TESTIMONY OF
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STANDING COMMITTEE ON NATURAL RESOURCES
HOUSE OF COMMONS
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Mr. Chair and Vice Chairs, and members of the committee, thank you for the opportunity to provide testimony today. I am the President of ASHRAE, which was founded in 1894, and is a global society advancing human well-being through sustainable technology for the built environment. The Society and its more than 56,000 members worldwide focus on building systems, energy efficiency, indoor air quality, refrigeration and sustainability. ASHRAE has about 6,000 members in Canada and over ten percent of our Board Members are Canadian, including ASHRAE's President-Elect, Darryl Boyce, who you also will be hearing from today.

ASHRAE is well known for our hundreds of standards and guidelines that improve building systems, energy efficiency, indoor environmental quality, refrigeration, comfort, productivity and sustainability. ASHRAE provides training and professional development through in-person and online courses, and validates and recognizes professional expertise through its six certification programs.

I am excited this esteemed committee is invested in studying the economic opportunities for energy efficiency in Canada, and its contributions to Canada's climate commitments. With about 28% of Canada's greenhouse gas emissions being attributed to residential and commercial building operations, ASHRAE's technical expertise can help Canada improve energy performance and meet its climate commitments, while also improving productivity, health, resiliency, and overall quality of life.

I understand you have already heard from organizations that have modeled the economics of energy efficiency, including its relationship to jobs and international competitiveness. You have also heard from organizations concerned about affordability, costs, and financial considerations. And, you have heard from utilities and those focused on energy generation and delivery.

As ASHRAE is a society of engineers with technical expertise, ASHRAE's testimony will focus on technical tools, standards and guidelines that can help government and the private sector deliver on energy efficiency and building performance.

Importantly, ASHRAE's standards are voluntary, and developed through a consensus-based process through the participation of any and all interested and affected stakeholders including manufacturers, users, and representatives of government and academia. ASHRAE's standards process is accredited by the American National Standards Institute (ANSI) and follows ANSI's requirements for due process and standards development. ASHRAE also serves in the role of international secretariat for several ISO Technical Committees to help ensure that ASHRAE standards are represented on the international stage.

Many of ASHRAE's standards are adopted into building codes, including those concerning energy efficiency and high-performance green buildings. ASHRAE's flagship Standard 90.1, which establishes

minimum requirements for energy-efficient design of most buildings, is an indispensable reference for engineers and other professionals involved in design of buildings and building systems. Standard 90.1 has been a benchmark for commercial building energy codes in the United States and a key basis for codes and standards around the world for more than 35 years.

For communities wanting to achieve even better efficiency levels, ASHRAE has teamed with the International Code Council (ICC), Illuminating Engineering Society (IES), and the U.S. Green Building Council (USGBC) to publish the *2018 International Green Construction Code*® (2018 IgCC®). The purpose of the IgCC is to provide minimum requirements for high-performance green buildings to reduce emissions from buildings and building systems, as well as to enhance building occupant health and comfort, conserve water resources, protect local biodiversity and ecosystem services, promote sustainable and regenerative materials cycles, improve building quality, and enhance resilience to natural, technological, and human-caused hazards.

We understand that Canada has set even higher standards for itself in establishing a milestone to develop a nationwide net-zero energy building code by 2030, and with all provinces and territories adopting and implementing it by 2040. ASHRAE is reviewing its existing portfolio of standards to determine the best way to create a zero energy building standard, and we would be happy to share our expertise in this regard.

ASHRAE in partnership with AIA, IES, and USGBC, and with support from the U.S. Department of Energy (DOE), has published a series of Advanced Energy Design Guides (AEDGs), which provide a cost effective approach to achieving advanced levels of energy savings using readily available technology. The newest guides in the series provide recommendations needed for achieving a Zero Energy building, which is defined as a building that, on an annual basis, draws from outside resources equal or less energy than it provides using on-site renewable energy sources. The zero energy AEDG for K-12 school buildings was published in early 2018 and the zero energy AEDG for small to medium office buildings will be available in June 2019.

While building codes and standards can help tackle emissions from new construction, most of the built environment is already in place. Evaluating, assessing, and then retrofitting existing buildings to improve energy performance is where Canada can make even greater progress towards its energy and climate commitments.

Darryl Boyce, President-Elect of ASHRAE, knows buildings well. Very well. He knows how to operate them, how to fix them, and how to ensure optimal performance. As head of facilities at Carleton University, Darryl was responsible for over 50 buildings, encompassing 450,000 square meters of building space, including labs, residential space, and administrative operations. I'm going to let Darryl talk about some of the tools ASHRAE has developed to improve energy performance in a cost effective manner.

Thank you, Sheila. Optimizing the performance of Canada's existing buildings is key to meeting Canada's energy and climate commitments. Investments in these buildings can also generate solid economic benefits for those who own, operate, live, and work in these buildings. The Pembina Institute has found that every $1 million invested in energy efficiency results in $3 to $4 million in economic growth. That's a real return on investment.

Optimizing Existing Buildings

Now here's how ASHRAE can help. ASHRAE recently revised Standard 100, *Energy Efficiency in Existing Buildings*, which sets criteria to reduce energy consumption through improved energy efficiency and performance. When applied, the standard increases the energy efficiency of systems and components, and upgrades the thermal performance of the building envelope. It provides procedures and programs crucial to energy efficient operation, maintenance, management, and monitoring. This standard can be effective for achieving broader policy objectives, as retrofitting an existing building generally conserves more resources and is more cost-effective than razing the building structure and constructing new.

ASHRAE has also recently published an energy audit standard, ANSI/ACCA/ASHRAE Standard 211 *Standard for Commercial Building Energy Audits*, which outlines the requirements for ASHRAE Level 1, Level 2, and Level 3 energy audits. This standard should be useful as many municipalities have started to include energy audit requirements in conjunction with their benchmarking regulations.

Another tool ASHRAE has developed to improve the energy performance of existing buildings is ASHRAE's Building EQ. Building EQ is a building energy rating program that provides both an operational and asset rating to assess a building's energy performance. Beyond providing a score, Building EQ can help improve a building's energy performance after the benchmarking is completed. The Building EQ-In Operation rating assists with an ASHRAE Level 1 energy audit and provides both a standardized process and actionable recommendations for the building. We are using Building EQ at Carleton University to improve energy performance, improve the indoor environment and save money.

At Carleton we have been utilizing the energy audits to find opportunities to improve the operations of our buildings for a number of years and this has resulted in better indoor environments and energy saving in the range of 20%.

Another example of Building EQ's results comes from a case study of four fire stations in Sarasota County, Florida. While the climate in this area differs quite a bit from Canada, the results from the study remain instructive. Three of the four stations had LEED ratings, and yet the Building EQ process still unveiled energy efficiency opportunities, many of which were basic measures that could be easily implemented, such as improved use of motion and occupancy sensors and general room temperature setbacks. Electricity savings of 119,225 kWh were identified, which saved the fire stations over $9,500 annually.

It is not enough to design and build or renovate efficient buildings, we must also focus on building operations, especially as buildings become more complex. We need to ensure that the designs respond to effective operations and that the operators are effectively trained to get the real value from energy efficient design without compromising the indoor environment for the users.

Building Communication Systems

So-called smart buildings are another area where ASHRAE has developed tools to optimize building performance. ASHRAE's Standard 135 defines data communication services and protocols for information technology used to monitor building systems and to ensure all building automation systems can "talk" to one another. Ensuring these data protocols are in place will help buildings actually realize the energy savings as designed.

I'm now going to hand the microphone back to Sheila, who will speak on how buildings integration with the electric grid can deliver even greater energy efficiency benefits and cost savings.

New Energy Future

As you know, our building and energy infrastructure is rapidly changing. We are moving to smart buildings, smart cars, and a smart grid. And this integration and communication presents us with some huge energy and cost savings opportunities.

As leaders in the buildings industry, ASHRAE wants to ensure its expertise is employed as policies are developed in defining the relationship between buildings and the smart grid. Buildings systems will be communicating about their energy use through the Internet and will be able to exchange information with electricity providers, other buildings, and transportation systems. As well, building systems will also receive data via the Internet and use that data to inform system operation and performance. Micro-grids, distributed energy resources, and energy storage systems will be an important part of this new energy future. Of course, this inter-connected system must be implemented in a way that still ensures the safety, security and privacy of the building occupants and their information.

ASHRAE is developing an "Application Guide on the Smart Grid," which will help building designers, policy makers, and those involved in the technology and energy sectors plan for this new energy future.

ASHRAE has also developed Standard 201, Facility Smart Grid Information Model, which provides a common basis for electrical energy consumers to describe, manage, and communicate about electricity consumption and forecasts.

As Canada moves to a smart grid, ASHRAE welcomes the opportunity to share its technical expertise to ensure this transition is done effectively and efficiently, and to also assist in providing the tools, resources, and knowledge to ensure proper operation of buildings in this new paradigm.

Thank you again for giving us the opportunity to testify before this committee. We would be happy to provide more details on any of the issues we discussed, and we would be happy to take any questions.