

Background

In a world where the effects of climate change are becoming ever more apparent and more widespread, using energy wisely has assumed greater importance in recent years. Conservation is the cleanest and most cost-effective energy resource available. In Ontario and elsewhere, it has become a key resource in helping customers save energy, control costs and reduce their environmental footprint.

Over the past few decades, Ontario has used a number of different approaches to define the ways in which energy consumers can reduce their usage and to encourage greater demand-side participation. To this day, the province's efforts in this area are broad, encompassing everything from traditional, incentive-based conservation programs to training, education and support; direct load control; energy efficiency codes and standards; price-based models (e.g., time-of-use rates); demand response auctions; behind-the-meter (load-displacing) generation; and energy storage, among other related policies, programs and mechanisms.

Energy efficiency and conservation efforts in Ontario date back several decades, but the seed that was planted in the early 1980s by Ontario Hydro didn't really flourish until years later, by which time the supply-demand balance had become increasingly fragile and more active intervention on the demand side became more attractive .

For the most part, the 1980s in Ontario were dominated by supply-side initiatives¹ including large-scale nuclear projects at the Pickering, Darlington and Bruce sites. Although there was some attention paid to conservation, and targets for load shifting and conservation were set in 1982 at 1,000 megawatts (MW) apiece by 2000, the province's supply situation meant that demand management received limited attention during this period.

By the time Ontario Hydro published its Demand/Supply Plan in 1989, it showed a notable shift in the company's long-term planning approach such that resources on the

¹ Electricity Conservation Policy in Ontario: Assessing a System in Progress (York U) – page 145

supply side and the demand side were considered concurrently². In addition, several new demand-side management (DSM) programs were created. Although this plan was effectively shelved after the recession hit in the late 1980s, and demand for electricity – especially from large industrial users – plummeted, it established DSM as an important consideration in the context of energy adequacy and reliability in Ontario.

After the cancellation of Ontario Hydro's DSM programs in 1993, the provincial Ministry of Energy offered a number of programs for commercial, industrial and residential consumers but a change in government in 1995 resulted in these programs being discontinued.³

Fast forward several years and the *Energy Competition Act, 1998* opened the door to a competitive electricity market and effectively split Ontario Hydro into five successor companies, each with specific roles and responsibilities (Ontario Power Generation, generation; Hydro One, transmission; the Independent Electricity Market Operator, now known as the Independent Electricity System Operator (IESO), market and system operations; the Ontario Electricity Financial Corporation, debt and contract management; and the Electrical Safety Authority, training and safety standards).

After several years of collaboration between government, stakeholders, regulators at the Ontario Energy Board and technical experts at the IESO, Ontario's wholesale electricity market opened on May 1, 2002, introducing competition at the retail level.

In addition to enabling the creation of a market for electricity, the *Energy Competition Act, 1998* triggered other structural changes. Where Ontario Hydro had been responsible for long-term planning in the province, this restructuring left a void in that area⁴. Although local utilities engaged in some limited DSM measures in the early 2000s, there was little coordination, oversight or strategic vision. It was several years later, with the creation in 2005 of the Ontario Power Authority (OPA) – which merged with the IESO on January 1, 2015 and now operates under that name – that centralized

² Steven Norrie article page 2

³ York U paper – pg 148

⁴ Steve Norrie article pg 2

power system planning and modern energy conservation policies, programs and practices in Ontario were established.

The creation of a wholesale market for electricity in Ontario had some unintended consequences, including volatile prices at the retail level. Despite these occasionally high prices – which were eventually frozen in 2003 to reduce the impact on ratepayers – the market had limited success in attracting new entrants willing to invest in new generation resources. In the absence of meaningful investment in new power plants, and with artificially low energy prices at the retail level undermining any incentive to reduce consumption, Ontario started to experience energy shortfalls, and IESO-issued public appeals to conserve energy became commonplace.

In June 2003 the government of the day created the Electricity Conservation & Supply Task Force (ECSTF), which was established to develop an action plan for attracting new generation, promoting conservation and enhancing the reliability of the transmission grid.⁵ Comprising 19 leaders from across the sector, the task force met on a weekly basis and heard expert testimony from dozens of stakeholders. Its final report, published in January 2004, was titled *Tough Choices: Addressing Ontario's Power Needs*.

Among the recommendations contained therein were a call to create a “conservation culture” in Ontario and an acknowledgement that conservation could play an important role in ensuring security, adequacy, affordability, reliability, and financial sustainability, both financial and environmental. The report also explicitly noted that demand reduction should be given the opportunity to compete with supply-side alternatives and be evaluated on a level playing field.⁶

For conservation to achieve its full potential, the ECSTF argued, a lead organization needed to champion conservation efforts, coordinate activities by the different players, and assess the relative costs and benefits of different programs to ensure consistency

⁵ ECSTF – page i

⁶ ECSTF – page ii

and alignment with government policy.⁷ This call for a lead conservation agency was echoed by the Ontario Energy Board in a report to the Minister of Energy issued in March 2004.⁸

The *Electricity Restructuring Act, 2004* came into force in December of that year and enabled the creation of the OPA, whose responsibilities included forecasting demand for electricity, undertaking power system planning, developing an integrated power system plan, and promoting electricity conservation, among others.

The Conservation Bureau was established within the OPA in 2005 and served as a focal point for conservation-related activities in the province. Although the reporting function was transferred to the Environmental Commissioner of Ontario in 2009, the Conservation Bureau's other functions remained with the OPA.⁹ During its formative early years, the Conservation Bureau designed and launched a range of conservation programs delivered by local distribution companies (LDCs) as well as industry associations and private companies.¹⁰

As an agency of the government, the OPA (now IESO) has been the subject of numerous directives from the Minister of Energy related to different aspects of its business. One of the most important directives – dated June 13, 2006 – called on the OPA to prepare an Integrated Power System Plan (IPSP) to meet a number of policy goals.

The directive gave the OPA some degree of flexibility in how it achieved the first goal, which was focused on conservation. Calling for a total reduction in peak demand of 6,300 MW by 2025, it used a liberal definition of conservation that included codes and standards related to energy efficiency as well as load-displacing generation, including small-scale natural gas-fired cogeneration and tri-generation facilities on the customer side of the meter, among other options.

⁷ ECSTF – page 44

⁸ https://www.oeb.ca/documents/cases/RP-2003-0144/pressrelease_report_finalwithappendices_030304.pdf - pg ii

⁹ York U – page 139

¹⁰ Peter Love, Past, Present etc. – page 33

One month later, in a separate directive, the Conservation Bureau was directed by the Minister to create a three-year, \$400 million fund to help LDCs deliver conservation and demand management programs.¹¹ This directive was based on the following principles: LDCs have a legitimate role in delivering conservation and demand management (CDM); LDCs should be provided with stable, multi-year funding to deliver CDM; the relationship between the OPA and LDCs should be managed contractually; and the OPA's Conservation Bureau should manage the overall CDM program design as well as the evaluation, measurement and verification of program results.¹²

There were a number of challenges associated with reintroducing electricity conservation programs after a decade of relative inactivity. These include the need to rebuild the DSM program industry, disagreements regarding the proposed roles and responsibilities of various players in the sector, questions about the legitimacy of DSM as a resource, and alignment and cooperation between electricity and gas to make action easier for customers.

Despite these initial hurdles, in June 2008 the OPA reported that Ontario had met its interim target of 1,350 MW of peak demand reduction by the end of 2007 – the first step towards meeting the 2025 target.

Approximately one year after the creation of the OPA, the *Energy Conservation Leadership Act, 2006* was passed. The ECLA contained a number of provisions and requirements, including ones related to energy use by public agencies. The Act enabled the government to set specific targets for energy conservation by these agencies and require the preparation of annual energy conservation plans. These plans – to be made publicly available – were expected to include itemized descriptions of energy-consuming technologies and operations; summaries of annual energy usage; descriptions of current and proposed activities and measures to conserve energy; and summaries of progress and achievements in energy conservation.

¹¹ Find July 13 directive

¹² York U – pg 156

Other sections of this chapter will address subsequent changes to the legislative and regulatory framework for energy conservation in Ontario in greater detail. Some of the most important changes stem from the enactment of the *Green Energy Act, 2009* (GEA) in May of that year. While much of the Act was focused on mechanisms to accelerate the adoption of renewable generation, it also included a renewed focus on conservation. For example, the GEA made energy conservation core to LDCs' business operations, by establishing that mandatory targets must be met as a licence condition.¹³

Many provisions included in the EEA were incorporated into the GEA, such that products and appliances in Ontario must meet minimum energy-efficiency standards and must be labelled to demonstrate their compliance with these standards. The GEA also incorporated much of the content of the ECLA, though as was the case with the EEA, compliance and enforcement mechanisms were abandoned.

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In addition to aggregating several existing energy conservation policies, the GEA included some important new provisions, including ones pertaining specifically to government-owned and/or -managed facilities. It called on the provincial government to be guided by several conservation-oriented principles: clear and transparent reporting of energy consumption, water use and greenhouse gas (GHG) emissions associated with government facilities; planning and designing government facilities to ensure the efficient use of energy and water; making environmentally and financially responsible investments in government facilities; and using renewable energy sources to provide energy for government facilities.¹⁴ These requirements will be discussed in greater detail in another section of this chapter.

The GEA also paved the way for tracking and reporting on energy consumption and GHG emissions by the broader public sector, including municipalities, universities, schools and hospitals (also known as the MUSH sector), as detailed in Ontario Regulation (O. Reg.) 397/11, which will be discussed in greater detail in the Legal/Regulatory section of this chapter.

¹³ <http://www.energy.gov.on.ca/en/files/2014/09/conservation-first-en.pdf>

¹⁴ <https://www.ontario.ca/laws/statute/09g12>

Since 2003, electricity CDM programs have been offered under four consecutive frameworks: “Third Tranche funding”, programs offered by LDCs through the OEB, 2006 – 2010, 2011-2014 and current CFF framework...

More recently, the IESO worked collaboratively with LDCs to deliver CDM programs under the 2011-2014 CDM Framework. In January 2011, a suite of programs was introduced under the saveONenergy brand. Administered by the LDCs, these programs offered a variety of incentives for energy efficiency and conservation activities. They also contributed to engaging individuals and businesses on cost-effective ways to improve their living and work spaces while saving on annual energy costs, helping the province meet its energy needs and reducing or deferring the need to build new generation in the future.

Business programs were the primary driver of savings from the 2011-2014 conservation programs, accounting for 58 percent of the overall energy savings achieved. Between 2011 and 2014, the suite of business programs saved more than 4,000 gigawatt-hours (GWh) of energy and reduced peak demand by 389 MW, with the Retrofit program responsible for the largest savings, proportionally.¹⁵

Programs for residential customers, meanwhile, ran the gamut from incentives to remove old, inefficient appliances to coupons that encouraged the purchase of energy-efficient products such as compact fluorescent lightbulbs, programmable thermostats, power bars, dimmer switches and motion sensors. Between 2011 and 2014, residential programs saved 1,169 GWh of energy and 253 MW of demand in the province – equivalent to powering approximately 122,000 homes for one year.¹⁶

After 2014, Ontario transitioned to the 2015-2020 Conservation First Framework (CFF). This framework will be covered in the next section, which describes the main stakeholders on the conservation file in Ontario in 2017 and beyond.

Conservation in Ontario is not purely incentive program-based. Many Ontario LDCs are exploring other ways to manage their energy needs, increase resilience and security in

¹⁵ 2011-2014 Conservation Results Report – pg 4

¹⁶ 2011-2014 Conservation Results Report – pg 3

their service area, and unlock new value from their system by leveraging innovation. Although their primary function may not be to reduce total consumption, some of the options being tested include solar/storage systems, microgrids, dynamic pricing models, telemetry and communication systems, sensors and controllers, electric vehicle integration, distribution automation and others.

Main Stakeholders

Organization/Group	Key CDM-Oriented Responsibilities
Ministry of Energy	Establishes the policy framework Develops energy efficiency product standards Sets reporting requirements
Ministry of Municipal Affairs and Housing	Sets Building Code requirements
Ontario Energy Board	Regulates the electricity and gas sectors Approves licences, rates and fees
IESO	Operates the grid to ensure supply and demand are balanced Oversees provincial and regional electricity planning Administers wholesale electricity markets Manages the CDM portfolio for electricity Works with LDCs to design and deliver CDM programs for electricity Makes strategic CDM investments through the Conservation Fund Provides central support services to LDCs Works with gas utilities on areas of common interest
Local Distribution Companies (Electric)	Work with the IESO to design and deliver CDM programs for electricity Work directly with customers on CDM projects
Channel Partners	Market and promote CDM programs Provide other value-added services to customers
NGOs	

Municipal Governments	Develop community energy plans Provide input into regional plans
Canadian Standards Association	Develops energy efficiency product standards
Local Distribution Companies (Gas)	Design and deliver CDM programs for gas Work directly with customers on CDM projects

All activity related to energy conservation in Ontario stems from government policy in one way, shape or form. The Ontario Ministry of Energy sets broad energy policy, but works closely with other ministries, including the Ontario Ministry of the Environment and Climate Change, as well as other agencies, organizations and stakeholder groups.

As noted above, 2015 marked the start of a new approach to CDM in Ontario, with the launch of the 2015-2020 Conservation First Framework (CFF), which had its origins in the government's 2013 *Long-Term Energy Plan* (LTEP), released on December 2, 2013, and a directive to the OPA dated March 31, 2014.

The 2013 LTEP set a long-term conservation target of 30 terawatt-hours (TWh) in 2032, which represents a 16 percent reduction in the forecast gross demand for electricity compared to the 2010 LTEP.¹⁷

The CFF reflects Ontario's conservation targets and encapsulates many of the province's planned actions in support of these goals over a six-year period. It emphasizes the importance of a coordinated effort at all stages of the energy planning process, as well as more effective collaboration among sector partners (especially the province's 60+ LDCs) and between the gas and electricity sectors.

The overarching goal of the CFF is to reduce energy consumption by 7 terawatt-hours (TWh) through conservation programs delivered by LDCs to residential and business customers across the province by December 31, 2020. As outlined in a directive from

¹⁷ http://www.energy.gov.on.ca/en/files/2014/10/LTEP_2013_English_WEB.pdf

the Minister of Energy dated July 25, 2014, an additional 1.7 TWh of energy savings are to be achieved through conservation projects undertaken by transmission-connected customers under the Industrial Accelerator Program (IAP) banner, for which the IESO has sole responsibility.¹⁸

With a total budget of \$2.6 billion, the framework gives a much larger role to LDCs, with each being assigned a share of the 7 TWh target that they can pursue individually or in partnership with other LDCs.

To support LDCs in the delivery of conservation programs, the IESO provides central services including evaluation, measurement and verification (EM&V); market research; capability building (including training); administrative infrastructure; and technical support.

The IESO provides these tools, support and guidance to LDCs to help them meet their targets, as outlined in six-year Conservation and Demand Management (CDM) plans submitted to the IESO by each LDC. These plans enable LDCs to design and manage their own program offerings, giving them greater flexibility to align conservation programs with local needs, and providing more customer choice. The CFF also delivers long-term, stable funding, which gives LDCs greater certainty as they design and deliver programs in their CDM plans.

Through recommendations from customers, stakeholders, LDC working groups, and the EM&V process, program enhancements are continuously implemented to ensure current program offerings meet LDC, customer and system needs across the province.

As described in the terms of the IESO/LDC energy conservation agreements, LDCs are licenced by the Ontario Energy Board (OEB) under Part V of the Ontario Energy Board Act, 1998, S.O. 1998, c. 15, Schedule B. The IESO is licenced by the OEB under the same legislation.

With a view to maximizing efficiencies and minimizing costs, collaboration is a key focus of the CFF and helps to distinguish it from previous frameworks. The IESO works

¹⁸ July 25, 2014 directive

closely with LDCs, which are also encouraged to partner with other LDCs to meet energy reduction targets and achieve efficiencies in program delivery.

The CFF also differs from previous models structurally. With an emphasis on transparency, inclusivity, accountability, collaboration and efficiency, the Conservation First Implementation Committee (CFIC) supports the enhancement of existing province-wide programs and the development of new province-wide programs in order to meet provincial conservation targets in the most cost-effective way possible.

Established by the IESO with representation from LDCs, Enbridge, Union Gas, the Ministry of Energy and the Electricity Distributors Association (EDA), the CFIC establishes processes and provides oversight to working groups that help in the design of cost-effective, customer-centric and results-driven programs.

In addition, the CFIC provides recommendations on the adoption of proposed new province-wide programs and potential program enhancements, and monitors province-wide program results and LDC progress towards target achievement. It also helps to develop new tools and services, and provides limited guidance/input to the IESO related to potential revisions to the allocation of targets and budgets among LDCs.¹⁹

One of the most important improvements made in the development of the CFF was to increase LDC flexibility with respect to program design and delivery. Compared to the 2011-2014 framework, LDCs have substantially greater latitude to choose which programs work best in their own service territories.

As a result, in addition to offering standard, province-wide programs, many LDCs have introduced local programming options that are closely aligned with their customer base, load profile and conservation priorities – including programs related to swimming pool efficiency, home energy reports, small business refrigeration, social benchmarking, Wi-Fi-enabled thermostats, variable-frequency-drive pumps for agricultural uses and others.

¹⁹ CFIC Charter, pg 1

Further information on CFF programs, including early results and key programs, can be found in the Policies and Strategies section of this chapter.

With a view to maximizing the energy, employment, economic and environmental benefits of conservation, the IESO has taken a market transformation approach to promoting, facilitating and driving conservation in Ontario. This process takes a strategic, long-term view of the market and the cost-effectiveness of energy conservation measures. It includes interventions designed to identify and reduce barriers to participation; leverage new opportunities and new technologies; accelerate the adoption of energy-efficient products, services, practices and measures; and drive enduring changes in behaviour – not just on the part of energy consumers but the market itself.

To accelerate this market transformation, many of the CDM programs delivered in Ontario involve not just LDCs, customers and the IESO – but also other “channel allies.” These third parties may include manufacturers, distributors, retailers, consultants, engineers, contractors, electricians, technologists and other individuals or organizations involved in the sales, service or installation of energy efficient equipment. As a result of the close relationship they share with their customers, these trusted partners are becoming an increasingly important channel through which to more deeply engage electricity consumers, increase program participation and maximize energy savings.

The IESO’s Conservation Fund is another important player in the CDM space, serving as a key incubator of new ideas, technologies and solutions. Created in 2005, the Conservation Fund supports innovative conservation technologies, practices, research and programs that have the potential to deliver significant energy savings. It seeks projects that will lead to large-scale transformation in the marketplace or a change in consumer behaviour, demonstrate the energy-saving potential of emerging technologies, and investigate novel conservation concepts.

Since 2005, the Conservation Fund has provided financial support for more than 200 innovative energy projects across Ontario, some of which have evolved from pilots to province-wide programs. The fund has invested more than \$52 million, leveraging an

additional \$142 million from applicants and partners. Several themes have dominated recent project applications and inquiries. For example, there is a growing interest in heat pumps, especially among customers with electric baseboard heating as well as developers of new high-performance residential communities where the economics of connecting to the gas distribution system aren't viable.

Other recent proposals have focused on microgrids and district energy systems – an increasingly attractive construct for municipalities, universities and other types of energy users with multiple buildings, a commitment to environmental sustainability and a critical need for an uninterrupted supply of power. In addition to the potential cost savings associated with producing their own electricity, many of these consumers are keen to enhance their resilience against outages caused by extreme weather events and other circumstances.

Social benchmarking is another phenomenon that's gaining momentum in Ontario. In the context of electricity usage, social benchmarking involves the use of social media tools to enable users to compare their electricity usage with other users'. Research shows these comparisons can spur competition and drive significant reductions in electricity use.

Three social benchmarking pilots that received support from the Conservation Fund in recent years enabled residential customers to compare their household's energy consumption against that of similar homes in their neighbourhood. Several of the province's largest LDCs have since come to market with programs that provide participating customers with detailed home energy reports, enabling them to monitor, track, compare and reduce their energy usage.

Benchmarking is certainly not limited to residential electricity consumers. The IESO has been a strong supporter of the ENERGY STAR Portfolio Manager benchmarking tool offered by Natural Resources Canada (NRCan). Launched in Canada in 2013, this industry-leading interactive energy management tool enables owners and managers of commercial and institutional buildings to upload their building and utility information to an online platform that tracks their energy performance over time and enables

meaningful comparisons to similar buildings. It offers weather-normalized energy use intensity values, GHG emission metrics, reporting features that help users track trends over time, and 1-100 energy performance scores for eligible building types.²⁰

As important as formal, incentivized CDM programs and other funding mechanisms are, they do not represent the only option available to the IESO to reduce peak demand and/or energy consumption in the province. Instead, the IESO has a full suite of other tools available – including demand response (DR).

Prior to the creation of the OPA in 2005, the IESO had already introduced several market-based DR programs for participants in Ontario's wholesale electricity market. These included the Transitional Demand Response Program, the Emergency Load Reduction Program and the Dispatchable Loads Program. These programs had different eligibility criteria and activation triggers, but all helped to ensure reliability when supply was tight.

Although the first two programs were discontinued when other more effective mechanisms were introduced, Ontario's dispatchable loads can still reduce their demand for electricity by more than 450 MW, under specific criteria.

Amendments to the *Electricity Act, 1998* enabled the creation of the Industrial Conservation Incentive, or ICI, which is administered by the IESO. The ICI is a form of voluntary demand response (DR). Customers that participate in the program, referred to as Class A, are charged the global adjustment based on their percentage contribution to the top five peak Ontario demand hours over a 12-month base period. The global adjustment is a financial mechanism used to recover the costs associated with investments in conservation and generation, and is charged to all electricity consumers in Ontario in different ways. Class A customers that accurately predict the top five hours, and shift their demand accordingly, can reduce their price exposure and total energy costs quite significantly.

²⁰ <https://www.nrcan.gc.ca/energy/efficiency/buildings/energy-benchmarking/3727>

The initiative was introduced by the government in 2010 to encourage load shifting and provide some rate relief to large-volume industrial electricity customers. Initially they were required to have an average monthly peak demand greater than 5 MW but program eligibility has been expanded several times to meet different policy goals, including most recently with passage of the *Fair Hydro Act, 2017* on May 31, 2017, which lowered the threshold for participation to 500 kilowatts (kW) for certain designated consumers. Eligibility requirements are established in O. Reg. 429/04.

In addition to offering advantages to customers, the ICI is making a material difference to the province as a whole by reducing peak demand and deferring the need to build new generation or transmission resources. Although other factors must be considered when making year-over-year comparisons of peak demand – including the effects of embedded generation, which reduces demand for grid-supplied energy, and structural changes to the economy that have reduced the province's energy intensity – the ICI is clearly having the desired effect of incentivizing large loads to shift their consumption away from peak hours. In 2016, peak demand was reduced by approximately 1,000 MW as a result of actions taken by Class A customers.

In its role as market and system operator, the IESO uses other types of DR to ensure reliability. Through ministerial directives issued in 2005 and 2006, the OPA was required to procure up to 500 MW of DR, which resulted in the creation of three DR programs: DR1, DR2 and DR3.²¹ DR1 – a voluntary load-shedding program – was eventually discontinued, as was DR2, a mandatory load-shifting program.

DR3, a mandatory, contract-based program evolved into the Capacity-Based Demand Response (CBDR) program, a transitional program that brings DR3 participants into the wholesale electricity market. This program, which currently represents 159 MW of DR capacity, provides availability and utilization payments to both aggregated and individual loads that are capable of reducing their consumption at times of peak demand and when it is economic for them to do so.

²¹ <https://eco.on.ca/reports/2009-energy-report-vol-1-rethinking-energy-conservation-in-ontario/>

These resources are considered in the IESO's economic dispatch process alongside bids and offers from other resources. Over time the DR capacity within CBDR will decline as contracts expire and participation in the transitional program comes to an end. As this capacity expires, participants will have the opportunity to compete against other providers of DR capacity through the IESO's DR auction, a competitive process through which demand-side resources are selected to be available to reduce their electricity consumption. The DR auction is an annual event that was implemented in December 2015.

Further down the road, following a planned redesign of Ontario's wholesale market over the next four to six years, these demand-side resources will be able to compete against other resource types – including generation and imports – in a capacity auction to meet Ontario's resource adequacy needs.

Development of an incremental capacity auction that can accommodate a range of resource types – on the supply side and the demand side – is one of the priorities of the IESO's Market Renewal program, an ambitious, coordinated set of projects that will result in a fundamental redesign of Ontario's electricity markets. When fully implemented, it will provide increased opportunities for all participants in Ontario's electricity market, with greater competition, flexibility and transparency resulting in efficiency gains for the entire sector, including customers and suppliers.

These efforts are part of the IESO's long-term focus on delivering superior reliability in a changing environment and driving to a more efficient and sustainable marketplace.

The DR auction is already having the desired effect of attracting new entrants, driving prices down and providing the IESO with much needed flexibility to respond to changing system conditions and needs. Compared to the prices set during the first auction in 2015, clearing prices for the 2016 auction fell sharply: a 12 percent decrease for the

summer commitment period and a 17 percent decrease for the winter commitment period, reflecting good competition between existing resources and new entrants.²²

One of those new entrants was a DR aggregator that committed to providing 1 MW of DR capacity, as needed. While this number is tiny in the context of all available resources on the power system, it represents 2,000 to 3,000 homes and signals the start of broader engagement on the part of residential consumers and the aggregator community, which has expressed a keen interest in exploring new opportunities to deliver value and support reliability in the province.

Participation in DR by residential aggregators is expected to pick up steam in the months to come as the province's long-standing residential load control program – peaksaver PLUS – is being phased out in 2017. The technology platform for the program is dated and several LDCs have already taken steps to leverage other mechanisms and technologies through which to engage small-volume customers.

One of the areas of greatest promise for DR in Ontario may be at the local level. As communities across the province grapple with aging infrastructure, growing demand for electricity and occasional resistance to building new generation and/or transmission resources, small-scale DR may emerge as an important non-wires alternative. To test out the feasibility of DR to solve local issues, the IESO is working with LDCs in the Brant region southwest of Toronto on a local DR pilot – an exploratory opportunity identified in the Brant Area Integrated Regional Resource Plan.

If implemented, this pilot will test the use of DR to support local capacity needs, specifically to relieve overloading on the 115 kilovolt (kV) system serving the area, under certain circumstances. It will also enable the IESO and stakeholders to develop a framework or mechanism to implement DR-based solutions through regional plans, and test the economic viability of non-wires alternatives, as compared to traditional transmission, distribution and generation (wires-based) options.

²² <http://www.ieso.ca/en/corporate-ieso/media/news-releases/2016/12/ieso-announces-results-of-demand-response-auction>

Electricity planning in Ontario happens at the local, regional and provincial level, each with its own considerations and requirements. Regional planning is an essential link between large-scale and small-scale planning activities. It considers all the factors that can reasonably be expected to affect electricity production, delivery, consumption and reliability at the local level, including community energy plans, as well as province-wide projects like new bulk transmission lines.

Developments over the past few years have changed how regional planning is done in Ontario. In 2010, the OEB concluded that a structured approach to regional planning was required.²³ In 2013, this process was formalized.²⁴

Working closely with transmitters, distributors, customers, communities and other affected stakeholders, the IESO's planners develop recommendations on how best to meet reliability needs. Regional planning is an ongoing process, with plans developed to provide a 20-year outlook, but re-evaluated every five years at minimum

Although conservation and demand management are often considered at the provincial and/or regional levels for planning purposes, several LDCs in Ontario are looking into potential applications that could alleviate local constraints and defer or eliminate the need for costly investment in wires-based infrastructure.

There is no single demand-side measure that's effective or appropriate in all areas. Every community's electrical infrastructure, load characteristics, building stock and customer demographics are different. As a result, the feasibility of CDM solutions must be undertaken and evaluated in a way that's very site-specific and case-specific. What works in one area may not be viable – or even appropriate – somewhere else in the province.

Instead, options available to the LDCs may include targeted demand response, energy storage, small-scale generation and other distributed energy resources. With the support of the Conservation Fund, local achievable potential studies (which assess the

²³ <https://www.oeb.ca/industry/policy-initiatives-and-consultations/renewed-regulatory-framework-electricity>

²⁴ <https://www.oeb.ca/industry/tools-resources-and-links/information-regional-infrastructure-planning>

conservation potential of a particular area) are in the works in several parts of the province.

Small-scale, local conservation can be highly effective but barriers to progress should not be ignored. For example, LDCs commonly lack the data necessary to assess the viability of targeted demand-side solutions at the transformer station level. When complete, the local achievable potential research should provide valuable data that can be leveraged by LDCs and the IESO to determine whether CDM solutions are technically feasible and cost-competitive in those specific areas.

Access to good data is a growing focus in Ontario. As is the case in other jurisdictions around the world where investments are being made in smart grid infrastructure, the increased digitalization of Ontario's grid is starting to enable better coordination, communication, analytical capability and asset management.

Ontario took an early lead in the development of a smart grid by mandating the installation of smart meters and the transition to time-of-use prices. Some 4.7 million smart meters were installed in homes and small businesses earlier this decade, and are now sending enormous quantities of energy consumption data to a centralized database known as the Meter Data Management/Repository (MDM/R), which is managed by the IESO in its role as the Smart Metering Entity as per O. Reg. 393/07.²⁵

Although most LDCs in the province have been using the MDM/R for billing purposes, the true value of the data it contains remains largely untapped. In response to a December 2016 Order from the OEB²⁶, the IESO has begun collecting enhanced data, and is working with stakeholders to explore ways to extract the full value of Ontario's smart meter data while ensuring all customer privacy provisions are protected.

A Data Strategy Advisory Council was created in mid-2017 to provide input into the review and development of products and processes for the implementation of third-party

²⁵ <https://www.ontario.ca/laws/regulation/070393>

²⁶

http://www.rds.ontarioenergyboard.ca/webdrawer/webdrawer.dll/webdrawer/rec/552233/view/dec_order_es_SME_20161124.PDF

access to this data. With representation from electricity consumers, LDCs, consultants, academia, service providers/delivery agents, and municipalities, this group will help define the path forward. In addition to exposing opportunities for the private sector to develop new products, services and technologies, the enhanced data captured in the MDM/R could be used to further refine Ontario's CDM program offerings.

Turning to other CDM activity in Ontario that's not incented, administered or overseen by the IESO, codes and standards are another important contributor to energy conservation, representing approximately one-third of total energy savings. Appliance and product standards are captured under O. Reg. 404/12 and apply to household and commercial appliances such as water heaters, furnaces and other space heating equipment, air conditioners, lamps and other lighting products, motors, pumps, electronic equipment and other related products.

The energy-efficiency requirements contained in Ontario's *Building Code*, administered by the Ministry of Municipal Affairs and Housing, are among the most rigorous in North America for new houses and large buildings. With every iteration, requirements related to energy performance have been strengthened. At the federal level, energy efficiency requirements are being considered for existing buildings and, potentially, a National Energy Retrofit Code for Buildings that, once available, could be adopted by the provinces as part of their energy-efficiency regulations, as can be seen in major international jurisdictions.

Although the energy-efficiency requirements contained in Ontario's *Building Code* are progressive by North American standards, when viewed from an international perspective, they fall slightly behind other leading European jurisdictions. As indicated in the 2016 *Climate Change Action Plan*, however, the Ontario *Building Code* is moving towards net zero carbon emission homes and small buildings by 2030.²⁷ Further information on codes and standards can be found in the Legal/Regulatory section of this chapter.

²⁷ <https://www.ontario.ca/page/climate-change-action-plan#section-5>

Policies and Strategies

In Ontario, conservation goals, targets and priorities are factored into energy policy and planning at different points – most importantly during the long-term planning process. As enshrined in the *Energy Statute Law Amendment Act*, S.O. 2016 c.10 (also known as Bill 135)²⁸ the Minister of Energy is responsible for issuing a long-term energy plan that sets out the Government of Ontario's goals and objectives with respect to energy – a process that replaces the Integrated Power System Plan framework under which the IESO, OEB and other stakeholders previously operated.

Ontario produced its first *Long-Term Energy Plan* in 2010, which was reviewed and updated in 2013 with input from residents, businesses and other stakeholders in communities across Ontario. The government also issued a discussion paper in 2013 entitled *Conservation First: A Renewed Vision for Energy Conservation in Ontario*. In this document, the government reaffirms its commitment to prioritizing conservation in energy planning, stating conservation should be the first resource considered in meeting Ontario's electricity needs.²⁹

Ontario's latest *Long-Term Energy Plan* is expected to be released in late summer 2017. The government has indicated five principles will guide decision-making related to the 2017 plan: affordability, reliability, clean energy, community and Indigenous engagement, and conservation and demand management.

As required by legislation, the IESO provided a technical report to inform government planning and prioritization. Published on September 1, 2016, the IESO's Ontario Planning Outlook (OPO)³⁰ is a technical report that provides a 10-year review (2005-2015) and a 20-year outlook (2016-2035) for Ontario's electricity system. This sweeping report covers a broad range of considerations, including costs, conservation and demand management, supply resources (including energy storage), capacity, reliability,

²⁸ <https://www.ontario.ca/laws/statute/S16010>

²⁹ <http://www.energy.gov.on.ca/en/files/2014/09/conservation-first-en.pdf> p 4

³⁰ <http://www.ieso.ca/sitecore/content/ieso/home/sector-participants/planning-and-forecasting/ontario-planning-outlook>

market and system operations, transmission and distribution, and emissions from the electricity sector.

The OPO examines how conservation and other low-carbon resources can support reliable and efficient operations over a range of possible demand outlooks. Each of the four demand scenarios assumes the achievement of three key targets set in the 2013 LTEP:

- 30 TWh of total energy savings by 2032
- 7 TWh of energy savings through LDC programs delivered under the CFF and 1.7 TWh of savings through the IAP by 2020
- demand response to meet 10 percent of peak demand by 2025

It delves into the many factors that may impact demand for electricity over the next 20 years, including population growth, commercial and industrial sector activity, electric vehicle penetration levels, and the electrification of space heating, water heating and transportation, among others.

The OPO predicts that by 2035, almost half of all energy savings will stem from updated building codes and equipment standards, which deliver energy efficiency with a high degree of certainty and require no ratepayer incentives. Codes and standards implemented to date will continue generating savings going forward, growing to about 7.9 TWh in 2035.

Planned and anticipated codes and standards should save an additional 7 TWh over the same period, with the vast majority of energy savings coming from the commercial and residential sectors. The breakdown between the two measures shows 9.6 TWh coming from equipment efficiency standards and 5.3 TWh from building codes.³¹

Ontario has already made great strides towards reducing the impacts of human activity on the environment, including the elimination of all coal-fired power generation by 2014 – the single largest climate change initiative undertaken in North America, and an

³¹ <http://www.ieso.ca/sitecore/content/ieso/home/sector-participants/planning-and-forecasting/ontario-planning-outlook> module 3, pg 9

important contributor to the province achieving its ambitious 2014 emissions reduction target of six percent below 1990 levels.³²

Building on a strong foundation that includes nuclear generation and renewable resources like hydroelectric, wind and solar units, Ontario's electricity supply mix is already largely decarbonized. Since the supply shortfalls of the early 2000s, more than \$35 billion has been invested in cleaner generation, coupled with \$16 billion in transmission- and distribution-related upgrades.³³

Electricity generation in Ontario produces few GHG emissions. Transmission-connected natural gas-fired generators provided just nine percent of Ontario's electricity in 2016.³⁴ While its contribution is relatively small in absolute MW, gas generation will continue to play an important role in Ontario for the foreseeable future, providing flexibility and enabling the IESO to respond quickly to unexpected changes in supply and/or demand. In addition to providing energy and capacity, this flexibility also enables gas generators to deliver a variety of ancillary services that are essential to operating a well-balanced, reliable and cost-effective power system.

Going forward, the government has signalled its intention to continue aligning its policies with respect to energy and climate change. The *Climate Change Mitigation and Low-Carbon Economy Act, 2016* (Bill 172) passed in May 2016. The legislation sets the framework for climate action and establishes the following GHG emission targets in statute³⁵:

- A reduction of 15 percent below 1990 levels by the end of 2020
- A reduction of 37 percent below 1990 levels by the end of 2030
- A reduction of 80 percent below 1990 levels by the end of 2050

Approximately one month later, the government released its Climate Change Action Plan, which identified more than 90 actions to be implemented over the next five years

³² <http://www.energy.gov.on.ca/en/archive/the-end-of-coal/>

³³ <http://www.economicclub.ca/events/display/ontarios-minister-of-energy>

³⁴ <http://www.ieso.ca/en/corporate-ieso/media/news-releases/2017/01/ontarios-independent-electricity-system-operator-releases-2016-electricity-data>

³⁵ http://www.ontla.on.ca/web/bills/bills_detail.do?locale=en&BillID=3740

in an effort to fight climate change, reduce GHG emissions and transition to a low-carbon economy – many of which will impact how residential, commercial, industrial and institutional customers consider and use energy.³⁶

The plan included a \$325 million commitment to the Green Investment Fund that will help homeowners use less energy, support more electric vehicle charging stations across Ontario, retrofit social housing developments, help businesses reduce emissions, help fund local environmental organizations and help provide Indigenous communities with training, tools and infrastructure to address climate change.³⁷

Of that amount, \$100 million will help homeowners reduce their energy bills while cutting GHG emissions through enhancements to existing home energy audit and retrofit programs offered by the province's two natural gas distributors, Enbridge Gas Distribution and Union Gas.

The IESO is working with both distributors to expand their home energy audit and retrofit programs to include electricity-focused measures through a pilot program called Whole Home, which is one component of the Ontario Home Energy Conservation Incentive Program offered by Enbridge and Union.

The Whole Home pilot is a province-wide, multi-fuel home energy-efficiency program. It represents a coordinated effort by the IESO, Enbridge and Union that is intended to provide residential consumers with a single point of entry and a streamlined approach to identifying and financing home energy-efficiency improvements. The pilot will expand program eligibility to electrically heated homes, fund home energy audits and assessments, and offer new incentives to reduce electricity consumption, including ENERGY STAR-qualified air conditioners and appliances, gas furnaces with electronic control modules and air source heat pumps.

The audits will provide homeowners with a holistic view of their home, including its energy requirements and savings opportunities. Armed with this information, homeowners can prioritize their spending on energy-efficiency measures. The pilot will

³⁶ <https://www.ontario.ca/page/climate-change-action-plan>

³⁷ <https://www.ontario.ca/page/green-investment-fund>

also provide some larger incentives to drive investments in high-cost, high-value equipment such as heat pumps, which have steep upfront costs but offer substantial energy-savings potential. Launched in May of 2017 the Whole Home Pilot is expected to include 22,000 households by the end of the year.

In addition to reducing their electricity consumption by approximately 5,000 kWh per year by making energy-efficient upgrades, participating households should also benefit from improved home comfort and increased resale value.

The *Climate Change Mitigation and Low-Carbon Economy Act, 2016* also enabled the creation of a cap-and-trade program, the proceeds of which will be used to finance a “green bank” known as the Ontario Climate Change Solutions Deployment Corporation, established in February 2017³⁸.

At a high level, it was created to stimulate business related to the development of commercially available technologies that reduce GHG emissions from buildings or from the production of goods. Its focus will be on providing information, services and incentives to individuals; stimulating private sector financing; and identifying/reducing market barriers that currently inhibit the deployment of low-carbon technologies rather than engaging in or providing financial incentives for research and development.

Over the spring and summer of 2017 the IESO worked closely with the Ministry of Energy and the Ministry of the Environment and Climate Change to create a website, staff a call centre, develop marketing material and prepare for the launch of the Green Ontario Fund. Leveraging the IESO's expertise in designing and delivering appealing, customer-focused CDM programs, the fund will build on existing infrastructure and offer a “one-window” approach to customer service and simple processes that should drive high participation rates.

As noted above, the CFF has transformed the landscape for incentivized CDM in Ontario. LDCs are making good progress towards their 2020 targets and the LDC CDM portfolio remains cost effective. Similarly, many of Ontario's 59 transmission-connected

³⁸ <https://www.ontario.ca/laws/regulation/r17046>

customers – some of the province's largest employers – have undertaken multi-year IAP-funded projects to drive operational efficiencies. Like the LDC-delivered portfolio of programs, the IAP remains cost-effective, though it may be several years before these large, complex projects fully deliver the expected conservation results. Both sets of programs are currently delivered at less than \$0.04/kWh.

LDC-delivered programs are managed and promoted under the Save on Energy (SOE) brand and include options for residential and business customers (including commercial, institutional and low-volume industrial users). Programs for business customers deliver the lion's share of results, averaging 71 percent of total energy savings. Residential programs, by contrast, represent 20 percent of total savings – though this number is on the rise, in large part due to the success of a coupon redemption program targeting residential energy-efficiency products, known in Ontario as the Coupon program. Small, embedded industrial consumers (which do not participate in the IAP) are responsible, on average, for nine percent of SOE-supported energy savings.

Coupon redemption has been popular with residential and small business consumers, with 4.1 million coupons redeemed across the province, representing 6.4 million energy efficient products purchased in 2015.³⁹ Results for 2016 are even stronger, showing a 28 percent increase over 2015.

While some of this growth can be attributed to price drops of energy efficient products vis-à-vis non-energy-efficient alternatives, making upgrades more financially palatable than in previous years, the success of the Coupon program is also evidence that Ontarians' understanding of the full spectrum of benefits that energy efficiency can deliver has deepened.

To build on these results, the program model is shifting later this year. Instead of relying on coupons, the new Instant Discount program is expected to increase engagement with consumers to an even greater extent, enabling them to benefit from incentives

³⁹ <http://www.ieso.ca/en/sector-participants/conservation-delivery-and-tools/conservation-e-blasts/2016/12/2015-conservation-results-report>

when making online energy-efficient purchases, while simultaneously reducing administrative costs and challenges for LDCs and the IESO.

For business customers, the two most important programs in Ontario are the Retrofit program and the Energy Manager program. Delivering approximately 54 percent of total energy savings tracked under the CFF and the 2011-2014 framework, the Retrofit program provides incentives that enable participants to replace outdated, inefficient equipment with high-efficiency alternatives and install new control systems that improve operational processes.

While the program is subject to continuous improvement and change, eligible measures include lighting retrofits and controls; HVAC redesign; chiller replacement; variable speed drives; building envelope improvements; and implementation of new operating systems, procedures and/or equipment, including things like energy management systems, sensors and controls, metering equipment and related communication systems.

The Retrofit program really delivers for Ontario. It has broad applicability and can be implemented by most types of commercial, industrial and institutional consumers. It also includes both prescriptive and custom tracks for maximum flexibility. Now that much of the “low-hanging fruit” has already been captured, when the next iteration of the program is brought to market, it’s expected to reflect the natural evolution of products, technologies, applications and prices.

For optimal results, funding to purchase and install energy-efficient equipment should be complemented by training that enables users to operate the equipment more effectively and identify other potential improvements at their facility. In Ontario, building market capability through training and support is becoming as much of a priority as incentivizing the purchase and installation of energy-efficient products.

The SOE Training and Support incentives are designed to enhance CDM-oriented knowledge and skills among LDCs, channel partners, customer employees and other individuals with a role in delivering SOE-funded projects. Incented courses enable participants to identify operational savings opportunities, increase employee

engagement in energy matters, integrate new technologies and best practices, and secure executive approval to implement proposed changes. As the capability of Ontario's businesses and institutions grows, and energy efficiency is considered a standard practice for planning and budgeting purposes, the need for ratepayer-funded incentive programs is expected to decline.

Since 2011 Ontario has also provided direct financial support to large electricity consumers to hire energy managers to increase participation in existing programs and drive the implementation of non-incented energy-efficiency projects. Energy managers in Ontario are active in all sectors of the economy including industrial sites, office buildings, retail complexes, multi-unit residential properties, hospitals, universities and municipal buildings.

Inspired by BC Hydro's pioneering incentivized Energy Manager program, and informed by other pilot projects through the IESO's Conservation Fund, the IESO's Energy Manager program has two streams: one for embedded energy managers who work full-time at the participant's site(s) and one for so-called "roving" energy managers hired by LDCs to provide support to smaller industrial, commercial and institutional consumers that would benefit from the expertise of an energy manager but individually lacked the savings potential to justify a full-time resource.

Over the 2011-2014 period, the Embedded and Roving EM programs produced more than 115 million kilowatt-hours (kWh) of net verified energy savings and more than 4,600 kW of net verified summer peak demand reduction. Interest on the part of large volume, transmission-connected customers eventually prompted the expansion of the EM program to include IAP-eligible consumers, including steel mills, petrochemical facilities, automotive factories and mines, among others. As of March 2017, more than 20 customers – representing over one-third of all eligible IAP customers – were participating in the EM program.

In the spirit of providing conservation opportunities that meet customers' needs and expectations, the IESO also worked closely with LDCs, customers and service providers to create an EM option specifically for customers with facilities located in multiple LDCs'

service territories. For multi-distributor customers, the program offers administrative simplicity through a single contract and a single point of contact with the IESO for activities across the province.

To maximize their chances of success in identifying and implementing energy-efficiency improvements, IESO-funded energy managers have access to a broad range of tools and support, including a private online discussion forum, a monthly newsletter, in-person events, training courses in presentation skills and financial basics, and other research and resources. Energy managers may even benefit from “energy hunts” wherein other energy managers tour a host facility and search out new, undiscovered energy-savings opportunities.

Multi-site customers were the beneficiaries of another program designed and implemented in 2016: the Energy Performance Program (EPP). After a successful Conservation Fund pilot project undertaken by a large grocery chain, the program was formally launched in December 2016. Designed to be highly flexible, the program enables participants to choose which conservation measures are most appropriate and offer the greatest energy savings potential to their business.

The EPP provides commercial and institutional customers with facilities located in multiple service territories the opportunity to receive energy efficiency incentives on a pay-for-performance basis – the first such program of this scale and scope in North America. Its unique structure reduces the administrative burden on large, multi-site customers and enables them to access larger incentives than would normally be the case – assuming they meet exacting performance requirements. Although the program is being centrally administered by the IESO, savings will be credited to LDCs and count towards their CDM Plan targets.

Rigorous, independent evaluation, measurement and verification (EM&V) of conservation results is essential to credibility. Evidence-based analysis helps to establish CDM as valuable resource for meeting Ontario’s energy needs by providing answers to key questions. Can conservation reliably deliver energy savings? Is conservation more cost-effective than supply-side alternatives? Do the benefits of

conservation outweigh the costs? And is conservation an effective and appropriate use of public funds?

EM&V provides essential information to policy-makers, system planners and program administrators to use in developing long-term plans, optimizing program performance and determining whether energy savings and demand reduction targets are being met. It is also used to develop a reliable net savings estimate – those energy savings attributable to or resulting from program-sponsored efforts as distinguished from other measures.⁴⁰

Cost-effectiveness is a priority in Ontario and has broad implications for program planning, design and implementation to ensure ratepayer dollars are invested wisely. In general terms, conservation is considered cost-effective when the lifecycle costs of implementing conservation programs and actions are less than the benefits (e.g., avoided costs of new generation, transmission or distribution.)

When it comes to EM&V, Ontario has taken existing best practices developed in other jurisdictions and adapted them to ensure they are meaningful and relevant. In some cases, Ontario has taken established benchmarks and used them as a springboard for more rigorous EM&V protocols and processes, enabling a more strategic view of program and portfolio effectiveness.

To ensure they continue to meet established policy objectives and other criteria, the IESO evaluates every conservation program every year – as compared to many other jurisdictions, which evaluate programs every few years and/or integrate spot checks into their EM&V process. Evaluating programs regularly deepens the collective understanding of what's driving the market, enables administrators to identify potential enhancements, and reveals which programs are delivering the greatest benefit to customers and to the system as a whole. All evaluation results are made public and support the province's commitment to transparency.

⁴⁰ <http://ieso.ca/-/media/files/ieso/document-library/conservation/lde-toolkit/emv-protocols-and-requirements-10312014.pdf> p vi

Cost-effectiveness metrics can be used to assess CDM during planning stages and as part of the EM&V process. It can be assessed at various levels of detail: measure, program or portfolio. The measure is the most granular level of CDM and represents the conservation technology, product or action implemented by a participant. A program is defined as a collection of measures or activities targeted towards, for example, a particular end-use (e.g., lighting) or customer type (e.g., small commercial). And a portfolio is a collection of programs.⁴¹

The IESO uses multiple tests when evaluating the cost-effectiveness of its CDM activities. In addition to assessing individual programs, the IESO also considers them on a broad, portfolio-wide basis that considers other policy drivers and social objectives. The most meaningful test is the Total Resource Cost (TRC) test, which compares the costs incurred to design and deliver conservation programs (and customers' costs) with the avoided supply-side resource costs including generation, transmission or distribution options. The strength of the TRC test is that it provides a holistic viewpoint that considers costs and benefits to both the local utility and participating customers.⁴²

Other common tests used to assess conservation programs include the Program Administrator Cost (PAC) test, which is focused solely on the costs to program administrators (e.g., LDCs or the IESO); the Societal Cost (SC) test, which is identical to the TRC test but also includes the cost of "externalities" such as carbon emissions and health costs; and the Levelized Unit Electricity Cost (LUEC) test, which normalizes the costs incurred to design and deliver CDM programs on a unit basis to enable comparison with supply-side alternatives.⁴³

⁴¹ <http://ieso.ca/-/media/files/ieso/document-library/conservation/lcd-toolkit/cdm-ee-cost-effectiveness-test-guide-v2-20150326.pdf> p 7

⁴² <http://ieso.ca/-/media/files/ieso/document-library/conservation/lcd-toolkit/cdm-ee-cost-effectiveness-test-guide-v2-20150326.pdf> p 9

⁴³ <http://ieso.ca/-/media/files/ieso/document-library/conservation/lcd-toolkit/cdm-ee-cost-effectiveness-test-guide-v2-20150326.pdf> p8

Legal/Regulatory Framework

The *Ontario Energy Efficiency Act, 1990* (EEA) gave the province the authority to require minimum energy performance standards (MEPS) on the sale of certain energy-consuming products. Two years later, the federal Energy Efficiency Act enabled the federal government to require MEPS on products traded across provincial or international borders. Both pieces of legislation, and the associated codes and standards, have driven substantial energy savings in the province in the intervening years.

Given that regulation of building construction is a provincial responsibility, Ontario's first *Building Code Act* was proclaimed in 1974, with the first *Building Code* regulation taking effect the following year.⁴⁴ It is updated roughly every five years, with the most recent *Building Code* (2012) coming into force on January 1, 2014. The Code is administered by the Building and Development Branch of the Ontario Ministry of Municipal Affairs and Housing. And while its focus is on ensuring public safety in newly constructed buildings, it also supports the government's commitments to energy conservation, barrier-free accessibility and economic development.

To the extent possible, efforts are made to harmonize Ontario's *Building Code* with model national construction codes, including the *National Building Code of Canada* and the *National Energy Code of Canada for Buildings*, which was designed to complement provincial/territorial building codes. It sets out minimum requirements for energy efficiency that may be adopted in whole or in part into provincial or territorial legislation and codes or, alternatively, used as guidelines for the construction of new, energy-efficient buildings.⁴⁵

As noted above, the *Green Energy Act, 2009* (GEA) – also known as the *Green Energy and Green Economy Act, 2009* – is better known for encouraging renewable generation than it is for promoting energy conservation. However, as noted above, it also

⁴⁴ <http://www.mah.gov.on.ca/Page10806.aspx>

⁴⁵ http://www.nrc-cnrc.gc.ca/eng/solutions/advisory/codes_centre/codes_brochure.html

introduced energy-efficiency standards for a number of household and commercial appliances through O. Reg. 404/12.

Amendments to the GEA introduced in 2012 brought other changes. Most notably, buildings that fall under broader public sector (BPS) ownership – municipal facilities, universities/colleges, schools, hospitals and the like – became subject to new energy consumption and GHG reporting requirements.

As established in O. Reg. 397/11, affected groups in the BPS are required to publicly report their energy use and GHG emissions, and produce five-year CDM plans. The Environmental Commissioner of Ontario (ECO's) 2015-2016 annual energy conservation progress report suggests the BPS-owned and/or leased portfolio represents about 590 million square feet of floor space across 15,000 facilities with total energy consumption of 18.6 billion equivalent kWh (ekWh) /year.⁴⁶

While voluntary programs can and do deliver useful results, mandatory energy reporting programs are generally considered more effective in driving long-term, persistent energy performance improvements. Mandatory reporting regimes bring heightened scrutiny to energy consumption patterns – not just on the part of the building owner doing the reporting, but also by local residents, special interest groups, other government bodies, and even independent third parties seeking to improve on existing results through new approaches or technologies.

With several years' consumption data now available, the ECO's report declares energy use in Ontario's public buildings shows "significant potential" for energy-efficiency improvements. When fully implemented, these improvements could produce many benefits, including reduced operating costs, less demand on energy infrastructure, more green jobs, and reduced GHG emissions.⁴⁷

As important as energy consumption within the BPS is, those properties represent a fraction of the untapped conservation potential across the province. Provincial public

⁴⁶ http://docs.assets.eco.on.ca/reports/energy/2015-2016/ECO_Conservation_Lets_Get_Serious.pdf p 63

⁴⁷ http://docs.assets.eco.on.ca/reports/energy/2015-2016/ECO_Conservation_Lets_Get_Serious.pdf p 81

buildings – whether owned/leased by the government itself or by the BPS – account for just eight percent of the energy used in all Ontario buildings.⁴⁸

O. Reg. 20/17, made under the *Green Energy Act, 2009*, was passed in February 2017 and introduced new reporting requirements for energy consumption and water use by certain privately owned properties in excess of 50,000 square feet. These include office buildings and other commercial properties, multi-unit residential properties with more than 10 units, retail stores and some industrial properties.⁴⁹

Using the ENERGY STAR Portfolio Manager mentioned above, reporting will be phased in over three years (2018-2020) according to property size, from largest to smallest. Although some large commercial property owners have been using Portfolio Manager for several years, and have found ways to leverage what they've learned from benchmarking against their peers, the process will be new for many participants, including owners of large retail facilities, warehouses and condominiums.

While the reporting requirements described above apply to buildings within the BPS portfolio and, separately, to the private sector, different requirements apply to government-owned or -managed properties. In support of the 2007 Go Green Action Plan (GGAP), the Ontario Ministry of Infrastructure (MOI) committed to reducing GHG emissions through energy conservation measures. The GGAP outlined overall Ontario Public Service (OPS) targets in a number of areas, including OPS building-related emissions.

Ontario has met this target through extensive energy retrofits in government-owned buildings and energy conservation measures undertaken by employees. To help achieve the overall GGAP targets, MOI committed to a building-related emissions reduction of 27 percent by 2020 (over a 2006 baseline). The MOI portfolio has already achieved a previous target of 19 percent reductions by 2014.

⁴⁸ http://docs.assets.eco.on.ca/reports/energy/2015-2016/ECO_Conservation_Lets_Get_Serious.pdf p 79

⁴⁹ <http://www.energy.gov.on.ca/en/ontarios-ewrb/>

Annual energy and GHG reporting requirements are outlined in the Ontario Facilities Energy Consumption Directive (per the Green Energy Act). Annually, the energy and GHG reporting requirements are split out:

- The 5-Year Energy Plan reporting on target buildings and initiatives for MOI buildings
- The Enterprise-Wide GHG Summary which includes the MOI-managed portfolio as well as custodial ministries, which have buildings that are managed by the ministry directly and fall outside of the scope of MOI management

In support of the building-related GHG emissions targets for 2014 and 2020 (19 percent and 27 percent respectively), an electricity reduction target was set at 20 percent by 2012 (over a 2002 baseline). To achieve this target, Infrastructure Ontario (IO) was directed by MOI to implement building-related electricity reduction initiatives.

The 2014 target was achieved. Moving forward, MOI has given IO direction to implement a new target encompassing all fuel types (electricity, natural gas, propane, fuel oil, chilled water, steam). The new target is a two-percent reduction, year over year, for all fuel types.

Considerable progress has been made since committing to emission reduction targets, with results coming through a variety of initiatives including major building retrofits, retro-commissioning and new design guidelines/standards. Although the 2014 target was achieved, the 2020 target remains uncertain, with a number of factors contributing to this uncertainty.

As noted above, in the spring of 2016, the Ontario government released its five-year *Climate Change Action Plan*. In this plan, the government seeks to reduce its GHG emissions from its facilities. A new target was established: a 50-percent reduction of GHG emissions by 2030, using 2006 as a baseline. IO-managed facilities are heading in the right direction and showing improvements in the area of energy efficiency and

conservation. With aging buildings, investment in new technologies will improve the chances of hitting those emission targets in the future.

MOI reports GHG emissions annually using an internally developed methodology that incorporates some elements of The World Resources Institute Greenhouse Gas Protocol (GHG Protocol). The GHG Protocol provides standards and guidance for reporting greenhouse gases. Because of the nature of government facilities, elements of the GHG protocol were adapted into an internal methodology for applicability to the MOI portfolio.

In January 2017, IO and the IESO announced they had struck a five-year partnership to test innovative CDM technologies, processes and program delivery models in the public sector. With a view to accelerating the adoption of CDM solutions in both the public and private sectors, IO received up to \$10 million in support from the Conservation Fund.

Through this agreement, the IESO will support the testing of new CDM projects across IO's diverse portfolio. IO's portfolio features approximately 4,000 buildings and structures across the province that support a wide-range of ministry programs. This includes multi-ministry office buildings, courthouses and correctional facilities.

Approved projects are expected to yield insights in a number of areas including facility benchmarking; building automation; heating, ventilation and air conditioning and advanced controls; lighting systems; building envelope; energy efficiency options for heritage buildings; efficient building operation; electricity, gas and water collaboration; energy storage technologies; integration with regional energy planning; and opportunities to work toward net zero buildings.

By creating a safe, controlled environment in which new technologies and solutions can be tested, this partnership is expected to reduce some of the existing barriers to widespread implementation and encourage uptake by the broader public sector and potentially the commercial, industrial and institutional sectors.

Financial Mechanisms

For customers in Ontario considering energy efficiency improvements at their homes or businesses, the primary source of funding for these measures is the IESO's conservation programs, delivered mainly through LDCs. On average, for every \$1 the customer spends on energy efficiency improvements, the IESO contributes \$XXX.

To help Ontario customers become more energy-aware and enable them to better control their consumption and their costs, the Ministry of Energy has compiled a list of incentive programs for business (<http://www.energy.gov.on.ca/en/incentives-program-for-business/>) and for communities (<http://www.energy.gov.on.ca/en/incentives-programs-for-communities/>).

Some other options include:

The Atmospheric Fund (TAF): a not-for-profit organization that invests in "urban solutions" to reduce GHG emissions and air pollution. As part of its organizational mission, TAF provides financing to entrepreneurs whose product or service can significantly cut emissions in Toronto, and developers and property owners who are making their buildings more energy efficient. Its ultimate goal – reducing Toronto's GHG emissions by 80 percent by 2050 – informs all its actions, including investment decisions. TAF's vision is that Toronto becomes a "climate-smart city" that is a leader among urban centres around the world. <http://taf.ca/about-us/>

Efficiency Capital (EC): this privately held Canadian corporation offers financing of energy efficiency retrofits for multi-unit residential, commercial, industrial and institutional buildings through its insured energy-savings warranty program. EC enables property owners and asset managers to increase overall building profit by realizing savings on operating costs and achieving significant declines in GHG emissions associated with energy consumption. EC earns back its capital and its professional services investment by sharing the clients' utility cost savings. <http://efficiencycapitalcorp.com/>

City of Toronto Home Energy Loan Program (HELP): HELP is a financing option offered by the City of Toronto. Low-interest loans are available to local homeowners who are interested in improving the energy and water efficiency of their home. Through HELP, the City provides the funding required to complete the improvements and homeowners repay the loan over time through installments on their property tax bill.
<http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=7e00643063fe7410VgnVCM10000071d60f89RCRD>

MaRS: this unique Toronto-based organization brings together educators, researchers, social scientists, entrepreneurs and business experts under one roof. It describes itself as “a launch pad for startups, a platform for researchers and a home to innovators” and offers expert advice, market intelligence and access to capital. MaRS works in several sectors and has one practice focused on Energy & Environment (Cleantech).
<https://www.marsdd.com/>

Ontario Centres of Excellence (OCE): While its focus is not solely on energy efficiency, OCE co-invests with industry to commercialize innovation originating in the province's publicly funded colleges, universities and research hospitals. They also support and invest in early-stage projects, where the probability of commercial success and potential total return on innovation are substantial. OCE drives the commercialization of cutting-edge research across strategic market sectors to build the economy of tomorrow and secure Ontario's and Canada's global competitiveness.
<http://www.oce-ontario.org/about-us>

Green Investment Fund (GIF): Created to support the objectives of Ontario's *Climate Change Action Plan*, this \$325-million fund will support projects that will fight climate change, grow the economy and create jobs. These investments are part of the government's plan to secure a healthy, clean and prosperous low-carbon future. GIF projects will: help homeowners use less energy; support more electric vehicle charging stations across Ontario; retrofit social housing developments; help businesses reduce emissions; help fund local environmental organizations; and help provide Indigenous communities with training, tools and infrastructure to address climate change.
<https://www.ontario.ca/page/green-investment-fund>

IESO Education and Capacity Building Program (ECB): the ECB program is intended to support First Nation and Métis communities and organizations, co-ops, municipalities, public sector entities, registered charities and not-for-profit organizations. These projects help equip communities and organizations with knowledge and training, creating opportunities for them to participate actively in Ontario's energy sector. <http://www.ieso.ca/get-involved/funding-programs/education-and-capacity-building-program/overview>

TargetGHG: This new program, part of the Ontario Green Investment Fund and delivered by OCE, is aimed at helping Ontario meet its GHG emission reduction targets by encouraging large industrial plants to adopt leading-edge technology and supporting Ontario's entrepreneurs in developing creative new solutions. <http://www.oce-ontario.org/programs/strategic-initiatives/TargetGHG>

Electric Vehicle Incentive Program (EVIP): this program administered by the Ministry of Transportation supports the adoption of electric vehicles (EVs) and the reduction of GHG emissions by the transportation sector. EVIP began in 2010 and was updated to further support the goals of Ontario's Climate Change Action Plan by making EVs even more affordable; incenting EVs with larger batteries and larger seating capacity; and ensuring that zero emission vehicles are more strongly supported. <http://www.mto.gov.on.ca/english/vehicles/electric/electric-vehicle-incentive-program.shtml>

SMART Green: this program offered by the Canadian Manufacturers & Exporters (CME) in partnership with Government of Ontario helps small- and medium-sized manufacturers reduce GHG emissions and improve their energy efficiency. It provides assistance in the form of non-repayable grants of 50 percent of eligible costs up to \$200,000 and is intended to improve the competitiveness of the Ontario manufacturing supply chain by not only delivering value to eligible manufacturers, but also by contributing to Ontario's 2020 targets for GHG emissions reduction. <https://cmeweb.crm.eperformanceinc.com/smartgreen/>

High-rise Retrofit Improvement Support Program (Hi-RIS): this is a three-year pilot program now offered by the City of Toronto to help residential property owners pursuing energy and water efficiency and conservation improvements. The multi-residential stream of the program has a \$10 million funding envelope with a participation target of approximately 10 buildings.

<http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=e206c94d3dc4f410VgnVCM10000071d60f89RCRD>

Guelph Energy Efficiency Retrofit Strategy (GEERS): as part of the GEERS program, Guelph homeowners are encouraged to make energy efficiency improvements to their homes, including insulation, windows, weatherizing, climate control devices, furnaces, air conditioners, heat recovery systems and solar panels. The upfront costs of the retrofits are paid through the pilot program and homeowners repay these costs over a period of up to 25 years at low interest rates through special monthly charges known as Local Improvement Charges, which are collected through property taxes.

<http://guelph.ca/plans-and-strategies/community-energy-initiative/geers/>

Bibliography