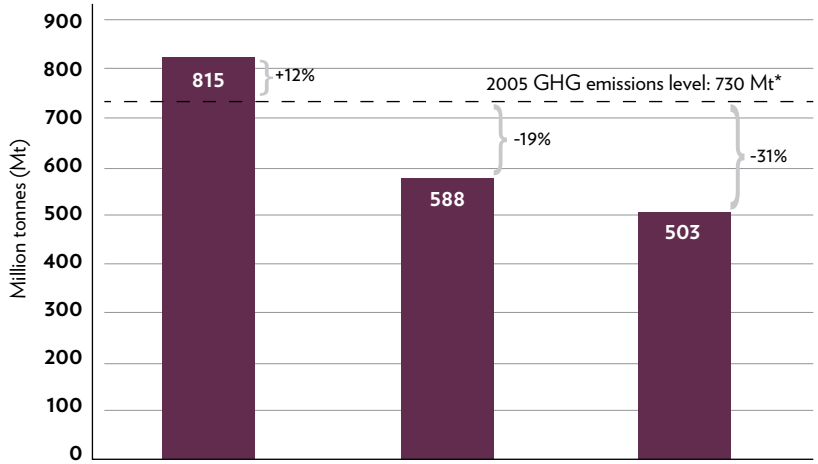
With support from the Green Freight Assessment program, ColdStar Solutions Inc. became one of the first Canadian companies to switch their fleet to trucks powered by compressed natural gas (CNG). The program provided energy use data to inform ColdStar's decision to adopt CNG trucks and provided resources that helped off-set the higher cost of a CNG truck ($150,000) compared to their diesel equivalent. This investment will make ColdStar more competitive by saving up to 30% on fuel – while reducing emissions by more than 25%.

ENERGY EFFICIENCY – A CORNERSTONE OF CANADA'S CLIMATE PLAN

Canada's strengthened climate plan – *A Healthy Environment and a Healthy Economy* – was introduced in December 2020. Building on the foundation of the 2016 *Pan-Canadian Framework on Clean Growth and Climate Change*, the plan can deliver the emissions reductions needed to exceed our original 2030 target and contribute significantly to achieving new, more ambitious targets. The government has passed legislation committing Canada to net-zero emissions by 2050.

FIGURE 1. PROJECTED CANADIAN GREENHOUSE GAS EMISSIONS IN 2030 (AS AT MARCH 31, 2021)

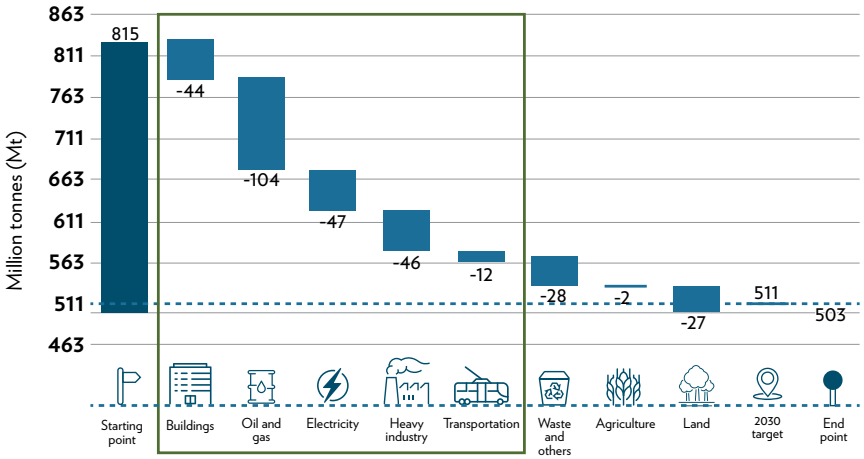
MEGATONNES OF CARBON DIOXIDE EQUIVALENT



* 2005 historical number based on the *2020 National Inventory Report*

FIGURE 2. SOURCES OF EMISSION REDUCTIONS CONTRIBUTING TO REACHING THE 2030 TARGET

MEGATONNES OF CARBON DIOXIDE EQUIVALENT



In April 2021, the Government of Canada announced it will enhance its emissions reduction target under the Paris Agreement – known as a Nationally Determined Contribution (NDC) – to 40 to 45% below 2005 levels, by 2030. This enhanced target was submitted to the United Nations Framework Convention on Climate Change on July 12, 2021. This target falls outside of the reporting period for this report.

SETTING A COURSE FOR A NET-ZERO FUTURE

WHERE WE ARE HEADED	***THE TOOLS TO GET US THERE***
HOMES AND BUILDINGS Accelerate high-performing retrofits and net-zero new construction by embracing new technologies, low-carbon building materials and innovative financing models and enable the next generation of skilled energy efficiency workers	• Model energy codes for homes and buildings • Energy efficiency standards for products and systems • Research, development and demonstration (RD&D) projects • Benchmarking and labelling energy performance • Investments in sustainable, resilient homes, buildings and communities
INDUSTRY Accelerate the uptake of energy management systems and raise the level of ambition in implementing activities across the industrial decarbonisation spectrum – energy efficiency, electrification and fuel switching	• Energy efficiency standards for products and systems • RD&D to advance clean technologies • Support and incentives for energy management systems, projects and certifications • Information sharing and capacity building
TRANSPORTATION Build momentum to decarbonize the transportation sector by fostering greater electrification, fuel switching, and energy-saving practices, while making zero-emission options more accessible and affordable	• Codes and standards aligned with the United States • Purchase incentives • Deployment of new electric vehicle (EV) and alternative fuel infrastructure • RD&D to support innovative vehicle and infrastructure technologies • Awareness and education to inform consumer and business decisions • Benchmarking, training and tools for green freight
LEADING BY EXAMPLE Leverage the government's purchasing power to model and encourage net-zero, climate-resilient and sustainable government operations and build partnerships to position Canada as a leader in the transition to a net-zero future	• An updated Greening Government Strategy • Domestic partnerships, such as *Build Smart – Canada's Buildings Strategy* with provinces and territories • International leadership and partnerships
CLEAN FUELS Advance the clean fuels sector and grow the market by levering natural advantages such as vast feedstocks and a low-emitting grid and by supporting global pace-setting technologies to position Canada as a leading producer and consumer of clean fuels	• Enabling codes and standards • Investing in clean fuels RD&D, production and use • Supporting pace-setting technology • Regulations

ENERGY EFFICIENCY REGULATIONS

ADMINISTRATION

Natural Resources Canada (NRCan) has initiated the development of the next amendments to the Regulations. The amendments will reduce energy consumption and support the Government's climate change objectives and its commitments to addressing unnecessary regulatory differences within Canada and North America. The details can be found in NRCan's Forward Regulatory Plan for 2021 to 2023.

ENFORCEMENT

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.

Between April 1, 2020, and March 31, 2021, NRCan processed almost 3.2 million records relating to the importation of regulated energy-using products to Canada. More than 10.3 million new or revised model numbers were submitted to NRCan for entry into the department's equipment database from dealers' energy efficiency reports.

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