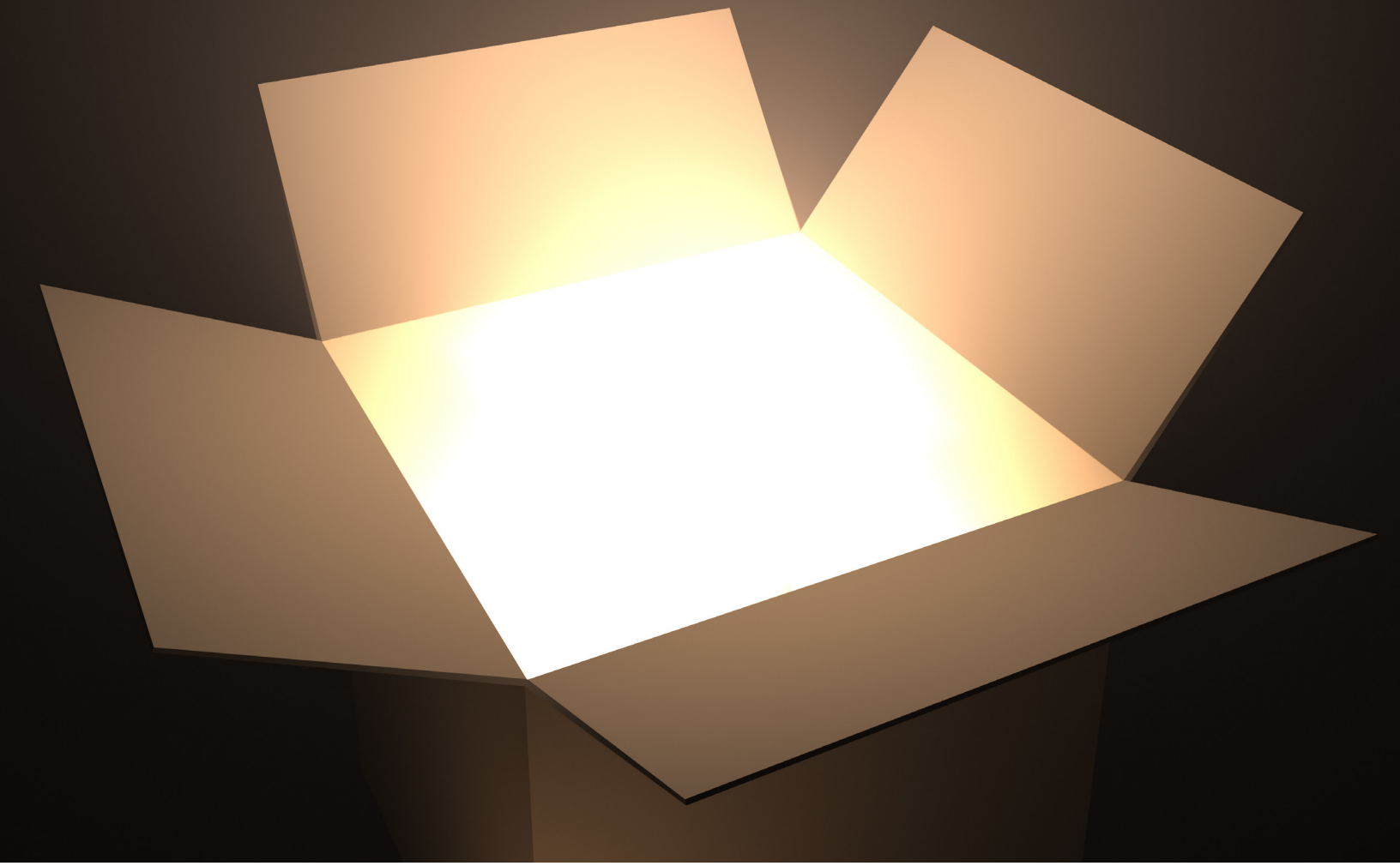
Studies in Ontario Energy Policy Series | No. 7

Unpacking the Climate Potential of Energy Efficiency



Effective and Resilient Governance for Energy Efficiency in Low-Carbon Sustainable Energy Transitions

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About the Sustainable Energy Initiative

The challenges of climate change and the need to support sustainable energy, economies and communities inspired the Faculty of Environmental Studies to establish the Sustainable Energy Initiative. SEI builds and strengthens research, education and skills for students and professionals in energy efficiency and conservation, renewable energy sources and community energy planning. SEI seeks collaboration and partnerships to support analysis of technical, economic, social and political contexts and innovation in sustainable energy and its applications. SEI encourages sustainable, equitable communities in Canada and around the world. https://sei.info.yorku.ca/

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Executive Summary

Estimates of the technologically and economically achievable potential for energy efficiency improvements in Canada are significant. Modelling by the International Energy Agency for example, suggests that under ambitious policy scenarios, Canada's GHG emissions could be reduced by approximately 200 million tonnes CO_2e per year (28 percent of current emissions) and with cumulative savings of $1.1 trillion USD between 2017 and 2050.

In addition to offering the potential to make major contributions to a low-carbon sustainable energy transition, energy efficiency improvements can reduce energy costs to consumers, avoid the adverse environmental and social impacts of new energy supplies, improve productivity, strengthen energy security and enhance the resilience of energy systems to the impacts of climate change.

Despite their benefits, energy efficiency initiatives have struggled to achieve their full technological and economic potential to reduce to energy demand. These failures have been due to a range of market, institutional, financial, policy, regulatory, behavioural and informational barriers.

In recent years, new challenges have emerged beyond these traditional and well-understood obstacles. Changes in policy direction, often flowing from changes in governments, have resulted in significant retrenchments, and in some cases wholesale dismantlings, of energy efficiency strategies in North America. The Government of Ontario's decision to terminate its "Conservation First" strategy in March 2019 was among the most dramatic of these developments, but far from unique.

This study seeks to understand the dynamics behind these developments, and to identify potential strategies and design principles to inform the development of more effective and resilient governance structures for energy efficiency in Canada. Specifically, the study examines a series of cases in which commitment and consensus around energy efficiency faltered, threatening the stability and, at times, the existence, of energy efficiency programming in a variety of Canadian (BC, Alberta, Ontario, Nova Scotia and New Brunswick) and American (Maine, Connecticut and Indiana) jurisdictions.

Based on these cases, and a review of wider public policy literatures on institutional robustness and policy resiliency, a set of five guiding yet non-prescriptive principles for building effective and resilient energy efficiency strategies are presented. These principles are:

- Clarity of objectives, roles, funding and accountability;
- Fairness in the distribution of costs and benefits;
- Flexibility and the ability to adapt to changing needs, circumstances and opportunities;
- Polycentrism (the involvement of multiple actors and agencies) in program design and delivery; and
- Diversity in partnerships, strategy, funding mechanisms and evaluation.

These principles are translated into specific recommendations regarding the governance, financing, delivery and evaluation of energy efficiency strategies using Ontario as an illustrative example.

The key recommendations for Ontario that emerge in this context include:

- The establishment of a new provincial agency - Energy Efficiency Ontario (EEO), with a mandate to develop a comprehensive, integrative energy efficiency strategy for the province.
- The engagement or re-engagement of a variety of agents with established expertise and capacity in program design and implementation, including Local Distribution Companies (LDCs) and Enbridge for residential and commercial consumers, and the Independent Electricity System Operator (IESO) for large industrial consumers, in energy efficiency program delivery.
- The establishment of requirements that natural gas and electricity utilities LDCs demonstrate their pursuit of all cost-effective and achievable energy efficiency opportunities as condition of rate and capital investment approval by the Ontario Energy Board, on an ongoing basis.
- The strengthening of the mandates of the Auditor-General of Ontario/ Environmental Commissioner of Ontario to assess and report on the province's energy efficiency performance.

The primary focus of the study is on energy efficiency governance in the context of energy uses in buildings, stationary equipment, appliances and devices and industry. The core principles could be applied to other energy uses, and wider climate change mitigation strategies as well. The study does not make recommendations on the specific details of program or portfolio design.

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List of Acronyms

ACEEE	American Council for an Energy-Efficient Economy
BCUC	BC Utilities Commission
CCIR	Carbon Competitiveness Incentive Regulation
CEE	Consortium for Energy Efficiency
CEEF	Connecticut Energy Efficiency
CESAR	Canadian Energy Systems Analysis Research
DEEP	Department of Energy & Environment Protection
DERs	Distributed Energy Resources
DSM	Demand-side Management
EE	Energy Efficiency
EEB	Energy Efficiency Board
EEO	Energy Efficiency Ontario
EERS	Energy Efficiency Resource Standards
ESCo	Energy Service Company
GHG	Greenhouse Gas
HVAC	Heating, Ventilation and Cooling
IEA	International Energy Agency
IESO	Independent Electricity System Operator
IRP	Integrated Resource Plan
IPSPs	Integrated Power System Plan
IURC	Indiana Utility Regulatory Commission
LDC	Local (electricity) Distribution Company
LRAM	Lost Revenue Adjustment Mechanism
MEPS	Minimum Energy Performance Standards
MPUC	Maine Public Utilities Commission
NIPSCO	Northern Indiana Public Service Company
NRCAN	Natural Resources Canada
OEB	Ontario Energy Board
OPA	Ontario Power Authority
PACE	Property Assessed Clean Energy
PURA	Public Utilities Regulatory Authority
RGGI	Regional Greenhouse Gas Initiative
SEA 340	Senate Enrolled Act 340
TIER	Technology Innovation and Emission Reduction System
TRC	Total Resource Cost
UARB	Utility and Review Board

Introduction

Energy efficiency has received relatively consistent recognition and support of policy-makers since the 1970s, although less attention than the development of new energy supplies. This support has been a function of efficiency improvements' ability to contribute to responses to energy price increases, environmental degradation, and energy poverty, while improving economic productivity, strengthening energy security and improving energy system resilience.

Current estimates of the technologically and economically achievable potential for energy efficiency improvements in Canada are significant. A 2018 study by the International Energy Agency (IEA) modelled potential energy efficiency savings in Canada to 2050, based on carbon pricing arrangements introduced in the Pan-Canadian Framework on Clean Growth and Climate Change. The study found that the potential savings could reduce energy demand by around 100 Mt of oil equivalent below a business-as-usual scenario, or roughly one-third of total primary energy demand in 2016. GHG emissions would be reduced by approximately 200 million tonnes CO_2e per year (28 percent of current emissions) and with cumulative savings of $1.1 trillion USD between 2017 and 2050.[1]

A recent energy efficiency potential study completed for the Ontario Independent Electricity System Operator (IESO) suggested a technical potential for reductions of future electricity demand by 25 percent relative to business as usual forecasts to 2038, and natural gas consumption by 31 percent were possible.[2] Other analyses have suggested even greater savings may be possible, with a technical potential of up to 53 percent with respect to electricity and an economic potential of 31 percent relative to business-as-usual forecasts to 2035. [3] Energy efficiency has been consistently identified as the lowest impact[4] and most cost-effective[5] means of meeting energy needs.

1 International Energy Agency (IEA), *Energy Efficiency Potential in Canada to 2050*, Insight Series 2018 (Paris: International Energy Agency, 2018). https://webstore.iea.org/insights-series-2018-energy-efficiency-potential-in-canada.

2 Navigant Consultants, *2019 Integrated Electricity and Natural Gas Achievable Potential Study* (Toronto: Navigant Consultants Ltd, 2019). http://www.ieso.ca/2019-conservation-achievable-potential-study.

3 See R. Childs, T. Hammer, and H. van Rensburg, *Achievable Potential Study:Long-Term Analysis* (Toronto: Nexant, 2016). http://www.ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Completed/Achievable-Potential-Study-LDC-Working-Group. The Navigant study also assumes an average annual incremental savings of 0.8% in the maximum scenario for Ontario. Ontario achieved savings of 1.4% in 2017 and other jurisdictions have achieved well above 2% per year. See Efficiency Canada, *Canadian Energy Efficiency Scorecard* 2019 (Ottawa: Efficiency Canada 2019) https://www.scorecard.efficiencycanada.org/wp-content/uploads/2019/11/Scorecard.pdf and American Council for an Energy Efficient Economy (ACEEE) *The 2019 State Energy Efficiency Scorecard* (Washington DC: ACEEE 2019) https://www.aceee.org/sites/default/files/publications/researchreports/u1908.pdf.

4 Winfield, M., Gibson, R., Markvart, T., Gaudreau, K. and Taylor, J., "Implications of Sustainability Assessment for Electricity System Design: The case of the Ontario Power Authority's Integrated Power System Plan," *Energy Policy,* 38 (2010) 4115-4126.

5 Environmental Commissions of Ontario, *ECO 2019 Energy Conservation Report* (Toronto: Environmental Commissioner of Ontario, 2019) Summary, pg.7 https://eco.auditor.on.ca/our-reports/energy/

Energy efficiency policy development is highly decentralized in Canada. As with electricity and consumer level distribution energy policy more generally,[6] policy leadership and implementation has largely fallen to provincial governments, utilities, regulators and dedicated demand-side management program administrators in each province. The federal government's role has been focused on providing baseline national efficiency standards for equipment and buildings, data gathering, research and development, and support for specific program initiatives.[7]

Increased recognition of the multiple benefits of energy efficiency programming, growing concern for reducing GHG emissions and the need to facilitate a transition to a low-carbon economy have introduced new policy objectives for energy efficiency strategies. These developments have prompted experimentation with new administrative and funding models for energy efficiency programming. They have also prompted questions of how to deliver effective efficiency strategies in ways that maximize their contributions to a low-carbon sustainable energy transition.

Energy efficiency initiatives have struggled to achieve their full technological and economic potential to reduce to energy demand due to a range of market failures, and institutional, financial, policy, regulatory, behavioural and informational barriers. In recent years, energy efficiency initiatives in North America have encountered new challenges beyond these traditional and well-understood obstacles.

Changes in policy direction, often flowing from changes in governments, have resulted in significant retrenchments, and in some cases wholesale dismantlings, of energy efficiency strategies. The Government of Ontario's decision to terminate its "Conservation First" strategy in March 2019 was among the most dramatic of these developments, but far from unique.

This study seeks to understand the dynamics behind these developments, and identify potential strategies and design principles to inform the development of more effective and resilient governance structures for energy efficiency in Canada. Specifically, the study examines a series of cases in which commitment and consensus around energy efficiency faltered, threatening the stability and, at times, the existence, of energy efficiency programming in a variety of Canadian and American jurisdictions.

Based on these cases, and a review of wider public policy literatures on institutional robustness and policy resiliency, a set of five guiding yet non-prescriptive principles for building effective and resilient energy efficiency strategies across Canada. These principles are translated into specific recommendations regarding the governance, financing delivery and evaluation of energy efficiency strategies using Ontario as an illustrative example. The primary focus is on energy efficiency governance in the context of energy uses in buildings, stationary equipment, appliances and devices and industry, although the core principles could be applied to other energy uses, and wider low-carbon energy transitions as well. The study does not make recommendations on the specific details of program or portfolio design.

6 Doern, G.B. and M.Gattinger *Power Switch: Energy Regulatory governance in the 21st Century*. (Toronto: UPT, 2003) Chapter 1 "Canadian Energy Policy and Regulation in Historical Context" pp.21-39.

7 See https://www.nrcan.gc.ca/energy-efficiency/10832

What Is 'Energy Efficiency'?

Energy is used to produce services, like lighting, heating and transportation, yet the process of delivering these services can never be 100 percent efficient. The Second Law of Thermodynamics dictates that some energy potential is lost each time energy is *converted* from one form to another. In fact, two-thirds or more of the primary energy employed in a system may be lost through conversations to final uses like lighting, space heating and cooling, and transportation (see **Figure 2**). There are often substantial opportunities to improve the efficiency of energy systems as technologies and practices improve. At a theoretical level, energy efficiency entails getting as close as possible to the theoretical maximum rate at which energy can be converted into useful services. The goal is to deliver the same or even improved energy services to consumers while using fewer primary energy resources.

In practice, "energy efficiency" is used to refer to a set of practices for managing and restraining energy consumption in electricity or natural gas utility systems, such that the energy intensity of that system (a measure of how much energy is required to produce a unit of output) decreases over time. As such, energy efficiency is a core component of contemporary 'demand-side management' (DSM), a term used to differentiate meeting energy needs and maintaining energy system stability and reliability that do not involve building more energy supply.

There are several components to demand-side management, including:

- ***Behaviour Change*** – This is using existing technology in ways that reduce energy consumption. It is often referred to as energy conservation. Examples include turning off lights when leaving a room, turning off computers when not in use and programing smart thermostats to reduce energy consumption when not needed. The essential feature of these approaches is that they do not require the purchase of new technologies but do require a personal change in behaviour.
- ***Systems Operation Improvements*** – This is ensuring that entire systems are maintained and operated in the most efficient manner. While behavior change has a large impact in homes, ensuring that HVAC (heating, ventilation and air conditioning) systems are operating at their optimal level can have an even larger impact in commercial and institutional facilities. Like behavior change, this does not require the purchase of new technologies.
- ***Adopting New, More Efficient Technologies*** – This is replacing older, less energy-efficient technologies with newer, more energy-efficient ones. A common example is replacing incandescent light bulbs with more energy-efficient LED ones, though there is an extremely wide range of potential technological upgrades that could improve energy efficiency across the end-use sector. It can also include whole systems like a house or office building.

- ***Demand Response*** – This is reducing energy demand at certain times of the day when the system is nearing its limits. This is a uniquely electricity measure as there is limited ability in current electricity systems to store excess energy when there is surplus capacity to use when the system is at its peak. Demand response is taking on new importance in the management of the integration of renewable and low-carbon, but distributed and potentially intermittent, energy sources, like solar photovoltaic and wind, into energy systems.[8]

All four categories are considered to fall within the definition of "energy efficiency" for the purposes of this report.

The focus in this report is on governance and financial models used to deliver energy efficiency in electricity and natural gas end-use sectors, particularly in buildings and industry, though it should be noted that the potential to increase efficiency also exists in the transportation sector, as well as in energy production and distribution.[9]

8 National Renewable Energy Laboratory (NREL) *The Role of Storage and Demand Response* (Boulder CO: NREL, 2015) https://www.nrel.gov/docs/fy15osti/63041.pdf. See also Winfield, M., and Gelfant G., "Distributed Energy Resource Development in Ontario: A socio-technical transition in progress?" *Energy Regulation Quarterly*, January 2020 - Volume 7, Issue 4, 2019.

9 IEA, *Energy Efficiency Potential in Canada to 2050*."

The Potential and Benefits of Energy Efficiency

As will be explained in more detail below, interest in energy efficiency in utility systems was, historically-speaking, primarily for its potential to reduce system costs and improve domestic energy security by pursuing energy efficiency "resource acquisition" as though it were akin to a supply-side resource. As concern for environmental issues like climate change has grown, and as businesses and industries have developed around the delivery of energy efficiency programs and technologies, it has also become increasingly clear that there are *multiple benefits* associated with energy efficiency.

Figure 1: The Multiple Benefits of Energy Efficiency[10]

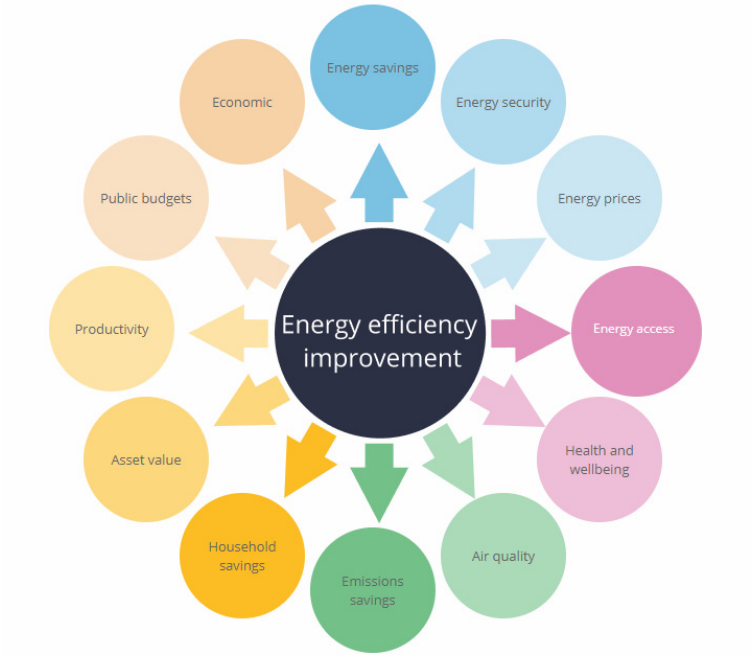
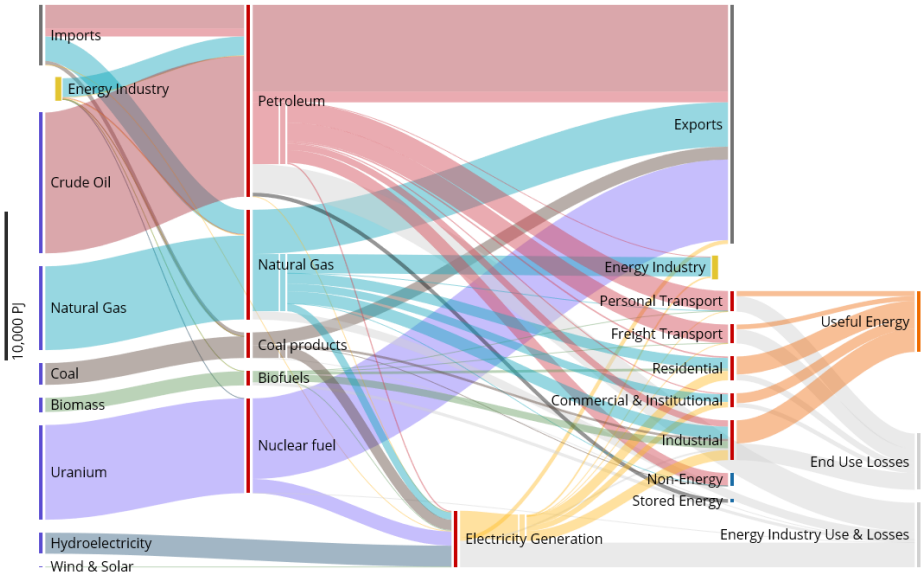


Figure 1 shows a range of benefits associated with energy efficiency. These are broadly categorized into three or four groups: energy-related (shown in blue), environmental (shown in green), social (shown in pink), and economic (shown in orange). Energy efficiency improvements are widely seen to improve the overall energy productivity of the economy. [11]
Recent information compiled by the University of Calgary as part of its Canadian Energy Systems Analysis Research (CESAR) concluded that about two-thirds of the energy used in the Canadian economy is lost through conversions. **Figure 2** illustrates these findings in a Sankey diagram slowing energy flows from primary energy sources to end uses in Canada.[16]

10 International Energy Agency, "Energy Efficiency," 2019, https://www.iea.org/topics/energyefficiency/.
11 International Energy Agency (IEA), *Multiple Benefits of Energy Efficiency* (Paris: IEA, 2019) "Productivity" https://www.iea.org/reports/multiple-benefits-of-energy-efficiency/productivity#abstract.

Figure 2: Energy flows in Canada: 2013 (PJ or petaJoules)[12]



The goal of energy efficiency improvements is to improve the ratio of useful energy delivery relative to losses in end-uses and in energy production and conversion.

There are considerable environmental and social benefits that would be associated with realizing energy savings. Avoided environmental impacts of energy resource extraction and use in terms of GHG emissions, air pollution, water pollution and use, waste generation and landscape disruptions are important benefits of energy conservation.[13]

Energy efficiency could make a substantial contribution to in Canada's greenhouse gas (GHG) emissions as well. The 2016 Pan-Canadian Framework on Clean Growth and Climate Change, for example, identified a range of efficiency actions in buildings and industry with the collective potential of up to a 78 Mt CO_2e reduction by 2030.[14] Subsequent modelling by the International Energy Agency suggests that, under their most aggressive policy scenario, improved energy efficiency could be responsible for 30-40 percent of the GHG emission reductions required for an 80 percent reduction in emissions below 2005 levels by 2050.[15]

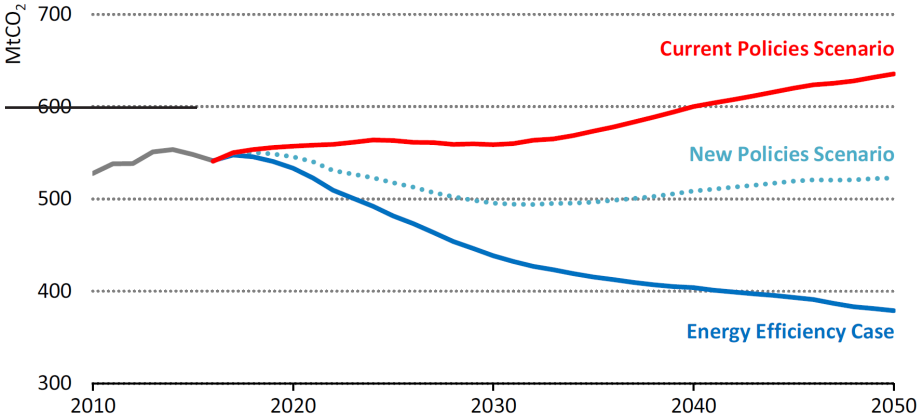
12 Sankey Diagram developed using https://www.cesarnet.ca/visualization/sankey-diagrams-canadas-energy-systems.

13 Winfield, Gibson, Markvart, Gaudreau, and Taylor, "Implications of Sustainability Assessment for Electricity System Design."

14 Canada, British Columbia, Alberta, Ontario, Quebec, New Brunswick, Nova Scotia, PEI, Newfoundland and Labrador, Northwest Territories, Nunavut, and Yukon, *Pan-Canadian Framework for Clean Growth and Climate Change* (2016) https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework.html.

15 IEA, *Energy Efficiency Potential in Canada to 2050*." See also B.Haley, *Study Shows Canada's Efficiency Resource Potential* June 14, 2018, https://www.efficiencycanada.org/canada-resource-potential/.

Figure 3: CO_2 emissions in Canada from fuel combustion by scenario[16]



Another comprehensive estimate of the potential economic and employment benefits of energy efficiency was made in a report commissioned by Natural Resources Canada (NRCan). It modelled the macro-economic impact of a relatively aggressive energy-efficiency scenario out to 2040 and concluded that the net benefits would include:[17]

- A total net increase in national GDP of $230 billion to $580 billion over the study period (2012-2040) with every $1 spent on energy efficiency programs resulting in an increase in GDP of $5 to $8;
- A total net increase in national employment of 1.5 to 4.0 million job-years.
- A peak annual increase in GDP is $19 billion to $48 billion, and a maximum annual increase in employment of 121,000 to 304,000 jobs
- GHG emissions would be cut by 92 MT/yr.

In short, improvements made in energy efficiency represent gains to Canada's economy, environment, and society.

At the provincial level, energy efficiency initiatives programs in Ontario are estimated to have reduced electricity and natural gas use by 7 percent over the past decade, and reduced GHG emissions by about 6 megatonnes (Mt) CO_2e.[18] An energy efficiency potential study recently completed for the Ontario Independent Electricity System Operator (IESO) suggested a technical potential to reduce future electricity demand by 25 percent relative to business as usual forecasts to 2038, and natural gas consumption by 31 percent.[19] Other

16 IEA, *Energy Efficiency Potential in Canada to 2050*.

17 Acadia Centre, Dunsky Consulting and Economic Development Research Group *Energy Efficiency: The Engine of Economic Growth in Canada* (Boston: Acadia Centre, 2018) https://acadiacenter.org/wp-content/uploads/2014/11/ENEAcadiaCenter_EnergyEfficiencyEngineofEconomicGrowthinCanada_EN_FINAL_2014_1114.pdf.

18 ECO, *2019 Conservation Progress Report*, pg.7.

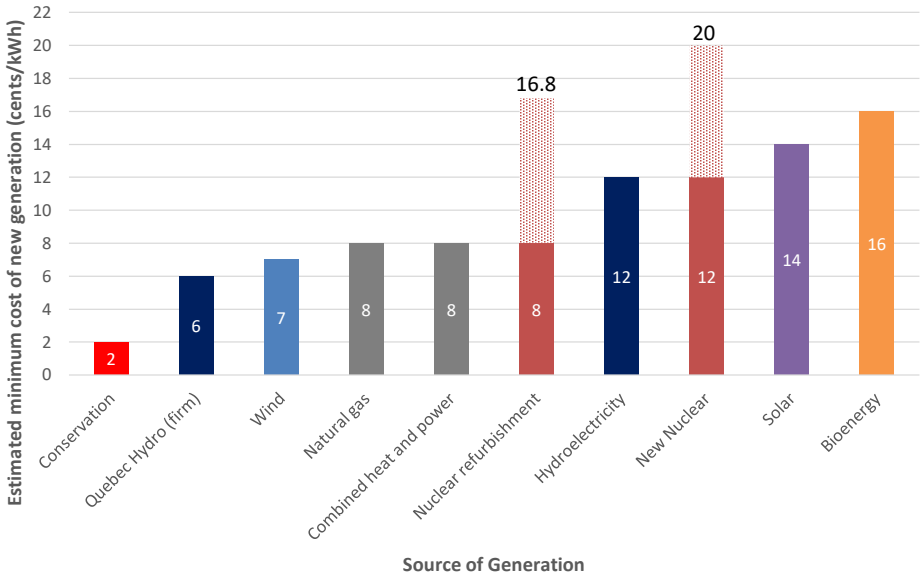
19 Navigant Consultants, *2019 Integrated Electricity and Natural Gas Achievable Potential Study*. assumes an average annual incremental savings of 0.8% in the maximum scenario for Ontario. Ontario achieved savings of 1.4% in 2017 and other jurisdictions have achieved well above 2% per year. See Efficiency Canada, *Canadian Energy Efficiency Scorecard* 2019 (Ottawa: Efficiency Canada 2019) https://www.scorecard.efficiencycanada.org/wp-content/uploads/2019/11/Scorecard.pdf and American Council for an Energy Efficient Economy (ACEEE) *The 2019 State Energy Efficiency Scorecard* (Washington DC: ACEEE 2019) https://www.aceee.org/sites/default/files/publications/researchreports/u1908.pdf.

analyses have suggested even greater savings may be possible.[20] With respect to electricity, for example, a 2016 IESO study identified a technical potential for savings of up to 53 percent relative to business as usual to 2035 and an economic potential of 31 percent.[21]

In Ontario, both natural gas and electricity programs have performed well in terms of cost-effectiveness. In 2017, Local (electricity) Distribution Company (LDC)-delivered programs had a Total Resource Cost (TRC) ratio of 2.54, meaning that for every dollar spent on electricity conservation, there was a benefit of $2.54 to society. For natural gas, in 2016, the most recent year for which data is available, Enbridge and Union Gas programs had TRC ratios of 2.6 and 2.9.[22] Ontario natural gas customers are estimated to have saved $2.5 billion from 1995-2014 through energy efficiency programs.[23]

Energy efficiency options have been consistently identified as the most cost-effective strategy for meeting energy needs. The relative costs of energy conservation relative to supply-side options in Ontario is shown in **Figure 4**.

Figure 4: Estimated Costs of Additional Electricity Supply in Ontario [24]



20 The Navigant study also assumes an average annual incremental savings of 0.8% in the maximum scenario for Ontario. Ontario achieved savings of 1.4% in 2017 and other jurisdictions have achieved well above 2% per year. See Efficiency Canada, *Canadian Energy Efficiency Scorecard* 2019 (Ottawa: Efficiency Canada 2019) https://www.scorecard.efficiencycanada.org/wp-content/uploads/2019/11/Scorecard.pdf and American Council for an Energy Efficient Economy (ACEEE) *The 2019 State Energy Efficiency Scorecard* (Washington DC: ACEEE 2019) https://www.aceee.org/sites/default/files/publications/researchreports/u1908.pdf.

21 See R. Childs, T. Hammer, and H. van Rensburg, *Achievable Potential Study:Long-Term Analysis* (Toronto: Nexant, 2016). http://www.ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Completed/Achievable-Potential-Study-LDC-Working-Group. The Navigant study also assumes an average annual incremental savings of 0.8% in the maximum scenario for Ontario. Ontario achieved savings of 1.4% in 2017 and other jurisdictions have achieved well above 2% per year. See Efficiency Canada, Canadian Energy Efficiency Scorecard 2019 (Ottawa: Efficiency Canada 2019) https://www.scorecard.efficiencycanada.org/wp-content/uploads/2019/11/Scorecard.pdf

22 ECO, *2019 Conservation progress Report*, pg.52.

23 Enbridge (2016) *Energy & Climate Change 2015 Performance Report*, Enbridge, Toronto.

Energy efficiency offers a number of significant advantages as a decarbonization pathway. The existing modeling of deep decarbonization options for Canada places a strong focus on electrification of transport and building Heating, Ventilation and Cooling (HVAC) systems as means to achieving major emissions reductions.[25] These pathways are seen to carry with them the potential for large increases in electricity demand and to imply the need for a large expansion of centralized generating capacity, such as large hydro and nuclear power projects. Such expansions would carry with them significant infrastructural, technological, social and environmental costs and risks, and their political and financial viability, even in aggressive carbon pricing scenarios, is open to serious question.[26]

If Canada is to achieve a sustainable low-carbon energy transition, the trade-offs associated with these types of decarbonization pathways need to be minimized to the greatest extent possible.[27] Improvements in energy efficiency, particularly in the built environment and industry, offer significant opportunities to meet future energy needs while significantly de-carbonizing the economy and avoiding the trade-offs associated with conventional energy supply options.

24 ECO, *2019 Annual Report on Energy Conservation,* pg.7*;* Ontario Clean Air Alliance, "Ontario's Electricity Options: A Cost Comparison," (Toronto: OCAA, 2014) https://www.cleanairalliance.org/wp-content/uploads/2019/05/options-2019.pdf. The actual costs of new and refurbished nuclear are highly contested, and the chart shows the range of credible estimates that are available for Ontario.

25 Expert Panel on Energy Use and Climate Change (2015), *Technology and Policy Options for a Low-Emission Energy System in Canada*. Ottawa: Council of Canadian Academies; Battaille, C., Sawyer D., and Melton, N., (2015) *Pathways to Deep Decarbonization in Canada*, CMC Research Institutes; Government of Canada (2016). *Canada's Mid-Century Long-Term Low-Greenhouse Gas Development Strategy.* Ottawa: Minister of Environment and Climate Change.

26 Winfield, Gibson, Markvart, Gaudreau, and Taylor, "Implications of Sustainability Assessment for Electricity System Design."

27 Winfield, Gibson, Markvart, Gaudreau, and Taylor, "Implications of Sustainability Assessment for Electricity System Design."

Barriers and Challenges to Realizing Energy Efficiency Potential

Despite the enormous potential for energy efficiency gains, many barriers to the realization of its full potential have been identified. These challenges fall into two broad categories: barriers that stem from and may be addressed by policy, and more diffuse political and/or institutional challenges for designing and maintaining effective governance regimes for energy efficiency. These barriers are described in detail in the following section.

Key Barriers

Widely identified barriers to improving energy efficiency include the following:[28]

- ***Market Failures*** – Energy efficiency is widely recognized as a case of market failure. Market organization or price distortions may prevent customers from appraising the true cost of energy production and use, and therefore the potential savings arising from energy efficiency.
- ***Financial Barriers*** – Energy efficiency is often characterized by upfront costs in the form of investments in improvements in buildings and end-use technologies (i.e. high-efficiency lighting) with the benefits being realized through energy savings over future years. This can lead to concerns of the length of payback periods, and perceptions that energy-efficiency investments are complicated and risky with high transaction costs.
- ***Gaps in Information and Awareness*** – Energy consumers may lack sufficient information and understanding to make rational energy consumption and investment decisions. Moreover, even if customers have sufficient information, they may still not use it to make rational consumption or investment decisions.
- ***Regulatory and Institutional Barriers*** – Energy tariffs that decrease the more energy is consumed may discourage energy-efficiency investments, and existing rates structures may encourage energy distributors to maximize energy sales rather than invest in cost-effective energy efficiency. Utilities and energy policy decision-makers may also have institutional biases towards supply-side investments.
- ***Technical Barrier***s – Affordable energy-efficiency technologies suitable to the local conditions may not be available and there may be insufficient capacity to identify, develop, implement and maintain energy-efficiency investments.

28 Peter Love, *Fundamentals of Energy Efficiency: Policy, Programs and Best Practices* (Toronto: Energy Efficiency Fundamentals.org, 2018) Part 1.

- ***The Agency Problem*** – Conflicts of interest may exist in relationships where one party is expected to act in another's best interests. With respect to energy efficiency, a landlord may be reluctant to improve the energy efficiency of a building where tenants pay for their own energy use as tenants would receive the bulk of the financial benefits of such investments.
- ***Visibility*** – Energy efficiency is *hard to see.* Most energy-efficiency measures are hidden between walls, in the mechanical or electrical room, or in the compressor in the middle of an appliance where they cannot be seen. Supply-side options, such as conventional power plants, are much more visible (indeed, they are so visible that they can lead to local opposition[29]). This makes it difficult to point to tangible benefits and outcomes from energy efficiency initiatives.
- ***Measurability*** – The benefits of energy efficiency can be *hard to measure*. Unlike supply-side measures, whose output can be measured through a meter, savings from energy-efficiency measures are based on a change from what would have happened without them. While estimates can be made using standard, well-accepted protocols, these protocols may not be equipped to measure the full range of energy efficiency benefits, and implicit or explicit political and policy choices may be embedded in different protocols. Consequently, it will always be more difficult to measure the impact of energy efficiency policy than for supply-side measures.

Responses and Solutions

Over the years, a range of policy options have been identified to overcome these barriers. These include the following:[30]

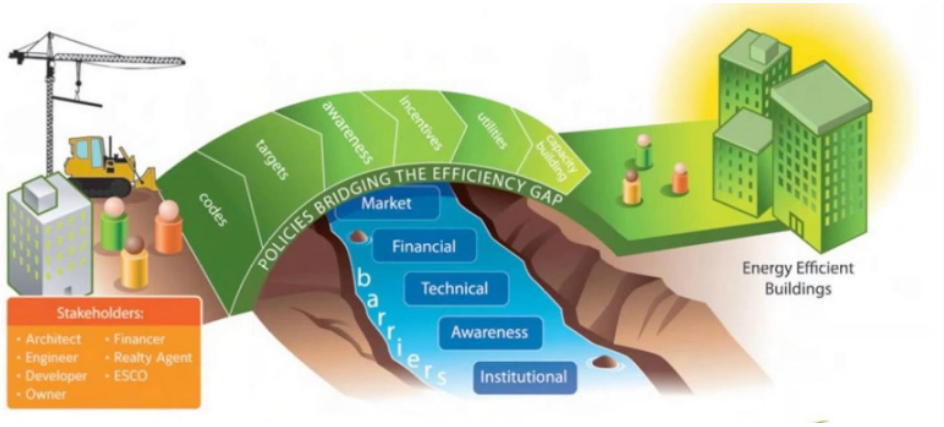
- ***Pricing mechanisms*** – These include time-of-use rates to encourage demand response (switching from on-peak to off-peak), minimizing fixed costs on energy bills (as these reduce the advantages of efficiency), and variable rates where higher consumption levels are charged higher per-unit prices.
- ***Regulatory and control measures*** – These include mandatory activities such as energy audits; energy management; minimum energy performance standards (MEPS) for appliances, products, and buildings; energy consumption reduction targets; and energy-efficiency investment obligations on private companies.
- ***Fiscal measures and tax incentives*** – Grants, subsidies and tax incentives can be provided for energy-efficiency investments. More broadly, utility rate structures can be adjusted to provide incentives for investments in energy efficiency, and the offset potential revenue losses flowing from reduced energy sales due to energy efficiency initiatives.

29 See Winfield, M., Mulvihill, P., and Etcheverry, J., "Strategic Environmental Assessment and Advanced Renewable Energy in Ontario: Moving Forward or Blowing in the Wind?" *Journal of Environmental Assessment Policy and Management*, Vol.15, No.2, June 2013, 1-19.
30 Love, *Fundamentals of Energy Efficiency* Part 1.

- ***Promotional and market transformation mechanisms*** – These include public information campaigns and promotions, inclusion of energy efficiency in school curricula, appliance labelling, and building certification.
- ***Technology development*** – Funding for the development and demonstration of energy-efficient technologies.
- ***Capacity building*** – This includes supporting and encouraging the development of utility energy efficiency capacity, the energy service company (ESCo) industry, and training programs and development of the energy-efficiency industry.
- ***Financing Mechanisms*** – These include revolving funds for energy-efficiency investments, project preparation facilities, and contingent financing facilities.
- ***Government House in order*** – This is where the government improves the energy efficiency of its own operations through direct procurement of energy-efficiency goods and services.

Figure 5 provides an illustration of how these types of policies are bridging the energy-efficiency gap created by various barriers.

Figure 5: Policies to bridge the energy efficiency gap[31]



31 Love, *Fundamentals of Energy Efficiency* , Part 1, pg. 37.

The Jevons Effect and "Rebound"

An additional challenge to energy efficiency initiatives is what is termed the "rebound" effect. The concept has its origins in William Jevons' 1865 observation that, in some cases, greater energy efficiency could lead to a 'backfire' of increased energy use. In his time, Jevons noted that technical improvements to the efficiency in steam engines resulted in increased use of coal as steam engines then began to be used in other applications.[32]

In a modern context, this phenomenon is sometimes referred to as the "rebound" effect where consumers' savings from energy efficiency improvements are re-invested in new, energy-intensive forms of consumption. Estimates of the impact of the "rebound" effect in relation to energy efficiency initiatives vary widely, from 5-60 percent of initial savings, depending on assumptions and circumstances. [33]

A number of potential responses to the "rebound" problem have been identified. Most emphasize the importance of pursuing efficiency gains through an integrated strategy employing economic, regulatory and informational tools, as opposed to one-off initiatives. Regulatory standards and codes may be employed to lock-in savings by removing high energy-consuming technologies from the marketplace. Energy pricing that reflects the full life-cycle costs of supply technologies, including carbon pricing, may limit opportunities for additional consumption while efficiency investments keep total energy costs to consumers stable.[34] Consumer behaviour and preferences may also be a factor. Purchasers of the more energy-efficient technologies may be seeking to reduce their environmental footprint. They may then invest the savings generated in additional energy-saving technologies and reduce their energy consumption even further.[35]

32 Peter Love, *Fundamentals of Energy Efficiency: Policy, Programs and Best Practices* Part 1, pg.47.
33 Love, *Fundamentals of Energy Efficiency*; Kenneth Gillingham, David Rapson, and Gernot Wagner, *The Rebound Effect and Energy Efficiency Policy* (Washington: Resources for the Future, 2014) https://media.rff.org/documents/RFF-DP-14-39.pdf.
34 Karen Williams, "Rebound" Effects from Increased Energy Efficiency: A Time to Pause and Reflect" *The Energy Journal* Vol. 34, No. 4 (2013), pp. 25-42; D.F. Vivanco, R.Kemp and E. van der Voet "How to deal with the rebound effect? A policy-oriented approach," *Energy Policy,* 94 (2016) 114-125. See also Wackernagel, Mathis; Rees, William (1997). "Perceptual and structural barriers to investing in natural capital: economics from an ecological footprint perspective". *Ecological Economics.* 20 (3): 3–24.
35 Love, *Fundamentals of Energy Efficiency*, pg.47.

New Political Challenges to Energy Efficiency

Beyond the traditional and well-understood barriers to energy efficiency, over the past few years efficiency initiatives in North America have encountered a range of new challenges, particularly from the political level. Changes in policy direction, sometimes flowing from changes in governments, have resulted in significant retrenchments, and in some cases wholesale dismantlings, of energy efficiency strategies. The Government of Ontario's decision to terminate its "Conservation First" strategy in March 2019 was among the most dramatic of these developments, but was far from unique at the subnational level in North America.

These developments represent significant challenges to the realization of the potential contributions of energy efficiency to environmental and economic sustainability. More broadly they represent deeper challenges to low-carbon transition strategies. Energy efficiency strategies, particularly those financed through charges on electricity and natural gas bills, have generally been subject to relatively high levels of regulatory oversight, intended to ensure that program benefits exceed the costs of new energy supply, and that their design and delivery is cost-effective.

Well-designed and managed energy efficiency programs offer very low risks of negative economic, social or environmental trade-offs.[36] Rather the realization of technologically possible and economically rational efficiency potential is almost always a no-lose/no regrets option for consumers. Efficiency strategies should, therefore, be highly resilient to shifts at the political level.

In this context, energy efficiency measures should be among the most politically robust elements of low-carbon transition strategies. The emerging political vulnerability of energy efficiency initiatives carries with it significant implications for the survivability of even more contentious components of such transition strategies, like carbon pricing. Substantial lessons may be learned from the experiences around energy efficiency for the design of wider transitional strategies.

The Case Studies

In order to understand the emergent political dynamics around energy efficiency strategies, eight separate case studies (five Canadian, three American) are identified in which political intervention had contributed to a weakening, a destabilization, or a dismantling altogether of energy efficiency policy and programming.

36 Winfield, Gibson , Markvart, Gaudreau, and Taylor, "Implications of Sustainability Assessment for Electricity System Design.

The primary criteria for inclusion was the existence of well-defined event, process or political intervention that prompted a change or challenge to the institutional status quo for energy efficiency governance. Case studies were chosen to represent a variety of different administrative structures, funding models, and energy and electricity system market arrangements, in order not to bias our analysis toward any specific governance arrangement. The study also sought cases that had exhibited some variability in performance in achieving energy savings over the past decade or more, and not those with a high degree of consistently high or low performance. Finally, the study sought cases with different responses to challenge – some that managed to rebound relatively quickly, others which did not, and yet others in which the long-term impacts have yet to be observed.

Background on the eight case study jurisdictions is provided in **Table 1** below.

Table 1: Energy Efficiency Governance Case Studies

Jurisdiction	End-Use Energy	Admin Model	Resources	Period
Alberta	16% Elec; 79% NG; 5% Other;	Govt agency	Carbon revenues;	2000 - Present
British Columbia	44% Elec; 48% NG; 8% Other;	Utility	Rates; Carbon revenues;	2007 - Present
Connecticut	30% Elec; 38% NG;	Utility	SBC; ISO-NE Capacity; RGGI;	2007 - Present
Indiana	26% Elec; 43% NG;	Third-party -> Utility	Rates;	2009 - Present
Maine	19% Elec; 15% NG;	Govt / Third-party	SBC; ISO-NE Capacity; RGGI; Taxpayers;	2009 - Present
New Brunswick	58% Elec; 2% NG; 40% Other;	Govt -> Utility	Taxpayers -> Rates;	2005 - Present
Nova Scotia	36% Elec; 1% NG; 63% Other;	Third-party	Rates;	2010 - Present
Ontario	30% Elec; 58% NG; 12% Other;	Multi-Utility (LDCs and IESO)	Rates; carbon revenues.	2003 - Present

The resulting cases provide a comprehensive and inclusive sample of the range of factors that influence political commitment and stakeholder consensus around energy efficiency. They are presented below in alphabetical order.

Alberta

Energy efficiency initiatives in Alberta have had a long and varied history.[37] These early efforts included new energy codes for buildings in 1981 and the creation of a series of energy efficiency programs in the provincial government and by energy utilities. An assessment in 1992 found that about $8.3 million had been invested in a number of residential, commercial, institutional and industrial programs. Due to government budget cuts and utility restructuring, these programs were gradually discontinued.

In 2000, the provincial government created Climate Change Alberta, which became responsible for administrating government energy efficiency programs. Over its 14-year history, it delivered 23 programs in the residential, institutional and transportation sectors. In 2008, the government created the Climate Change and Emission Management Fund, an emission offset system, that provided funding for a handful of energy efficiency initiatives in the private sector (though this has not been a source of funding in recent years). Between 2012-2017, specialty programs were offered by the government for the municipal and agricultural sectors, indigenous communities and a loan program for seniors.

Yet, while there is some history of government energy efficiency programming, the supporting policies and institutions for utility-led program administration have historically been less formalized than in other provinces. For instance, prior to 2011, ATCO Gas, a natural gas distribution company in Alberta, delivered a modest $1.6 million DSM program, yet when it proposed to the Alberta Utility Commission that this be increased to $4 million, the regulator denied cost recovery as DSM activities were not explicitly listed within the legislation governing energy utilities.

The situation began to change with the election of a new provincial government in 2015, which subsequently launched Alberta's 'Climate Leadership Plan' in 2016. The new plan called for the creation of a provincially-owned crown corporation (called 'Energy Efficiency Alberta') to deliver energy efficiency programming, to grow the energy efficiency industry in Alberta, and to raise awareness about energy use and conservation. The new corporation was to be funded through the recently implemented carbon levy on consumer fuels with an initial budget of $645m over five years, and would be responsible for reporting results publicly on an annual basis and submitting an annual business plan on its proposed activities. At the same time, Energy Efficiency Alberta was not subject to regulatory oversight by the Alberta Utility Commission).

An energy efficiency advisory panel was established in 2016 to advise the government's long-term vision for energy efficiency, and to make recommendations on potential programs. The advisory panel conducted stakeholder engagement sessions with the public, with indigenous communities and with technical experts in mid-2016 and hired Dunsky Energy Consulting to assess costs and GHG reductions from an initial suite of proposed programs.

37 This history has been documented in a case study that was published as part of a free on-line textbook on energy efficiency. See Jesse Row, "Case Study: Energy Efficiency in Alberta," in Love *Fundamentals of Energy Efficiency: Policy, Programs and Best Practices*. http://energyefficiencyfundamentals.org/textbook/Fundamentals-of-Energy-Efficiency-Sec2.pdf.

The panel issued its final report ('Getting it Right: A more energy-efficient Alberta') in January 2017.[38] Energy Efficiency Alberta had already been established at the end of 2016, officially and initial programs were launched in the spring of 2017.

As the first programs were launched before a CEO or other staff had been hired, initial programs were implemented by independent third parties who won open contract competitions. Unlike many other energy efficiency agencies that deliver some programs with their own staff and contract with third parties for others, Energy Efficiency Alberta made a conscious decision to continue to contract with third parties for the delivery of further programs.[39] Although some energy utilities were aware of opportunities to deliver these programs, they did not end up being part of the successful delivery teams.

In the first two years of offering programs, $194 million was invested in a wide range of energy efficiency programs directly to residential, commercial, institutional and small/medium industrial customers. The only sectors excluded were transportation (included in the mandate but not undertaken in the first years) and large industrial emitters (who paid a separate carbon fee that funds Emissions Reduction Alberta, as discussed below). Energy Efficiency Alberta also secured $93 million from the federal government's Low Carbon Economy Leadership Fund, to complement provincial funding over a period of three years (2018-2021).

Despite these initial successes, the future of Energy Efficiency Alberta is unclear. A provincial election in 2019 led to a change in government, from the New Democratic Party government of Rachel Notley (which had introduced the legislation creating the carbon levy and Energy Efficiency Alberta) to the United Conservative Party government, led by Jason Kenney. Prior to being elected, Kenney had hinted that a UCP government would shut down the corporation, stating "we don't kneed bureaucrats changing our showerheads and our light bulbs" at a news conference in early 2019.[40] Shortly after being elected, the government cancelled the carbon levy program that was the primary source of funding for Energy Efficiency Alberta, but has so far 'stepped back' from scrapping all efficiency programming.[41]

The cancellation of the carbon levy nevertheless creates considerable uncertainty about future funding for efficiency programming. The Alberta government has also announced plans to replace the former Carbon Competitiveness Incentive Regulation (CCIR) with a new 'Technology Innovation and Emission Reduction System' (TIER).[42] Over its lifetime, the CCIR had

38 Alberta Energy Efficiency Panel, *Getting It Right: A More Energy Efficient Alberta: Final Report* (Calgary, 2016), https://www.alberta.ca/documents/climate/EEAP-Report-Getting-It-Right-Complete.pdf.

39 Alberta Energy Efficiency Panel, "Getting it Right" Appendix H.

40 Claire Clancy, "Kenney Hints UCP Government Would Scrap Energy Efficiency Alberta," *The Edmonton Journal*, March 6, 2019, https://edmontonjournal.com/news/politics/kenney-hints-ucp-government-would-scrap-energy-efficiency-alberta.

41 Amanda Stephenson, "UCP Steps Back from Scrapping NDP's Energy Efficiency Alberta; Will Look at Programs 'with an Open Mind' |," *Calgary Herald*, May 24, 2019, https://calgaryherald.com/business/local-business/kenney-government-will-consider-fate-of-energy-efficiency-programs-on-case-by-case-basis.

42 Government of Alberta, *Technology Innovation and Emissions Reduction Engagement*, Alberta.ca, 2019, https://www.alberta.ca/technology-innovation-and-emissions-reduction-engagement.aspx.

collected $463 million from large GHG emitters, which was earmarked for the Climate Change and Emissions Management Corporation (subsequently renamed Emissions Reduction Alberta), and used to match industry funds for technology and innovation being developed by large final emitters such as oil sands companies and included energy efficiency projects. The new TIER system allows for regulated entities to meet their (less aggressive)[43] emissions reduction requirements by paying into a fund to support innovation, and to "reduce Alberta's deficit and support the province's energy war room."[44] The implications of this model for efficiency programming are unclear at this time.

British Columbia

BC Hydro, a provincially-owned utility company, serves over 95 percent of all end-use electricity customers in British Columbia. Private utility company FortisBC serves the remaining electricity customers, located in the south-central region of the province. DSM programs are administered by the utilities, going back to the mid-1990s, and – in the case of BC Hydro – are laid out in five-year IRPs.

The BC government, under the leadership of Premier Gordon Campbell, introduced an energy plan in 2007 that set aggressive efficiency targets for BC Hydro, initially requiring BC Hydro to acquire 50 percent of new/incremental resource needs through conservation by 2020 [45]. The Act also called for BC Hydro to be able to meet domestic demand with a 3 TWh surplus by 2026, and to cease use of the Burrard Thermal natural gas plant. The BC Utilities Commission (BCUC) rejected BC Hydro's 2008 long-term acquisition plan because it was deemed not to be least-cost, suggesting that it was the utility board's judgment that the government's renewable energy plan would lead to unnecessary increase in costs to consumers.

The response from the government was to pass the 2010 Clean Energy Act, with an explicit goal of making BC a clean energy exporter to the US [46]. At the same time, the 2010 Act revised upward the efficiency targets to 66 percent reduced aggregate demand in electricity by 2020 (FortisBC adopted the target voluntarily and increased it to 80 percent of load growth by 2023), re-affirmed the self-sufficiency requirement (and moved forward the insurance requirement date to 2020), required BC Hydro to submit its IRPs to the Minister of Energy before the BCUC, and placed limitations on the authority of the utility board to regulate rates and proposed new projects under the plan (notably the proposed construction of the new 'Site C' dam on the Peace River, with a projected capacity of 900 MW).

43 Isabelle Turcotte, Jan Gorski, Brianne Riehl, *Carbon Emissions: Who makes big polluters pay: A comparison of provincial and federal industrial carbon pricing systems for industrial emitters* (Calgary: Pembina Institute, 2019) https://www.pembina.org/pub/carbon-emissions-who-makes-big-polluters-pay.

44 Alberta, *Technology Innovation and Emissions Reduction Engagement*.

45 Government of British Columbia, *The BC Energy Plan: A Vision for Clean Energy Leadership* (Victoria, BC: Government of British Columbia, 2007), https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/electricity-alternative-energy/bc_energy_plan_2007.pdf.

46 Government of British Columbia, "Clean Energy Act," 2010 SBC §, accessed May 28, 2019, http://www.bclaws.ca/civix/document/id/complete/statreg/10022_01#section2.

A number of important developments took place shortly thereafter. In November 2010, Premier Gordon Campbell announced his resignation, and he was succeeded by Christy Clark in March 2011, who sought to pursue a 'family first' policy agenda focused pocketbook issues. In March 2011, the BCUC rejected BC Hydro's revenue requirement application, which had called for rate increases of 52 percent between 2011 and 2015, and a cumulative rate increase between 2010 and 2020 of just over 100 percent [47]. The proposed rate increase ran counter to the new government's objectives, thus prompting the 2011 government-led BC Hydro review to assess the utility's rate planning and spending. The Review made a number of recommendations for BC Hydro to cut costs, particularly labour costs, and recommended continued use of the Burrard Thermal plant and reconsideration of the self-sufficiency insurance surplus capacity [48]. The Review also noted that construction of Site C was a "reasonable cost alternative to meet load growth" and recommended that BC Hydro re-evaluate DSM plans to reduce overall costs to ratepayers [49].

The government proceeded to cancel further BCUC hearings on the matter and capped rate increases at 17 percent over three years. In 2013, the government announced a 10-year rate plan for BC Hydro, directing BCUC to limit rate increases to 15 percent in the first two years, 10.5 percent over the following three years, and working with government and BC Hydro ensure rates remain "low and predictable" in the final five years [50]. Despite this, BC Hydro proposed a DSM plan in its 2013 IRP above the minimum required to meet its 2010 Clean Energy Act obligations (though its preferred plan was the least ambitious of three more aggressive plans considered in the 2013 IRP), but to moderate (i.e., reduce) spending on that plan for the initial two-years, due to an energy surplus condition the utility considered to be short-term.

In the years following, a revised long-term load forecast in 2016 indicated that the energy surplus would continue well into the future. Consequently, BC Hydro proposed continued moderation of DSM spending through to 2019 (plans for Site C continued, however). According to a report prepared by the Program on Water Governance at the University of British Columbia, the cumulative effect of DSM spending reduction between 2013 and 2019 amounts to more than 3000 GWh/year and 600 MW of missed savings by 2024 – more than 50 percent of Site C's projected annual energy production and capacity, and at roughly 1/3 to 1/2 the cost per MWh [51]. In short, according to the authors of this report, BC Hydro prefers to curtail DSM spending in the interest of reducing short and long-term losses associated with continued energy surpluses.

47 John Calvert et al., *Clean Electricity, Conservation and Climate Justice in BC: Meeting Our Energy Needs in a Zero-Carbon Future* (Vancouver, B.C.: Canadian Centre for Policy Alternatives, BC Office, 2012), http://ra.ocls.ca/ra/login.aspx?inst=centennial&url=https://www.deslibris.ca/ID/233556.

48 Calvert et al.; Justine Hunter, "$800-Million in Cuts to BC Hydro Urged," *The Globe and Mail*, August 11, 2011, https://www.theglobeandmail.com/news/british-columbia/800-million-in-cuts-to-bc-hydro-urged/article590631/.

49 John Dyble, Peter Milburn, and Cheryl Wenezenki-Yolland, *Review of BC Hydro* (Victoria, BC: Government of British Columbia, June 2011), https://ceaa-acee.gc.ca/050/documents/p63919/97006E.pdf.

50 Bill Bennett, "10 Year Plan for BC Hydro" (November 26, 2013), https://news.gov.bc.ca/files/Newsroom/downloads/Presentation.pdf.

51 Richard Hendriks, Philip Raphals, and Karen Bakker, *Reassessing the Need for Site C*, Program on Water Governance (Vancouver, B.C.: University of British Columbia, April 2017).

Nevertheless, even with the moderation in DSM spending, the 2016 IRP stayed on track to meet the legislated reductions of 66 percent of aggregate demand by 2020. According to BC Hydro's present DSM plan, detailed in Section 3 of the utility's most recent revenue requirement application, spending on DSM is expected to remain broadly in-line with 2018 levels between 2020 and 2022 [52].

Connecticut

Connecticut is served by two main investor-owned electric utility companies (Connecticut Light & Power; United Illuminating Company). Municipal electric companies also provide efficiency programs to customers. Efficiency efforts date back to 1998, to the passage of P.A. 98-28, which established the state Renewable Portfolio Standard, an Energy Efficiency Board (EEB) and the Connecticut Energy Efficiency Fund (CEEF). Presently, utility companies prepare plans 'advised and assisted' by the Energy Efficiency Board (EEB), which comprises15 appointed members representing state agencies and utility companies. The EEB also oversees the CEEF which is largely funded by system benefit charges on customers' bills and supplemented by funding received by utilities through the forward capacity market and through the RGGI. According to the Regional Energy Efficiency Database, capacity markets contributed 17 percent of all program funding in 2017, and the RGGI 3 percent [53].

Utility plans are subject to regulatory oversight of the Department of Energy & Environment Protection (DEEP), which contains within it the Public Utilities Regulatory Authority (PURA), which also appoints the EEB members. In 2007, the passage of Public Act 07-242 (2007), "Electricity and Energy Efficiency Act", required utilities to procure all cost-effective energy efficiency as their first-priority resource, and to develop Conservation and Load Management (i.e., IRP) plans. The plans assess capacity and energy requirements for 3, 5, and 10 years (annual reviews are conducted as well). However, this act has historically been interpreted "overly restrictively" by regulators, who tend to focus only on addressing projected capacity needs and not pursuing all cost-effective energy efficiency.

In 2017, state lawmakers redirected $127m over two years out of the CEEF to make up for a budget shortfall (in addition to raids on various other clean energy funds), thus reducing the efficiency budget by 1/3. This forced the EEB to scale back programs.[54] The bipartisan budget was passed after a 'budget impasse' lasting 118 days, following a state election in 2016 that substantially reduced the Democratic majority in the House of Representatives (79 D – 72 R)

52 Fred James, "BC Hydro Fiscal 2020 to Fiscal 2021 Revenue Requirements Application" (Vancouver, B.C.: BC Hydro, February 25, 2019).

53 Regional Evaluation Measurement & Verification Forum, "Regional Energy Efficiency Database," Northeast Energy Efficiency Partnerships, 2019, https://neep.org/initiatives/emv-forum/regional-energy-efficiency-database.

54 Niucol Ahn, "Clean Energy Slashed in New Budget," *Yale News*, December 7, 2017, https://yaledailynews.com/blog/2017/12/07/clean-energy-slashed-in-new-budget/; Keith M. Phaneuf, "Tentative Budget Raids CT Electric Bills, Diverts Clean Energy Funds," *The CT Mirror*, October 20, 2017, https://ctmirror.org/2017/10/20/tentative-budget-raids-ct-electric-bills-diverts-clean-energy-funds/.

and the Senate (18 D – 18 R). While the split did not take place strictly along party lines, one Republican representative said the budget was a compromise of tax hikes (to appease democrats) and spending/borrowing reforms (to appease republicans) [55].

Proponents of clean energy, energy efficiency, and energy contractors reacted negatively, joining forces with a bipartisan group of lawmakers (several on the legislative Energy and Technology Committee) in early 2018 to push for restoration of the funding. The state governor also proposed reinstating at least $24m [56]. The EEB issued its annual report in March 2018, warning about negative economic and environmental impacts stemming from the raid [57]. In May 2018, the legislature restored $10m in funding for 2019 budget and passed SB-9 to expand the Renewable Portfolio Standard and make administrative changes to protect efficiency funds from future raids [58].

The state was nevertheless sued by a coalition of different industry and environmental interests, led by Connecticut Fund for the Environment. The plaintiffs' principal argument was that there existed a contract between utilities and ratepayers that funds contributed to the EEF would be used for intended purposes. However, the plaintiffs lost the case, the judge finding that there was no implied contractual right over how the money was spent [59]. This decision is currently under appeal to the US. Court of Appeals for the Second Circuit [60].

Indiana

Indiana's energy sector consists of 76 municipal electric utilities owned and operated by local governments in Indiana — 9 of which are under the jurisdiction of the Indiana Utility Regulatory Commission (IURC). Additionally, the IURC regulates the five major investor-owned electric utilities in the state: Northern Indiana Public Service Company (NIPSCO), Vectren South, Indianapolis Power and Light, Duke Energy, and Indiana Michigan Power.

55 Keith M. Phaneuf, Jacqueline Rabe Thomas, and Mark Pazniokas, "House Sends Veto-Proof, Bipartisan Budget to Malloy," *The CT Mirror* (blog), October 26, 2017, https://ctmirror.org/2017/10/26/house-sends-veto-proof-bipartisan-budget-to-malloy/.

56 Gregory B. Hladky, "Lawmakers Want To Restore Energy Efficiency Funds, But Don't Know Where To Find The Money," *Hartford Courant*, February 13, 2018, https://www.courant.com/politics/hc-pol-restoring-energy-funds-20180213-story.html; Keith M. Phaneuf, "Lawmakers Urge Reversing Clean-Energy Cuts, but Lack Budget Fix," *The CT Mirror*, February 13, 2018, https://ctmirror.org/2018/02/13/lawmakers-urge-reversing-clean-energy-cuts-but-lack-budget-fix/.

57 *Gregory B. Hladky, "State Report: Budget Raid On Energy Funds Hurting Connecticut Economy," Hartford Courant*, March 9, 2018, https://www.courant.com/politics/hc-pol-energy-efficiency-warning-20180308-story.html.

58 Matt Pilon, "Sweeping Energy Reforms Clear House," Hartford Business Journal, May 9, 2018, http://www.hartfordbusiness.com/article/20180509/NEWS01/180509891/sweeping-energy-reforms-clear-house.

59 Robert Walton, "Connecticut Can Use Efficiency Funds to Cover Budget Shortfall, Court Rules," *Utility Dive*, October 30, 2018, https://www.utilitydive.com/news/connecticut-can-use-efficiency-funds-to-cover-budget-shortfall-federal-cou/540850/.

60 Gregory B. Hladky, "Legal Fight over Energy Fund Raids Continues," *Hartford Courant*, November 27, 2018, https://www.courant.com/news/connecticut/hc-news-appeal-filed-energy-fund-raids-20181127-story.html; Laura McMillan and Leticia Colon de Mejias, "PRESS RELEASE: Energy Funds: Brief Filed as Ratepayers, Energy Businesses, and Environmental Advocates Continue Push for Review of Decision," *CFE/Save the Sound* (blog), March 8, 2019, https://www.ctenvironment.org/2019/03/08/press-release-energy-funds-brief-filed-as-ratepayers-energy-businesses-and-environmental-advocates-continue-push-for-review-of-decision/.

In 2009, the IURC ordered the five investor-owned utilities to achieve an annual energy savings goal of 2 percent within ten years by offering five core programs for delivery through a state-wide administrator.[61] The IURC explained the benefits of a hybrid third-party/utility approach as including program uniformity, coordinated utilization of technology and market research, and administrative efficiencies [62]. Two third-party administrators were contracted, one to run programs and another to evaluate them. As part of the order, utilities would also need to prepare and submit three-year efficiency plans to the IURC, beginning in 2010, and develop and offer utility-specific programs, where needed to meet ascribed savings targets. Utilities worked together with the Office of Utility Consumer Counselor, large industrial consumers, the Indiana Municipal Power Agency and Citizens Action Coalition of Indiana to develop the initial programming [63]. The statewide program was officially launched in 2012 under the brand *Energizing Indiana*. The programs were ratepayer-funded via a minimal monthly fee (approximately $2/month) on the consumer's electricity bill.

Though the initial IURC action had received bipartisan support,[64] in March 2014 and under new government, the Indiana Senate repealed its EERS and energy efficiency program via the passage of Senate Enrolled Act 340 (SEA 340). The bill began as a simple industrial opt-out bill, but was subsequently amended in the House to end the entire *Energizing Indiana* program. The bill then passed in the Senate with no debate in the legislature or public input.[65] An array of business interests opposed the legislation.[66] Incoming Republican Governor Mike Pence neither signed nor vetoed the bill, stating "I could not sign this bill because it does away with a worthwhile energy efficiency program. I could not veto this bill because doing so would increase the cost of utilities for Hoosier ratepayers and make Indiana less competitive by denying relief to large electricity consumers, including our state's manufacturing base".[67] Pence also requested the IURC to make recommendations regarding future, appropriate efficiency goals, analysis of current programs and the cost impact to ratepayers of all possible DSM programs, and for an opt-out provision for large consumers.[68]

61 Programs included a Residential Home Energy Audit; Income Qualified Weatherization; School Education Programs; Residential Lighting Rebates; and Commercial & Industrial Prescriptive Rebates.

62 *Indiana Utility Regulatory Commission, Demand Side Management Programs*, Indiana Utility Regulatory Commission, 2010, https://www.in.gov/iurc/2571.htm.

63 Bryndis Woods and Nina Schlegel, *The Performance of Indiana's Utilities' Energy Efficiency Programs* (Applied Economics Clinic, June 2018), https://aeclinic.org/publicationpages/2018/6/1/the-performance-of-indiana-utilities-energy-efficiency-programs.

64 Bev Gard and James Merritt, "Jolted into Efficiency: We All Must Do Our Part," IndianaDG, December 23, 2009, http://www.indianadg.net/jolted-into-efficiency-we-all-must-do-our-part/.

65 Kari Lydersen, "Who's behind the Effort to Kill Indiana's Efficiency Law?," *Midwest Energy News*, March 17, 2014, https://energynews.us/2014/03/17/midwest/whos-behind-the-effort-to-kill-indianas-efficiency-law/; Kari Lydersen, "Before Being Dismantled, Indiana's Efficiency Program Was Effective," *Midwest Energy News*, June 26, 2015, https://energynews.us/2015/06/26/midwest/before-being-dismantled-indianas-efficiency-program-was-effective-2/.

66 Martin Kushler, "Indiana Businesses Support Energy Efficiency. So Why Is the Legislature Trying to Gut the State's Programs?," Text, *ACEEE* (blog), March 12, 2014, https://aceee.org/blog/2014/03/indiana-businesses-support-energy-eff.

67 Joanna A. Foster, "Gov. Pence Lets Indiana Energy Efficiency Program Die," *ThinkProgress*, March 31, 2014, https://thinkprogress.org/gov-pence-lets-indiana-energy-efficiency-program-die-c3e8844305eb/.

68 Mike Pence to IURC Chairman James D. Atterholt, "Letter from Governor Michael R. Pence, Dated March 27, 2014," March 27, 2014, https://www.in.gov/iurc/files/IURC_GAO_2014-1.pdf.

Some speculated that the large, investor-owned utilities were the principal forces pushing for the expanded bill.[69] Ed Simcox, acting President of the utility industry group in Indiana, rejected that allegation, but nevertheless wrote an editorial supporting SEA 340, arguing that "pausing" the statewide pursuit of "very aggressive" targets would avoid large cost increases and not lead to the end of utility efficiency programs.[70] Simcox also noted that most of the 'low-hanging fruit' had been picked, that more expensive measures would be needed to meet targets, and thus that a pause was beneficial to allow time to review the costs and benefits of the next steps. Utilities were troubled by the fact that Energizing Indiana was not the result of legislation, but rather crafted and implemented by the IURC.

Martin Kushner, senior fellow at the ACEEE, disagreed with this view, noting the legislation called for programs to end at the end of 2014; "that's not a pause, that's a termination", Kushner stated.[71] Kushler went on to draw out several lessons from the incident. For one, because the programs and targets originated in a regulatory body and not the legislature, there was a lack of support for efficiency in the latter body and a 'turf' issue between the two (the IURC explicitly stated that concerns the programs were "created administratively, not statutorily" led to SEA 340).[72] Furthermore, the utilities resented that a portion of programs would be delivered by a third-party administrator.

As per SB 340, the IURC released its final status report (prepared by 'Energy Center of Wisconsin') in August 2014 and issued its list of recommendations to Governor Pence in October 2014.[73] The Commission recommended that, for flexibility purposes, utilities be responsible for setting their own targets through the IRP process, but also that new legislation be introduced requiring utility IRPs to set EE/DSM goals. The Commission declined to make further recommendations on the existing utility DSM plans or on the opt-out provision but did suggest that consideration be given to finding ways to incent large consumers to undertake efficiency initiatives and to consider how to measure and evaluate the effect of those initiatives.

Governor Pence signed into law "replacement" Legislation SB 412, based largely on the IURC's recommendations (though without any EM&V mechanisms for large, opted-out consumers), in 2015.[74] This Act required electric utilities to

69 Lydersen, "Who's behind the Effort to Kill Indiana's Efficiency Law?"; RP Siegel, "Why Did Indiana Kill Its Successful Energy Efficiency Bill?," TriplePundit, 2014, https://www.triplepundit.com/story/2014/why-did-indiana-kill-its-successful-energy-efficiency-bill/44676.

70 Lydersen, "Who's behind the Effort to Kill Indiana's Efficiency Law?"; Ed Simcox, "Legislation Won't Kill Energy Efficiency Efforts," *Indianapolis Star*, March 7, 2014, https://www.indystar.com/story/opinion/readers/2014/03/07/legislation-wont-kill-energy-efficiency-efforts/6184639/.

71 Kushler, "Indiana Businesses Support Energy Efficiency. So Why Is the Legislature Trying to Gut the State's Programs?"; Lydersen, "Who's behind the Effort to Kill Indiana's Efficiency Law?"

72 Carol A. Stephan to Mike Pence, "Letter to Governor Mike Pence Re: EE and DSM," October 9, 2014, https://www.in.gov/iurc/files/2014-10-09_Ltr__to_Governor_Re__EE-DSM_(3).pdf.

73 Steve Kihm and Melanie Lord, Indiana's Core and Core Plus Energy Efficiency Programs: Benefits, Costs and Savings (Madison, WI: Energy Center of Wisconsin, August 14, 2014), https://www.in.gov/iurc/files/DSM_Report_to_General_Assembly_w_Cover_Letter_8-15-2014%281%29.pdf; Stephan to Pence, "Letter to Governor Mike Pence Re: EE and DSM," October 9, 2014.

74 James Merritt and Randall Head, "Integrated Resource Plans and Energy Efficiency," Pub. L. No. 412, SB (2015), https://iga.in.gov/legislative/2015/bills/senate/412; Bryndis Woods and Nina Schlegel, *The Economic Impacts of Repealing Indiana's Energy Efficiency Resource Standard: Lost Jobs and Higher Electric Bills* (Applied Economics Clinic, July 2018), https://aeclinic.org/publicationpages/july2018/the-economic-impacts-of-repealing-indianas-energy-efficiency-resource-standard. July 2018

develop their own three-year electricity plans, budgets, and goals and permitted large customers consuming more than a megawatt of energy to opt-out of efficiency programs. No efficiency savings targets were set. Beginning 2017, utilities would be required to include energy efficiency into their integrated resource plans and submit to the IURC for regulatory approval every three years. The legislation also specifies that the IURC may not require a third-party administrator to implement efficiency programs, and that the IURC would permit utilities to recover the costs of efficiency programs through retail rates.

Maine

Maine is served by several investor-owned and municipal utilities, though energy efficiency is presently handled by a third-party DSM administrator, the Efficiency Maine Trust. Between 2002 and 2010, administration of energy efficiency programs the responsibility of the Energy Division of the Maine Public Utilities Commission, while RGGI funds were managed by the Energy and Carbon Savings Trust. In 2009, Efficiency Maine Trust was established by the Maine Energy Future Act (PL 372), for the purposes of consolidating efficiency funds for all fuels, pursuing efficiency resources and conducting market transformation activities. The Trust is managed by the independent Efficiency Maine Trust Board (nine-member stakeholder board of trustees) with oversight from the three-member Maine Public Utilities Commission (MPUC) and funded via system benefits charges, capacity markets, and the RGGI. Though it is the responsibility of the Board to manage funds necessary to run efficiency programs, funding is proposed to and approved by the state legislature.

Operating under the banner of “Efficiency Maine”, the Trust develops and implements a Triennial Plan – a three-year strategic plan for energy efficiency, conservation, and alternative energy resource programs for residential and commercial customers in the state - for both the electric and natural gas sectors. The first plan covered years 2011-2013. The most recent 2017-19 plan targets savings between 2.2 and 2.6 percent of retail sales. In 2017, capacity markets contributed 13 percent of electricity program funding. Additional funding has been provided through federal grants (e.g. American Recovery Reinvestment Act), Maine Yankee settlement funds, and renewable portfolio standard alternative compliance payments. However, federal funding contributing a larger share of overall funding between 2010-2013 (34 percent of total revenues in 2012; 26 percent in 2013; 12 percent in 2014, effectively nil in 2015).

In 2012, Maine fell 13 places in ACEEE State Energy Efficiency Scorecard due to legislators not fully funding its Energy Efficiency Resource Standard and the state’s slow adoption of more stringent building codes. According to the ACEEE, the state’s FY 2013 budget allocations fell short approximately $30 million from projected energy efficiency funding requirements to meet savings targets set by the state statute. In the same year, Governor LePage put forward a bill to increase government oversight of the Efficiency Maine Board, to divert funding elsewhere, and ‘make it easier’ for government to conduct future budget

raids for unrelated purposes.[75] Though the bill was substantially amended in the legislature, Efficiency Maine was nevertheless assigned additional budget oversight via the passage of PL 637, and required to provide reports to the Legislature biannually on the status of the fund's budget and programs.

In 2013, funding levels and provisions for stability were restored to Efficiency Maine under the Omnibus Energy Act, LD 1559, which retooled and reworked existing energy efficiency efforts and called for the development of new efficiency programs in the state. Governor LePage attempted to veto the bill, but Maine's Senate overrode the decision 35-0. LD 1559 requires utilities to fund Efficiency Maine adequately to enable the Trust to achieve all cost-effective and reliable electric and natural gas efficiency for commercial, industrial, and residential customers. This is achieved via a fixed system benefit charge, which is capped at 4 percent of total retail electricity and transmission and distribution sales in the state. According to the Act, energy efficiency programs targeting low-income customers must receive at least 10 percent of the funding collected. Additionally, LD 1559 expanded natural gas efficiency programs and enacted the first direct contract between investor-owned utilities and Efficiency Maine with the purpose of providing energy efficiency initiatives to large industrial customers.

New Brunswick

There is one provincially-owned utility company in New Brunswick (NB Power), and three municipal electric utilities. Between 2005 and 2015, efficiency programming was administered by a provincial crown-corporation, Efficiency New Brunswick. In 2015, a newly elected Liberal government tabled a bill to dissolve the corporation and transfer DSM administration to NB Power instead. Since 2016, NB Power has administered efficiency programs according to 3-year plans prepared by the utility and overseen by the New Brunswick Energy and Utilities Board.

Efficiency New Brunswick was originally established with an initial budget of $11.9m by the Conservative government's 2005 "Energy Efficiency and Conservation Agency of New Brunswick Act". The Board was to be appointed by the provincial cabinet, as well as the Chief Executive Officer. According to the legislation, the board would prepare annual budgets to estimate the amounts required for operation of the agency, as well as annual reports containing an eternal auditor's review and other information requested by the Minister. An election in 2006 resulted in a Liberal party government, led by Shawn Graham, who had campaigned on the "three E's" of energy, education and the economy. The new government reneged on a commitment to repeal the former government's tax rebate on energy costs, stating that the policy did not entice the people of New Brunswick to conserve energy.[76] The government released a climate change action plan in 2007 that set an objective of expanding efficiency

75 Dylan Voorhees, "An Inside Perspective on the Big Energy Bills This Legislative Session: Part I," *Natural Resources Council of Maine* (blog), May 3, 2012, https://www.nrcm.org/blog/an-inside-perspective-on-the-big-energy-bills-this-legislative-session-part-i/.

76 The Canadian Press, "N.B. Liberals Cancel Tory Tax Rebate," *CBC*, December 21, 2006, https://www.cbc.ca/news/canada/new-brunswick/n-b-liberals-cancel-tory-tax-rebate-1.578984.

programming delivered by Efficiency NB, though it refrained from making any larger, substantive changes to the still-young institutional framework.

In late 2009, the Liberal government announced plans to sell the provincial utility company to Hydro Quebec, which (alongside persistent provincial deficits) may have played a part in that party losing the election in the following year to the Conservative party. Electricity rates were again an issue in this election as well; the Conservatives had promised a three-year rate freeze during the campaign.[77] In 2011, the government released an energy blueprint that reaffirmed a commitment to expanding efficiency programs administered by Efficiency NB and required provincial utilities to prepare three-year DSM plans in collaboration with Efficiency NB.[78] The first such plan was released in July 2014, which called for investment of $57 million between 2014/15 and 2016/17.[79]

Nevertheless, efficiency efforts in New Brunswick were beset with some controversy under the Conservative government. In 2012, a Conservative member of the legislative assembly, Margaret-Ann Blaney, resigned position to take the CEO job at Efficiency NB, raising concerns about patronage in the organization.[80] In 2014, government budget cuts (approximately $3m less than proposed in the 2014 efficiency plan) caused Efficiency NB to cancel its residential rebate program.[81] The Conservatives lost the election later in 2014 to the Liberals, who swiftly introduced legislation to dissolve Efficiency NB and hand responsibility for efficiency to NB Power, and to prevent Blaney from receiving severance and suing the province.[82] Employees and programming of Efficiency NB were officially merged into NB Power in April 2015.[83]

NB Power released its first three-year DSM plan later in 2015, budgeting a total of $64.5 million and increased electricity savings (over the previous efficiency plan) for the years 2016-2018.[84] Bridge funding provided by the government enabled some residential and commercial programming to address multiple fuels, though only in 2016. Concerns have been raised whether funding for the plan are adequately funded.[85]

77 CBC News, "Alward Faces Tough Challenges after N.B. Win," *CBC*, September 28, 2010, https://www.cbc.ca/news/canada/new-brunswick/alward-faces-tough-challenges-after-n-b-win-1.931735.

78 New Brunswick Department of Energy, *The New Brunswick Energy Blueprint.* (Fredericton, N.B.: New Brunswick Dept. of Energy, 2011), http://ra.ocls.ca/ra/login.aspx?inst=centennial&url=https://www.deslibris.ca/ID/229896.

79 Electricity Efficiency Steering Committee and Dunsky Energy Consulting, *2014/15 - 2016/17 Electricity Efficiency Plan: Executive Summary* (Fredericton, NB: New Brunswick Department of Energy and Mines, July 2014), 15.

80 CBC News, "Blaney Resigns to Become Efficiency NB CEO," *CBC News*, May 16, 2012, https://www.cbc.ca/news/canada/new-brunswick/blaney-resigns-to-become-efficiency-nb-ceo-1.1150940.

81 CBC News, "Efficiency NB Rebate Cuts Have Home Inspectors Scrambling," *CBC*, February 15, 2014, https://www.cbc.ca/news/canada/new-brunswick/efficiency-nb-rebate-cuts-have-home-inspectors-scrambling-1.2538578.

82 "Bill 7 - An Act to Dissolve the Energy Efficiency and Conservation Agency of New Brunswick," accessed April 3, 2019, https://www.gnb.ca/legis/bill/FILE/58/1/Bill-7-e.htm; CBC News, "Efficiency New Brunswick Folded into NB Power," *CBC*, December 12, 2014, https://www.cbc.ca/news/canada/new-brunswick/efficiency-new-brunswick-folded-into-nb-power-1.2871099; Jacques Poitras, "Bills Kill Severance for Robert MacLeod, Margaret-Ann Blaney," *CBC*, December 12, 2014, https://www.cbc.ca/news/canada/new-brunswick/bills-kill-severance-for-robert-macleod-margaret-ann-blaney-1.2871002.

83 Canada Government of New Brunswick, "Efficiency NB Officially Joins NB Power," April 1, 2015, https://www2.gnb.ca/content/gnb/en/news/news_release.2015.04.0232.html.

84 NB Power and Dunsky Energy Consulting, *DSM Plan 2016-2018* (Fredericton, NB, 2015).

85 Efficiency Canada, *Canadian Provincial Energy Efficiency Scorecard 2019*, https://database.efficiencycanada.org/NB/.

Nova Scotia

Nova Scotia has one major private utility company (Nova Scotia Power), owned by Emera, and six independent municipal distribution utilities. Demand-side management programming in the electricity sector is managed by a third-party DSM Administrator, Efficiency Nova Scotia. Since 2014, Efficiency Nova Scotia has operated as a 10-year franchise, currently held by the non-profit corporation, EfficiencyOne. The activities of Efficiency Nova Scotia are overseen by the provincial Utility and Review Board (UARB).

Efficiency Nova Scotia was originally established as an independent, non-profit corporation in 2010, after a protracted public debate and consultation process concerning the implementation DSM programming in the province going back to 2008 (and arguably back even further, to the creation of the government agency *Conserve Nova Scotia* and Nova Scotia Power's first DSM plans in 2006). These earlier initiatives were beset by controversy – concern about patronage appointments the case of the former;[86] lackluster, unambitious efforts in the case of the latter.[87] A coalition of stakeholders formed to push for greater accountability in 2007, and for consideration of alternative administrative models. The government eventually agreed to conduct consultations on DSM administration, and Nova Scotia Power indicated it would not push for utility administration either. The consultation process began in February 2008. Industrial consumers briefly pushed for a taxpayer-funded model, while remaining stakeholders pushed for an administration model with more independence from industry and government. The final report and settlement agreement with the UARB called for the creation of a third-party administrator by June 2009, though the provincial election and change in government that year delayed this until November 2009.

Efficiency Nova Scotia was soon confronted with several challenges, including weakening electricity demand in the industrial sector (thereby increasing rates for remaining customers, leading some to call for a pause in efficiency programming), and a tax ruling from the federal Canadian Revenue Agency that increased expenses by ~10 percent. Nova Scotia suffered from a weak economy in the years following 2010, contributing to mounting political pressure to balance the budget while also minimizing cost of living increases.[88] In the 2013 election, the Liberal Party was elected, campaigning (in part) on their plan to 'kill the efficiency tax' (the on-bill charge for efficiency programming) as a way to reduce electricity rates.

The Liberal Party's election commitment threatened to completely scrap or significantly reduce energy efficiency efforts. The generation utility (Nova Scotia Power), facing decreasing load growth, was not in favour of further demand-side management. However, Efficiency Nova Scotia, as an independent non-profit

86 Keith Doucette, "Conserve Nova Scotia Controversy Won't Go Away," *The Globe and Mail*, August 15, 2007, https://www.theglobeandmail.com/news/national/conserve-nova-scotia-controversy-wont-go-away/article1080064/.

87 Brendan Haley, "Case Study: Nova Scotia," in *Fundamentals of Energy Efficiency: Policy, Programs and Best Practices*, ed. Peter Love, 2018, http://energyefficiencyfundamentals.org/textbook/.

88 Michael MacDonald, "Nova Scotia's First NDP Government Faces Rocky Road into Election Year," *The Globe and Mail*, December 7, 2012, https://www.theglobeandmail.com/news/politics/nova-scotias-first-ndp-government-faces-rocky-road-into-election-year/article6082864/.

corporation was able to provide its own advice to government without having to navigate through a government ministry or a utility. Efficiency Nova Scotia and its advocates emphasized the concept of competing against electricity supply and highlighted the potential for a new model to help resolve the abovementioned tax dispute with the federal government. The organization's independence also enabled it to conduct independent communications, such as op-eds and provide information and support to advocates, such as environmental organizations and energy efficiency contractors.

Rather than doing away with ratepayer-funded DSM, the new government emphasized a new model where efficiency would compete with supply and be more affordable and accountable. They implemented further revisions to the governance structure for efficiency,[89] some of which addressed challenges the new institutional framework had experienced, others which constrained efficiency efforts moving forward. The new government converted the role of DSM administrator into a franchise (called Efficiency Nova Scotia), which would be held for the first 10 years by EfficiencyOne (formerly the Efficiency Nova Scotia Corporation). Future franchise agreements would be granted by the provincial Ministry of Energy. The on-bill charge for energy efficiency was removed and instead embedded into the electricity rate.[90] New legislation was introduced that obligated Efficiency Nova Scotia to undertake all cost-effective and reasonably available efficiency and conservation activities. However, at the same time, the Liberal government also formalized a requirement for the UARB to take into consideration the 'affordability of electricity' when reviewing Efficiency Nova Scotia program plans, and the program budget was capped at an amount below what was estimated to be cost-effective for 2015 as Efficiency Nova Scotia transitioned to its new model.

In the years following these changes, EfficiencyOne and Nova Scotia Power have struggled to independently agree on a budget for efficiency. Both UARB and EfficiencyOne preferred a longer-term perspective, while Nova Scotia Power pushed for a focus on short-term affordability concerns. The Ministry of Energy took Nova Scotia Power's side in 2016, clarifying to UARB that its 'affordability' criterion pertained to costs during the three-year supply agreement. There have also been disputes over the provision of customer data to EfficiencyOne, which ended when regulators ordered Nova Scotia Power to provide residential customer information. NS Power had argued providing data would violate privacy and anti-spam laws.[91]

89 CBC News, "Efficiency Nova Scotia Rate Increase Still on Bill," *CBC*, January 24, 2014, https://www.cbc.ca/news/canada/nova-scotia/efficiency-nova-scotia-rate-increase-still-on-bill-1.2509520.

90 CBC News, "Check Your Bill: Nova Scotia Power Overcharges Thousands," *CBC*, May 2, 2014, https://www.cbc.ca/news/canada/nova-scotia/check-your-bill-nova-scotia-power-overcharges-thousands-1.2629334; Global News, "N.S. Liberals' First Budget since Election Forecasts $279M Deficit - Halifax," *Global News,* May 3, 2014, https://globalnews.ca/news/1248712/nova-scotia-budget-forecasts-279m-deficit/.

91 Paul Withers, "'A Savings to Ratepayers': EfficiencyOne Wins Battle for Customer Data," *CBC*, November 16, 2017, https://www.cbc.ca/news/canada/nova-scotia/efficiencyone-wins-battle-for-customer-data-1.4406055.

Ontario

Ontario has had by far the most varied experience with the delivery of energy efficiency programs in Canada. It first started when Ontario Hydro set a target of 1,000 MW of load shifting and 1,000 MW of conservation in 1982, in response to a Royal Commission (a.k.a. The Porter Commission) report that recommended in 1980 that the province move away from its traditional supply planning model and that future electricity planning should emphasize demand management. The conservation programs were discontinued in 1993, largely due to the opening of the Darlington nuclear plant, when there was already a surplus of generating capacity. By the time the programs were closed, they had reduced peak electricity demand by 1,200 MW.[92]

Natural Gas Conservation

In 1993, the Ontario Energy Board (OEB) established a regulatory framework to govern DSM programs by the two privately-owned natural gas utilities in Ontario (Union Gas and Enbridge). In contrast to the many changes that have been made in the delivery of programs for electricity customers, gas-side programs have continued and expanded ever since. Since its creation, programs have been developed and delivered to residential, commercial and industrial customers. As part of this framework, the utilities can make an application to receive a Lost Revenue Adjustment Mechanism (LRAM) that compensates them for lost revenue due to conservation so that they are indifferent to the amount of natural gas they sell. They can also apply for further compensation through a Shared Savings Mechanism (SSM) which gives them additional funds if they are able to exceed their conservation targets. Both these mechanisms were developed in California to incentivize their private energy utilities to deliver energy conservation.

The OEB's 2015-2020 DSM Framework for the natural gas utilities allowed them to budget up to $155 million/year for DSM activities. By 2016, the verified net cumulative energy savings from programs managed by these utilities was about 1.8 billion m^3 of natural gas.[93] Although Ontario's December 2018 Environment Plan did not include any specific budgets for natural gas DSM, it did assume an expansion of programs and that these programs would account for 18 percent of the province's revised emission target of 143 MT.[94] Enbridge Gas Inc. (who recently merged with Union Gas) had started their consultations regarding their next 2020-2025 plan but have recently requested that 2021 be treated as a transition year until a new five- year plan can be developed and approved.[95]

92 Love, *Fundamentals of Energy Efficiency: Policy, Programs and Best Practices*, chap. 8.

93 Love, "Case Study: Past, Present and Future of Energy Conservation in Ontario," in *Fundamentals of Energy Efficiency: Policy, Programs and Best Practices*, by Peter Love (Toronto, 2018), http://energyefficiencyfundamentals.org/textbook/.

94 Ministry of the Environment, Conservation and Parks, *Preserving and Protecting Our Environment for Future Generations: A Made-in Ontario Environment Plan* (Toronto, ON: Government of Ontario, 2018). The target is widely regarded as significantly less ambitious than the previous government's targets. See S.McCarthy and L.Stone, "Ontario to scale back climate-change goals," *The Globe and Mail*, November 29, 2018.

95 Adam Stiers, "Letter to Ontario Energy Board Re EB02019-003 – Post 2020 Natural Gas Demand Side Management Framework Consultation – Correspondence" (Toronto, ON: Ontario Energy Board, September 6, 2019).

Electricity Conservation

The province reengaged with electricity demand-side management activities in the early 2000s, driven by concerns of long-term electricity supply and system stability in the aftermath of the break-up of Ontario Hydro, experiments with wholesale and retail electricity markets, and the 2003 blackout.[96] In 2004, the Electricity Conservation and Supply Task Force issued a report calling for, among other things, the creations of a "conservation culture", the creation of a conservation champion and recommending that conservation be evaluated on a level basis with supply resources. A Conservation Bureau, led by a Chief Energy Conservation Officer, was created in 2005 within the newly established Ontario Power Authority (OPA). The OPA was mandated to develop an integrated power system plan for the province. In addition to promoting a culture of conservation and procuring reductions in electricity demand, the Conservation Bureau was responsible for reporting on progress towards Ontario energy conservation goals and to identify barriers to conservation.

As an initial step, electricity local distribution companies (LDCs – municipally-owned electricity distribution utilities that operate in most cities and towns) and Hydro One (which, while owning and operating the transmission grid, is also considered an LDC as it provides distribution services in rural areas) were given an increase of $163 million in their rates, provided they invested a similar amount in DSM programs. Most LDCs, who had not previously been involved in DSM activities, launched a range of programs where were estimated to have reduced peak demand by 357 MW.[97]

Shortly after the creation of the OPA Conservation Bureau, the decision was made to cease the funding to LDCs, and to use electricity ratepayer funds for electricity conservation programs managed by OPA. An initial target of 1,350 MW reduction in peak demand by 2007 was set and met.[98] As part of the Act that created the OPA, funding for these conservation programs could be authorized by Directives issued by the Minister for specific programs. These typically included MW or MWh targets but no cost estimates or ceilings. The use of directive was to cease once the OPA had an approved Integrated Power System Plan (IPSP). Such a plan was never approved.

In 2009, the *Green Energy and Green Economy Act*[99] was enacted. While its main focus was on promoting greater use of renewable energy through a feed-in-tariff program, it also expanded the role for the LDCs in conservation, referring to them as the new "face of conservation". The legislation provided a framework for setting province-wide conservation targets and required that the LDCs be assigned individual targets by the OEB that had to be met as conditions of their licenses. The Act also transferred the responsibility for reporting on achievement of conservation targets and the identification of barriers to energy

96 R. MacWhirter and M. Winfield, "Competing Paradigms, Policy Windows and the Search for Stability in Ontario Electricity Policy," in *Divided Province: Ontario Politics in the Age of Neoliberalism* (Kingston/Montreal: Queens-McGill University Press, 2019).
97 Chief Energy Conservation Officer, *Taking Action – Supplement: Conservation Results 2005-2007* (Toronto, ON: Ontario Power Authority, 2008).
98 Chief Energy Conservation Officer, *Be the Change to a Culture of Conservation* (Toronto, ON: Ontario Power Authority, 2008).
99 S.O. 2009, c. 12.

efficiency from the Conservation Bureau, whose role was terminated, to the office of the Environmental Commissioner of Ontario. By 2013, total cumulative peak demand savings from these programs was estimated to be 1,900 MW.[100]

In 2013, Ontario released a new Long-Term Energy Plan, setting conservation targets of 30 TWh by 2032 (a 16 percent reduction in forecasted demand) with 7 TWh by 2020 and 2,500 MW of demand response.[101] It also stated that LDCs would have an expanded role in delivering on these targets. The OEB subsequently issued guidelines for each LDC which included specific conservation targets to be met by 2020 in support of the 7 TWh target. Under these guidelines, the LDCs could deliver programs developed by OPA or develop their own. Most of the LDC programs were aimed at residential and small commercial consumers, while the OPA delivered programs directly for large industrial consumers. These developments reflected the governments prioritization of conservation, as outlined in its publication at the same time of "Conservation First: A Renewed Vision for Energy Conservation in Ontario", which identified conservation as the cleanest and least costly energy resource. 2017 was the best year yet for electricity conservation programs in Ontario with savings of 1.8 TWh.[102]

At the same time however, the province has been moving to reduce the role of the commodity portion of electricity bills relative to the "fixed charge" portion for maintaining a grid connection. These developments remove financial incentives conservation and innovation more generally.[103] The declining portion of the bill related to consumption reduces the potential savings to consumers that could flow from pursuing energy efficiency activities.

In 2017, Ontario signed an agreement to join the GHG emissions cap-and-trade market alongside Quebec and California, which would come into effect on January 1, 2018. The province established 'GreenOn' in 2017 to deliver programs to reduce GHG emissions, supported by revenues received from the cap-and-trade market. These programs were to include significant energy efficiency initiatives, both in utility programming and building retrofits.

The IESO completed a mid-term review report on the framework for electricity conservation programs (the Conservation First Framework) in June 2018. The report's recommendations, to what is now the Ministry of Energy, Northern Development and Mines (MENDM), included suggestions for a "one window" approach to conservation program delivery from a consumer perspective and the inclusion of a carbon price in TRC calculations. The report also highlighted the need for an improved governance model around the province's energy conservation efforts.[104]

100 Ministry of Energy, *Conservation First: A Renewed Vision for Energy Conservation in Ontario* (Toronto, ON: Government of Ontario, 2013).

101 Government of Ontario, *Achieving Balance: Ontario's Long-Term Energy Plan* (Toronto, ON: Government of Ontario, 2013).

102 Independent Electricity System Operator, *2017: Report on Energy Efficiency Activities* (Toronto, ON: IESO, 2018).

103 Ontario Energy Board, *Board Policy: A New Distribution Rate Design for Residential Electricity Customers*, April 2015, online: <https://www.oeb.ca/oeb/_Documents/EB-2012-0410/OEB_Distribution_Rate_Design_Policy_20150402.pdf>. On the implications of this development see Julia Zeeman, *Emerging Business Models for Local Distribution Companies in Ontario*, (Toronto: Faculty of Environmental Studies, 2016), online: <https://sei.info.yorku.ca/files/2016/09/MRP_-JZEEMAN_2016_Final-.pdf>.

104 ECO, *2019 Conservation Progress Report*, pg.57.

The 2018 provincial election led to a new Progressive Conservative government. During the campaign, the Conservative Party had explicitly targeted the end of cap-and-trade as a key policy goal, alongside reductions in the cost of electricity. The removal of funding for energy conservation from electricity bills was also specifically referenced in the PC platform.[105]

The Progressive Conservative government's first act was to repeal the legislation implementing the cap-and-trade market. GreenOn was consequently cancelled. Although utilities were set to receive $100 million for energy conservation initiatives under GreenOn,[106] its cancellation occurred before they had been able to launch many programs.

The new government also made major changes to the delivery of the programs by LDCs and the Independent Electricity System Operator (IESO), which had been merged with OPA in 2017. In March 2019 the new government terminated the "Conservation First" framework, eliminating the LDC targets and the role of LDCs in delivering programs, cancelling most residential programs (with the exception of low income and First Nations programs), and reduced the funding for the remaining programs to $686 million over the next two years.[107] The new government also merged the Environmental Commissioner's Office (ECO) with the Auditor General's Office. The fate of the ECOs previous energy conservation reporting mandate remains unclear.

A new Long-Term Energy Plan is due in 2020 but it is not clear at this stage what it will include regarding electricity conservation programs in terms of funding source or targets. While there has also been some discussion of conservation participating in the proposed capacity market,[108] this would not begin until after 2024.

105 Progressive Conservative Party of Ontario, *Plan for the People* (Toronto: PC Ontario Party, 2018), https://www.ontariopc.ca/plan_for_the_people.

106 "Green Investment Fund," https://www.ontario.ca/page/green-investment-fund

107 Ministry of Energy, "Backgrounder: Ontario Reducing Costs by Centralizing and Refocusing Conservation Programs" (Toronto, ON: Government of Ontario, March 21, 2019).

108 Independent Electricity System Operator, *Incremental Capacity Auction High-Level Design* (Toronto: IESO, 2019), online: <http://www.ieso.ca/en/Market-Renewal/High-Level-Designs/Incremental-Capacity-Auction-High-Level-Design>.

The Case Studies: Discussion

Past studies that have sought to evaluate energy efficiency governance models have tended to focus more on effectiveness than on acceptability or resiliency.[109] These studies all suggest that effectiveness results less from the specifics of administrative of funding models than from clear and consistent commitment from policy-makers, supported by stakeholder consensus, and diverse and stable sources of funding. Yet, this raises the question of what types of factors may influence commitment, consensus or funding stability, either positively or negatively. The following section briefly reviews the sources of instability and impacts in our case studies and provide some reflection on how governance arrangements may have played a role in shaping the outcome.

What Happened?

Each of our case studies experienced instability in policymaker commitment, stakeholder consensus and/or resources stability. In brief:

- The election of an unsupportive government in **Alberta** led to the cancellation of the carbon levy, which was the principal funding source for the third-party energy efficiency program administrator
- Changing political priorities and investments in major supply projects prompted long-term 'moderation' of energy efficiency spending by the major electrical utility in **British Columbia**. Similar factors may be at work in **Ontario**. In that province, there is an electricity surplus and a major commitment to the refurbishment of existing nuclear power plants, and a large (10,000MW total capacity) fleet of relatively new and underutilized natural gas-fired generating facilities.[110]
- The election of an unsupportive government in **Ontario** led to the cancellation of a carbon pricing program that supported energy efficiency, major institutional changes in energy efficiency delivery, and cancellation of almost all residential rate-base funded electricity programs before their scheduled completion
- Accusations of patronage and persistent underfunding led a newly elected government to dissolve the government agency that had delivered efficiency programming for 10 years and transfer these responsibilities to the provincial utility in **New Brunswick**
- A political party campaigned on eliminating the 'efficiency tax' associated with the then recently-created third-party program administrator, but did not follow through after being elected in **Nova Scotia**

109 See Appendix 2: The Evolution of Energy Efficiency Governance.

110 See M.Winfield and A.Gelfant, "Distributed Energy Resource Development in Ontario: A socio-technical transition in progress?" *Energy Regulation Quarterly,* January 2020 – Volume 7, Issue 4 2019 http://www.energyregulationquarterly.ca/articles/distributed-energy-resource-development-in-ontario-a-socio-technical-transition-in-progress#sthash.kOEmaFuT.dpbs.

- A 'budget impasse' in government resulted in a raid of the dedicated fund for energy efficiency programming, prompting retaliatory legal action from energy efficiency advocates and some restoration of funding in **Connecticut**
- The government failed to fund energy efficiency programming as necessary to meet its obligations under its energy savings targets, but implemented a system benefit charge and obligation for utilities to pursue all cost-effective efficiency shortly thereafter in **Maine**
- Regulators established an energy efficiency target and third-party administration framework, which faced push-back from utilities and legislators, who subsequently cancelled it and replaced it with less stringent obligations on utilities in **Indiana**

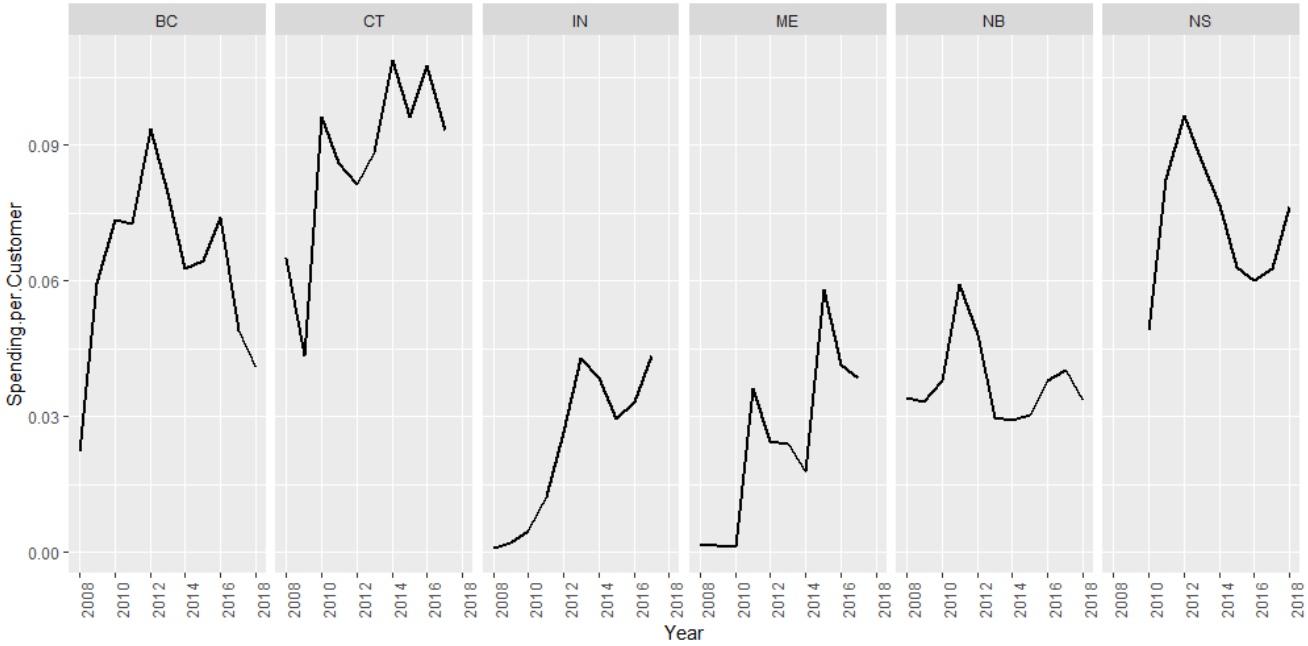
From an institutional standpoint, not all cases experienced the same degree of dissolution. While some, like New Brunswick, Indiana and Ontario, experienced relatively drastic institutional re-configurations others, like Connecticut, British Columbia and Maine, saw very little. Nova Scotia is a particularly interesting case in that the institutional arrangement was relatively young when the Liberal Party came to power with an agenda of 'killing the efficiency tax' yet it managed to survive with relatively little institutional change.

Looking at historical spending on electricity efficiency programming per customer, political intervention had a clear impact on constraining spending growth, and in some cases ratcheting back.[111] Ontario and Alberta are not included in the figure below, as the shocks experienced in each jurisdiction are too recent to have impacted spending.

The drop-in spending was most precipitous in Nova Scotia and British Columbia – both cases which experienced very little institutional reconfiguration – while New Brunswick and Indiana, where institutional arrangements for efficiency were significantly altered, experienced a relatively smaller drop in efficiency spending. The trend in Maine appears to map closely to the election period in the state, with growth and retrenchment in spending corresponding to shifts in power within the legislature.

111 Some qualifications about this chart should be made. Data for the US case studies comes from the US Energy Information Administration's 'Annual Electric Power Industry Report' and includes annual (reporting year) spending on energy efficiency (incentives and direct/indirect costs) from all actors in each jurisdiction for all end-use customer segments. Data for the Canadian case studies has been compiled from annual reports, submissions to provincial regulators, and government budgets (where applicable). Figures for British Columbia include spending and customer data for BC Hydro only, Nova Scotia includes spending by Efficiency Nova Scotia and customers of NS Power, and New Brunswick includes government budgets for Efficiency New Brunswick until its dissolution, and NB Power spending thereafter (customer data for NB power throughout).

Figure 6: Electricity efficiency program spending by utilities per total customers, 2008-2018



The source of instability in most cases was political intervention, often associated with a recent change in government (or at least a change in administration and priority, as seen in the case of British Columbia). In many cases (Alberta, New Brunswick, Nova Scotia, Ontario, Indiana and Connecticut), an election shifted the balance of power in government, giving more power to political interests that did not highly prioritize energy efficiency. The degree of political animosity was highest in Alberta, Nova Scotia and Ontario, were incoming governments campaigned on taking efficiency costs off consumers bills or scrapping energy efficiency programming altogether.

British Columbia and Indiana present partial exceptions to this observation. Though political change in both cases did precipitate a change in course in energy efficiency delivery, competing political and economic priorities of key stakeholders also seemed to play an important role. In Indiana, reporting indicated that the large investor-owned utilities were not fully on board with the regulator's plans and targets for efficiency, which may have been an important driver of political efforts to dissolve institutional arrangements. In British Columbia, spending on demand-side management programs has been 'moderated' for the foreseeable future, largely due to the momentum behind the construction of the Site C dam and the prolonged conditions of surplus associated with it. A case could be made that Ontario's decision to move ahead with nuclear refurbishment, coupled with relatively flat projected demand growth, puts it in a similar situation as British Columbia.

Even still, in both Indiana and British Columbia, policymaker commitment and stakeholder consensus about the importance of efficiency led to a continuation in programming, even if at levels below which they might otherwise have operated. It is generally true of most of the case studies that policymakers and stakeholders remain supportive of energy efficiency, though this clearly comes in degrees. The situations in Alberta and perhaps Nova Scotia are exemplative of the lowest degree of support for efficiency (though Governor LePage in Maine was also clearly hostile to energy efficiency). In these cases, policymakers had an explicit intent of scaling back energy efficiency programming specifically.

Ontario follows closely, as the incoming government was very clear about their desire to reduce costs to consumers, though energy efficiency may not have been a primary focus of this desire. In Nova Scotia, low policymaker commitment was mitigated through effective advocacy on the part of the program administrator regarding the benefits of energy efficiency. Advocacy (or opposition to program retrenchment) in Ontario has been comparatively lacking.

In many of our cases, political intervention was motivated by concerns about the cost of energy as reflected on energy bills, for consumers (or at least communicated as such during political campaigns). Generally speaking, consumer cost concerns appear to be more salient during times of slow economic growth, either generally (e.g., at the tail-end of the 2008 recession) or for specific industries (e.g., pulp and paper in Nova Scotia).

In some cases, economic concerns were less pertinent than budgetary ones, even if efficiency programming in those cases did not directly impact those budgets (e.g., Connecticut). The common factor here is the existence of a window through which political actors can position cuts to efficiency as necessary belt-tightening. In some cases, political actors may be able to reap the benefits of *appearing* to have acted on this issue by simply making the costs of efficiency programming less transparent to end-users).

The Role of Governance Structures

Finally, the influence of governance on the outcomes of political intervention and instability in energy efficiency institutions must be considered The question here is not whether one administrative or funding approach is better or worse when it comes to dealing with shocks, but rather how institutional structure influences the kinds of shocks a system is exposed to, and how these different systems influence and shape outcomes in the event of disruption. There are a couple key considerations in this regard: relationships between stakeholders and access to resources.

The cases investigated here demonstrate the complexity of the relationship between governments (who set the policy objectives) and program administration and funding. Connection between policy goals and administration is perhaps tightest in a government-administered model, yet also the most exposed to flux when goals change, or other political demands arise that induce governments to constrain efficiency spending. Yet, government leadership may be essential to pushing things forward. Consensus among

stakeholders is perhaps the strongest determinant of institutional resiliency in this regard. However, broad consensus can be difficult to achieve and maintain over the longer-term – pushing too far in any given direction is likely to alienate one or more stakeholder groups, if there is not some kind of institutional flexibility built in as a safety valve.

A trade-off in institutional design may exist between transformative aims and flexibility for incumbent actors. For example, industrial opt-out provisions may be beneficial in minimizing stakeholder opposition to more ambitious efficiency goals, yet also obviously weakens the transformative potential of the associated initiatives. Similarly, blunt savings targets (e.g., savings of 2 percent a year, rather than requirements to acquire all cost-effective efficiency), even if based on initial potential studies, may lead to opposition from so–regulated stakeholders. These tensions appear most characteristic of utility-administered programs, as third-party and government-run systems can have a closer link between policy goals and program administration.

Nevertheless, ensuring that feedback mechanisms exist to strengthen the connection between efficiency programming and private benefits among the general public, and to capitalize on and nurture the relationship with materially-invested private stakeholders, is an important balancing act that institutions for efficiency need to perform. The closer and more direct the relationship between the public and the administrator of efficiency programming, the higher the likelihood that the public will not lend its support to populist-like political action to scuttle things in the interest of short-term cost reductions. From the cases examined above, it isn't clear that any of the administrative models are more or less capable of building such close relationships.

Irrespective of program administrative model, designing institutions such that there exists some distinct body, organization or department that has a direct interest in the issue *and* considerable access to and influence over decision-making in the state, province, company or actor-network in question, does seem beneficial to long-term institutional resiliency, particularly if mirror departments exist in other stakeholder organizations. Third-party administrative models do seem to provide this interest focus by default, though it is not impossible for utility or government-run institutions to do the same. In fact, locating the strong proponent voice in government or industry might actually help to prevent inter-organizational tension, which does appear to be characteristic of the third-party models covered here.

The other structural factor of relevance concerns access to resources. The case studies above support past findings that, while resource diversity may be valuable, it is no panacea - resource stability/certainty is as essential to longer-term institutional resiliency. The introduction of carbon pricing in Ontario and Alberta introduced a significant new funding sources for energy efficiency initiatives. However, both cases demonstrated the political vulnerability of such funding models. The amount of funding that will be raised for efficiency from new sources like capacity markets is far from certain.[112]

112 International Energy Agency, *Market-Based Instruments for Energy Efficiency: Policy Choice and Design*."

Another complexity of resource diversity is when supplemental resources are provided from 'outside' the system in which they are expended. Federal government support is no doubt beneficial in shoring up provincial efficiency programming, though (as in Maine) it is possible that the existence of such resources may induce 'internal' actors to mitigate their own actions / spending. If and when external resources 'dry up', it may be difficult to then marshal the additional internal resource to maintain continuity in program spending levels. To the public, and to skeptical political actors, this can appear as a large increase in costs with an unproportioned increase in benefits. Accordingly, external resource provision may be best directed at very broad, universally valuable endeavours (e.g., nation-wide potential mapping services), or at very targeted, supplemental actions to fill niches missed by existing provincial initiatives.

Finally, the cases above highlight the importance of clarity and transparency around how funds are raised, managed and spent. The purposes of funding need to be clear, was well as how they will be kept separate and directed toward that purpose, and how the entire process will be accounted for in a transparent and procedurally-acceptable manner for all stakeholders. Systems with these features may be more resistant to efforts to cap, constrain or reduce that funding though political intervention – at least insofar as advocates for efficiency can fight to defend those arrangements. It may be more difficult to recognize budget-constraining activities by program administrators where resource support arrangements are byzantine - contained within lengthy and technical submissions to utility regulators, rather than a one-line item in a government budget for instance

At the same time, streamlined, transparent, and dedicated funding arrangements risk becoming an irresistible 'Golden Goose' for cash-strapped governments, and/or an easy target for political campaigns looking to reduce costs of living (e.g., Maine, Connecticut, Nova Scotia, Ontario). This is not necessarily a byproduct of administrative and resource centralization, as decentralized and rate-based administrative models are still exposed to political intervention (e.g., Ontario). All this suggests that there is no single solution to attaining resource stability and certainty, and that institutional factors that appear to bolster these goals in one jurisdiction may work against them in the next.

Building Resilient and Effective Governance for Energy Efficiency

Past studies of energy efficiency governance studies all suggest that effectiveness results less from the specifics of administrative or funding models than from clear and consistent commitment from policy-makers, supported by stakeholder consensus, and diverse and stable sources of funding.

All of the cases studied experienced some degree of instability in one or more of these factors. The previous section briefly reviewed the nature of the instability experiencing in each case and reflected on the role that governance models played in shaping the outcome.

The experiences described in the case studies speak to the importance of the *resiliency* of energy efficiency governance arrangements. The long-term transformative goals of energy efficiency initiatives, requiring long-term investments in technologies, buildings, and behaviour changes, implies that their *effectiveness* will require some degree of policy stability in the face of changing political, economic and social circumstances. At the same time, energy efficiency strategies need to retain the capacity to respond to changing conditions, needs and opportunities.[113] The balance between those attributes a core element of *resiliency* in policy and institutional design.

In the case of energy efficiency effectiveness and resiliency can be seen mutually supportive attributes in system design. Effectiveness is enhanced by the long-term stability provided by resilient governance arrangements, while the resiliency of those arrangements is likely to be reinforced by evidence of effectiveness in program delivery.

This section explores to the concept of resiliency in governance arrangements and identify five key principles that are characteristic of design for resilient governance. The section concludes with a discussion of what these principles may imply for the governance of energy efficiency. The five principles emerge as overlapping strongly with design features likely to enhance the effectiveness of energy efficiency strategies.

113 Capano, G., & Woo, J. J. (2017). Resilience and robustness in policy design: a critical appraisal. *Policy Sciences*, *50*(3), 399–426; Rosenbloom, D., Meadowcroft, J., & Cashore, B. (2019). Stability and climate policy? Harnessing insights on path dependence, policy feedback, and transition pathways. *Energy Research & Social Science*, *50*, 168–178.

114 Hood, "A Public Management for All Seasons?"; Aaron Wildavsky, Trial Without Error: Anticipation vs Resilience as Strategies for Risk Reduction (St. Leonards, N.S.W.: Centre for Independent Studies, 1985); Kenneth Shepsle, "Studying Institutions: Some Lessons from the Rational Choice Approach," Journal of Theoretical Politics 1, no. 2 (1989): 131–47, https://doi.org/10.1177/0951692889001002002.

What Is 'Resiliency'?

"Resiliency-thinking" in the study of institutions and public administration can be traced back to the late-1980s.[114] The basic premise entails an institutional system – in this case, the system of rules, organizations, relationships and procedures involved in the delivery of energy efficiency – that is capable of weathering external and internal 'shocks' without collapsing, persevering in its ability to function as it was intended to, maintaining its basic structure, adapting to the new circumstances it finds itself in.

Valuing resiliency in institutional design thus means prioritizing organizational and resource redundancy and a diversity of perspectives, attained through maintenance of multiple, discreet yet non-compartmentalized units and/or departments, with multiple rather than single objectives, more allowance for mistakes and errors, and thus a higher degree of spare capacity.[115] As described in a recent review of the academic literature on resiliency-thinking in public administration, a resilient institutional arrangement consists of:

> *"[M]ultiple organizational units in non-hierarchical networks with overlapping jurisdictions and cross-scale linkages; it has spare capacity to use in times of crisis; it relies on multiple types of knowledge (e.g. scientific and experience-based) and sources of information; it encourages stakeholder participation, and it uses trial-and-error policy experiments and social learning to keep the policy system within a desirable stability domain."*[116]

Resiliency-thinking thus heavily emphasizes collaborative, consensus-building governance, with extensive stakeholder participation and reliance on local knowledge and social learning. This, along with the emphasis on flexibility and adaptation, has led some to criticize it as being politically naïve.[117] Participatory processes are often difficult to initiate and sustain and may be sensitive to power asymmetry and elite capture. Policy reforms don't always work as intended, and outcomes can often be influenced by veto players or policy coalitions. The emphasis on flexibility and adaptation, some argue, may run counter to goal-directedness, the ability to control agenda-setting, and overall stability in policy objectives.[118]

A deeper challenge is that governance simply does not follow the rational, purposeful approaches to institutional design and policy-making discussions of resiliency seem to imply. There are many internal dynamics that prevent simply 'fixing' governance to more effectively attain resiliency, even though most involved probably recognize the theoretical value in consensus, integration, learning, experimentation and so forth. Politics, in short, is "considerably more messy and ugly" than resiliency thinking may sometimes convey.[119]

115 Hood, "A Public Management for All Seasons?"
116 Andreas Duit, "Resilience Thinking: Lessons for Public Administration," *Public Administration* 94, no. 2 (June 2016): 364–80, https://doi.org/10.1111/padm.12182.
117 Duit.
118 Giliberto Capano and Jun Jie Woo, "Resilience and Robustness in Policy Design: A Critical Appraisal," *Policy Sciences* 50, no. 3 (September 1, 2017): 399–426, https://doi.org/10.1007/s11077-016-9273-x.
119 Duit, "Resilience Thinking," 373.

Nevertheless, while it may difficult if not impossible to intentionally design institutions to be resilient and robust, and that this type of governance may be hard to maintain, some governing arrangements do appear to be more capable of preserving in the face of external and internal disturbances. This suggests that there may be some underlying characteristics, or principles, that more resilient institutions appear to possess, even if they were not intentionally designed along such lines. Such principles are likely not directives, explicitly and rigorously defining the exact structure and function of governance for a given resource or issue-area. Rather, design principles for resiliency should be broad-based, non-prescriptive, and helpful to 'keep in mind' during the process of establishing institutions and participating in them in the process of governance.

Principles for Resilient and Effective Governance

Extensive research on the governance of common-pool resources (e.g., fisheries, forests) has indicated that it is possible to identify principles for resilient institutional design, even if such governing arrangements are rarely if ever intentionally designed to be so.[120] This report uses a simplified set of principles for resilient governance for energy efficiency, consisting of clarity, balance, flexibility, polycentrism, and diversity. All will contribute strongly to energy efficiency strategy effectiveness as well.

It is not clear that energy efficiency shares the features of the common-pool resources around which these principles for resiliency have developed. Yet, based on the analysis of the case studies examined above, it can be seen that they do have relevance for understanding what works and what could be improved in energy efficiency governance.

In this final section, some possible implications of resiliency-thinking for energy efficiency governance and highlight institutional design choices are discussed. Policies that could help to bolster, not only resiliency, but also the social and political acceptability of energy efficiency institutions, as well as their effectiveness in delivering energy savings are examined.

Principle 1: Clarity of Objectives, Roles, Funding and Accountability

Clarity entails the existence of clear objectives, backed up by transparent policy rationales and adequate, long-term funding to achieve those objectives. Clarity means all stakeholders can answer the question of who is responsible for what, that all are aware of the rules governing their obligations and the consequences for failing to meet them, and that there are transparent and widely accepted procedures for demonstrating that obligations have been met.

There are many policy objectives that can be achieved through robust and effective energy efficiency programming, many of which were discussed above. While this is certainly a valuable characteristic of energy efficiency, it nevertheless can complicate designing institutions around clear and transparent goals or objectives. Of note – in some of our case studies (e.g., Ontario, Alberta), the increasing intertwining of climate objectives and policy with energy efficiency programming may have contributed to the weakening of the

120 Elinor Ostrom, *Understanding Institutional Diversity*, 1 edition (Princeton: Princeton University Press, 2005).

policymaker commitment for energy efficiency in these jurisdictions. At the same time, it appears that carbon pricing was a more pressing political target, and energy efficiency a victim of collateral damage.

This is not to say that environmental benefits of energy efficiency should not be considered; rather, it is only to call attention to the importance of clarity in specifying goals, how they are to be achieved *and* transparently measured and evaluated. It is increasingly important to specify the policy rationale with respect to carbon reductions, energy system benefits and social equity. Attempts to graft these objectives onto existing systems without thoroughly integrating them into existing policies and procedures around targets, system planning, and evaluation, measurement and verification seems unlikely to bolster institutional resiliency.

Savings targets and/or requirements to pursue all cost-effective efficiency are two ways of formalizing expectations around policy objectives and stakeholder responsibilities, giving program administrators and energy system managers (and hopefully policymakers) clear direction that energy efficiency is a quantifiable resource. The most aggressive energy efficiency resource standards (EERS) in the US are in Massachusetts and Rhode Island, setting annual savings targets of more than 2.5 percent in each case. By comparison, recent research on Canadian energy efficiency policy calculates the strongest annual electricity savings target to equal approximately 1.1 percent (in Nova Scotia).[121]

Yet, as our case studies indicate, clear targets and responsibilities may themselves become a source of contention if the stakeholders on which they are placed refuse to accept them. So, while clarity may work in favour of resiliency in terms of improving acceptability and transparency for the general public and for political actors, it might work against it for the obligated parties. This predicament can and should be addressed by ensuring that the process by which responsibilities are set and negotiated is participatory, inclusive of multiple stakeholders, and flexible enough to accommodate unique circumstances.

Clarity entails accountability for and transparency of results as well. Clear and accepted evaluation, measurement and verification procedures, preferably by third-party oversight, can, therefore, help to bolster social and political acceptability. Government-administered programs have tended not to involve as rigorous accounting and verification procedures as regulated utility programming, which works against resiliency. There is a clear link to the overall 'effectiveness' of energy efficiency regimes here as well, since clear policies and procedures work to define what is or isn't cost-effective and how to prioritize different objectives.

121 See https://database.efficiencycanada.org/NS/

Principle 2: Fairness and Transparency in the Distribution of Costs and Benefits

In any resource-based socio-economic system, there are costs and benefits associated with the exploitation of the resource. It is often the case that those who benefit from the resource do not bear the costs associated with its use, or those that bear the (private) costs may not fully perceive the (public) benefits. Ensuring that institutions are configured to balance these types of cost/benefit relationships is critical to building support and acceptance of the institution. This implies the *perception* of fairness – the calls upon people and organizations that are associated with energy efficiency savings should be roughly commensurate with the benefit they received and, crucially and perhaps more importantly, the linkage between the costs they bear and the benefits that accrue must be clear to them.

In principle, this should be relatively easy to achieve with energy efficiency, since the costs associated with programming that most end-users bear is low compared to the benefits they stand to receive. Yet this is rarely clear to the consumer, particularly where resource requirements are attained through rate applications by utilities. Consumers may never become aware of the costs of efficiency programming in such systems, even though they may engage or receive program incentives. But, since the linkage between cost and benefit is not clear, it is easier for political actors to campaign against energy efficiency based on costs without substantial public opposition. More generally, many consumers may lack the energy literacy to be able to recognize the broader system benefits of efficiency programming and could, therefore, be more likely to focus only on the costs they must bear.

What can be done to address these issues? Clearly demonstrating bill savings associated with energy efficiency programming may be one way to help bridge the gap between cost and benefit for typical consumers. Having a dedicated system benefit charge with a dedicated allocation for energy efficiency may help improve the transparency around costs and benefits as well, though as previously noted can create a political target in times of tight budgets or slow economic growth. Stronger, more direct and more consistent engagement of consumers by program administrators may help to create awareness of energy efficiency programming and how and where consumers stand to benefit. Policies and programs to help address risks associated with return on investment for larger projects may help bolster support and engagement from both large and small consumers. For the utilities, policies to tackle throughput disincentives are clearly important to balancing the costs these actors could accrue from energy efficiency programming.

Fairness also implies that institutions be constructed to ensure that those with obligations or responsibilities under the rules have appropriate access to and ability to negotiate rule interpretation, revision and enforcement. Accordingly, resilient governance should be participatory and non-hierarchical, to the extent it is feasible and efficient to do so. Strategies to link funding to primary policy rationale and beneficiaries, political organization of energy efficiency allies, and ensuring forums for all stakeholders (e.g., low-income, environmental organizations) to participate in regulatory processes are important in this regard.

Principle 3: Flexibility and Adaptive Capacity

Flexibility is a closely related principle, meaning in essence that resilient institutions are able to change or adapt to particular circumstances that arise and that require different or innovative solutions to novel problems. Participatory and non-hierarchical governance contributes to institutional flexibility; so too can regulatory mechanisms and sanctions for rule violation or failure to deliver on responsibilities that are not mandatory and/or uniform in their application or graduated in their severity. Flexibility also benefits from the existence of multiple different sources of resources (e.g., funding) necessary to the continued operation of the system, and through the ability of actors to experiment in policy and/or program delivery.

In energy efficiency, this might mean being able to take advantage of "policy windows" that open with shifting political objectives and growing recognition of multiple benefits. For program administrators, these means having the ability to change program design based on technological and market changes, without bureaucratic decision-making processes, as well as the ability to experiment and fail with new program design strategies. Setting aside dedicated funds (that are not governed by conventional cost-benefit tests) for 'innovation' in program design and for piloting and demonstrating new technologies is helpful in this regard.

Flexibility implies a degree of decentralization to accommodate and/or learn from locale uniqueness or particularities. Accordingly, opportunities should be created for sub-provincial or state actors to experiment, exceed provincial standards, or develop their own unique programs. Planning processes and programming can be carried out locally, adapted to the specific needs and requirements of the region. Program administrators must develop the ability to contract with new policy entities and institutions, based on political changes and the challenge of transitioning to a low-carbon economy.

Principle 4: Polycentrism in Program Design and Delivery

Polycentric governance entails that actors can organize not one but multiple different governing entities at different scales, from local to national. While most efficiency governance takes place largely at the sub-national, i.e., state or provincial, level, due to the nature of electricity grids and state jurisdiction, polycentric arrangements do come into play and can be important in strengthening resiliency of efficiency institutions – for instance, by separating out governing functions among different bodies (though with some overlap), or embedding local or regional initiatives in an overarching national framework or policy goal. Importantly, a 'governing entity' need not be a formal governing body or organization – it can also be a network of like-minded advocates for a particular issue or course of action. Institutional design that facilitates the growth of such networks may also lead to more resilient governance.

Polycentrism points to the importance of developing a broad constituency of actors a vested interest in the continuity and expansion of energy efficiency efforts. Importantly, this includes non-governmental and civil society organizations from all energy system sectors, as well as program implementers, trade contractors, and other energy professions with a material interest in energy efficiency. As noted, the constituency network should exist across different political scales, meaning national, provincial and municipal level actors should be included. As political support for energy efficiency may vacillate at different levels of government, having a strong support network across all levels and sectors may help mitigate the impact of weakened policymaker commitment.

On the face of it, polycentrism may seem more easily accomplished in a decentralized program administration model with multiple utilities and municipalities playing an important role in delivering energy efficiency programming. More centralized models like government or third-party administration do not have the same level of de facto networking. This need not be the case, it simply implies that achieving polycentrism may need to be accomplished differently in centralized governance models, perhaps through more targeted outreach efforts directed at key local actors or organizations (e.g., municipalities). In either case, polycentrism may require substantial support, information sharing coordination structures to be fully effective.[122]

Polycentrism also points to the valuable role that the federal government can play in providing essential resources and support programs, establishing standards and protocols, facilitating the growth of professional networks, and tying efficiency to broader national policy objectives.

Principle 5: Diversity in Partnerships, Delivery Strategies, Funding Mechanisms and Evaluation

Finally, resiliency benefits from diversity in the types of stakeholders involved in governance, program strategies, funding sources, and the sources of information and feedback mechanisms (procedures or practices that return information about costs, benefits, performance and the like to stakeholders of all kinds) that are available. A core implication of diversity is that there is and should be no universal model for governing energy efficiency; what works best is likely to be an arrangement that is built around the unique characteristics of each jurisdiction. Ensuring that the concerns of a wide array of actors (particularly those that are not directly involved in the administration and delivery of efficiency programs) are heard and considered also contributes to diversity and, accordingly, resiliency.In energy efficiency, diversity helps work toward organizational redundancy, which in turn impacts flexibility and the ability to react to the potential loss of traditional policy rationales.

122 Winfield, M., Peters, R., Hall S., *A Quick Start Energy Efficiency Strategy for Ontario* (Drayton Valley: Pembina Institute, April 2006). https://www.pembina.org/pub/quick-start-energy-efficiency-strategy-ontario.

Our case studies demonstrate the value of having multiple funding streams from different sources, government organization and institutions. Of the three general funding sources for energy efficiency, rate-based funding seems the least exposed to political intervention, though it is by no means untouchable. Unsupportive governments are often able to affect decreases in funding through regulatory and/or governmental oversight of utility or third-party administered programming, or they may mobilize political support to reduce costs to consumers by eliminating efficiency. Transparency of efficiency programming costs on consumer bills is a double-edged sword. On the one hand, it may increase awareness of the existence of energy efficiency initiatives among consumers. But, as noted above, if costs are not also clearly connected to benefits, this kind of transparency does make an easy political target. A possible solution might be to display costs of such programming as an investment that is producing a value to the consumer greater than the 'book value' of the costs.

Multiple sources of funding are clearly valuable to organizational and programming stability, particularly when the principal source of funding is politically contentious (e.g., Alberta). New sources like capacity markets and carbon revenues have to date played a small but important role in supporting energy efficiency, but their share of funding could grow (and help to mitigate costs to consumers on bills as well). Of the two, carbon revenues are clearly more politically contentious, but given the current policy situation in Canada, a potential opportunity for increased polycentrism if the federal government were to devote more of the revenues toward national efficiency program support.

A cautionary note about reliance on federal funding is provided by the case of Maine, however. Heavy reliance on the federal *American Recovery and Reinvestment Act* may have inadvertently contributed to state underfunding when federal money dried up, if the state government had grown accustomed to having the outside resource. This suggests that federal support for energy efficiency should be very broad-based but also specifically targeted at particular niches that provincial governments and utilities have not demonstrated much progress on to date – possibly the 'higher hanging fruit' that would be unlikely to pass conventional cost-effectiveness testing, or supplementary to existing provincial programs on the condition of attaining a much higher level of savings than would otherwise be required.

Diversity entails using the full suite of program and policy tools available, pursuing both resource acquiring and market transformation, and allowing for considerable innovation in approaches from the actors involved. Centralized administration may be somewhat less amenable to the latter type of diversity, though establishing dedicated innovation funding (and permitting this through policy and regulatory structures) and a willingness to experiment with novel program approaches is still attainable. Diversity also requires greater quantity and sources of information, particularly as traditional 'widget-based' and low-hanging fruit (e.g., lighting) program strategies dwindle. Greater insight into and feedback from end-user consumption patterns, buildings and household's energy use will be beneficial as well.

Summary and Application of Principles

The implications of these five principles for energy efficiency strategy design, governance and financing are summarized as follows:

Principle 1: Clarity of Objectives, Roles, Funding and Accountability

a. Clearly define the evidence-based problem (s) to be addressed.

b. Establish clear objectives, goals, and timelines for energy efficiency initiatives.

c. Clearly define institutional and stakeholder roles and functions (including location of EE considerations in system planning processes).

d. Provide long-term funding mechanisms.

e. Establish clear mechanisms and institutional roles for evidence-based evaluation and accountability, including public reporting.

Principle 2: Balance, Fairness and Transparency in the Distribution of Costs and Benefits

a. Pursue all technically feasible, and economic (benefit vs. cost) energy efficiency opportunities on a long-term, portfolio basis.

b. Ensure cost-effectiveness in program/portfolio delivery.

c. Make clear how benefits are widely shared and recognized; particular attention should be given to the needs of marginalized and low-income constituencies, and other constituencies facing significant barriers to participation in program design and delivery.

d. Address utility concerns over lost revenues and provide incentives for utilities to participate in energy efficiency initiatives.

e. Reward locational efficiency, and demand response activities where appropriate and needed.

Principle 3: Flexibility and Adaptive Capacity

a. Provide incentives and space for innovation and experimentation; “good” failures should be tolerated.

b. Ensure the capacity to respond to/integrate new policy goals, such as climate change and low-carbon energy transitions.

c. Ensure ability to engage with new institutional actors and delivery agents and models.

Principle 4. Polycentrism in Program Design and Delivery

a. Engage multiple constituencies, actors and institutions in program design and delivery.

b. Provide for fair distribution of benefits among multiple constituencies.

c. Establish appropriate balances between centralized and decentralized approaches in program/portfolio design delivery.

d. Provide mechanisms/structures for program delivery at different scales and capacities.

e. Pursue diversity in funding sources and models.

f. Provide structures for coordination, information-sharing and support for decentralized initiatives.

Principle 5: Diversity in Partnership, Delivery Strategies, Funding Mechanisms and Evaluation

a. Establish a diversified funding base.

b. Employ the full range of tools available: financial incentives; standards and codes; direct program delivery; information; education and outreach.

c. Engage of multiple constituencies, actors and institutions in program design and delivery

d. Employ diverse range of Information sources in program design and evaluation (i.e. data on potential participants, markets, etc.)

An illustrative example of the application of these principles at a jurisdictional level are provided in **Appendix 1** (**Ontario**).

Conclusion

Energy efficiency has the potential to make significant, and highly cost-effective contributions to a low-carbon sustainable energy transition for Canada. Efficiency gains could contribute significantly to avoiding the major environmental, economic and social trade-offs associated with an electrification path otherwise grounded in large, centralized, high-cost, high-impact and high economic and environmental- risk, energy production facilities.

Serious efforts to improve the efficiency of energy use have been pursued since the mid-1970s. These initiatives have faced a range of traditional barriers associated with market failures, financing, utility rate structures, information gaps, agency problems, and the relative invisibility of benefits. Over the past few years, new challenges have emerged, particularly at the political level. Changes in policy direction, sometimes flowing from changes in governments, have resulted in significant retrenchments and, in some cases, dismantlings of energy efficiency strategies, particularly at the provincial and state level in Canada and the United States.

In response to these developments, this report examined the factors that influenced and shaped the politics of efficiency governance and delivery through eight (five Canadian and three American) case studies. Based on these case studies, and informed by the academic literature on institutional resiliency, five 'design principles' for building resilient governance for energy efficiency are identified: clarity, fairness, flexibility, polycentrism and diversity. These principles overlap strongly with design features likely to enhance the effectiveness of energy efficiency strategies.

The findings reinforce those of the earlier studies that no one governance model is best. At the same time, the study identifies underlying principles of resiliency that highlight areas in which different approaches must adopt strategies to ensure that exposure to external or internal disruption is minimized. Some of these considerations include the following.

- With growing recognition of the multiple benefits of energy efficiency, the policy objectives of efficiency initiatives become more complex as they broaden beyond traditional utility system-centric concerns to include themes like climate change mitigation and adaptation.
- Policymaker commitment is most likely to falter following a change in government, though competing political and economic priorities may contribute to de-prioritization of energy efficiency as well. The most common focus of political campaigns against efficiency (or associated institutions) are immediate energy costs to end-users.

- Stakeholder consensus is essential to weathering political interventions. Both centralized and decentralized administrative models must pay attention to building and maintaining networks of stakeholders, contractors, program delivery agents, and sources of private sector financing. It is crucial that stakeholders perceive themselves as partners in the pursuit of commonly accepted goals, and not as targets for imposition and enforcement of shifting political objectives and decrees.
- Flexibility and autonomy should not come at the cost of clarity and transparency, but neither should innovation be overly bound by the strictures of regulatory governance and the need to demonstrate immediate effectiveness.

The five design principles identified in this paper should not be taken as prescriptive rules for energy efficiency strategy design. Nor should they be taken to promote one or the other administrative or funding approach. Rather, they are guiding principles that can inform effective and resilient governance for energy efficiency at any stage of institutional development, and in any jurisdiction.

Appendix 1: Application of Design Principles: Ontario

Context

Ontario is currently in a surplus electricity supply situation. However, that circumstance will change significantly with retirement of Pickering Nuclear Station, currently scheduled for 2024,[123] and refurbishment of Bruce and Darlington facilities from 2020-2033, even without significant growth in electricity demand.

The province's IESO is proposing to establish an incremental capacity market to make up any shortfalls in supply resulting from nuclear retirements and refurbishments.[124] Experience with similar capacity market designs in the United States suggests that an Ontario market would be dominated by the large (approximately 10,000MW) and relatively underutilized fleet of natural gas-fired generating facilities constructed since the early 2000s.[125]

Increased reliance on natural gas-fired generation will lead to significant increases in GHG emissions, as well as emissions of smog precursors, particularly nitrogen oxides and fine particulate matter. The result could be the erosion of a significant (30-40%) portion of the gains obtained through the phase-out of coal-fired generation, completed in 2014.[126] The ongoing "life-extension" of the Pickering nuclear facility, whose operating license originally expired in August 2018,[127] and is now operating beyond end-of-life, might also be ended sooner.

In addition to reducing the need to run natural gas-fired generation, and run aging nuclear facilities, deployment of energy efficiency resources, particularly demand response, could play a significant role in optimizing the role of the substantial (4500MW wind and 450MW solar PV) fleet of intermittent renewable resources added to the province's electricity system between 2005 and 2018. Demand response activities could also contribute to the integration of distributed energy resources (DERs) into the province's energy system.[128]

123 The provincial government has indicated a desire to extend the life of the Pickering facility to 2025. R.Benzie, "Doug Ford quietly extends life of controversial 49-year-old Pickering Nuclear Plan," *The Toronto Star*, January 13, 2020. A further extension of the facility's life would require the approval of the Canadian Nuclear Safety Commission.

124 Independent Electricity System Operator, *Incremental Capacity Auction High-Level Design* (Toronto: IESO, 2019), online: <http://www.ieso.ca/en/Market-Renewal/High-Level-Designs/Incremental-Capacity-Auction-High-Level-Design>.

125 Adlar Gross, "Distributed Energy Resources (DER) and Energy Storge Capacity Markets: Experience from the US and Implications for Ontario's Incremental Capacity Auction" (2019) York University Working Paper, online: <https://sei.info.yorku.ca/files/2019/06/Capacity-Market-Working-Paper-June-2019.pdf

126 J.M. McGrath, "Why Ontario's electricity is about to get dirtier" *TVO,* September 20, 2019, https://www.tvo.org/article/why-ontarios-electricity-is-about-to-get-dirtier. See also IESO http://www.ieso.ca/Powering-Tomorrow/Data/The-IESOs-Annual-Planning-Outlook-in-Six-Graphs.

127 J.Gibbons, *Closing the Pickering nuclear in 2018: A cost-benefit analysis* (Toronto: Ontario Clean Air Alliance, 2016) https://www.cleanairalliance.org/wp-content/uploads/2016/06/pickering-fs.pdf.

128 DERs involve the integration of a of range technologies, including solar photovoltaic, wind power, cogeneration, renewable natural gas, energy storage, and electric vehicles, into stable and reliable energy resources at a local level. See Winfield and Gelfant, "DER Development in Ontario."

The province's 2014-2020 "Conservation First" electricity energy efficiency framework was, with the exception of some programs targeting low-income and industrial consumers, dismantled by the Ford government in March 2019.[129] The "Conservation First" framework took a relatively distributed approach to energy efficiency program implementation, involving LDCs, the IESO, and natural gas distributors. Although generally regarded as successful, the framework suffered from some significant gaps in terms of overall program coordination and integration, research and development and evaluation and monitoring functions.[130]

The province's energy efficiency framework around natural gas consumption is stable and well-established, but poorly integrated with electricity-side initiatives. Natural gas conservation programs would require substantial intensification to contribute to meeting even the province's reduced GHG emission targets announced in December 2018. Natural gas use for building space heating is widely identified as one of two key areas of non-industrial and electricity sector GHG emission growth, the other being transportation.[131]

The province's December 2018 "Made-in Ontario" environment plan referenced an expansion of natural gas conservation targets, but there has been little or no action to follow-up on these directions.[132]

As shown in **Figure 7** below, there is a large theoretical potential for efficiency gains in Ontario, although there are significant technical and economic barriers to their realization. As noted in the main report, an energy efficiency potential study recently completed for the Ontario Independent Electricity System Operator (IESO) suggested a technical potential to reduce future electricity demand by 25 percent relative to business as usual forecasts to 2038, and natural gas consumption by 31 percent.[133] Other analyses have suggested even greater savings may be possible.[134] With respect to electricity, for example, a 2016 IESO study identified with a technical potential for savings of up to 53 percent relative to business as usual to 2035 and an economic potential of 31 percent.[135]

129 Minister of Energy, Northern Development and Mines, "Minister's Directive. Discontinuation of the Conservation First Framework", March 29, 2019, online:<http://www.ieso.ca/en/Corporate-IESO/Ministerial-Directives>.

130 Environmental Commissioner of Ontario, *Energy Conservation Report 2019* (Toronto: ECO, 2019)

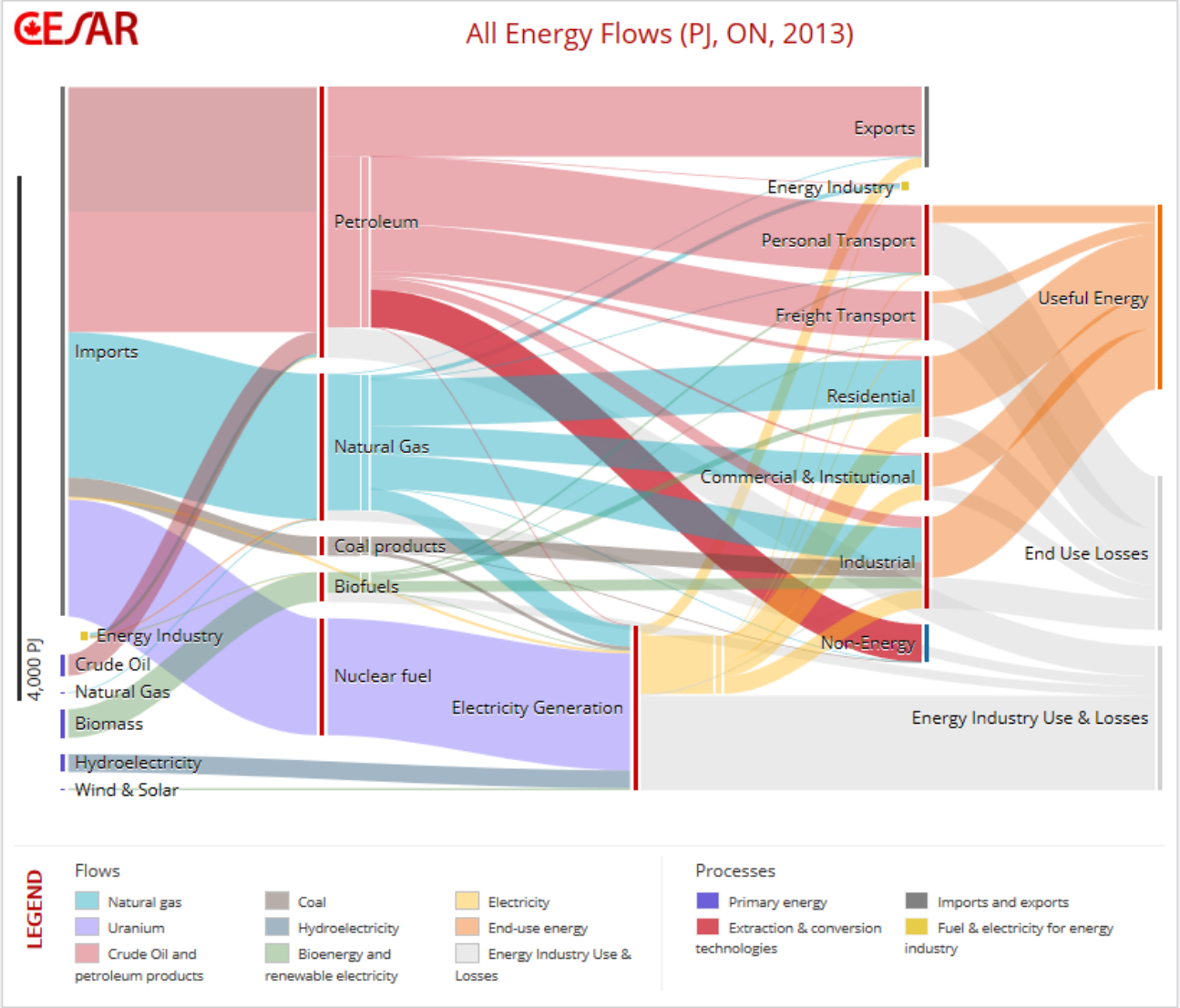
131 Auditor General of Ontario/Environmental Commissioner of Ontario, "Greenhouse gas emissions in Ontario," *Blog* October 23, 2018. https://eco.auditor.on.ca/blog/ghg-emissions-in-ontario/.

132 Ministry of the Environment, Conservation and Parks, *Preserving and Protecting our Environment for Future Generations*. (Ontario. Queen's Printer. 2018), online: <https://www.ontario.ca/page/made-in-ontario-environment-plan>.

133 Navigant Consultants, *2019 Integrated Electricity and Natural Gas Achievable Potential Study*.

134 The Navigant study also assumes an average annual incremental savings of 0.8% in the maximum scenario for Ontario. Ontario achieved savings of 1.4% in 2017 and other jurisdictions have achieved well above 2% per year. See Efficiency Canada, *Canadian Energy Efficiency Scorecard* 2019 (Ottawa: Efficiency Canada 2019) https://www.scorecard.efficiencycanada.org/wp-content/uploads/2019/11/Scorecard.pdf and American Council for an Energy Efficient Economy (ACEEE) *The 2019 State Energy Efficiency Scorecard* (Washington DC: ACEEE 2019) https://www.aceee.org/sites/default/files/publications/researchreports/u1908.pdf.

Figure 7: Energy flows in Ontario: 2013 (PJ or petaJoules)[136]



135 See R. Childs, T. Hammer, and H. van Rensburg, *Achievable Potential Study:Long-Term Analysis* (Toronto: Nexant, 2016). http://www.ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Completed/Achievable-Potential-Study-LDC-Working-Group. The Navigant study also assumes an average annual incremental savings of 0.8% in the maximum scenario for Ontario. Ontario achieved savings of 1.4% in 2017 and other jurisdictions have achieved well above 2% per year. See Efficiency Canada, *Canadian Energy Efficiency Scorecard* 2019 (Ottawa: Efficiency Canada 2019) https://www.scorecard.efficiencycanada.org/wp-content/uploads/2019/11/Scorecard.pdf and American Council for an Energy Efficient Economy (ACEEE) *The 2019 State Energy Efficiency Scorecard* (Washington DC: ACEEE 2019) https://www.aceee.org/sites/default/files/publications/researchreports/u1908.pdf.

136 Sankey Diagram developed using https://www.cesarnet.ca/visualization/sankey-diagrams-canadas-energy-systems.

For the purposes of applying principles for energy efficiency governance outlined in the main report to Ontario, the existing, post-March 2019, institutional and policy framework for electricity efficiency is treated as a blank slate. The existing arrangements around natural gas are recognized, as is the need for better integration with electricity-related activities, particularly from a consumer perspective, and the need for much more ambitious targets to significantly affect the province's GHG emissions. The approach also seeks to facilitate the integration of energy efficiency initiatives with the increasingly widespread adoption of municipally led-community energy and climate change plans in the province.[137] The recommendations build on a number of previous publications related to energy efficiency in Ontario by the research team.[138]

The situation in Ontario is complicated by the lack of any meaningful overall energy planning framework, particularly with respect to electricity. This problem was reinforced by the elimination of the requirement that the OPA/IESO develop Integrated Power System Plans (IPSPs), through Bill 135, adopted in 2016.[139] As a result, there is no overall energy resource planning process within which energy efficiency activities can be placed.

In this context, the key features that emerge from the application of the principles for resilient and effective governance of energy efficiency strategies in Ontario include the following:

- The establishment of a new provincial agency - Energy Efficiency Ontario (EEO), with a mandate to develop a comprehensive, integrative energy efficiency strategy for the province, updated on a cycle of not more than five years, including electricity and natural gas dimensions of energy use. EEO would also undertake energy efficiency potential studies for the province, conduct research on standards, codes, and program design, evaluate program performance, and report annually on the province's overall energy efficiency progress.
- Energy efficiency program design and implementation would retain its polycentric character in Ontario, engaging or re-engaging a variety of delivery agents with established expertise and capacity in program design and delivery, including LDCs and Enbridge for residential and commercial consumers, and the IESO for large industrial consumers. Development and implementation of standards and codes, subject regular reviews to ensure that they keep pace with the leading standards in North America, would continue to be lead by the Ministry of Energy, Northern Development and Mines, and in the case of the Building Code, the Ministry of Municipal Affairs and Housing, with input from EEO.

137 See the Community Energy Knowledge-Action Partnership (CEKAP) www.cekap.ca.

138 Winfield, M., Peters, R., Hall S., *A Quick Start Energy Efficiency Strategy for Ontario*; Winfield, M., and Koveshnikova, T., *The Impact of the Ontario Energy Board's Total Resource Cost Test on Local Distribution Company Electricity Conservation and Demand Management Initiatives."* (Toronto: Faculty of Environmental Studies, July 2009); Mallinson, R., and Winfield, M., *Electricity Conservation Policy in Ontario: Assessing a System in Progress* (Toronto: York University - Sustainable Energy Initiative, 2013); B.Haley, Gaede, J., Love., P. and Winfield M., "From utility demand side management to low-carbon transitions: Opportunities and challenges for energy efficiency governance in a new era," *Energy Research and Social Science*, Volume 59, January 2020, 101312.

139 MacWhirter and Winfield, "The Search for Sustainability in Ontario Electricity Policy."

- The primary funding mechanism would be rate-based, as none of the alternatives examined can offer the required long-term stable revenue streams needed to design and implement an effective and resilient energy efficiency strategy. Recommendations are made regarding the roles of federal and/or provincial carbon pricing revenues if they become available, but in current circumstances, they cannot be the foundation for an energy efficiency strategy for Ontario.
- LDCs, Enbridge and IESO would be required to demonstrate their pursuit of all cost-effective and achievable energy efficiency opportunities as condition of rate and capital investment approval by the Ontario Energy Board, on an ongoing basis.
- The mandates of the Auditor-General of Ontario/Environmental Commissioner of Ontario to assess and report on the province's energy efficiency performance would be strengthened.

The overall goal of the proposed approach is to address the widely identified need for stronger integration and coordination of energy efficiency activities in Ontario,[140] while building on the (until recently) relatively polycentric character of the system that had emerged over the previous two decades.

Detailed descriptions of the proposed approach in relation to the elements of the governance principles are provided in the following tables.

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140 Environmental Commissioner of Ontario, *Energy Conservation Report 2019*

Principle 1: Clarity of Objectives, Roles, Funding and Accountability

a. Clearly defined evidence-based problems to be addressed	The key challenges to be addressed by an energy efficiency strategy for Ontario include: • Reducing greenhouse gas emissions and other environmental and health impacts associated with electricity and natural gas supply-side options. • Improving energy system efficiency and resiliency. • Reducing long-term energy costs to consumers. • Providing better customer-level integration of electricity and natural gas conservation programs and services. • Facilitating the development and integration of low-carbon distributed energy resources (DERs), • Supporting the integration of energy efficiency into municipal-level climate change and energy planning.
b. Clear objectives, targets, and timelines	• The province should pursue all technically feasible, achievable and cost-effective efficiency improvements across fuel types (principally electricity and natural gas), prior to the development or refurbishment of energy supply. The efficiency potential identified the October 2019 IESO report should be treated as the province's minimum short-term targets. • Energy distribution utilities (LDCs, Hydro One and Enbridge) should be require demonstrate their pursuit cost-effective and achievable efficiency options as a condition of approval of new capital investments and annual rate cases. A similar requirement should be applied to the IESO with respect to the procurement of any new or refurbished generating or supply resources. • The province's approach should ensure continuous improvement as technologies and practices evolve. Specifically, reviews of the province's energy efficiency potential should be undertaken at intervals of not more than 5 years to reflect new technological and economic developments.
c. Clearly defined institutional and stakeholder roles and functions.	• A new provincial agency, Energy Efficiency Ontario (EEO), should be established to oversee and coordinate the province's energy efficiency efforts. The agency's functions would include: ○ The development of an integrated energy efficiency strategy for Ontario, outlining targets, and the roles and functions of utilities, provincial agencies, municipalities and other actors in the implementation of the plan. The plan should be subject to cabinet approval and binding on all provincial ministries and agencies, municipal governments and utilities. The plan should be revised and renewed on cycles of not more than five years. ○ The conduct energy efficiency potential studies on a five-year basis. ○ The conduct of regular (intervals of not more than 3 years) reviews of energy efficiency standards and codes in comparable jurisdictions to ensure that Ontario's standards are consistent with the leading standards in North America. ○ Participate in OEB rate hearings to assist in evaluating the energy efficiency components of LDC, Enbridge and IESO plans and programs. ○ Provide support to LDCs and Enbridge in energy efficiency program design and delivery, particularly smaller LDCs with lower capacity for program design and delivery. ○ Provide data access and modelling support for energy efficiency program design and the integration of energy efficiency into municipally led community energy and climate change planning initiatives. ○ To participate in, and contribute to, such energy, electricity and/or climate change planning processes as may emerge in the province. ○ Evaluate and report annually on the effectiveness of the specific energy efficiency initiatives and the province's overall energy efficiency performance.

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c. Clearly defined institutional and stakeholder roles and functions.	• LDCs and Enbridge Gas distribution should play the lead roles in program and portfolio design and delivery for residential, commercial and small industrial consumers, with support from the EEO, particularly for smaller LDCs. Third-party energy service providers may be employed to provide "one-window" integrated electricity and natural gas conservation services at customer level as Greensaver[141] currently does for some low-income programs. • IESO should continue in its role in transmission grid-connected industrial consumer program design and delivery. • The Ontario Energy Board (OEB) would enforce the requirement to demonstrate the pursuit of cost-effective and achievable efficient potential in its reviews of rate applications and proposed capital investments by LDCs, Enbridge, and the IESO. • An energy efficiency unit should be established within the province's energy planning processes whether led by the Ministry of Energy, Northern Development and Mines, the IESO, or another, new entity. • The Ministry of Energy, Northern Development and Mines would continue to lead the updating and enforcement of the province's energy efficiency standards and codes for energy-consuming devices and equipment with input from EEO. • Ministry of Municipal Affairs and Housing would continue to lead the updating and enforcement of the province's building code, with input from EEO. Municipalities developing community energy or climate plans should be permitted to establish building energy efficiency requirements beyond those established in the Ontario Building Code, in a manner similar to the British Columbia Energy Step Code.[142]
d. Clearly defined long-term funding mechanisms	• The core funding mechanism for energy efficiency programming should be a rate-based charge on electricity and natural gas consumers' utility bills. • The rate-based charge should be sufficient to cover the costs of delivering EEO's core services, as well as the costs of LDC and Enbridge program delivery, subject to cost-effectiveness tests, with allowances for innovation and experimentation ("sandboxes"); capacity building; programming for vulnerable or marginalized constituencies; and education and outreach activities. • The Government of Ontario should cooperate with the Government of Canada to ensure that any carbon pricing revenues that become available in Ontario are directed towards cost-effective investments in climate change adaptation and reductions is GHG emissions, including energy efficiency initiatives by municipalities, LDCs, and broader public sector agencies.
e. Clear mechanisms and institutional roles for evidence-based evaluation and accountability, including public reporting	• EEO should participate in OEB rate hearings to assist in evaluating the energy efficiency components of LDC, Enbridge and IESO plans and programs. • EEO should evaluate and report on the effectiveness of the specific energy efficiency technologies, programs and strategies. • EEO should report annually province's overall energy efficiency performance. • The Auditor-General of Ontario/Environmental Commissioner of Ontario should be mandated report annually on Energy Efficiency Ontario's performance. • The Auditor-General of Ontario/Environmental Commissioner of Ontario should be mandated to report annually on the cost-effectiveness of investments made in Ontario for climate change adaptation or mitigation with revenues generated through federal or provincial carbon pricing systems.

141 https://www.greensaver.org/utilities/programs/.
142 https://energystepcode.ca/.

Principle 2: Balance, Fairness and Transparency in the Distribution of Costs and Benefits

a. Ensure pursuit of all economic (benefit vs. cost) energy efficiency opportunities, ensuring that benefits are exceeding costs, on a full-cost (including environmental and social costs) long-term, portfolio basis.	• Energy distribution utilities (LDCs, Hydro One and Enbridge) should be required demonstrate their pursuit of all cost-effective and achievable efficiency options as a condition of OEB approval of annual rate applications and new capital investments. • The IESO should be required to demonstrate to the OEB the pursuit of all cost-effective and achievable efficiency options prior to the approval any new or refurbished generating or supply resources. • EEO should engage in an ongoing evaluation of the effectiveness of existing energy efficiency initiatives and provide regular (at least once every 5 years) assessments of the province's future energy efficiency potential.
b. Focus on cost-effectiveness of program/portfolio delivery	• The utility rate based charges should be based on the costs of delivering EEO's core services, as well as the costs of LDC, Enbridge and IESO program delivery, based on cost-effectiveness tests, with allowances for innovation and experimentation ("sandboxes"); capacity building; programming for vulnerable or marginalized constituencies; and education and outreach activities. • Federal or provincial Investments of carbon-pricing based revenues available in Ontario should be focussed on cost-effective investments in climate change adaptation and reducing GHG emissions, including energy efficiency and energy planning initiatives by municipalities, LDCs, and broader public sector agencies. The Auditor-General of Ontario/Environmental Commissioner of Ontario should be mandated to report annually on the performance of these investments in addressing climate change impacts and mitigation.
c. Ensure benefits are widely shared and recognized; pay particular attention to needs of marginalized and low-income constituencies, and other constituencies facing significant barriers to participation in program design and delivery	• Utility (LDC and Enbridge) energy efficiency portfolios should be required to include programming for vulnerable or marginalized constituencies; Provision of such programming, appropriate to the service area of distribution utilities, would be a condition of energy efficiency portfolio approval and therefore overall utility rate case approval. • EEO should include addressing the needs of marginalized constituencies in its annual reports on the province's energy efficiency performance. • EEO's mandate should include research on program needs, design and development for marginalized constituencies.
d. Address utility concerns over lost revenues; incentives for utilities to participate (e.g. incentives to reduce throughput incentives);	• Appropriate rate mechanisms and structure should be established to provide incentives to utilities to design and deliver energy efficiency programming. • Payments through revenue recovery and shared savings mechanisms should be subject to demonstrations of program effectiveness to the OEB, with input from EEO.
e. Reward locational efficiency, demand response (DR) where appropriate and needed.	• Utility rate structures should provide incentives to provide energy efficiency programming in regions subject to existing or projected supply constraints. • The existing DR market industrial and commercial consumers and aggregators should continue to function, subject to oversight by the OEB. • Role of LDCs as residential and commercial consumer DR and DER aggregators should be clarified, permitting appropriate charges for aggregation activities over their distribution networks, or as DR/DER aggregators themselves.

Principle 3: Flexibility and Adaptive Capacity

a. Provide incentives and space for innovation and experimentation; good failures tolerated	• Rate-based funding for utilities should include with allowances for innovation and experimentation ("sandboxes"). • Carbon pricing revenue-based funding for energy efficiency and related initiatives should allow for similar innovation and experimentation by municipalities and broader public sector agencies. • EEO's mandate would include ongoing research on energy efficiency potential, program design and performance, and energy efficiency technologies, practices and regulatory standards and codes.
b. Ensure capacity to respond to/ integrate new policy goals	• EEO should undertake regular reviews (a least every 5 years) of the province's energy efficiency potential, goals, objectives, standards and codes and programming. • EEO's energy efficiency strategy should be updated on a cycle of not more than five years, to take into account changing political, economic, environmental and technological context within which the plan is to operates.
c. Ensure ability to engage with new institutional actors and delivery agents and models.	• EEO should establish and advisory committee with representation from the major institutional and non-governmental actors in energy efficiency program design and delivery, including LDCs, IESO, Enbridge, the Ministry of Energy, Northern Development, 3 third party energy efficiency service providers, consumer representatives, including low-income or marginalized consumers, DR/DER aggregators and municipalities.

Principle 4. Polycentrism in Program Design and Delivery Principle

a. Engage multiple constituencies, actors and institutions in program design and delivery	• The proposed structure provides for multiple program design and delivery agents (LDCs, Enbridge, IESO, municipalities, third-party service providers) as appropriate to the relevant customer/service base. • The proposed structure provides for strengthened program research, integration and coordination functions through EEO. • The proposed structure provides for improved depth and coordination of evaluation functions through EEO and the Auditor-General/ECO. • The EEO board engages key constituencies in policy formulation and program design, delivery and evaluation.
b. Ensure fair distribution of benefits among multiple constituencies.	• The framework provides for an OEB role in overseeing design of cost-effective efficiency initiatives with positive benefit-to-cost ratios. • Lead delivery agents are scaled to appropriate market segments (LDCs and Enbridge to residential, commercial and small industrial; IESO to large industrial consumers). • Oversight, evaluation and reporting structures are provided through OEB, EEO, and the Auditor General/ECO.
c. Ensure balance between centralized and decentralized program/portfolio design delivery.	• As per 4b, the lead delivery agents are scaled to appropriate market segments. • Centralized coordination, capacity and oversight is provided as appropriate through EEO, the OEB, Auditor General/ECO, and Ministry of Energy, Mines and Northern Development.
d. Provide mechanisms/structures for program delivery at different scales and capacities.	• As per 4b, lead delivery agents are scaled to appropriate market segments. EEO would provide support or delivery for smaller LDCs.
e. Pursue diversity in funding sources and models.	• Rate-based funding would be the primary funding mechanism for the province's energy efficiency strategy. This may come to be substantially supplemented by federal or provincial carbon pricing revenues and other climate change funding as the carbon pricing regime in the province evolves. • Mechanisms are provided to ensure the investment of carbon pricing and other climate change revenues in cost-effective climate change adaptation and GHG emission reductions strategies as this will be essential to program credibility and acceptance.

Principle 5: Diversity in Partnership, Delivery Strategies, Funding Mechanisms and Evaluation

a. Pursue a diversified funding base.	• See 4e
b. Incorporate full range of tools available in program design and delivery; financial incentives, standards and codes, direct program delivery, information, education and outreach.	• To be incorporated as appropriate into the EEO Energy Efficiency Strategy. Benchmarking standards and codes against the best standards in North America, and subject to regular cycles for review and updating will be a core element.
c. Engage of multiple constituencies, actors and institutions in program design and delivery.	• See 4a and 4b
d. Employ diverse range of Information sources in program design and evaluation (i.e. data on potential participants, markets, etc.).	• Part of core mandate of EEO

Appendix 2: The Evolution of Energy Efficiency Governance

This appendix provides a brief overview of the evolution in governance models for energy efficiency since the 1970s, and a review of past studies that have addressed the question of whether one model is 'better' than the others. For the purposes of this paper, 'governance' is considered to pertain broadly to the institutional rules and procedures that inform energy efficiency policy development and objectives, who delivers efficiency programming (i.e., program administration), how such programs are funded, and the nature of the relationships between different stakeholders in the energy efficiency community.

Origins

Historically, public interest in energy efficiency emerged around concerns about energy security and energy costs in the wake of the OPEC oil embargo against the US and other countries in the 1970s. The first of what became many calls to promote a more sustainable society was made in 1973 by the Science Council of Canada. Under the leadership of Dr. Ursula Franklin, its report, *Natural Resource Policy Issues in Canada,* was the first to promote the concept of a conserver society. That same year, the federal government created the Office of Energy Conservation which continues today as the Office of Energy Efficiency in Natural Resources Canada. The first utility DSM programs were launched not long after: Ontario Hydro's first programs were launched in 1982 with a target of 1,000 MW in load shifting and conservation.[143] Similar programs were launched in other provinces during this time.

Early programming pursued efficiency as a form of 'resource acquisition' – demand-side energy savings as akin to supply-side resources. Such programs were typically administered by vertically-integrated, monopoly utility companies, who were encouraged by policy-makers to incorporate efficiency resources in an integrated resource planning process that was overseen by a public utilities regulatory board. Under this model – still the standard approach in many North American jurisdictions - the utility would offer technical assistance, information and financial incentives to end-use customers to invest in efficiency through a variety of programs targeted at different market sectors. The direct objective of the program administrator (i.e., the utility) is to meet energy demand and/or consumption at a lower cost than that of acquiring new generation resources or associated grid infrastructure. The costs of such programs are typically borne by utilities and passed on to consumers through approved rate structures. Hence, they are generally considered customer-funded (i.e., rate-payer) programs.

143 Peter Love, ed., *Fundamentals of Energy Efficiency: Policy, Programs and Best Practices*.

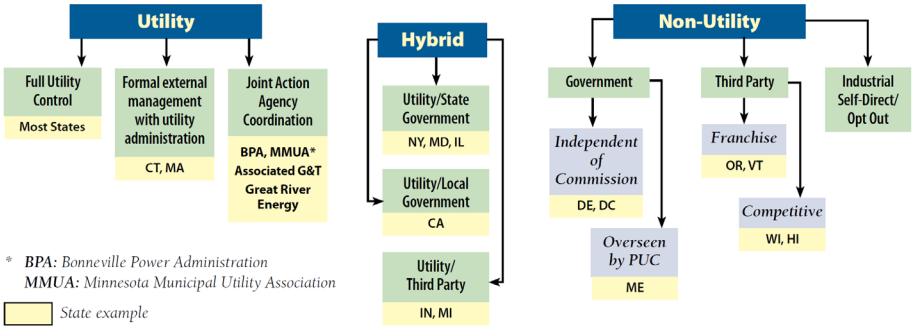
However, deregulation and unbundling in the late 1990s and 2000s prompted evolution in the governance of energy efficiency. The belief at the time was that markets would deliver efficiency resources without the need for regulation and centralized planning, and policy efforts thus turned increasingly toward market transformation - targeting 'upstream' changes to remove barriers to private investment in energy efficiency, alongside or in place of resource acquisition. Spending on efficiency programming declined dramatically.

It soon became clear that markets alone would not deliver efficiency savings at scale. At the same time, growing recognition of the multiple, non-energy benefits of energy efficiency in the early 2000s (e.g., the ability to deliver greenhouse gas reductions; improvements in low-income housing quality), coupled with increased understanding and acceptance of the science behind climate change, broadened the case for the public good aspect of efficiency investment. Together, these factors led to a renewed emphasis on efficiency in both Canada and the United States.

New Approaches

Many states and provinces across North America have thus taken steps to address the decline in efficiency spending, legislating new efficiency policies and regulations with broader objectives and clearer and more aggressive targets. Some have introduced system benefits charges, dedicated specifically to funding energy efficiency programming, on utility bills and developed cost-recovery policies to lessen the disincentive for utility companies to invest in efficiency. System restructuring has prompted the emergence of multiple different efficiency program administrative models, from those administered by third-party demand-side management (DSM) administrators, to those that remain utility-run, and yet to others run by governments or those utilizing some utility/government/third-party hybrid approach. **Figure 8** below provides an overview of different administrative models in the US.

Figure 8: Types of energy efficiency administrative structures in the US, Source: Sedano (2011)



Note: This figure refers to types of administrative structures for consumer-funded energy efficiency programs. State examples refer to the primary administrative structure existing in each state.

Though most states and provinces have stuck with a utility-administered program models, this can belie some underlying complexity in program delivery. According to data collected by the Department of Energy's Energy Information Administration, the number of distinct parties active in electricity efficiency sector varies widely among states, from 1 in Puerto Rico to 205 in Idaho (with an average of 33 across all states). The ownership structure of these entities varies as well. For instance, in 2017, cooperatives and municipalities comprised the largest share of actors, while investor-owned utilities and DSM administrators contributed the lion's share of spending.[144]

Table 2: Proportion of US total actors and incremental spending in electricity efficiency by ownership type, 2017

	Spending		Actors	
	$ (Millions)	%	#	%
Community Choice Aggregator	1.4	0.0%	1	0.2%
Cooperative	99.4	1.7%	186	32.9%
DSM Administrator	721.4	12.1%	10	1.8%
Federal	76.2	1.3%	1	0.2%
Investor Owned Utilities	4,505.5	75.6%	112	19.8%
Municipal	330.3	5.5%	199	35.2%
Municipal Mktg Authority	6.1	0.1%	6	1.1%
Political Subdivision	137.9	2.3%	47	8.3%
State	81.1	1.4%	3	0.5%
Transmission	3.1	0.1%	1	0.2%

Restructuring also led to the creation of energy and capacity markets, the latter in which energy efficiency projects have been permitted to participate in the ISO-New England and PJM system operator regions. Growing concern about climate change has prompted the development of regional and state/provincial cap-and-trade markets, GHG offset programs, and carbon taxes, which provide yet another potential stream of funding for energy efficiency initiatives. Governments at the federal, state/province and municipal levels have at times developed, administered and funded efficiency programs, sometimes run alongside more conventional utility or public-benefit energy efficiency programs in the residential and ICI sectors, or independently in the transportation sector.

144 U.S. Energy Information Administration, *Annual Electric Power Industry Report, Form EIA-861*, U.S Department of Energy, October 2019, https://www.eia.gov/electricity/data/eia861/.

Yet, according to the Consortium for Energy Efficiency (CEE), rate-payer funding accounted for 95.76 percent of electric demand-side management funding in 2017 in North America. The remaining four percent came from capacity markets (2 percent), carbon revenues from Regional Greenhouse Gas Initiative (RGGI) in the US northeast (1.5 percent), the US federal government's Weatherization Assistance Program (0.02 percent), and unidentified sources (2.99 percent).[145] These alternative funding sources are found mainly in the US electricity sector, however.

Governments continue to play a role in efficiency market transformation initiatives, through research and development programs, development and administration of building and product codes and standards, and through public procurement "lead-by-example" initiatives in public sector buildings and fleets. New, public-private hybrid initiatives such as green banks and property assessed clean energy (PACE) funding are also growing in importance, despite some prominent examples of policy instability (e.g., the UK Green Deal).[146]

It is also important to note that efficiency initiatives are often intended to leverage private investment in energy efficiency. Some studies suggest that the ratio of leveraged private investment to government and utility spending on efficiency programming is between 2 and 3 to 1.[147] Accordingly, while rate-payer funding is the principal source of support for resource acquisition programming, tax-payer funding and private investment play an important role as well.

We can thus identify three basic primary administrative models (utility-run, government-run, or third-party run) and three principal sources of funding (rates, taxes, and private spending), summarized in Table 3 above. While capacity markets and carbon revenues do not neatly align with these funding models, for practical purposes they are considered them as rate-based and tax-based, respectively, since procurement through capacity markets is supported by electricity rates, and carbon revenues most often gathered and managed by governments. Moreover, though some evolution in funding and administration of energy efficiency governance has occurred, by and large – across North America as a whole - energy efficiency continues to be delivered principally by utilities, funded by rate-payers (though non-utility administration is common in Canada).

145 Craig Massey, *2017 State of the Efficiency Progam Industry: Budgets, Expenditures, and Impacts* (Boston, M.A.: Consortium for Energy Efficiency, March 21, 2018), https://library.cee1.org/system/files/library/13561/CEE_2017_AnnualIndustryReport.pdf.

146 Jan Rosenow and Nick Eyre, "A Post Mortem of the Green Deal: Austerity, Energy Efficiency, and Failure in British Energy Policy," *Energy Research & Social Science* 21 (November 1, 2016): 141–44, https://doi.org/10.1016/j.erss.2016.07.005.

147 Ian M Hoffman et al., *The Total Cost of Saving Electricity through Utility Customer-Funded Energy Efficiency Programs:, Technical Brief* (Electricity Markets and Policy Group, Berkely Lab, April 2015), http://eta-publications.lbl.gov/sites/default/files/total-cost-of-saved-energy.pdf; International Energy Agency, "Market-Based Instruments for Energy Efficiency: Policy Choice and Design," *Insight Series 2017* (Paris, France: International Energy Agency, 2017); Maggie Molina, *The Best Value for America's Energy Dollar* (Washington, D.C.: American Council for an Energy-Efficient Economy, March 2014), https://aceee.org/sites/default/files/publications/researchreports/u1402.pdf.

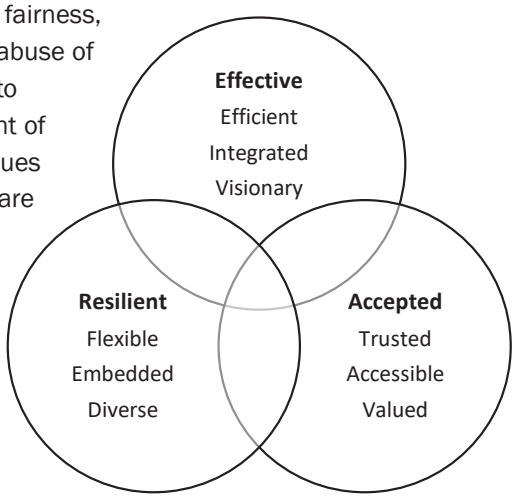
Table 3: Efficiency policy sectors, funding sources and leverage mechanisms

		Energy Efficiency Policy Sectors					
		Energy End-Use			Primary / Secondary Energy	Regulatory	
		Buildings	Transportation	Public Sector		Buildings	Products
Relevant policy examples		Targets (EERS; GHG); Opt-outs; Cost recovery; Low-income; Assessment, labelling;	Fuel economy standards; GHG emissions standards; Electrification & intensity; Low-income programming; Transportation demand management and modal shifts	Energy / climate change plans; Econ. dev. strategy;	Targets (EERS; GHG); Interconnection Standards (CHP);	Codes & standards;	Codes & standards;
Program Examples		Financial incentives (rebates, loans); Technical services (audits, retrofits, training); Behavioural strategies and education campaigns;	Financial incentives (rebates); Public transit; Intermodal, rail freight projects;	Research & Development; Public procurement;	Financial incentives (rebates, loans); Net metering;	Labelling, certification, rating systems; Information programs (energy use transparency, data); Technical services (training)	Labelling, certification, rating systems; Information programs (energy use transparency, data);
Leverage mechanism		Financial incentives; Green banks; PACE; On-bill financing; Offsets;	Financial incentives;	Offsets;	Financial incentives; Offsets;	Regulation; Information;	Regulation; Information;
Funding Sources	Govt.	Gen tax rev; Carbon rev;	Gen tax rev; Carbon rev; Fuel / road tax; Transit funding;	Gen tax rev; Bonds;	Gen tax rev;	Gen tax rev;	Gen tax rev;
	Util.	Rates & system charges; Capacity mkts;	N/A	N/A	Rates & system charges; Capacity mkt;	N/A	N/A
	Priv.	Developers; Consumers;	Freight managers; Consumers;	Consumers;	Developers; Consumers;	Developers; ICI building operators / owners; Consumers;	OEMs; Consumers;

How 'Should' Energy Efficiency Be Governed?

The emerging diversity in funding sources and administrative models naturally leads to the question of whether one or the other is 'better' than the others. Of course, 'better' is to some extent a characteristic that lies in the eye of the beholder. Better could mean that the system is set up to deliver energy efficiency as least-cost as possible, to the detriment of accessing the fuller potential of savings available. Alternatively, better could also mean the system prioritizes equitable outcomes, ensuring that the least well off benefit the most from how resources are prioritized. Better could also mean that the system is free from government influence, that it prioritizes job creation and private sector economic growth, or perhaps that it has managed to persist over a long-term without falling victim to political intervention.

A helpful framework for thinking about what different values can be expressed through the design of governance models was developed by public administration scholar Christopher Hood.[148] Hood identified three overarching values that can inform administrative design, which he termed the sigma-, theta-, and lambda-type families of values. Sigma-type values relate broadly to economy and parsimony, Hood argued, and emphasize institutional design that effectively matches resources to a narrowly defined set of tasks and circumstances, in a competent and 'sparing' fashion that 'trims fat' and avoids 'slack', waste and incompetence. Theta-type values include honesty, fairness, and 'mutuality' through the prevention of distortion, inequity, bias or abuse of office. When theta-type values are prioritized, more attention is paid to 'process controls' than on demonstrating output, and the achievement of maximum transparency in public operations. Finally, lambda-type values pertain to expectations of security and reliability. When these values are prioritized, the central concern is avoiding system failure, or paralysis in the face of threats and challenges. These three values, which are referred to as **effectiveness, acceptability, and resiliency**, provide some basic contours upon which assessments of energy efficiency governance models might be conducted.



One such well-known evaluation is the annual 'State Energy Efficiency Scorecard' report, produced by the American Council for an Energy-Efficient Economy (ACEEE) in the US.[149] This report, which has changed little in structure and format since 2006, ranks U.S. states on their performance across several different energy efficiency-related policy categories: utility and public benefits programs and policies, transportation policies, building energy codes, combined heat and power, state government initiatives, and appliance and equipment efficiency standards. Within each category, numerous measures are evaluated, scored, and summed to produce a total score out of 50. For example, some of the measures considered under the utility program/policy category include incremental savings from efficiency programs, spending on efficiency programs, performance incentives, and support of low-income efficiency programs.

148 Christopher Hood, "A Public Management for All Seasons?," Public Administration 69, no. 1 (1991): 3–19, https://doi.org/10.1111/j.1467-9299.1991.tb00779.x.

149 *The State Energy Efficiency Scorecard*, American Council for an Energy-Efficient Economy (ACEEE), 2018, https://aceee.org/state-policy/scorecard.

The ACEEE reports are certainly useful for evaluating different political jurisdictions on energy efficiency performance measures, but they are of more limited value in assessing and evaluating the underlying program administrative or funding models, let alone any other potential reasons why states tend to score consistently high, in the middle, or at the bottom. While they can provide useful information for other jurisdictions in terms of policies and initiatives of the consistent top performers that might be replicated at home, they do not provide any insight into whether or to what extent 'foreign' policy or institutions would work in a different context.

A different approach to evaluating energy efficiency institutions is to pose the question, 'how should energy efficiency be delivered?' Though this question does seem to imply the possibility of a universally-optimal arrangement, research has tended to show that this is not the case. Instead, studies in this area generally concluded that no one model or funding source is perfect, though there are nonetheless some key factors to consider when making decisions about institutional design.

For instance, Blumstein et al., identify four criteria that they suggest need to be considered in creating administrative structures: compatibility with policy goals, effectiveness of incentive structure, the ability to realize economies of scale and scope, and the contribution to the development of an energy-efficiency infrastructure.[150] What administrative structure might be best placed to deliver on these criteria, they conclude, would depend to a large extent on the local policy environment, structure and regulation of the electricity industry, and the relative focus on resource acquisition versus market transformation (or, more frequently, some combination of the two).

Similarly, a more recent assessment of the same question by Regulatory Assistance Project offered the following set of evaluative criteria with which to compare administrative models: compatibility with broader public policy goals; accountability and oversight; administrative effectiveness; and 'transition issues'.[151] Several sub-criteria are specified under each category, as summarized below in **Table 4: Criteria for Evaluating Administrative Structures, adapted from Sedano (2011)4**.

After reviewing several cases for each of four broad administrative models (independent third-party run; utility-run, government-run, or a hybrid approach), this study concluded that administrative structure is less relevant to having a "robust" ratepayer-funded efficiency program than is the "clear and consistent commitment of policy-makers supported by consensus" (though they do argue that third-party or utility-run programs are preferable to state-run program administration).

150 Carl Blumstein, Charles Goldman, and Galen Barbose, "Who Should Administer Energy-Efficiency Programs?," Energy Policy 33, no. 8 (May 2005): 1053–67, https://doi.org/10.1016/j.enpol.2003.11.006.

151 Sedano, "Who Should Deliver Ratepayer-Funded Energy Efficiency? A 2011 Update."

Table 4: Criteria for Evaluating Administrative Structures, adapted from Sedano (2011)

Compatibility with Policy Goals	Accountability and Oversight
– Harmony of financial interests – Integrated resource portfolio – Resource acquisition – Strategic deployment – Environmental improvement – Economic development – Energy efficiency market transformation – Sustainability of effort over time (funding, institutional stability)	– How is the budget set? – Who participates in program development (is there an opportunity for public participation)? – Are measurement and evaluation metrics an integral part of program design / evaluation? – How are results verified? – Frequency of reporting – Protocols & capabilities for periodic review – Scalability
Administrative Effectiveness	**Transition Issues**
– Efficient, non-redundant administrative costs – Budget competency – Ability to acquire and retain high-quality staff, experts, etc., – Flexibility to adapt programs to evolving market conditions/opportunities – Ability to target funds geographically – Local options for program design – Ability to facilitate timely payment of incentives	– Start-up costs of new organization covered – Smooth transfer of program responsibility – Preserving structure and potential transfer of data to facilitate subsequent program evaluations

A more recent report, produced by Dunsky Energy Consulting and prepared for Energy Efficiency Alberta, provides yet another evaluation of different program delivery and funding models for the integration of energy efficiency into utility system planning processes.[152] This report compares the strengths and weaknesses of the three efficiency delivery models (utilities, government agencies, and third-parties) and three funding sources (public sources, like general government revenue or carbon markets; utility system sources, like capacity markets or ratepayers; and private sources, such as carbon offset revenues or private capital) identified above through a review of six different jurisdictions (California, Illinois, Massachusetts, New York, Ontario, Vermont and Minnesota).

152 Dunsky Energy Consulting, *Integrating Energy Efficiency into the Utility System: A Review of Delivery and Funding Models*."

On delivery models, the authors lay out ten criteria that comprise an 'effective' system. These include integration in utility planning, integration of multi-fuel mandates, integration of market transformation initiatives, effective oversight/strong accountability, organizational focus on energy efficiency, a structure that allows for performance incentives, long-term predictability, appropriate geographic scope, access to customers and customer data, flexibility and responsiveness, and the ability to innovate and take risks. After reviewing the strengths and weaknesses of each model, they conclude that, though some models do address some areas more strongly, no model is truly better or worse – rather, careful institutional design, partnerships and alternative mitigation strategies can help to address potential shortcomings. Similarly, on funding sources, the report identifies a number of benefits and drawbacks associated with each different source but concludes that diversity and stability of funding is more pertinent to the integration of energy efficiency into utility system planning.

In short, past studies that have sought to evaluate energy efficiency governance models have tended to focus more on effectiveness than on acceptability or resiliency, and have generally found that effectiveness results less from the specifics of administrative of funding models than from clear and consistent commitment from policy-makers, supported by stakeholder consensus, and diverse and stable sources of funding.

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