

GOVERNMENT RESPONSE

INTRODUCTION

The Government of Canada is pleased to respond to the Seventeenth Report of the Standing Committee on the Environment and Sustainable Development (the Committee), entitled *Better Buildings for a Low-Carbon Future*. The Government would like to thank the committee members for their efforts in developing this report, as well as the witnesses who provided expert testimony and shared diverse perspectives on how to accelerate the transition to more energy-efficient buildings that emit fewer greenhouse gas (GHG) emissions.

As highlighted by the Committee, making buildings more energy efficient benefits both the economy and the environment. Canada is a large country, with a population dispersed across six distinct climate zones where Canadians build, live and work. The energy used to power, heat and cool buildings and run appliances accounts for 17 percent of Canada's GHG emissions.

The Government of Canada is working towards a new energy vision for Canada, and energy efficiency is an important part of that equation. When we invest in energy efficiency improvements to Canada's built environment—including homes, hospitals, schools, and our places of work—we are investing in our environment, our economy, and our health and overall comfort.

In addition to saving energy and reducing GHG emissions, energy efficiency improvements provide direct benefits back to Canadians through lower energy bills, higher asset values for homes and buildings, and healthier indoor environments. In Canada's Northern and remote communities, energy efficiency measures can help reduce reliance on diesel and provide savings to communities.

Investments in energy efficiency also contribute to the competitiveness and productivity of Canadian industry and businesses. As we innovate and adopt new energy efficiency solutions, we make Canada's green building sector a global leader. Between now and 2030, energy efficiency measures are expected to boost Canada's gross domestic product by more than \$350 billion and create 118,000 jobs.

Recognizing the multiple benefits of energy efficiency, the Government is taking significant action to accelerate the uptake of energy-efficient buildings in Canada. In December 2016, under the Pan-Canadian Framework on Clean Growth and Climate Change (PCF), federal, provincial, and territorial governments committed to improve energy efficiency by updating building codes, labelling building energy use, prioritizing retrofits, setting new standards for equipment, and supporting energy-efficient homes and buildings in Indigenous communities. In 2017, federal, provincial and territorial Energy Ministers released *Build Smart: Canada's Buildings Strategy*, which provides an implementation plan for PCF actions targeting the built environment.

Key funding envelopes announced in Budgets 2016 and 2017, such as the \$2 billion Low Carbon Economy Fund and \$21.9 billion for Green Infrastructure initiatives under the Investing in Canada Plan, are also supporting energy-efficient building projects across Canada. For example, Natural Resources Canada's (NRCan) Green Infrastructure programs include \$182 million over eight years, starting in 2018-19, to improve how homes and buildings are designed, constructed and renovated.

In November 2017, the Government of Canada launched the first-ever National Housing Strategy, a 10-year, \$40 billion plan to help ensure Canadians have access to housing that meets their needs and that they can afford. Building projects with ambitious energy efficiency standards are being prioritized under this Strategy.

Finally, the Government is committed to leading by example on climate change. In December 2017, it announced a new Greening Government Strategy that includes measures to reduce emissions from federal buildings. Collectively, these initiatives, and other targeted programs, are contributing to better buildings in Canada as envisioned by the Committee.

Looking forward, Canada's long-term transition to a low-carbon economy demands that we ensure new and existing buildings are more efficient from coast to coast to coast. Energy-

efficient buildings are an area of shared jurisdiction, and the Canadian Energy Strategy and the PCF will continue to facilitate national collaboration in this area. The Government will also continue to work closely with Indigenous partners to support buildings solutions tailored to the unique context of Canada's northern, remote and Indigenous communities.

Through Canada's national energy dialogue, Generation Energy, Canadians made it clear that the transition to energy-efficient buildings is necessary for a national energy future that is clean, reliable, low carbon, and affordable. In its June 2018 report, the Generation Energy Council proposed a new energy vision for Canada and a new way forward for energy efficiency. Beyond existing programs, Canada could explore broader instruments to increase uptake of energy efficiency solutions, engage Canadian consumers in leveraging low-carbon products, services and technologies, and amplify the impact of local projects.

With these investments and goals in mind, the Government of Canada has responded to the 21 recommendations of the Committee's report.

IMPLEMENTATION OF BUILDING EFFICIENCY IMPROVEMENTS THROUGH MODEL CODES

RECOMMENDATION 1:

The Committee recommends that the National Research Council, working with the Canadian Commission on Building and Fire Codes, publish the national model energy codes for both new and existing buildings as soon as possible, and for existing buildings no later than fiscal year 2022-23.

The Government supports this recommendation, which is consistent with commitments made under the PCF. Specifically, federal, provincial and territorial governments committed to develop and adopt increasingly stringent model codes, starting in 2020, with the goal of provinces and territories adopting net-zero energy ready codes by 2030. They also committed to develop a model energy code for existing buildings. Development of these model codes for new and existing buildings is underway and on track for publication by fiscal year 2022-23.

The National Research Council (NRC) and NRCan are supporting the work of the Canadian Commission on Building and Fire Codes (CCBFC) to develop these ambitious national model energy codes for new and existing buildings. Development of the codes is a collaborative and consensus-based process that is informed by other levels of government, stakeholders, and extensive consultation with Canadians.

RECOMMENDATION 2:

The Committee recommends that the National Research Council work with the Canadian Commission on Building and Fire Codes to add a new core objective to the national model codes that clearly identifies the importance of increasing energy efficiency and decreasing greenhouse gas emissions in Canada's buildings.

Energy efficiency requirements are found in the National Building Code of Canada for homes and small buildings, and the National Energy Code of Canada for large buildings. In support of commitments made under the PCF to develop and adopt increasingly stringent model energy codes for buildings, the NRC is currently supporting the CCBFC's work to update the core objectives of national model codes, with the first modifications expected in fiscal year 2020-21.

The CCBFC is an independent committee of volunteers established by the NRC to provide direction and oversight on the development of model codes. The CCBFC makes decisions on revisions and updates to codes based on proposals received from governments, industry and other stakeholders. The Government will continue to support the CCBFC in any efforts to add core objectives to model codes to increase energy efficiency and decrease GHG emissions from Canada's buildings.

RECOMMENDATION 3:

The Committee requests that Global Affairs Canada and Finance Canada respond to this report with a full description of how recent trade agreements signed by Canada have reduced tariffs on products and services that are specifically relevant to low-carbon building materials.

The Government of Canada is committed to ensuring that its free trade agreements (FTAs) encourage mutually supportive trade and environmental outcomes. FTAs and the reduction of trade barriers help to create conditions that facilitate trade and investment in environmentally friendly technologies. In its FTAs, Canada seeks to negotiate ambitious environment chapters that commit Parties to uphold high levels of environmental protection as trade is liberalized. Such provisions promote sustainable development and environmental conservation, as well as a level playing field for businesses. Canada's environment provisions in recent FTAs, such as in the Comprehensive and Progressive Agreement for a Trans-Pacific Partnership (CPTPP) and the Canada-European Union Comprehensive Economic and Trade Agreement (CETA), cover an expanded range of subjects, including commitments to promote trade and investment in environmental goods and services.

Reducing tariffs on low-carbon building materials supports the increased adoption of these materials in Canada. Canada's FTAs typically eliminate tariffs on all industrial products by all Parties. In its recent FTAs (e.g., CETA, CPTPP), tariffs are eliminated immediately on entry into force for a number of goods that may be relevant to low-carbon building materials, such as wood products, insulating materials, and high-efficiency windows.

Canada does not impose barriers on the import of environmental services, and our FTAs include obligations that prevent such barriers from being imposed. This allows for a large variety of environmental services to be imported by Canadian companies at competitive prices, in particular in situations where these services are not available in Canada.

These trade principles and commitments complement domestic energy efficiency goals for equipment in the building sector, set in August 2017 by federal, provincial and territorial Energy Ministers. Over the last year, governments have consulted with stakeholders in the building sector to create a five-year road map to bring new and higher energy-efficient technologies (e.g., space heating, water heating, windows) to market and encourage their adoption. The road map, released in August 2018, provides a path forward for stakeholders across the Canadian economy to engage with governments in coordinated RD&D and market deployment activities, in order to accelerate uptake and reduce costs of higher-efficiency products.

Additionally, through Green Infrastructure investments, NRCan is supporting proposals from a range of applicants, including builders, developers, provinces and territories, for real-world demonstration projects that seek to lower the cost of building to higher standards. This work will help reduce the costs of code compliance through innovative technology solutions, demonstration projects in all climates, and increased construction industry knowledge and experience.

RECOMMENDATION 4:

The Committee recommends that Employment and Social Development Canada ensure that programs exist or are established to address the labour transition required so that skilled personnel are available to implement net-zero energy ready codes.

Employment and Social Development Canada (ESDC) has several existing policy and program tools that can be leveraged to help workers acquire the skills they need to comply with net-zero building codes. ESDC invests approximately \$3 billion annually in labour market transfer agreements with provinces and territories to support the delivery of programs and services that enable workers to upgrade their skills to meet emerging labour market needs. At the same time, ESDC is directly supporting the development of forward-looking labour market information and skills training, including through Future Skills and sectoral initiatives, that are intended to help Canadians prepare for changing needs across a number of industries, including construction. In collaboration with provinces, territories and other stakeholders such as unions and training providers, ESDC will continue to work to ensure that Canadians are able to access supports to develop their skills to meet changing labour market needs and prepare for the jobs of tomorrow.

ESDC also supports apprenticeship initiatives to promote training in the skilled trades, including apprenticeship grants and loans, the Union Training and Innovation Program, the

Women in Construction Fund and the Pre-Apprenticeship Program. The Government will continue to work closely with provincial and territorial apprenticeship authorities and industry in the skilled trades to develop occupational standards and examinations through the Red Seal Program.

The Government is also supporting the development of specific skills required for employment in green jobs. For example, the Green Jobs Science and Technology Internship program is investing more than \$16 million to create 1,200 jobs as part of Canada's Youth Employment Strategy. This program provides opportunities for post-secondary graduates to gain relevant work experience through green jobs in science, technology, engineering and math fields in the natural resources sector. NRCan is also exploring opportunities to collaborate with non-government organizations, trade associations and provincial and territorial governments to develop training resources to support implementation of net-zero energy ready codes by 2030.

ENERGY RETROFITTING OF CANADA'S EXISTING BUILDINGS

RECOMMENDATION 5:

The Committee recommends that Natural Resources Canada, the National Research Council, and the Canada Mortgage and Housing Corporation work together to develop a national strategy for energy retrofits of existing buildings that reflects regional differences and targets the most effective emissions reduction opportunities.

The Government supports this recommendation, recognizing that more than 75 percent of the homes and buildings that will be in use in 2030 have already been built. Canada's Buildings Strategy under the PCF articulates a national strategy to increase the energy efficiency of existing buildings. The Government of Canada is committed to working with provinces and territories to complement and support regional actions without duplicating them, and provide the flexibility to design programs that reflect regional circumstances for greatest impact. Through the Low Carbon Economy Fund, the Government of Canada is working with provinces, territories and others to invest \$2 billion across Canada to support projects that provide innovative solutions to reduce pollution, and create cleaner and healthier communities, including projects to retrofit homes and buildings.

Additional federal efforts under the PCF are also contributing to a national approach to retrofits. The new model energy code for existing buildings will consider regional climatic differences and construction styles and materials. NRCan is also consulting with industry stakeholders across Canada to inform the development of a framework to address barriers to recommissioning of existing buildings. Additionally, Canada's *Energy Efficiency Regulations* set minimum energy performance standards for energy-using equipment found in buildings, and upcoming updates will focus on the most effective emission reduction opportunities.

Under the National Housing Strategy, the Government of Canada, through the Canada Mortgage and Housing Corporation (CMHC), plans to create up to 100,000 new affordable housing units and repair or renew 300,000 existing units across Canada. Housing projects under the Strategy's \$13.2 billion National Housing Co-investment Fund, launched in May 2018, will be required to meet ambitious minimum energy efficiency and GHG emission requirements in order to qualify for funding.

RECOMMENDATION 6:

The Committee recommends that Infrastructure Canada work to provide significant funding in order to accelerate energy retrofits of commercial, institutional, and multi-residential buildings in the public and private sectors, such as through the Canada Infrastructure Bank.

The Government has implemented several initiatives to support energy efficiency retrofits in commercial, institutional, and multi-residential buildings. Infrastructure Canada will be investing \$9.2 billion through the Green Infrastructure stream of the Investing in Canada Plan's bilateral agreements with provinces and territories. This stream supports energy efficiency retrofits to eligible public infrastructure (e.g., recreational centres, water and wastewater treatment facilities, public transit stations), as well as initiatives such as clean energy generation and the development of district energy systems. Additionally, the Government is investing in residential, commercial and industrial energy efficiency retrofits

as part of the \$2 billion Low Carbon Economy Fund, delivered by Environment and Climate Change Canada.

Under the National Housing Strategy, the National Housing Co-investment Fund will support energy efficiency retrofits over the next 10 years with \$3.46 billion available through low-cost repayable loans and \$2.26 billion in capital contributions for the repair or renewal of affordable rental housing, with a focus on community housing. Projects must demonstrate that they will achieve a minimum 25 percent reduction in energy use and GHG emissions relative to pre-repair or pre-renewal.

Finally, the Government has allocated \$5 billion to the Canada Infrastructure Bank to support investments in green infrastructure. The Bank has been operational since December 2017 and continues to build its capacity to consider projects that align with its investment mandate to support revenue-generating projects that advance the public interest through partnerships with private and institutional investors.

RECOMMENDATION 7:

The Committee recommends that Natural Resources Canada, in collaboration with the National Research Council and the Canada Mortgage and Housing Corporation, develop guidance and tools to support verification of the effectiveness of completed energy retrofits.

The Government of Canada recognizes the need for guidance and tools to verify the effectiveness of completed energy retrofits, and provides federal leadership in this area through NRCan's energy efficiency programs. NRCan offers nationally-consistent tools and delivery networks to support programs led by provinces and territories, municipalities, utilities and others.

For low-rise residential buildings, NRCan's EnerGuide Rating System provides a standardized tool and approach for home evaluations to assess and validate energy performance before and after retrofits. An EnerGuide home evaluation provides information for builders and homeowners when operating, renovating or purchasing a home. More than 50 programs and regulations delivered by provinces, territories, municipalities and utilities across Canada use the EnerGuide Rating System to support their residential energy efficiency initiatives, and since 1998, more than one million homes in Canada have received an EnerGuide rating.

For larger buildings, NRCan administers the ENERGY STAR Portfolio Manager tool, a free, interactive online energy performance benchmarking tool that allows building owners and operators to track and assess the energy performance of their buildings, and to compare their energy performance with their peers. It provides key performance metrics to integrate into a strategic management plan for energy consumption, water consumption, and GHG emissions. For multi-unit residential buildings, through NRCan's Program for Energy Research and Development, CMHC and NRCan have worked together to develop various tools including a Post Occupancy Evaluation protocol that can be used to assess the energy performance of new construction or retrofit projects. CMHC and NRCan are also collaborating to develop case studies that will provide guidance on the costs, benefits and effectiveness of energy retrofits.

RECOMMENDATION 8:

The Committee recommends that the federal government create or adopt a measurement tool to take into account the net carbon emissions avoided through adaptive reuse of existing buildings.

The Government supports this recommendation, and has committed through the PCF to undertake ongoing monitoring and reporting to ensure that policies are effective, take stock of progress, and inform Canada's future national commitments in accordance with the Paris Agreement on climate change. As part of the reporting process, Environment and Climate Change Canada produces, in keeping with United Nations Framework Convention on Climate Change reporting guidelines, the *National Inventory Report* on GHG sources and sinks, using methods and models developed by departmental engineering and scientific staff that are consistent with Intergovernmental Panel on Climate Change guidance. The underlying data and methodologies for estimating emissions are continuously improving, providing opportunities to refine information, approaches and measurement tools.

The Government is examining how life-cycle analysis can help to provide a more complete assessment of overall emissions impacts. Total emissions across all sectors, rather than just the buildings sector, can provide an economy-wide perspective as emissions improvements or regressions in one sector may be offset by another sector.

Affordable housing is also being monitored for emissions reductions under the National Housing Strategy. CMHC is exploring the development of an energy and GHG life-cycle analysis tool that funding applicants can use to assess the longer-term operating performance of their affordable housing projects. CMHC will investigate how this tool could be adapted and applied to assess the net carbon emissions associated with adaptive reuse housing projects. To complement this goal, the PCF also calls for mandatory energy-use labelling for buildings. Expanded labelling and energy disclosure will allow Canadians to determine whether adaptive reuse is an environmentally friendly option in individual circumstances.

RECOMMENDATION 9:

The Committee recommends that, as the federal government takes steps to recognize the value of embedded carbon in existing construction, it should take into account the unique characteristics of heritage buildings and the public interest in their protection.

The federal government recognizes the value of embedded carbon and the GHG emissions associated with the life-cycle of a building, including infrastructure construction, maintenance and decommissioning. The Government is committed to reducing the environmental impact of building materials using life-cycle assessment techniques to minimize embodied carbon and the use of harmful materials in construction and renovation. The Greening Government Strategy, launched in December 2017, recommends that all new federal construction and major renovation projects conduct a complete life-cycle assessment. With this in mind, the Government agrees that the value of embodied carbon of heritage buildings should be recognized and that special consideration be given to preserve and protect the value of heritage buildings, including their character-defining elements.

VOLUNTARY BUILDING STANDARDS: RAISING THE BAR FOR EFFICIENCY

RECOMMENDATION 10:

The Committee recommends that Natural Resources Canada, the National Research Council, and Environment and Climate Change Canada include building operator and building inspector training as part of federal funding, research, and incentive programs aimed at improving energy efficiency and reducing greenhouse gas emissions from the built environment.

The Government of Canada recognizes the importance of training building operators and building inspectors to achieve greater energy performance and GHG reductions. NRCan's Green Infrastructure programs are supporting energy code training and compliance, and this work was initiated in 2017 by undertaking market and needs assessments focused on building knowledge capacity across Canada. The Government is exploring opportunities to collaborate with non-government organizations, trade associations and provincial and territorial governments, with the goal of increasing access to training for building operators and building inspectors, and to develop training materials to support the accelerated implementation of new building energy codes.

Additionally, NRCan offers a number of resources and tools to enable improved energy management in buildings and uptake of voluntary building standards. Benchmarking and assessment tools such as ENERGY STAR Portfolio Manager, RETScreen and CAN-QUEST software help building owners and operators understand their energy use and evaluate energy-efficient options. NRCan and industry partners offer training resources to support the use of these tools.

The NRC is also developing technologies that allow building operators to monitor building energy efficiency and GHG emissions. The NRC informs operators and inspectors about advances in building energy efficiency and GHG reductions by attending technology transfer events and publishing in scientific journals and industry publications.

ENSURING CANADIANS HAVE THE INFORMATION TO MAKE SMART BUILDING DECISIONS

RECOMMENDATION 11:

The Committee recommends that Natural Resources Canada, in collaboration with the National Research Council, invest in methods (e.g. apps, web-based programs) through which building and home owners can obtain easily understood information about their estimated energy usage and carbon emissions, and to compare the economic and emissions impacts of various energy-efficiency retrofits.

The Government of Canada agrees that, as Canada transitions to a low-carbon future, it is essential to increase Canadians' awareness and understanding of energy efficiency options, and the opportunities to improve indoor comfort and health, lower energy bills and reduce GHG emissions through building, renovation and purchasing decisions. With this objective in mind, NRCan administers national programs such as ENERGY STAR and EnerGuide to help Canadians make energy-efficient choices for their homes and buildings. Currently, more than 80 percent of Canadians recognize the ENERGY STAR symbol, which is considered to be the most helpful consumer tool for energy efficiency. The EnerGuide Rating System was updated in 2016 to provide additional information for homeowners on their energy use and options for energy-saving renovations.

NRCan is also deploying other apps and web-based programs to help Canadians make informed choices. This includes an energy cost calculator for new appliances, a look-up tool to select home window products, savings calculators to show the impact of procuring energy-efficient products, a rebate finder tool, and the use of Carrot Rewards, a leading third-party behavioral insights app to encourage energy efficiency at home. To build upon this work, NRCan is supporting social innovation and digital approaches that test new and improved services and tools to inform homeowners. NRCan also offers online resources, including technical publications such as *Keeping the Heat In*, which provide important considerations when retrofitting a home.

Looking ahead, under the PCF, federal, provincial and territorial governments agreed to work together to require labelling of building energy use by as early as 2019. While provinces and territories have jurisdiction over energy labelling regulations, the Government of Canada is supporting this commitment by developing national digital platforms that can be used by provincial and territorial initiatives. For example, the Government is developing a homeowner website to open public access to EnerGuide data, allowing homeowners to view and compare their energy use. This tool will help to strengthen energy literacy, enhance transparency on the hidden costs of energy, and allow homebuyers to estimate energy costs when they are purchasing a home.

For commercial and institutional buildings, NRCan is collaborating with the United States Environmental Protection Agency to expand the ENERGY STAR Portfolio Manager tool, which enables building owners and operators to compare their energy use with similar buildings. To date, over 21,000 buildings in Canada leverage the Portfolio Manager tool. NRCan is also collaborating with provinces, territories and municipalities and other stakeholders to develop a harmonized approach to labelling and disclosure of building energy use. A key element of the approach will be an online database platform capable of disclosing and visualizing energy use by jurisdiction or facility, which will be made available in 2019. In addition, jurisdictions and stakeholders will receive support to develop and implement labelling and disclosure programs and policies.

NATIONAL LEADERSHIP THROUGH RESEARCH AND STRATEGIC INCENTIVES**RECOMMENDATION 12:**

The Committee recommends that the federal government further invest in research, development, and demonstration in building science.

The Government of Canada supports this recommendation. There is a clear role for federal leadership in RD&D, and through a variety of initiatives, the Government is fostering innovative solutions to help de-risk and reduce the costs of energy-efficient building techniques and technologies.

The Green Infrastructure funds under the Investing in Canada Plan provided \$48.4 million for NRCan's Energy Efficient Buildings RD&D program to support initiatives that accelerate

innovative technologies and design methods, provide cost-effective solutions, validate local construction with real-world demonstrations, and build confidence for the adoption of updated codes.

From 2013 to 2017, NRCan's Tall Wood Building Demonstration Initiative fostered commercial and regulatory uptake of tall wood buildings in Canada through RD&D projects. This work is continuing through the Green Construction through Wood (GCWood) Program announced in Budget 2017, which is dedicating \$39.8 million to support RD&D projects and activities that increase the use of wood in infrastructure projects as a green building material. GCWood RD&D activities will inform the adoption of green building construction technologies through the 2020 National Building Code of Canada, and provide technical information that will inform a code by 2025 that focusses on building performance rather than materials used.

The Government of Canada has also collaborated with the Federation of Canadian Municipalities since 2000 on the Green Municipal Fund, which received an additional \$125 million through Budget 2016. This long-running fund supports projects across Canada that benefit communities through improved environmental, economic, and social outcomes, including RD&D projects for buildings.

Finally, over the next decade, under the National Housing Strategy, \$241 million will be dedicated to enhance housing research, data, and demonstrations to fill data and information gaps, inform housing policy, and enable informed decision-making by housing stakeholders regarding performance and financial viability. Included in this initiative are demonstrations of technologies, practices, policies and programs that can improve the condition and performance of new construction and renewal affordable housing projects.

RECOMMENDATION 13:

The Committee recommends that the Canada Mortgage and Housing Corporation work with its partners to more broadly promote the incentives available for buying, building, and renovating energy-efficient homes, prior to the point of financing.

The Government of Canada is working to increase awareness of the incentives available for energy-efficient homes prior to the point of financing. As noted under Recommendation 11, NRCan and other partners offer a wide range of information on energy-efficient home construction and renovation that consumers and businesses can use to inform their purchase and renovation decisions. CMHC's modernized Green Home program, launched in 2016, offers a premium refund of up to 25 percent to borrowers who either buy, build or renovate for energy efficiency using CMHC-insured financing. The Green Home program is actively promoted through various social media platforms. CMHC also works with Approved Lenders to ensure they are aware of the program and highlight its benefits to homebuyers and homeowners.

Additionally, through the National Housing Strategy, CMHC is working with its affordable housing partners to support the development of new energy-efficient affordable housing projects and the energy-efficient renewal of existing projects. CMHC is promoting the Strategy through social media and is actively working with key stakeholders to raise awareness of energy-efficient affordable housing funding opportunities.

RECOMMENDATION 14:

The Committee recommends that Natural Resources Canada and the National Research Council work with, and encourage, provincial/territorial, municipal, and industry partners to streamline the regulatory environment in order to encourage the early adoption of onsite renewable energy generation and green building techniques and technologies.

The Government is working with provincial, territorial, municipal, industry and international partners to streamline Canada's regulatory environment for green buildings. The federal government updates and enforces the *Energy Efficiency Regulations* for products, which set minimum energy performance standards for energy-using equipment imported into Canada and across provincial borders. Federal, provincial and territorial Energy Ministers have agreed to a framework for collaboration that includes setting joint priorities for standards to meet climate change and energy savings goals, and for areas to improve regulatory development, implementation and transparency. Action plans are published and reported

annually. This collaboration meets the intent of the Canada Free Trade Agreement – to reduce barriers to the free movement of persons, goods, services, and investments within Canada and to establish an open, efficient and stable domestic market.

The Government also collaborates with international and Canadian stakeholders to maintain and update standards related to the safety and quality of solar photovoltaic systems. Harmonization reduces trade barriers, allowing an increase in products offered for Canadians and facilitating exports for Canadian manufacturers, thus increasing economic development opportunities for Canadian businesses.

Canada has one of the best standards of construction in the world due to its central and harmonized code development process. Model energy codes are developed at the national level, and are then adapted and adopted by provinces and territories. To encourage harmonization and adoption of the latest building energy codes across Canada, for the first time NRCan and the NRC are providing free online access to both the 2017 National Energy Code of Canada for Buildings and the 2015 National Building Codes section related to energy efficiency for housing and small buildings. The Government will continue to support the CCBFC in its work to incorporate on-site renewable energy generation and green building technologies into future versions of the national model codes.

RECOMMENDATION 15:

The Committee recommends that Natural Resources Canada, Finance Canada, Infrastructure Canada, and the Canada Mortgage and Housing Corporation identify and implement effective financial incentives to encourage on-site renewable energy generation and net-zero energy ready building construction (e.g. a federally-backed mortgage rate reduction, Canada Infrastructure Bank funding, insurance incentives, or programs similar to the U.S. renewable energy tax credits or U.S. tax credits for home builders).

The Government of Canada is implementing a variety of initiatives in support of this recommendation. The Government currently provides businesses with an accelerated capital cost allowance for specified clean energy generation equipment that generates electricity or heat from renewable energy sources or waste (e.g., wood waste, landfill gas). Start-up expenses may be eligible for a full deduction in the year incurred as Canadian Renewable and Conservation Expenses.

NRCan's Energy Efficient Buildings RD&D program provides funding for innovative projects that will help reduce the cost and create market confidence in net-zero energy-ready construction. NRCan also launched the Smart Grid Program at the beginning of 2018, which will provide up to \$100 million to support the demonstration and deployment of smart grid technologies. These technologies are key to enabling the integration of on-site renewable electricity with the electricity grid.

Through some funding programs under the National Housing Strategy, applicants may include the incremental costs of increasing the energy efficiency of their affordable housing projects in their loan or grant application. Projects that go beyond the minimum energy efficiency requirements, such as by pursuing net-zero energy ready standards, are prioritized for funding. In addition, CMHC's modernized Green Home refund program offers a premium refund of up to 25 percent to borrowers who either buy, build or renovate for energy efficiency using CMHC-insured financing. CMHC is currently supporting research to explore how to incentivize the owners of private rental apartment buildings to engage in renewal activities that can modernize their buildings and significantly improve energy performance.

The Government is also working to support provinces and territories in their efforts to advance energy-efficient building construction. Funding is available through the \$2 billion Low Carbon Economy Fund to focus on PCF priority areas, such as residential energy efficiency. Many provinces and territories have expressed their intent to leverage this funding to offer financial incentives for energy efficiency retrofits. In addition, the Canada Infrastructure Bank is has a mandate to invest in revenue-generating infrastructure projects to attract private and institutional investment, including an allocation of \$5 billion in green infrastructure.

LEVERAGING FEDERAL REAL PROPERTY MANAGEMENT AND PROCUREMENT TO PROMOTE BUILDING EFFICIENCY

RECOMMENDATION 16:

The Committee requests that the federal government focus more attention on its Greening Government Strategy and report back to the Committee on its progress by the end of 2018.

The federal Greening Government Strategy directs organizations to reduce GHG emissions from federal government facilities and fleets by 40 percent below 2005 levels by 2030 and 80 percent by 2050. The Government achieved a 28 percent GHG emission reduction for fiscal year 2016-17 from the 2005 baseline. In the fall of 2018, the Treasury Board Secretariat of Canada's (TBS) Centre for Greening Government will publicly report the Government's progress for fiscal year 2017-18 through the Open Data portal.

RECOMMENDATION 17:

The Committee recommends that Public Services and Procurement Canada and the Treasury Board of Canada Secretariat work with all other federal departments and agencies to demand higher energy efficiency standards (e.g. LEED, BOMA BEST) when procuring rental space and new buildings.

Public Services and Procurement Canada (PSPC) and TBS are leading by example and supporting federal government departments and agencies in ensuring higher energy efficiency standards become business as usual for real property within the Government of Canada. The Greening Government Strategy sets clear objectives regarding real property investment decisions. The Strategy also ensures that all new construction and building retrofits prioritize low-carbon investments based on integrated design principles and life-cycle analysis to evaluate the total cost of ownership. All new federal government buildings should be constructed to be net-zero carbon ready starting at the latest in 2022.

Emissions from newly leased facilities and renewed leases will be tracked starting in the 2019-20 fiscal year. The majority of emissions from leased facilities will be reported by 2025. The government will demonstrate leadership by ensuring that new leases include improved energy and sustainability performance standards and are monitored through programs such as ENERGY STAR Portfolio Manager.

RECOMMENDATION 18:

The Committee recommends that Public Services and Procurement Canada and the Treasury Board of Canada Secretariat require all federal custodian departments and agencies to develop and implement multi-year energy retrofit strategies for their respective portfolios of existing federally-owned buildings.

Under the Greening Government Strategy, TBS requires the highest GHG-emitting departments to undertake a strategic evaluation of their real property portfolios to determine the most cost-effective pathway to achieve low-carbon operations and meet the Government's targets. These departmental evaluations include energy efficiency, retrofit and clean energy actions.

PSPC, NRCan and the NRC are working together to offer technical advisory services, training, and procurement services that enable custodian departments to develop and implement their low-carbon portfolio strategies. Measures proposed in these strategies help to improve the energy and GHG performance of federal buildings.

RECOMMENDATION 19:

The Committee recommends that the federal government, when making federal infrastructure procurement decisions, consider including full life cycle analyses that address carbon emissions and storage resulting from the infrastructure's materials, construction, operation, and de-commissioning.

Departments must ensure that all new buildings and major building retrofits prioritize low-carbon investments based on integrated design principles and life-cycle and total cost of ownership assessments. This requires departments to reduce the environmental impact of building materials using life-cycle assessment techniques to minimize embodied carbon and the use of harmful materials in construction and renovation. The TBS Centre for Greening

Government is working with its partners at PSPC, NRC and NRCan to support departments in reducing carbon emissions through the Greening Government Strategy.

In addition, the GCWood program supports the Government's efforts to adopt procurement policies that will facilitate the implementation of life-cycle analysis in federal government infrastructure projects. NRCan is coordinating efforts with NRC and PSPC, as well as with industry, to develop a national and harmonized Life-Cycle Inventory to be used in conducting analysis of existing and new buildings including adapted building reuse.

AN ENERGY-EFFICIENT BUILDING STRATEGY FOR CANADA'S NORTH

RECOMMENDATION 20:

The Committee recommends that Natural Resources Canada and the National Research Council work with Indigenous governments and communities, territorial and affected provincial governments, and industry to invest in building science and clean energy generation research, development, demonstration, and post-construction monitoring in the Canadian North.

The Government supports this recommendation and recognizes the importance of working with Indigenous and other partners to advance building science and clean energy generation in the North. A new Arctic Policy Framework is being co-developed to replace Canada's Northern Strategy (2009) and the Statement on Canada's Arctic Foreign Policy (2010). One of the proposed outcomes of the Framework is to reduce the reliance on diesel in off-grid communities, including those in the North.

The Government is implementing a number of new programs, including the Clean Energy for Rural and Remote Communities Program, which has been allocated \$220 million over six years, starting in 2018-19, to reduce the reliance of rural and remote communities on diesel fuel, support the use of more sustainable and renewable power solutions, and encourage energy efficiency. The Arctic Energy Fund is providing \$400 million over 10 years starting in 2018-19 to support energy security in the territories by enabling them to transition to renewable energy or install cleaner, more reliable fossil fuel-based energy systems. In addition, \$53.5 million will be invested over 10 years starting in 2018-19 to continue the Northern Responsible Energy Approach for Community Heat and Electricity Program (REACHE) program to support energy efficiency and renewable energy projects and capacity building initiatives in the Canadian North.

Under NRCan's Program for Energy Research and Development, the Government is collaborating with territorial housing agencies to research and demonstrate sustainable, highly energy-efficient, and culturally-appropriate northern housing. Since 2008, Northern Sustainable Housings have been demonstrated and monitored in each territory. The knowledge and lessons learned have been shared with northern housing stakeholders. Additional affordable multi-unit residential demonstration projects are currently underway to support RD&D in this more accessible and cost-effective housing form. NRCan, CMHC, and the NRC continue to support northern housing stakeholders with research on optimized new construction and retrofit strategies and high performance heat recovery ventilation systems.

In addition, the NRC, NRCan, CMHC and Polar Knowledge Canada developed a committee on northern housing in 2013 to facilitate research collaboration. This committee has expanded to include membership across the North, and held a Northern Housing Forum in May 2018 to focus on holistic approaches to northern housing challenges, provide solutions to technical, social and financial northern housing barriers, and offer recommendations to governments, housing corporations and northern communities to inform their next-generation housing design and implementation decisions.

RECOMMENDATION 21:

The Committee recommends that Natural Resources Canada and the National Research Council work with Indigenous governments and communities and territorial and affected provincial governments to develop building standards specifically adapted to the Canadian North.

The Government recognizes the unique context of the Canadian North and the need to

develop building standards specifically tailored to northern needs. The NRC and NRCan are partnering to develop simplified housing design guides adapted to the requirements of northern, remote and Indigenous communities. The Standards Council of Canada's Northern Infrastructure Standardization Initiative, established in 2011, supports the development of standards that mitigate the impacts of climate change on, and increase the resilience of, infrastructure in the Canadian North. The Standards Council of Canada has a well-established network of stakeholders in northern Canada (i.e., Nunavut, Yukon, the Northwest Territories, Nunavik, and Nunatsiavut) from various levels of government, industry and academia that have been supporting this work since its inception.

Crown-Indigenous Relations and Northern Affairs Canada is collaborating with Indigenous and northern communities, organizations and governments to improve climate change adaptation across northern Canada. The Climate Change Preparedness in the North program received \$21.5 million over five years in Budget 2016 for risk assessments and adaptation planning in communities, and a further \$25.4 million over five years in Budget 2017 for the implementation of infrastructure adaptation measures. The program supports the Standards Council of Canada by integrating new standards into infrastructure projects.