Overview of Canada's Legislative and Regulatory Systems and their Impact on Community Energy Planning

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A Major Paper submitted to the Faculty of Environmental Studies in partial fulfillment of the requirements for the degree of Master in Environmental Studies

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FOREWORD:

This major research paper provides direct correlations to my Plan of Study and its area of concentration, community energy planning (CEP) and policy, and satisfies the five learning objectives laid out its three components: (1) Understand how climate change can be mitigated through energy planning and policy; (2) what are the theories and practices of community energy planning?; and (3) understand the legislative and regulatory environment in which CEP is emerging in Canada.

1. Understand how climate change can be mitigated through energy planning and policy e.g., the integration of low-carbon energy systems

Under this component, I aimed to develop a solid understanding of climate change and learn how energy and climate policy and planning can effectively mitigate the problem. To achieve this learning objective, I participated in experiential learning opportunities and completed academic courses focused on climate change and energy policy, including an internship with Quality Urban Energy Systems of Tomorrow (QUEST) and Community Energy Knowledge Action Partnership (CEKAP) titled *Municipal Climate Change Planning Guidance;* I also completed the course *Climate Change: Science and Policy*. For my major paper, I spent significant time studying climate policy and planning strategies in two provincial jurisdictions: Ontario (ON) and British Columbia (BC). Researching climate policy documents in-depth, such as Ontario's Climate Change Action Plan, helped me to build a solid understanding of policy options utilized to mitigate climate change. Stakeholder interviews also provided opportunity to discuss important issues with experts in the field, further expanding my understanding of the (1) challenges facing communities and governments working to mitigate the impacts from climate change, and (2) strategies deployed by all levels of government, e.g., federal, provincial, regional, and municipal, to both adapt and combat climate change.

2. What are the theories and practices of community energy planning?

Under this component, my learning objective was to build a greater understanding of the theories and principles of CEP. Beyond the completion of my learning strategies, I achieved this

objective by conducting an academic and grey literature review to build a greater understanding of CEP theories and approaches. My research included a review of the history and evolution of CEP in Canada, which gave me a solid foundation in which to conduct stakeholder interviews and advance my research on identifying alignments, misalignments, and gaps in the legislative and regulatory systems across levels of government that impact CEP.

3. Understand the legislative and regulatory environment in which CEP is emerging in Canada.

Under this component, my main objectives were to (1) build a solid understanding of the legislative and regulatory environment in which CEP is emerging in Canada, and (2) learn how the regulatory and policy frameworks and regulatory structures produce barriers or support for CEP initiatives. My major research paper has the greatest connection to this component as I spent a significant period of my research studying the legislative and regulatory environment that impacts CEP in Canada. Early in my research, a detailed spreadsheet containing current federal, provincial, and municipal legislation, regulation, policies, and supporting documentation that impact CEP was built to provide a clearer image of the current energy and climate frameworks that exist within the study jurisdictions. During this process, a documentary analysis was conducted of the literature, including a review of plans, programs, commentaries, assessments and submissions related to CEP in each jurisdiction. Regulatory and institutional structures were also assessed to build an understanding of the barriers and support for CEP initiatives. This included a review of behind the meter programs, initiatives, and technologies in each jurisdiction, including net metering and battery storage. Additionally, the targeted interviews included experts in provincial and municipal energy and climate policy. These conversations further enhanced my understanding of this component and its learning objectives.

ABSTRACT

The imperative for climate change planning in Canada to drive down greenhouse gas (GHG) emissions has compelled municipalities to develop and implement community energy plans. Today, more than 200 communities across Canada, representing over 50% of the population, have an energy plan. CEP is an increasingly popular strategy for municipalities to reduce GHG emissions, build resiliency, and create local economic benefits. Due to this significant uptake in CEP nationwide, it is important to understand the impact it is having on multi-level governance systems, as very little is known about the influence CEP has on regional-level institutional, infrastructural, and land use systems.

Communities across Canada exist within an energy system that is interdependent in terms of infrastructure and regulatory regimes, so barriers can arise due to issues such as lack of capacity and experience. A divided and territorialised energy system that operates across different levels of government can impede community energy plan outcomes, at times unknowingly due to the lack of research literature on this topic. To help mitigate this problem, this paper identifies alignments, misalignments and gaps in the legislative and regulatory environment across jurisdictions to assist municipalities with better community energy plan development and implementation, and assist policymakers to enact legislation that supports CEP and embedded jurisdictional goals such as GHG targets.

This major research paper begins with an overview of community energy planning theory and approaches to lay a foundation on which to build a more complex illustration of CEP in Canada, and more specifically Ontario and British Columbia. Common barriers to CEP are identified between the jurisdictions, including a lack of capacity and experience.

A review of the jurisdictional regulatory and institutional structures related to ‘behind the meter’ programs, initiatives, and technologies is also included to provide a greater understanding of CEP enabling factors, including the net meter and smart meter programs. A series of policy and program options are included as recommendations for government to further support CEP goals and objectives, and as solutions to the misalignments, gaps and barriers identified throughout this research. Recommendations were crafted based on desk-top policy research and targeted

interviews with key institutional and non-state actors, academics and non-governmental organisations (NGOs) active in the CEP field.

Acknowledgements

I would like to thank my supervisor, Dr. Mark Winfield, for his guidance and support throughout the completion of my Master of Environmental Studies degree at York University.

I would also like to thank all interviewees for taking the time to share their knowledge and expertise with me on the various topics covered in this research paper.

List of Acronyms

ACEP = Aboriginal Community Energy Plan
BIA = Business Improvement Area
BC = British Columbia
BCCAC = BC Climate Action Charter
BCUC = British Columbia Utilities Commission
BTM = Behind the Meter
CCAP = Climate Change Action Plan
CEEI: Community Energy Emissions Inventory
CEKAP = Community Energy Knowledge Action Partnership
CEP = Community Energy Planning
CHP = Combined Heat and Power
CP = Carbon Pricing
DER = Distributed Energy Resources
EE = Energy Efficiency
FBC = FortisBC
FIT = Feed-in Tariff
GA = Global Adjustment
GHG = Greenhouse Gas
GTF = Gas Tax Fund
ICEM = Integrated community energy mapping
ICI = Industrial Conservation Initiative
IESO = Independent Electricity System Operator
LCELF = Low Carbon Economy Leadership Fund
LDC = Local Distribution Company
LIC = Local Improvement Charge
MEPP = Municipal Energy Plan Program
MW = Megawatt
NECB = National Energy Code of Canada for Buildings
OEB = Ontario Energy Board
ON = Ontario
OPG = Ontario Power Generation
PV = Photovoltaic
PCF = Pan-Canadian Framework
QUEST = Quality Urban Energy Systems of Tomorrow
RPP = Regulated Price Plan
SCC = Smart Cities Challenge
SOP = Standing Offer Program
TOU = Time-Of-Use
TPO = Third-party Ownership
TWh = Terawatt-hours
VNM = Virtual Net Metering

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INTRODUCTION

OBJECTIVE

The purpose of this research is to build a better understanding of the impact CEP is having on multi-level governance systems though the identification of alignments, misalignments, and gaps in the legislative and regulatory systems. Recommendations are provided as potential solutions to the identified issues and as enabling actions to further drive CEP in the studied jurisdictions. Due to its impact on CEP, a brief review of the regulatory and institutional structures related to 'behind the meter' programs, initiatives, and technologies is also included in this paper. The primary focus of this research is on two provincial jurisdictions—Ontario and British Columbia—but, federal policies are also examined. To build a greater awareness of the impacts of CEP, this paper aims to answer specific questions, including: what policy objectives are associated with CEP programs, initiatives and technologies and how do these vary across levels of government within and between jurisdictions? How do CEP initiatives relate to the province's wider energy policy and planning frameworks? Which institutions and organizations are identified as the key actors in CEP initiatives? How do related regulatory and policy frameworks and regulatory structures provide support or barriers to CEP initiatives?

The outcomes from this research will aid communities with CEP development and implementation and assist policy makers and government agencies with decision-making through the identification of alignments, misalignments, and gaps in the legislative and regulatory environment.

RESEARCH METHODOLOGY

This research utilizes a mix of qualitative research methods. First, a secondary literature review was conducted to build an understanding of the current CEP environment in Canada. Accessing scholarly, peer-reviewed journals and reports via York University's Indexes and Databases laid a solid foundation on which to build a clearer picture of CEP in Canada. The article *Community energy plans in Canadian cities: success and barriers in implementation*, is one example.

Second, a detailed spreadsheet was completed to document current climate and energy federal, provincial, and municipal legislation, regulation, policies, and supporting documentation. This step was essential to building an understanding of the jurisdictional frameworks currently impacting CEP in Ontario and British Columbia. This research also identifies past legislative actions such as Ontario's feed-in tariff program due to their impact on CEP goals and objectives. During this process, direct and indirect links to CEP were identified and noted for further analysis. Areas of interest included land use, transportation, buildings, and infrastructure initiatives. For example, Ontario's Climate Change Action Plan indirectly supports CEP via funding for initiatives that reside under the umbrella of CEP, including EV infrastructure and school energy efficiency retrofits.

Third, a documentary analysis was conducted of literature discussing CEP, including a review of commentaries, assessments and submissions in each jurisdiction. Organizations with expertise in CEP (e.g. QUEST) and academic organizations (e.g. Sustainable Energy Initiative) were targeted as potential resource sources. Websites of key actors in the industry, including utilities (e.g. BC Hydro and Hydro One) and regulators (e.g. Ontario Energy Board and British Columbia Utilities Commission) were also reviewed. This step furthered my understanding of the key stakeholders influencing CEP in Ontario and British Columbia and provided insight into many of the programs and policies affecting community energy plan development and implementation across these provinces.

Fourth, eleven targeted interviews with key institutional and non-state actors, academics and NGOs active in the CEP field were conducted: Ontario (6) and British Columbia (5). Seven interviewees were identified and selected due to their professional designation and expertise in climate and energy policy, and the remaining four were selected via snowball sampling. A Stakeholder Interview Protocol was designed to guide the administration and implementation of the interviews. This ensured key information was relayed and understood by interviewees, e.g., confidentiality details. All interviews were recorded via the on-line video conferencing software *GoToMeeting* to assist with notetaking and as a reference source post-interview. A list of main questions was developed and used to guide the interviews, but probing often led to other unique questions being posed. The interview protocol and main questions are provided as an appendix. During the interviews, key points and ideas were written down and summarized post-interview.

The input gathered from expert opinions helped to form the recommendations presented in the paper. Furthermore, interviewees helped to identify the various alignments, misalignments, and gaps uncovered during this research.

Fifth, an overview of jurisdictional legislation, regulation and initiatives that impact CEP were completed by my colleague, Adlar Gross. A summary of his findings are included in this paper. The full documents are attached as an appendix.

COMMUNITY ENERGY PLANNING

COMMUNITY ENERGY PLANNING THEORY

Modern energy planning and management is gaining traction as concerns over climate change drive a societal shift towards decarbonisation. This shift is further influenced by various social, political, environmental, medical, and long-term technical and economic concerns.[1] In terms of energy, communities can achieve significant GHG reductions while improving their energy systems via three actions: energy efficiency, energy conservation and fuel switching to renewables.[2] St. Denis and Parker (2009) believe these three approaches are particularly effective because they reflect a community's values, knowledge and intrinsic capacities. Communities become invested, including local governments.

Daniel Lerch, from the Post Carbon Institute, believes CEP can deliver results because local governments have the capacity to take action on the various opportunities and threats that impact the energy system. The "local people planning these systems are personally invested in their outcome as they are members of the community themselves".[3] Local stakeholders (e.g., municipal government, businesses, non-profit organizations, and citizens) work collaboratively to develop and implement energy plans that provide a variety of benefits to their community. Neighbourhoods generate a percentage of their energy requirements via (1) clean distributed energy resources (DER) and (2) local distribution networks supported by local involvement in the management and control of the system. These are fundamental aspects of CEP.

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1 Mendonc, M., Jacobs, D., & Sovacool, B. (2010). Powering the green economy: the feed-in tariff handbook. London: Earthscan.

2 St. Denis, G., & Parker, P. (2009). Community energy planning in Canada: The role of renewable energy. Renewable and Sustainable Energy Reviews, 13 (8) 2088-2095. Retrieved from https://doi.org/10.1016/j.rser.2008.09.030

3 Lerch, D. (2007). Post carbon cities: planning for energy and climate uncertainty. Sebastopol, CA: Post Carbon Institute. Retrieved from http://www.postcarbon.org/publications/post-carbon-cities/

Results can also be influenced by regional and municipal governments through a variety of actions such as changing zoning objectives, introducing development charges and tax incentives for developers, and collaborating with Local Distribution Companies (LDC) to encourage the development and implementation of renewable and low-carbon energy sources.[4] Beyond local governments, national and provincial governments also have significant leverage in driving CEP implementation through actions such as applying legislative amendments to land use planning and linking infrastructure grants to CEP initiatives.[5]

Since its inception, CEP has been defined in various ways. Mark Jaccard, professor at the School of Resource and Environmental Management at Vancouver's Simon Fraser University, describes it fittingly: CEP "combines planning concepts - neo-traditional design, complete communities, green cities - with energy management concepts - energy cascading, demand-side management, integrated resource planning" (1997).[6] CEP was traditionally focused on buildings and equipment, but the modern variation is broader encompassing land use planning, transportation, site design, and energy management as well.[7]

According to Kirby Calvert, Co-director of CEKAP, CEP can be viewed as a Tale of Two Transformative Acts: vertical integration and horizontal integration. Vertical integration "brings a local lens to the planning process and imparts a stronger role for municipalities and local government in energy planning".[8] Compared to provincial and federal governments, local governments are in a stronger position to enact change as they benefit from closer relationships with local stakeholders, including LDC. Horizontal integration "represents a shift from 'government' to 'governance'; in other words a more inclusive planning process that is opened up to the general public, community organizations and business entities".[9] Community involvement with CEP can build community buy-in and social license to implement change.

4 Jaccard, M., Failing, L. and Berry, T. (1997). From equipment to infrastructure: community energy management and greenhouse gas emission reduction. Energy Policy, 25(13), 1065-1074. Retrieved from https://dx-doi-org.ezproxy.library.yorku.ca/10.1016/S0301-4215(97)00091-8

5 Ibid.

6 Ibid.

7 Ibid.

8 Calvert, K. (2017). Toward First Principles of Community Energy Planning. CEKAP. Retrieved from http://www.cekap.ca/blog/toward-common-first-principles-of-community-energy-planning/

9 Ibid.

Horizontal integration also differentiates between municipal and community energy planning. A CEP is not the municipality's plan for the City, it is the community's plan for the City.[10]

COMMUNITY ENERGY PLANNING DEFINED

CEP can be defined as a long-term, integrative energy planning process implemented at the local level to achieve a variety of outcomes. Community energy plans provide a framework that intertwines a variety of elements into an effective planning and management strategy. The concepts overarching goal is to mitigate community GHG emissions through energy conservation initiatives and local sustainable energy solutions at a building or neighbourhood scale.[11]

CEP provides communities with significant energy, environmental and economic benefits, including (1) greater resiliency and energy security due to a diverse range of integrated renewable-low carbon energy sources, (2) reduced pollution through fuel switching initiatives and energy conservation, and (3) increased job creation and investment opportunities. Benefits derived from CEP can be realized by considering energy use, efficiency, and renewable-low carbon energy in decisions about land use, transportation, buildings, and infrastructure.[12]

Table 1 provides specific examples related to four key areas intertwined under the CEP integrative framework:

Land Use Planning (LUP): This key component of CEP involves the management of land and resources and is used to assist communities with visualizing and achieving goals that keep environmental, social, and economic concerns at the forefront of decision-making. CEP considers energy early in the LUP process with a goal of designing smart energy communities that improve livability for residents. Through the use of local land use regulations and policies, e.g., development cost charges, local governments can influence developers to create more high density mixed-use neighbourhoods that lower environmental impact and result in healthier and more resilient communities.

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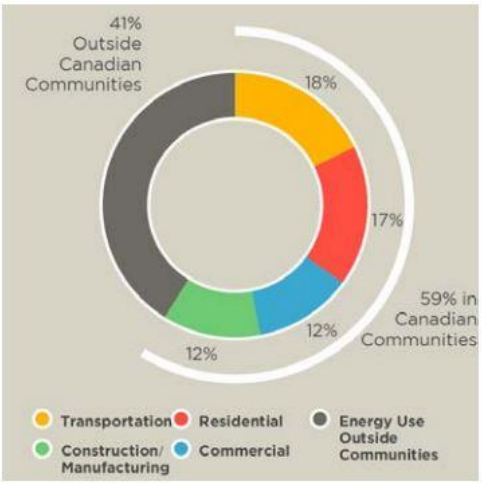
10 City of London, Ontario.

11 Community Energy Planning. (n.d.). City of Toronto. Retrieved from https://www.toronto.ca/services-payments/water-environment/environmentally-friendly-city-initiatives/community-energy-planning/

12 Energy Planning. (n.d.). BC Climate Action Toolkit. Retrieved from https://www.toolkit.bc.ca/Plan-Do/Energy-Planning

***Transportation*:** As the fastest growing source of GHGs at the local level, this sector is a major component of CEP.[13] Influencing transportation systems to be more pedestrian and transit friendly can lead to deep GHG reductions. This can be achieved during the land use and infrastructure planning process or via legislation and regulation. Utilizing a multi-modal approach, which considers a variety of modes (walking, cycling, automobile, public transit, etc.) and their connections,[14] to transportation planning reduces the need for vehicle use in communities. High occupancy vehicle lanes, zero emission standards, and ride sharing programs and services are a few options available to community energy planners to lower GHG emissions from this sector.

Figure 1: Energy End Use in Canada



Source: Community Energy Planning: Getting To Implementation in Canada

Buildings: In Canada, buildings are the largest users of energy, with space heating and domestic hot water representing the largest share (approximately 60 per cent of energy end use in buildings).[15] Capturing efficiencies in these areas is essential to mitigating emissions across the building sector. This can be achieved via a range of actions and policy levers, including building energy benchmarking and mandatory home energy labelling. Due to the impact buildings have on jurisdictional GHG emissions and targets, buildings are a key component of CEP.

Infrastructure: Infrastructure decisions play a significant role in a communities' ability to achieve community energy plan objectives. Infrastructure includes a diverse range of options for municipalities to mitigate GHG emissions, including district energy and combined heat and power opportunities. Multiple funding programs and initiatives across levels of government enable community energy plan infrastructure projects, such as EV public charging facilities and landfill gas capture plants. For example, in 2019, the GM 6.4 MW co-generation plant will come online in St. Catharines, Ontario. The project will use renewable landfill gas as fuel to generate

13 Community Energy Planning: Getting To Implementation in Canada. (2016, Aug). Retrieved from https://www.ourcommons.ca/Content/Committee/421/FINA/Brief/BR8398218/br-external/Community%20Energy%20Planning-Getting%20to%20Implementation%20in%20Canada-e.pdf

14 Litman, T. (2017). Introduction to Multi-Modal Transportation Planning. Victoria Transport Policy Institute. Retrieved from http://www.vtpi.org/multimodal_planning.pdf

15 Community Energy Planning: Getting To Implementation in Canada. (2016, Aug). Retrieved from https://www.ourcommons.ca/Content/Committee/421/FINA/Brief/BR8398218/br-external/Community%20Energy%20Planning-Getting%20to%20Implementation%20in%20Canada-e.pdf

electricity and recover thermal energy to power and heat its Propulsion Plant.[16] It is estimated the plant will reduce GHG emissions by approximately 77 per cent annually.[17] The project is being developed under Ontario's TargetGHG program, a program funded by the Ontario Green Investment Fund.

Table 1: Four key areas impacted by CEP

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Land Use Planning	Transportation	Buildings	Infrastructure
Zoning and development rules	High-occupancy vehicle lanes	Energy audits and retrofits	District energy utility opportunities
Brownfield remediation	Low carbon fuels	Net-Zero Ready	Waste heat recovery
Intensification, infill, conversion	Zero-emissions vehicle standard	High efficiency lighting and heating	Combined heat and power opportunities
Urban containment boundaries	Bike and pedestrian paths and facilities	Building energy benchmarking	EV charging infrastructure
New street design	Ride-sharing	Home energy labelling	Renewable energy opportunities

Source: BC Climate Action Toolkit. Retrieved from https://www.toolkit.bc.ca/Plan-Do/Energy-Planning

ENABLING COMMUNITY ENERGY PLANNING

Community energy plans

Across the country, more than 170 communities, representing over 50 per cent of the population, have developed a community energy plan.[18] This statistic is increasing as Canadian provinces, territories and municipalities take advantage of the various legislation, regulation, policies, programs, initiatives, guides, toolkits, and organizations existing within this space. This is interesting as no framework or integrative structure for CEP exists to directly support CEP at the federal level. Policies and programs exist to support initiatives that reside under the umbrella of CEP, but they are not designed to directly enable CEP.

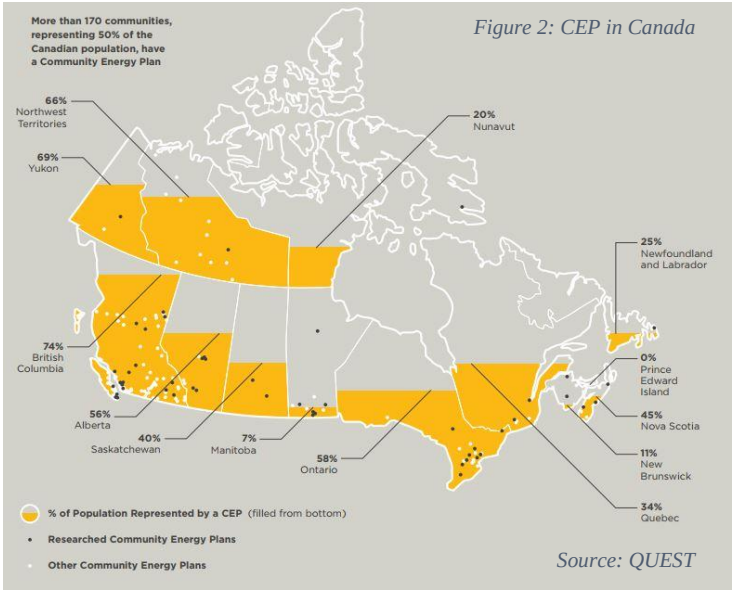

Figure 2: CEP in Canada

The state of CEP in Ontario is similar, as the province does not have an integrative, legislative, planning and policy framework, just an assembly of plans, programs and initiatives that directly

16 GM Canada proposes renewable energy project at St. Catharines Propulsion Plant. (2017, Dec). Manufacturing Automation. Retrieved from https://www.automationmag.com/operations/sustainability/7813-gm-canada-proposes-renewable-energy-project-at-st-catharines-propulsion-plant

17 Ibid.

18 National Report on Community Energy Plan Implementation. (2015). Quality Urban Energy Systems of Tomorrow. Retrieved from http://gettingtoimplementation.ca/wp-content/uploads/2015/02/National-Report-on-CEP-Implementation.pdf

and indirectly contribute. This leaves CEP a sole responsibility of individual communities and municipalities in the province, which is challenging as many do not have the resources, capacity and authority to proceed with community energy plan development and implementation. As CEP is an integrative concept, the lack of an integrative framework acts as a barrier to local energy planning progress.

In British Columbia, the situation differs. BC has a provincial level planning framework for CEP that incorporates a list of supportive elements, including the BC Climate Action Charter (BCCAC) and the Community Energy Emissions Inventory (CEEI). This has proven effective as 74 per cent of the population in British Columbia is represented by a community energy plan.

Clearly, the most effective enabling factor associated to CEP is an integrative framework that directly guides and supports CEP and the many elements existing under its rubric. This framework helps integrate a variety of individual initiatives into an overall plan at the community level. The following list represents a few of these supporting mechanisms impacting CEP in Canada, some of which are discussed in further detail throughout this paper:

- **Funding programs**: In Ontario and British Columbia, funding programs often exist at each level of government to support the development and implementation of community energy plans, including the Municipal GHG Challenge Fund (ON). Additionally, various federal and provincial funding programs enable actions and activities that support CEP goals and objectives. For example, mandatory home energy labelling—a commitment made under the Pan-Canadian Framework and Ontario's Climate Change Action Plan (CCAP)—will be supported by the Home Energy Rating and Disclosure program to (1) provide free energy audits to homeowners and (2) support the development of energy audit training programs in the province.
- **Climate and energy policy**: Municipalities possess a range of policy levers that can influence emissions across multiple sectors, including transportation, buildings, and infrastructure. Implementing policy that encourages denser mixed-use, walkable neighbourhoods encouraged by zoning and planning provisions lowers GHG emissions

and supports CEP goals and objectives.[19] Policy that supports low-energy transport (e.g. zero-emissions vehicle standard), energy efficiency (e.g. energy step program), and/or fuel flexibility (e.g. district energy system), for example, are also highly beneficial.

- **Data**: Access to accurate, consistent and relevant data is critical for communities to make informed and effective energy and environmental policy, program and investment decisions. Quality data is imperative to (1) building GHG community inventories, (2) providing accurate energy reporting, and (3) measuring success. British Columbia's CEEI is one example of a tool that provides data to municipalities in support of their community energy plan and BCCAC commitments.

- **Integrated community energy mapping (ICEM):** ICEM is a mapping and modeling approach and tool that combines building and technology energy modelling software, data, and geographic information systems to provide scalable spatial decision support to CEP.[20] ICEM is used increasingly by energy professionals, municipalities, utilities, and the public to add value to decision-making in energy planning. The tool is ideal for designing energy and emissions inventories for communities, and assisting with utility conservation demand management and demand-side management program planning.[21] Additionally, ICEM can identify smart energy network opportunities within municipalities. Outcomes that support CEP objectives and goals include the achievement of (1) energy cost savings for residents, businesses, and organizations, (2) energy conservation and GHG reduction targets, and (3) offsetting energy infrastructure renewal costs.[22] ICEM is a key resource for the development and implementation of CEP.

Although Ontario and British Columbia have developed and implemented climate action frameworks that enable CEP, many barriers still exist in both jurisdictions.

[19] Community Energy Planning Best Practices. (2009). BC Hydro. Retrieved from https://www.bchydro.com/content/dam/hydro/medialib/internet/documents/power_smart/sustainable_communities/global_best_practices_model.pdf
[20] Data Issues and Promising Practices for Integrated Community Energy Mapping. (2016). Retrieved from http://ftp.maps.canada.ca/pub/nrcan_rncan/publications/ess_sst/299/299224/cgdi_ip_0050e.pdf
[21] Ibid.
[22] Ibid.

COMMON JURISDICTIONAL BARRIERS TO CEP IN ONTARIO AND BRITISH COLUMBIA

Common barriers to CEP in Ontario and British Columbia should be addressed in order to increase the implementation of community energy plans and drive climate action initiatives. As stated earlier, the purpose of this research is to build a better understanding of the impact CEP is having on multi-level governance systems though the identification of alignments, misalignments, and gaps in the legislative and regulatory systems, therefore, the identification of existing common barriers to CEP is an important step in this process. The following jurisdictional barriers were identified through a combination of targeted interviews and literature review: capacity and experience, plan structure for implementation, and behavioural change.

Capacity and Experience

A lack of capacity and experience has been identified as a barrier to CEP in both provincial jurisdictions. Communities interested in pursuing community energy initiatives are often tasked with attracting capacity with specialised knowledge in CEP. This can be difficult for various reasons, including location. Certain regions are at a disadvantage due to factors such as demographics. While conducting targeted interviews in Ontario, the interviewees confirmed that smaller regions within the province lack the regional capacity for the specialised knowledge required to execute such actions as renewable energy projects. The lack of capacity and experience impacted the number of people responsible for CEP initiatives. Only a small number of qualified individuals working to implement CEP projects increase the probability of extended timelines and expanded costs, and encourage impatience throughout the community.[23]

As in Ontario, smaller communities throughout British Columbia often lack the required resources to fully fund full-time personnel hired to address energy and climate initiatives such as community energy plans and projects. To address this lack of capacity, BC Hydro introduced the Community Energy Manager Program. This initiative provides funding to communities to hire

[23] Tozer, L. (2013). Community energy plans in Canadian cities: success and barriers in Implementation. *Local Environment, 18(1)* 20-35. Retrieved from http://dx.doi.org/10.1080/13549839.2012.716406.

an energy manager to assist with emissions planning and implement energy projects. If eligible, the program provides 50 per cent of the salary of a full-time senior staff member for two years.[24]

Plan Structure for Implementation

One key barrier to implementation identified during the research was not ensuring the community energy plan is effectively structured from the start for implementation, i.e., how are key policies, plans, programs aligned with partners that are responsible in some way for delivering the plan objectives. For example, has the business community, e.g., the Chamber of Commerce and the BIA, been effectively and actively engaged in the planning process? Did they have an opportunity to provide input on the plan? Do they understand what they can be doing or should be doing to benefit from the plan's goals and objectives? Additionally, what about other relevant stakeholders? For example, has the LDC been identified as being an enabler or an implementer in the plan and is their role thoroughly understood by all applicable parties? Furthermore, has the utility inserted their new responsibilities into their own corporate planning activities? Program or policy misalignment with partners can lead to delays and/or act as barriers to success.

Behavioural Change

Research has shown that community-wide behavioural change is difficult to facilitate when municipalities lack jurisdictional control.[25] Negative individual perceptions of proposed changes can also increase resistance and act as a barrier. For example, if an action is perceived to be inconvenient or costly to the public, it increases the possibility that it will be rejected by stakeholders and policy-makers.[26] This finding was common amongst municipalities that lacked direct control over decision-making and usually led to the actions being delayed or abandoned in favour of projects and initiatives that are easier to accomplish.[27]

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[24] Community Energy Manager Program. (2018). BC Hydro. Retrieved from https://www.bchydro.com/powersmart/business/programs/sustainable-communities/cemp.html

[25] Tozer, L. (2013). Community energy plans in Canadian cities: success and barriers in Implementation. *Local Environment, 18(1)* 20-35. Retrieved from http://dx.doi.org/10.1080/13549839.2012.716406.

[26] Ibid.

[27] Ibid.

REVIEW OF FEDERAL AND PROVINCIAL LEGISLATION, REGULATION AND INITIATIVES THAT IMPACT CEP

In Canada, no framework or integrative structure for CEP exists at the federal level. Instead, the national government enables CEP through supportive policies and funding programs that aid a collection of initiatives that reside under the rubric of CEP. While these initiatives may support community energy plan goals and objectives, it would achieve greater impact if a federal mandate for CEP existed, with direct support provided through national legislation, regulation, policies and programs. As no framework exists, provinces are required to build and maintain their energy infrastructure on a province-by-province basis, with significant differences existing between jurisdictions. To help identify the alignments, misalignments and gaps in the legislative and regulatory systems that exist between and within jurisdictions, a detailed review of all federal and provincial (ON and BC) legislation, regulation, and initiatives was completed. Provincial reviews in this section are summarized, with the full reviews attached in the appendix.

FEDERAL LEGISLATION, REGULATION AND INITIATIVES THAT IMPACT CEP

The Pan-Canadian Framework on Clean Growth and Climate Change

The Federal Plan—developed in collaboration with the provinces and territories—is an overarching strategy to achieve multiple objectives, including economic growth, GHG emission reductions, and increased resilience to climate change.[28] Central to the plan's framework is carbon pricing (CP), a key aspect of Canada's transition to a low carbon future. CP is believed to be an effective tool to achieve GHG reductions. The Framework applies multiple principles to guide the implementation of CP within the pan-Canadian approach, including a consistent, regular, transparent, and verifiable reporting on CP policies and a requirement that CP be applied

[28] Complementary actions to reduce emissions. (n.d.). Government of Canada. Retrieved from https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework/complementary-actions-reduce-emissions.html#3_2

to a broad set of emission sources across the economy.[29] CP is a supportive policy to CEP as it helps jurisdictions set and drive towards GHG reductions.

In addition to CP, the Pan-Canadian Framework impacts CEP through its complementary actions to reduce GHG emissions in the following areas:

- Electricity: Increasing renewable and low-carbon energy sources with support for community-based generation; modernizing the grid to support smart-grid technologies, e.g. energy storage; & mitigating diesel use in northern and remote communities through investments in DER and electricity infrastructure.

- Built Environment: adopting stringent building codes with a goal to implement a net zero energy ready model building code by 2030; developing a model code for existing building by 2022 to guide energy efficiency upgrades; setting new EE standards for heating equipment and other technologies; and supporting more efficient building standards in aboriginal communities.

- Transportation: supporting the deployment of electric vehicle infrastructure, including electric charging stations; increasing investments in public-transit upgrades and new infrastructure; developing clean fuel standard to reduce emissions.

- Government Leadership: cutting emissions from government assets mitigates GHG emissions and accelerates transition to highly efficient buildings and net zero vehicles.[30]

Low Carbon Economy Fund

This fund supports the implementation of the GHG reducing initiatives presented within the Pan-Canadian Framework. The $2 billion fund will be leveraged towards investments in projects that mitigate GHG emissions and generate clean growth with the goal of achieving the commitments pledged under the Paris Climate Accord.[31] Over 5 years, the fund will support projects and initiatives throughout the provinces and territories, as well as municipalities, Indigenous

[29] Ibid
[30] Ibid
[31] Low Carbon Economy Fund. (n.d.). Government of Canada. Retrieved from https://www.canada.ca/en/environment-climate-change/news/2017/06/low_carbon_economyfund.html

governments and organizations, businesses and both not-for-profit and for-profit organizations.[32] The Low Carbon Economy Fund is comprised of two parts: (1) Funding of $1.4 billion delivered to provinces and territories that have adopted the Pan-Canadian Framework to assist with leadership commitments and initiatives laid out in the Framework, and (2) remaining funds available to the Low Carbon Economy Challenge and for implementation of the Framework to support projects and initiatives that reduce GHG emissions throughout jurisdictions. Examples of CEP projects and initiatives supported by the fund include the implementation of DER, including community solar farms, and efficiency upgrades to homes and buildings.[33]

National Energy Code of Canada for Buildings 2015

The National Energy Code of Canada for Buildings (NECB) lays out technical requirements for the energy efficient design and construction of new buildings.[34] The document's scope includes building envelopes; lighting; service water systems; heating, ventilating and air-conditioning systems; and electrical power systems and motors. The NECB 2015 includes updates on interior lighting control requirements and reduced hot water discharge rate for showers and lavatories.[35] CEP is influenced by the NECB due to the significant impact commercial, institutional, and residential buildings have on total energy consumption in Canada.

Infrastructure Canada

The Federal Gas Tax Fund (GTF)

This predictable, long-term funding is delivered to provinces and territories to assist with supporting local infrastructure projects and initiatives. The $2 billion fund is transferred to municipalities across Canada to assist with the development and implementation of approximately 2500 projects.[36] In Ontario, over $7.9 billion has been transferred to the province since the program was first introduced in 2005.[37] The City of Toronto has been a significant beneficiary, using the GTF funding to upgrade local transit infrastructure and fleet replacement,

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32 Ibid

33 Ibid

34 National Energy Code of Canada for Buildings 2015. (n.d.). National Research Council Canada. Retrieved from https://www.nrc-cnrc.gc.ca/eng/publications/codes_centre/2015_national_energy_code_buildings.html

35 Ibid

36 The Federal Gas Tax Fund. (n.d.). Infrastructure Canada. Retrieved from http://www.infrastructure.gc.ca/plan/gtf-fte-eng.html

37 Infrastructure Canada Projects and Programs (since 2002) - Ontario. http://www.infrastructure.gc.ca/map-carte/on-eng.html

e.g., Light Rail Transit vehicles.[38] The GTF supports CEP as strategic investments are made in such areas as community energy systems, public transport, drinking water, and solid waste management.

Canada Infrastructure Bank (CIB)

The CIB is a new tool to assist with the development of infrastructure projects in communities across Canada. The Bank will invest in infrastructure projects that are of interest to provinces, municipalities, as well as the private sector and institutional investors, to help reduce the requirement for grant dollar spending on such projects.[39] The program provides loan guarantees and small capital contributions to participants, helping them to build more affordable projects within their communities. The plan is to provide $35 billion investment dollars in transformational infrastructure initiatives, $10 billion of which will directly impact CEP: $5 billion for public transit systems and $5 billion for green infrastructure projects, including the promotion of DER.[40]

Smart Cities Challenge (SCC)

The Smart Cities Challenge is a federal government initiative that encourages municipalities, regional governments, and Indigenous communities of all sizes to design innovative ideas that utilize "smart" technology and data to improve the livability of their communities.[41] The goal of the competition is to spur sustainable innovation in urban centers to drive the competitors towards smarter cities that require less energy, less traffic, and essentially operate in a more efficient and effective way. The $300 million competition is awarded over three rounds:

- one large prize of $50 million;
- two prizes of $10 million for mid-sized communities;
- one prize of $5 million for a small community; and
- one prize of $5 million available for an Indigenous community.[42]

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38 Federal Gas Tax Fund. (n.d.). City of Toronto. Retrieved from https://www1.toronto.ca/wps/portal/contentonly?vgnextoid=0c7cddfdb91a3410VgnVCM10000071d60f89RCRD&vgnextchannel=24eb7873580a3410VgnVCM10000071d60f89RCRD

39 Canada Infrastructure Bank. (n.d.). Infrastructure Canada. Retrieved from http://www.infrastructure.gc.ca/CIB-BIC/index-eng.html

40 Ibid

41 Smart Cities Challenge - Get Ready! (n.d.). Infrastructure Canada. Retrieved from http://www.infrastructure.gc.ca/plan/cities-villes-eng.html

42 Ibid

The best ideas entered win. The SCC is a great opportunity for communities to implement the innovative, community energy plan initiatives and projects that face greater barriers due to various factors, including risk.

The Clean Fuel Standard

The Federal Clean Fuel Standard is a new regulation currently being designed to incentivize the use of low carbon fuels, energy sources and technologies with the objective to cut greenhouse gas emissions by 30 megatonnes annually by 2030, equivalent to taking seven million cars off the road. The standard would establish and apply lifecycle carbon intensity requirements to liquid, gaseous and solid fuels used in the transportation, industrial and building sectors and then require producers and distributors to gradually reduce the carbon intensity of the fuels they supply. [43] Options to assist organizations with achieving requirements include fuel switching from fossil fuels to low-carbon fuel sources, e.g., hydrogen; blending renewable content, e.g., ethanol and biodiesel, into higher-carbon fuels; and upgrading facilities and/or investing in low-carbon technology to reduce a fuel's total carbon footprint.[44] For firms that cannot comply with the new standard, compliance credits will be offered at a cost. These tradable credits will come from other market participants that have earned credits by exceeding the standard for a given fuel in a given year or displacing fossil fuel consumption through the deployment of alternative energy sources and technologies, e.g., electric vehicle manufacturers. The Federal Government has labeled this regulation "the single largest contributor to Canada's 2030 climate commitment."[45] Consultations on the Clean Fuel Standard are currently ongoing with the final regulation to be implemented by mid to late 2019.

Once implemented, the Clean Fuel Standard could have a significant impact on community energy planning goals and objectives.

***Conclusion*:** Canada does not have a strong set of national energy policies. The nation has built its energy infrastructure on a province-by-province basis, with significant differences existing between jurisdictions. The Pan-Canadian Framework on Clean Growth and Climate Change is

[43] Clean Fuel Standard. (2018). Government of Canada. Retrieved from https://www.canada.ca/en/environment-climate-change/services/managing-pollution/energy-production/fuel-regulations/clean-fuel-standard.html

[44] Plumptre, B. (2017). Three takeaways from Canada's clean fuel standard framework. Pembina Institute. Retrieved from http://www.pembina.org/blog/clean-fuel-standard-framework

[45] Flanagan et al. (2017). State of the Framework. Pembina Institute. Retrieved from https://www.pembina.org/reports/state-of-the-framework.pdf

one notable federal strategy that aims to achieve multiple objectives, including economic growth, GHG emission reductions, and increased resilience to climate change. In terms of CEP and DER supporting legislation, very little exists besides funding programs for community energy initiatives.

ONTARIO LEGISLATION, REGULATION AND INITIATIVES THAT IMPACT CEP

Summary

Currently, Ontario lacks legislation that requires CEP at both the provincial and local levels. Our research has identified multiple legislative acts, policies, plans and programs that enable actions that support CEP, but nothing directly forces municipalities to engage in the process. Through initiatives such as the Climate Change Action Plan and Municipal Energy Plan Program (MEPP), the province has developed a strong support base for climate action and energy planning, but in the absence of an integrative planning framework mandated by the province, municipalities must utilize their own expertise and resources to move forward. These circumstances often challenge local governments as many do not have the resources, capacity or authority required to develop and implement community energy plans and the multitude of individual initiatives associated to their success.

This may have something to do with Ontario's "hybrid market" that includes real-time spot pricing and long-term government backed contracts for power, making their electricity market relatively unique in Canada.[46] The majority of provinces in Canada, e.g., British Columbia, are dominated by government-owned vertically integrated utilities.[47]

As mentioned in the attached *Ontario energy and climate policy overview*, supports for initiatives that impact CEP are abundant and fall under the umbrella of land use policy and energy policy. Ontario's major land use policy legislation—the Municipal Act, the Planning Act and Provincial Policy Statement—all incorporate energy planning and conservation into their sphere of influence to some degree. For example, the Municipal Act states a municipality may

[46] Background Report on the Ontario Energy Sector. Mowat Centre. http://energizingtomorrow.ca/wp-content/uploads/MowatEnergyRFP_AppendixB.pdf
[47] Ibid.

provide for or participate in long-term energy planning within the municipality; the Planning Act incorporates Community Improvement Plans, which can be used for energy efficiency uses in a number of areas, including buildings; and the Provincial Policy Statement encourages energy efficiency, supports active transportation, and promotes renewable and alternative energy systems, where feasible.

With regards to energy policy, the provincial framework has expansive legislative and regulatory control over the electricity sector, while others areas are left unregulated, e.g., thermal utilities. Regulated by the Ontario Energy Board (OEB), electricity utilities (generators, distributors, transmitters) are bound by its decisions. The OEB sets rules, establishes energy rates, develops new energy polices, licenses energy companies, and monitors the wholesale electricity market and energy companies.[48] Decisions implemented by the OEB can have significant impact on CEP. Examples of past and current discussions between the OEB and relevant stakeholders on policy decisions include: (1) an expansion of the Net Metering Program (e.g. virtual net metering), (2) a new rate design for commercial and industrial electricity customers (e.g. gross load billing), (3) a new distribution rate design for residential electricity customers (e.g. fixed monthly charge); and (4) modifications to the OEB Distribution System Code (e.g. 1% net metering capacity of a distributor's total throughout). Some additional examples of energy policy in the province that impacts CEP are as follows:

- Green Energy Act: focused on expanding renewable energy generation, encouraging energy conservation and creating jobs in the clean energy sector.

- Conservation First Framework: maps out Ontario's energy conservation goals between 2015-2020

- Ontario Energy Board Act: prevents a distributor or transmitter from owning and operating renewable energy generation facilities that exceed 10 MW

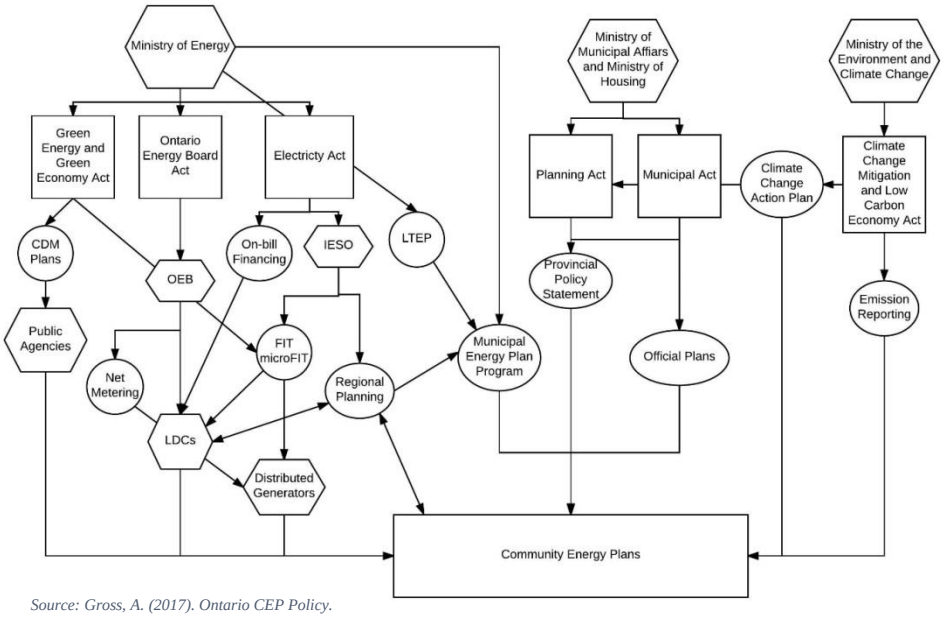
One significant change to energy policy in Ontario is the cancellation of the Feed-In Tariff (FIT) programs (FIT and microFit) in 2017. The programs have been replaced by net-metering. Over their lifespan, the FIT and microFit programs were very successful in encouraging the adoption

48 Ontario Energy Board. (2017). About Us. https://www.oeb.ca/about-us

of renewables, especially solar photovoltaic (PV). In fact, to date almost 99% of community energy projects in Ontario are solar.[49]

With regards to CEP barriers, our research identified multiple, including the lack of access to data, the suspension of supply procurement programs (e.g. behind-the-meter combined heat and power), and the exclusion of generators from acquiring distribution or transmission assets (over 10 MW).

Figure 3: Ontario CEP Policy Map



Source: Gross, A. (2017). Ontario CEP Policy.

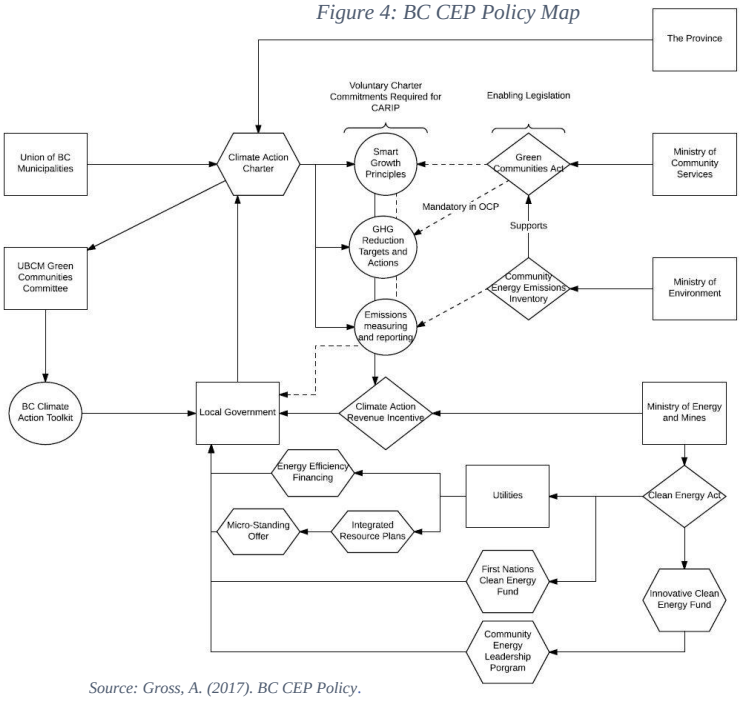
[49] McMurtry, J. (2017). Canadian Community Energy: Policy, Practice, and Problems.

BRITISH COLUMBIA LEGISLATION, REGULATION AND INITIATIVES THAT IMPACT CEP

Summary

British Columbia's legislative and regulatory environment delivers strong support for CEP, although barriers still exist within its framework. To begin, the province enforces legislative requirements for Community Energy Emissions Inventories as established in the Green Communities Legislation, i.e., GHG reduction targets are mandatory in Official Community Plans and policies and actions to achieve these targets must be defined.[50] This requirement is one tool used to assist the province with achieving its climate targets; however, it has not been effective enough to help the province meet its 2020 GHG reduction target, according to the new BC government. This is due to a variety of reasons, including a low carbon price of $30/tonne. Research shows that a higher carbon tax is more effective at altering consumer behaviour and reducing emissions in various sectors. For example, British Columbia reduced GHG emissions 3 per cent between 2007 and 2014 with a $30/tonne carbon price. In comparison, Sweden reduced GHG emissions 22 per cent between 1990 and 2013 with a $150/tonne carbon price.[51] The difference is quite significant. Therefore, in May 2018, British Columbia dropped its 2020 emissions target, blaming the previous Liberal government for failing to do enough to meet that goal.[52] A new target aiming to achieve a 40 per

Figure 4: BC CEP Policy Map



Source: Gross, A. (2017). BC CEP Policy.

[50] Greenhouse Gas (GHG) Emission Reduction Targets, (2017). Policies and Actions. Local Government Division. Retrieved from http://www.cscd.gov.bc.ca/lgd/greencommunities/targets.htm

[51] Johnson, T. (2017, Jan). What it takes for a carbon tax to work. *CBC*. Retrieved from https://www.cbc.ca/news/canada/calgary/carbon-taxes-do-they-work-it-s-a-good-question-1.3887729

[52] Laanela, M. (2018, May). B.C. government drops greenhouse gas target for new 2030 goal. *CBC News*. Retrieved from https://www.cbc.ca/news/canada/british-columbia/b-c-government-drops-greenhouse-gas-target-for-new-2030-goal-1.4653075

cent reduction below 2007 levels by 2030 has been included in Bill 34, the Greenhouse Gas Reduction Targets Amendment Act, 2018.[53]

In terms of CEP, British Columbia's mandatory requirement for Community Energy Emissions Inventories as established in the Green Communities Legislation is one significant difference between British Columbia climate policy and Ontario (voluntary and less effective in ON). British Columbia also provides strong support for action plans, tools, funding programs, and strategies that support CEP. Energy efficiency performance standards were implemented for appliances, industrial equipment, and buildings to assist with lowering GHG emissions. Moreover, the province has developed a solid regulatory framework for the clean energy sector, with various strategies and programs intertwined to assist its growth. Notable examples include the landfill gas regulation, the Solar Hot Water Ready Program, the Bioenergy Strategy, and the BC Energy Step Code. The BC Energy Step Code is a progressive tool that allows municipalities to increase energy efficiency performance targets in order to support market transformation. All of these actions will be required if British Columbia is to achieve its goal of becoming net zero ready by 2032.[54]

Although British Columbia has implemented multiple actions that support CEP, there are also areas for improvement. For example, a lack of judicial control over transit funding has forced some municipalities to abandon certain CEP initiatives. That being said, British Columbia has provided municipalities with significant decision-making authority, unlike Ontario. In terms of energy generation, this has allowed the City of Vancouver greater freedom to implement DER projects, such as a landfill gas generation development and some solar PV development.[55] Another area for improvement is a need for greater integration between community energy plans and BC Hydro Integrated Resource Plans and Utility Long-Term Resource Plans. This action could assist with decision-making and resource allocation and lead to far more effective energy planning. Furthermore, improvements in the area of third-party ownership and net metering are recommended. TPO is limited due to the requirement that the generating facility must reside on the same or adjacent parcel of land as the customer. Additionally, British Columbia Utilities

53 Ibid.

54 Energy Step Code BC's Transition to Net Zero Energy Ready New Buildings. (2016). Climate Action Leadership Symposium. Retrieved from https://www2.gov.bc.ca/assets/gov/environment/climate-change/cng/symposium/2016/20_energy_step_code_bcs_transition_to_net_zero_energy_ready_buildi_-_zachary_may.pdf

55 Tozer, L. (2013). Community energy plans in Canadian cities: success and barriers in Implementation. *Local Environment, 18(1)* 20-35. Retrieved from http://dx.doi.org/10.1080/13549839.2012.716406

Commission recently approved proposed changes to not allow customers to generate electricity that exceeds their anticipated annual consumption; this action acts as a barrier to large, utility-scale net metering projects. The cancelation of the Standard Offer Program further signifies that renewable energy projects in the province face substantial barriers moving forward.

British Columbia is a CEP leader in Canada. While there are misalignments that act as barriers, overall provincial legislation and regulation is supportive of CEP. Energy and climate action have been well integrated with municipal land use planning tools, making municipalities more effective in implementing initiatives. Clear guidelines and case studies have also been created to demonstrate the different ways in which municipalities can adopt and adapt these tools to their local context.

REGULATORY AND INSTITUTIONAL STRUCTURES: BARRIERS AND SUPPORT FOR BEHIND-THE-METER PROGRAMS, INITIATIVES, AND TECHNOLOGIES

Behind-the-meter (BTM) refers to an on-site renewable or low-carbon energy system that powers residential, institutional, or commercial buildings. BTM systems can be utilized for multiple applications, including self-generation and power balancing, i.e., matching the supply of electricity to demand on a smart grid via initiatives such as demand response. BTM systems deliver electricity to buildings, fulfilling a percentage of its electrical needs; the remaining electricity is supplied to the grid, utility, or storage system. In Canada, BTM systems are regulated through the Net Metering and FIT programs. BTM energy systems play a significant role in CEP because they (1) help to reduce GHG emissions, (2) increase energy security and reliability of the grid, (3) provide economic benefits to the system owner and utility, and (4) provide community groups and members with a mechanism to participate in CEP goals and objectives. Due to their substantial impact on CEP, this section reviews the regulatory and institutional structures impacting BTM programs, initiatives and technologies in Ontario and British Columbia.

ONTARIO BEHIND-THE-METER PROGRAMS, INITIATIVES, AND TECHNOLOGIES

Net Metering

Third Party Ownership

Third Party Ownership (TPO) is a concept where a third party owns and operates a renewable energy system and sells the electricity generated to customers. One way this can be accomplished is via a power purchase agreement. Using net metering, the customer could receive credits from the LDC for electricity generated by the third party owned renewable energy system.[56] TPO is beneficial because it offers individuals that are interested in generating renewable energy on their property the opportunity to do so without having to pay the high upfront costs required to purchase the system.[57] This concept is beneficial to CEP as it broadened the scope of potential net metering customers, allowing more individuals to participate in the program, in turn supplying the electricity gird with more renewable energy. Under the current net metering framework, TPO is not allowed as the rules require all energy produced via DER to be generated and consumed on site by the systems owner and operator.[58] But, after significant consultations between the OEB and relevant stakeholders, the current net metering program will be expanded in 2018 via legislative and regulatory amendments to allow TPO of net-metered renewable generation systems in Ontario.[59] This change is presented in the updated 2017 Ontario Long-term Energy Plan.[60]

Virtual Net Metering

Single entity and multiple entity virtual net metering (VNM) are a form of bill crediting for a shared DER system.[61] They expand the program significantly by removing barriers to participation, including a clause that states electricity generated via DER must be generated onsite and consumed by the systems owner. Single entity VNM would allow a single owner

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56 Third-Party Ownership & Virtual Net Metering. (n.d.). Ontario Sustainable Energy Association. Retrieved from https://www.ontario-sea.org/resources/Documents/OPRAC/Submissions/MOE%20Questionnaire%20NET%20Metering%20-%20OSEA%20Reply%20-%20FINAL%20-%2020170208.pdf

57 Ibid

58 Ibid

59 Ontario Plans to Enable Third-Party Ownership of Net Metering Systems. (2017, Oct). PVBUZZ. Retrieved from https://www.pvbuzz.com/ontario-third-party-ownership-net-metering-systems/

60 Ontario's Long-Term Energy Plan. (2017). Government of Ontario. Retrieved from https://files.ontario.ca/books/ltep2017_0.pdf

61 Virtual Net Metering: Clean Power for All People. (2017, July). SparkPower. Retrieved from http://sparkpower.ca/2017/07/virtual-net-metering-clean-power-people/

(e.g., individual or business) of a DER system with multiple meters (e.g. buildings) to distribute electricity credits amongst their LDC accounts. Multiple entity VNM would allow a utility to distribute electricity credits to multiple owners of a DER system, offsetting their electricity bills. A community owned solar PV array is one example where virtual net metering would apply. Credits would be distributed based on ownership shares in the DER system.[62] These forms of net metering reduce costs to DER owners and utilities in many areas due to economies of scale (e.g., volume discounts in capital costs, financing costs and operating expenses) but increase administrative costs on LDC due to the increased workload, e.g., applying credits to accounts.[63] Currently, VNM is not allowed under the net metering policy, but change is coming. According to the 2017 Ontario Long-Term Energy Plan, the government will propose legislative and regulatory amendments in the fall of 2017 that will allow for VNM demonstration projects to be developed throughout the province. [64] Pending passage of legislative amendments, regulatory changes would be made in 2018.[65]

TPO and VNM delivers various benefits to multiple entities, including individuals, business, and utilities. Ontario's electricity system would also benefit from an expanded net metering program: TPO and VNM can increase grid resiliency by offsetting vulnerability to upstream supply disruptions, displace distributed loads from the grid through DER and self-consumption, and help LDC defer costly infrastructure investments to grid constrained areas through TPO of DER systems.[66]

Tiered Pricing vs. Time-of-Use Pricing

Currently, net metering customers are billed under the Tiered Pricing structure of the Regulated Price Plan (RPP) and not time-of-use (TOU). This has been a point of interest within the renewable energy industry as some individuals have expressed a desire to provide residential and small business net metered customers the ability to choose between the two options. It has been noted that electricity exported to the grid at volumetric electricity rates can de disadvantageous

62 Ibid.

63 Third-Party Ownership & Virtual Net Metering. (n.d.). Ontario Sustainable Energy Association. Retrieved from https://www.ontario-sea.org/resources/Documents/OPRAC/Submissions/MOE%20Questionnaire%20NET%20Metering%20-%20OSEA%20Reply%20-%20FINAL%20-%2020170208.pdf

64 Ontario's Long-Term Energy Plan. (2017). Government of Ontario. Retrieved from https://files.ontario.ca/books/ltep2017_0.pdf

65 Ibid.

66 Third-Party Ownership & Virtual Net Metering. (n.d.). Ontario Sustainable Energy Association. Retrieved from https://www.ontario-sea.org/resources/Documents/OPRAC/Submissions/MOE%20Questionnaire%20NET%20Metering%20-%20OSEA%20Reply%20-%20FINAL%20-%2020170208.pdf

as summer on-peak rates in Ontario are between the times of 11:00 am and 5:00 pm, a timeframe that delivers the most available sunlight for solar net metering customers.[67]

In order for this option to be made available, investments in the Independent Electricity System Operator's (IESO) Meter Data Management and Repository are required to accept generation data. This central database collects, validates, estimates, edits and delivers billing quality data from smart meters to utilities.[68] Furthermore, investments in electricity distributor billing and communications systems are also required. In 2017, the Ministry of Energy conducted a cost-benefit analysis to build a better understanding if these investments would be cost effective for electricity ratepayers.[69] Providing the TOU pricing structure to net metering in Ontario could deliver multiple benefits to the system, including increased uptake of the program due to higher returns and lower break-even points for net metering customers, increased supply (due to increased uptake) in the summer months during mid-day peak demand reducing the timeframe natural gas Peaker plants are required online, and upgraded systems that provides data with greater detail, improving transparency, program delivery and development.

Ontario Energy Board Distribution Rate Design

New Rate Design for Electricity Distributors

According to the OEB's former *Rate Design for Residential Electricity Customers,* electricity consumers in Ontario were charged a fixed monthly service charge and a variable rate.[70] The lower the consumption of grid electricity, the lower the customer bill as the variable rate was based on the kWh of consumption. This rate design was beneficial to net metering participants as the generation and use of electricity from DER lowered the need for grid electricity, allowing the generator to achieve an acceptable payback period on their investment, e.g., rooftop solar system. Therefore, DER generators that produced enough electricity to meet their needs were only charged a monthly service charge. For utilities, this had been identified as an issue as the monthly service charge did not fully cover their costs incurred for delivering on-going reliable service and their requirement to take excess electricity from DER systems when over

67 Ontario Hydro Rates. (2018). Time-of-Use Pricing. Retrieved from http://www.ontario-hydro.com/current-rates

68 Webinar on Potential Updates to Ontario's Net Metering Program. (2017, Jan). Ontario Sustainable Energy Association. Retrieved from https://www.ontario-sea.org/resources/Documents/OPRAC/Net%20Metering%20-%20Part%202%20-%20Webinar%20FAQ.pdf

69 Environmental Registry. (2017). Ministry of Energy. Retrieved from https://www.ebr.gov.on.ca/ERS-WEB-External/displaynoticecontent.do?noticeId=MTI5NTIx&statusId=MjAwMjM1

70 Draft Report of the Board. (2014, Mar). Ontario Energy Board. Retrieved from www.oeb.ca/oeb/_Documents/EB-2012-0410/EB-2012-0410%20Draft%20Report%20of%20the%20Board_Rate%20Design.pdf

producing.[71] To address this problem, the OEB allowed LDC to place a 1% capacity limit from net metering on their total throughout.[72] This limit was a barrier to DER and net metering as it limited the number of participants in the program.

As this capacity limit conflicted with the government's renewable energy goals stated in the Long-Term Energy Plan and threatened the traditional utility business model, a new distribution rate design for residential electricity customers was designed after significant consultations with stakeholders. The new rate design, a fixed cost implemented incrementally over a 4-year period (2016 to 2019), allows LDC to fully recover distribution system costs and allows for the elimination of the OEB Distribution System Code's 1% limit on net metering capacity.[73] Although this new rate design eliminates the 1% capacity barrier, it also raises the costs to net metering customers that only require small amounts of electricity from the grid, in turn increasing the payback period of DER systems.[74] Therefore, the consequences of this new rate design both benefit and diminish the effectiveness of the net metering program.

New Rate Design for Electricity Commercial and Industrial Customers

Gross Load Billing is a billing method being considered by the OEB as the standard way to charge commercial and industrial customers when they have a load displacement generator behind the meter. According to the OEB, because the number of customers with load displacement or BTM generation is increasing, LDC require a fairer rate design to recover the costs incurred, such as investments in infrastructure.[75] These costs are recovered via the Global Adjustment, but depending on how the customer is billed, DER can impact the amount paid to the utility for these services. Currently, there is not a consistent billing method in place for distributers when dealing with this type of customer.

In Ontario, commercial and industrial customers are billed in one of two ways: net load billing or gross load billing. Customers charged via "net load" billing means they are billed based on their

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71 A New Distribution Rate Design for Residential Electricity Customers. (2012). Ontario Energy Board. Retrieved from https://www.oeb.ca/oeb/_Documents/EB-2012-0410/OEB_Distribution_Rate_Design_Policy_20150402.pdf

72 Webinar on Potential Updates to Ontario's Net Metering Program. (n.d.). Ontario Sustainable Energy Association. Retrieved from https://www.ontario-sea.org/resources/Documents/OPRAC/Net%20Metering%20-%20Part%202%20 %20Webinar%20FAQ.pdf

73 A New Distribution Rate Design for Residential Electricity Customers. (2012). Ontario Energy Board. Retrieved from https://www.oeb.ca/oeb/_Documents/EB-2012-0410/OEB_Distribution_Rate_Design_Policy_20150402.pdf

74 The Impact of Differential Distribution Rates on Rural Residential Electricity Consumers. (2016, July). The Low Income Energy Network. http://www.lowincomeenergy.ca/news-events/2016/07/the-impact-of-differential-distribution-rates/

75 Billing for Customers with Load Displacement Generators. (2016, Mar). Ontario Energy Board. Retrieved from https://www.oeb.ca/oeb/_Documents/Documents/OEBltr_Gross_Load_Billing_Tx_20160329.pdf

net energy consumption at the meter. This gives consumers with DER the ability to lower their distribution charges through conservation or load displacement generation.[76] "Gross load" billing refers to the customer being "billed for transmission charges and/or Global Adjustment based on not just the customer's net load, but also on any customer load served by embedded generation facilities."[77] Current rate design allows for gross load billing to be applied only to customers with embedded generation facilities larger than one megawatt or larger than two megawatts for renewable DER.[78] The move to gross load billing would remove the current incentive for commercial and industrial customers to utilize BTM generation to lower electricity costs, in turn reducing the adoption of low carbon/renewable energy projects in the province.[79] This move could be considered a barrier to CEP goals and objectives, including renewable energy generation and GHG emission targets. A reduction in low carbon/renewable energy projects increases reliance on centralized electricity generation, decreases grid resiliency and energy security, and removes local energy dollars from the community.

Micro FIT & FIT Programs

In 2009, a FIT program was developed in Ontario under the Green Energy and Green Economy Act, 2009, to encourage and support DER projects, attract investment, and create jobs in the renewable energy sector. The program was administered by the IESO, and divided into two streams depending on the capacity of the DER system: the FIT program represents projects greater than 10 kW and up to 500 kW, and the microFIT program represents all projects less than 10 kW of renewable energy generation.[80] Renewable energy technologies that qualified under the FIT program include solar PV, renewable biogas, on-land wind turbines, and water power.

The program offered renewable energy generators comprehensive guaranteed pricing structures for electricity production under long term contracts (e.g. 20 yrs.).[81] Although the program achieved significant success, it was discontinued in 2016.[82] (The 2011 FIT program two-year

76 Stevens, D. (2016, Apr). Changes Coming to Electricity Rate Design for Ontario's Commercial and Industrial Consumers. Energy Insider. Retrieved from http://www.airdberlis.com/insights/blogs/energyinsider/post/ei-item/changes-coming-to-electricity-rate-design-for-ontarios-commercial-and-industrial-consumers-2/

77 Stevens, D. (2016, Apr). OEB to Consider Rate Design and Billing for Customers with Load Displacement Generation. Energy Insider. Retrieved from http://www.airdberlis.com/insights/blogs/startupsource/post/ei-item/oeb-to-consider-rate-design-and-billing-for-customers-with-load-displacement-generation

78 Billing for Customers with Load Displacement Generators. (2016, Mar). Ontario Energy Board. Retrieved from https://www.oeb.ca/oeb/_Documents/Documents/OEBltr_Gross_Load_Billing_Tx_20160329.pdf

79 Ibid.

80 FIT and microFIT Program. (2015). Ministry of Energy. Retrieved from http://www.energy.gov.on.ca/en/fit-and-microfit-program/

81 Feed-in Tariff Program. (n.d.). IESO. Retrieved from http://www.ieso.ca/sector-participants/feed-in-tariff-program/overview

82 Feed-In Tariff Program Two-Year Review. (2018). Ministry of Energy. http://www.energy.gov.on.ca/en/fit-and-microfit-program/2-year-fit-review/

review states the program attracted more than $27 billion in private sector investment, and created more than 20,000 jobs; additionally, the program was on track to create approximately 50,000 jobs). December 31st 2016 marked the end of new FIT projects as the IESO ceased accepting applications at that time.

The FIT program in Ontario was replaced by the Net Metering Program in 2017. To update and improve the current Net Metering Program, various proposed amendments (Part 1) were accepted and include the removal of the 500 kW limit on net metered facilities and enabling energy storage.[83]

Storage

According to the Ontario Long-Term Energy Plan 2017, the province has taken steps to improve its understanding of energy storage and how it can benefit its electricity network. Actions taken since 2013 include:

- Procuring 50 megawatts of energy storage via the 2014 energy storage procurement framework;
- Using the Smart Grid Fund to support several energy storage projects and test the full range of their capabilities on distribution systems;
- Commissioning various studies to understand the different benefits of energy storage systems.[84]

Completed in two consecutive phases, the IESO secured 50 megawatts of storage under a directive from the Minister. During Phase 1, the IESO awarded contracts to five companies under a competitive Request for Proposal process. Approximately 34 MW were secured during this phase. During Phase 2 the IESO offered 10-year contracts to five companies and secured 16.75MW.[85]

The Ontario Long-Term Energy Plan 2017 also identifies two studies that found energy storage facilities reduce costs for large customers and increase reliability of the electricity system in the

83 Webinar on Potential Updates to Ontario's Net Metering Program. (n.d.). Ontario Sustainable Energy Association. Retrieved from https://www.ontario-sea.org/resources/Documents/OPRAC/Net%20Metering%20-%20Part%202%20 %20Webinar%20FAQ.pdf
84 Ontario's Long-Term Energy Plan. (2017). Government of Ontario. Retrieved from https://files.ontario.ca/books/ltep2017_0.pdf
85 Energy Procurement Programs and Contracts. (2017). IESO. Retrieved from http://www.ieso.ca/sector-participants/energy-procurement-programs-and-contracts/energy-storage

province. The plan also commits to ensuring that there are no unfair barriers that disadvantage the deployment of energy storage, including historical policy frameworks that act as barriers to deployment. Ontario's regulatory framework encourages just-in-time electricity and has traditionally followed the principle that electricity is a resource that cannot be stored.[86] This is one identified barrier to storage projects. The Ontario Government has also recently directed the OEB and IESO to review its rules and regulations impacting storage, one example being the way in which the GA is charged for energy storage projects.[87]

Ontario Regulation 429/04 will be amended to update how the GA is charged to storage facilities with an average monthly peak demand under 1 MW.[88] Once implemented, Class B storage facilities will remit the GA only on net consumption, i.e., net load billing, instead of paying it twice, once when purchasing electricity from the distribution/transmission system and twice when supplying electricity to customers.[89] Two other notable changes include (1) an amendment to the net metering regulation (O. Reg. 541/05) to allow renewable energy generation technologies to be paired with energy storage technologies, and (2) the development of a new class of license for energy storage facilities.[90] These are welcome announcements for energy storage advocates in the province.

Distributed Energy Resources Credits

The design and implementation of DER Credits is currently being considered by the OEB. Due to the benefits DER can provide to the distribution network, e.g. voltage support mitigates or eliminates the need for generator owned capacity investments, LDC could use DER credits as a method to increase the rate of adoption of DER systems.[91] According to the OEB, because the benefits associated to DER are linked to location, source, and availability of controllability, the credits should be designed and issued on a basis of benefits to the system. A few examples include (1) the size of the DER system and its ability to delay capacity upgrades in an area, (2) the ability of the LDC to control the DER load when required (e.g., demand response), and (3)

86 Waqar A. Qureshi, Nirmal-Kumar C. Nair, and Mohammad M. Farid. "Impact of Energy Storage in Buildings on Electricity Demand Side Management." Energy Conversion and Management 52 (2011): 2111.

87 Ontario's Long-Term Energy Plan. (2017). Government of Ontario. Retrieved from https://files.ontario.ca/books/ltep2017_0.pdf

88 Power to Connect. (2018, Feb). EDA. Retrieved from https://poweroflocalhydro.ca/wp-content/uploads/2018/02/2018_EDA_Vision_Paper.pdf

89 Stevens, D. (2017, Nov). Ontario Ministry of Energy Proposes Regulatory Changes to Start Implementing 2017 LTEP. Energy Insider. Retrieved from https://www.airdberlis.com/insights/blogs/energyinsider/post/ei-item/ontario-ministry-of-energy-proposes-regulatory-changes-to-start-implementing-2017-ltep

90 Power to Connect. (2018, Feb). EDA. Retrieved from https://poweroflocalhydro.ca/wp-content/uploads/2018/02/2018_EDA_Vision_Paper.pdf

91 Staff Discussion Paper. (2016, Mar). Ontario Energy Board. Retrieved from https://www.oeb.ca/oeb/_Documents/EB-2015-0043/Staff_Discussion_Paper_RDCI_20160331.pdf

the probability of availability of the response (i.e., the likelihood that fuel is available when needed, for example, via storage).[92]

According to the OEB's Staff Discussion Paper, *Rate Design for Commercial and Industrial Electricity Customers*, the regulator believes the credits could be disbursed in a number of ways: (1) offer DER credits in the form of installation subsidies to customers that are considering or implementing a DER project in an area that requires capacity. The subsidies could be based on the Net Present Value to the deferred investment of the distributor; and (2) offer DER credits for control of DER systems. The payments could be a small payment for the right to control use and a larger time-differentiated payment for actually using the resource.[93]

Hydro One Anti-Islanding 7% rule

According to Hydro One, the Ontario electricity transmission and distribution utility, in order to ensure the reliability, safety and quality of supply to existing load customers and distributed generators, a limit was placed on the amount of DER that can be connected to the grid.[94] Known as the "7 per cent of peak" rule, the policy limits the amount of solar PV connected to the LDC's distribution system.[95] This limit is in part driven by the desire to avoid unintentional islanding, i.e., "the unintentional energization of a portion of the system that has become disconnected from the utility supply".[96] To build a better understanding of Hydro One's connection thresholds and rules, a study by Kinectrics was conducted in 2011. A report titled *Technical Review of Hydro One's Anti-Islanding Criteria for Microfit PV Generators* concluded that Hydro One's position is reasonable.[97] Using this report as evidence to support its policies, Hydro One will not modify its "7 per cent of peak" rule to allow for greater DER penetration of the distribution system. But, as noted during the consultation and engagement on the Ministry of Energy's Net Metering/Self-Consumption program concept proposal, the utility is open to the possibility of modifying the rule in the future based on further research and testing.[98] This came

92 Ibid.
93 Ibid.
94 Third-Party Ownership & Virtual Net Metering. (n.d.). Ontario Sustainable Energy Association. Retrieved from https://www.ontario-sea.org/resources/Documents/OPRAC/Submissions/MOE%20Questionnaire%20NET%20Metering%20-%20OSEA%20Reply%20-%20FINAL%20-%2020170208.pdf
95 Board Staff Discussion Paper. (2012, Dec). Ontario Energy Board. Retrieved from https://www.oeb.ca/oeb/_Documents/EB-2012-0246/Micro-embedded_Discussion_Paper_20121220.pdf
96 Technical Review Of Hydro One's Anti -Islanding Criteria For Microfit Pv Generators. Kinectrics. http://studylib.net/doc/18440097/technical-review-of-hydro-one-s-anti-islanding-criteria-f...
97 Ibid.
98 Ontario Net Metering/Self Consumption Summary Q&As. (n.d.). Switch. Retrieved from http://www.switchontario.ca/resources/Documents/Ontario%20Net%20Metering%20-%20Self%20Consumption%20FAQs.pdf

as bad news for many DER supporters, e.g., the Canadian Solar Industries Association, as the rule is viewed as a barrier. The organization point out the rule has limited the ability of many microFIT projects to connect to the distribution grid. The rules limit "microFIT PV solar penetration on the utility's F- and M-class feeders to 7% and 10% of the peak feeder load."[99] Because Hydro One's Anti-Islanding 7% rule limits the amount of DER that can connect to the distribution system, it acts as a barrier to CEP.

In contrast, the OEB has removed the limits on the amount of net metering a distributor may provide due to a new distribution rate design.

Market Renewal Program

IESO's Market Renewal Program is currently being designed to reform Ontario's annual electricity market. The changes are meant to address past issues with market design (e.g., Ontario's two-schedule system that "delivers a uniform price of electricity across the province but does not fully reflect actual conditions (like transmission limitations) on the power grid"), [100] while increasing efficiency, competition, transparency, certainty and implement-ability.[101] Planned market reform enhancements include (1) improved utilization of interties with neighboring electricity systems to deliver benefits including a reduction in the cost of surplus-generation conditions[102] and (2) the development and implementation of an incremental capacity auction used to support investments in Ontario's electricity system.

Capacity Auctions

Under the IESO' Market Renewal Program, an incremental capacity auction will be implemented to improve the procurement of the generation resources required to meet the needs of Ontario's electricity system while increasing system reliability and resilience. Capacity auctions are able to deliver improved efficiency by (1) creating a competitive market for generators, (2) increasing the system's flexibility to adjust to changing circumstances, and (3)

99 Technical Review of Hydro One's Anti -Islanding Criteria for Microfit PV Generators. (2011, Nov). Kinectrics. Retrieved from http://studylib.net/doc/18440097/technical-review-of-hydro-one-s-anti-islanding-criteria-f...

100 Market Renewal. (n.d.). IESO. Retrieved from http://www.ieso.ca/en/sector-participants/market-renewal/market-renewal-single-schedule-market

101 Incremental Capacity Auction. (2017, May). IESO. Retrieved from IESO ICA Presentation.

102 Stevens, D. (2017, Mar). Canada: Study Estimates Billions Of Dollars In Benefits From IESO's Market Renewal Project. Mondaq. Retrieved from http://www.mondaq.com/canada/x/578704/Oil+Gas+Electricity/Study+Estimates+Billions+Of+Dollars+In+Benefits+From+IESOs+Market+Renewal+Project

attracting low-cost, non-traditional capacity resources.[103] Procuring capacity via a competitive market instead of the current technology centric procurement approach can deliver system benefits if designed correctly. Because an optimal, resilient supply mix requires a variety of capacity options, Ontario's new market should be sophisticated enough to allow all cost effective generation technologies to successfully compete where they provide value.[104] For example, even at the federally suggested carbon price of $50 per tonne of CO_2 by 2022, solar PV and wind will struggle to compete with natural gas on price giving fossil fuel an advantage in a capacity market.[105] If the market is designed to differentiate among the various economic, technical and environmental requirements, this could benefit small-scale, community renewable resources.

Regulated Price Plan pricing pilots

The Ontario government is currently working with the OEB and several municipal utilities (e.g. Alectra Utilities and London Hydro) to test innovative time-of-use (TOU) price structures with the goals of improving system efficiency, reducing system peak and long-term infrastructure investment, promoting efficient consumption choices and behaviours, and providing consumers more choice in their electricity price plans. New pricing structures could also increase support for DER technologies and energy innovations. A review of the current RPP by the OEB found that the existing TOU structure did not provide the correct pricing signals to incent consumers to shift their consumption patterns.[106] The new pricing pilots being tested aim to achieve these policy objectives through reduced regulatory barriers (e.g., setting time periods) and greater flexibility and consumer choice. Offering customers greater incentives to reduce their electricity consumption through an extreme price differential is one example. The pilot projects include a variation of time-of-use, critical peak, real-time and flat-rate pricing approaches. A few examples are as follows:

- Low Overnight: creates low-priced overnight rate (¢2/kWh) between 12am and 6am

Price Period	Summer Hours (May through Oct)	Winter Hours (Nov through April)	Price (¢/kWh)
Overnight Off-Peak	12am to 6am	12am to 6am	2.0
Off-Peak	Weekdays: 6am – 7am and 7pm – 12am Weekends: 6am – 12am	Weekdays: 6am – 7am and 7pm – 12am Weekends: 6am – 12am	6.5
Mid-Peak	Weekdays: 7am – 11am and 5pm – 7pm	Weekdays: 11am – 5pm	9.2
On-Peak	Weekdays: 11am – 5pm	Weekdays: 7am – 11am and 5pm – 7pm	18.4

Figure 5: Low Overnight

103 Market Renewal. (n.d.). IESO. Retrieved from http://www.ieso.ca/en/sector-participants/market-renewal/market-renewal-incremental-capacity-auction

104 Power to Lead. (2017). OSPE. Retrieved from https://www.ospe.on.ca/public/documents/advocacy/submissions/OSPE_2017_LTEP_Submission.pdf

105 McCarthy, S. (2018, Apr). 'Carbon pricing works,' Canadian economists say as national debate heats up. *Globe and Mail*. Retrieved from https://www.theglobeandmail.com/business/article-carbon-pricing-works-canadian-economists-say-as-national-debate/

106 Regulated Price Plan Roadmap. (2015, Nov). Ontario Energy Board. Retrieved from https://www.oeb.ca/sites/default/files/uploads/RPP_Roadmap_Report_of_the_Board_20151116.pdf

- Flat Prices: single price (¢9.8/kWh) charged during all hours, priced at a premium to achieve revenue neutrality

- Super-Peak Time-of-Use: removes mid-peak price period and introduces Super-Peak period on summer weekday afternoons (¢25.3/kWh)

Figure 6: Super-Peak TOU

Price Period	Summer Hours (June through Aug)	Winter Hours (Sept through May)	Price (¢/kWh)
Off-Peak	Weekdays: 12am-7am, 7pm – 12am Weekends: All day	Weekdays: 12am-7am, 7pm – 12am Weekends: All day	6.3
On-Peak	Weekdays: 7am – 1pm	Weekdays: 7am-7pm	9.5
Super-Peak	Weekdays: 1pm-7pm	N/A	25.3

- Quick Ramping Critical Peak Pricing (CPP): offers discounted off-peak rate plus 48 Quick-Ramping CPP events, each two hours in duration. Participants provided with load control devices to respond to Quick-Ramping CPP events.[107]

Figure 7: Quick Ramping CPP

Price Period	Summer Hours (May through Oct)	Winter Hours (Nov through April)	Price (¢/kWh)
Off-Peak	Weekdays: 12am-7am, 7pm – 12am Weekends: All day	Weekdays: 12am-7am, 7pm – 12am Weekends: All day	6.0
Mid-Peak	Weekdays: 7am – 11am and 5pm – 7pm	Weekdays: 11am – 5pm	9.5
On-Peak	Weekdays: 11am – 5pm	Weekdays: 7am – 11am and 5pm – 7pm	13.2
Quick-Ramping Critical Peak Price	On the top six system peak days in July and August, and the top three system peak days in June and September: highest demand hour between 4pm-8pm	On the top six system peak days in January and February, and the top three system peak days in December and March: highest demand hour between 4pm-8pm	59.6

In total, 12 pilots developed by the OEB—in accordance with the Guidelines for Pilot Projects on RPP Pricing—and Hydro One will be tested for approximately 1 year.

In terms of energy management, some of these pilot projects will incorporate various forms of communication and smart technologies to identify their impact on customer behaviour, energy use and costs; for example, Alectra Utilities will test enhanced TOU with low overnight off-peak rates and quick-ramping CPP for electric vehicle owners. The LDC will also examine how real-time information feedback delivered through a home energy management system will impact consumer behaviour.[108] According to the Ministry of Energy, the pricing pilots could result in further conservation gains, which would have a positive impact on provincial GHG reduction goals.[109] It would also align with Ontario's Conservation First policy and have a positive impact on community energy planning goals and objectives.

[107] Approved RPP Pilot Structures and Prices. (2017, Oct). Ontario Energy Board. Retrieved from https://www.oeb.ca/sites/default/files/approved-rpp-pilot-structures-prices-20171031.pdf

[108] Alectra Utilities Regulated Price Plan Pilot Application. (2017, April). Ontario Energy Board. Retrieved from https://www.oeb.ca/industry/policy-initiatives-and-consultations/rpp-roadmap

[109] Regulated Price Plan Roadmap. (2015, Nov). Ontario Energy Board. Retrieved from https://www.oeb.ca/sites/default/files/uploads/RPP_Roadmap_Report_of_the_Board_20151116.pdf

The Industrial Conservation Initiative

The Industrial Conservation Initiative (ICI) is a demand response program that offers incentives—reduced global adjustment (GA) costs—to large electricity consumers to reduce their energy consumption during system peak demand with the goals of deferring the longer-term need for new peaking generation and mitigating GHG emissions. ICI participants, known as Class A, are charged the GA on the basis of their percentage contribution to the total system demand during the top five peak demand hours of the year.[110] It is estimated that the ICI reduced peak demand in 2016 by 1,300 megawatt (MW).[111] When the initiative was launched in 2010, only customers with an average peak demand of greater than 5 MW were eligible for the program, but on January 1, 2017, Ontario Regulation 429/04 was amended to make all electricity consumers with an average monthly peak demand of more than 1 MW eligible for the ICI.[112] Additionally, small companies and greenhouses in the manufacturing and industrial sectors with average monthly peak demand greater than 500 kW and less or equal to 1 MW are also eligible. Both positive and negative consequences have been associated to this amendment:

Positives: Now that the Ontario government has expanded the ICI program, there are more opportunities for participants to invest capital in behind-the-meter (BTM) generation or other conservation initiatives. This action will reduce overall GHG emissions associated to the electricity sector. Additionally, even greater GHG emission reductions will be achieved as a greater number of industrial customers "chase the peaks". As more ICI participants utilize BTM generation in an attempt to lower their GA costs on potential peak hour days, loads will be flattened more often making them harder to forecast.[113] This consequence will force participants to run their BTM generators more often in order to ensure they capture more potential peak days.

Negatives: This new, lower eligibility threshold for ICI participants has raised concerns because the program has an unintended consequence of transferring Class A large industrial consumer costs onto non-participating Class A and Class B residential and commercial consumers. This happens because some ICI participants have the ability to bend the rules by utilizing standby

110 Industrial Conservation Initiative (ICI) Overview. (2017, Feb). IESO. Retrieved from www.ieso.ca/-/media/files/ieso/document-library/global.../ici-overview-webinar.pdf

111 Industrial Conservation Initiative Backgrounder. (2017, Sept). IESO. Retrieved from http://www.ieso.ca/-/media/files/ieso/document-library/global-adjustment/ici-backgrounder.pdf?la=en

112 Industrial Conservation Initiative (ICI) Overview. (2017, Feb). IESO. Retrieved from www.ieso.ca/-/media/files/ieso/document-library/global.../ici-overview-webinar.pdf

113 Smith, E., Sadikman, J., & King, R. (2017, Mar). Ontario's "Fair Hydro Plan" changes provincial electricity pricing and expands opportunities for behind-the-fence generation. Osler. Retrieved from https://www.osler.com/en/resources/regulations/2017/ontario-s-fair-hydro-plan-changes-provincial-ele

generators on the 5 highest demand days of the year, reducing their overall annual GA costs.[114] The aggregate cost reduction benefit to the power system from reduced energy consumption during system peak demand is less than the combined reduced electricity bills for Class A consumers, so the costs are redistributed from ICI participating Class A consumers to non-participating Class A and Class B consumers who do not qualify for the program. This has led to Class B customers carrying much of the cost load.

Conclusion: Overall goals of CEP typically aim to mitigate energy use through local energy conservation initiatives and the integration of renewable-low carbon energy sources at a building or neighbourhood scale; therefore, the importance of BTM programs, initiatives, and technologies should not be understated. In Ontario, there are still many barriers facing this industry. With the cancellation of the micro-FIT and FIT programs, net metering now regulates BTM technologies in the province. Some barriers diminish the effectiveness of the net metering program, while others act specifically as barriers to CEP. For example: (1) The Hydro One Anti-Islanding 7% rule limits the amount of solar PV connected to the LDC's distribution system due to reliability, safety and quality of supply concerns, according to the utility. This limits the amount of DER that can connect to the distribution system; (2) gross load billing, a new billing method being considered by the OEB, would remove the current incentive for commercial and industrial customers to utilize BTM generation to lower electricity costs. This would reduce the adoption of low carbon/renewable energy projects in the province; and, (3) tiered pricing, the current billing structure for net metering customers under the RPP, has been found to be less beneficial to net metering participants as the TOU pricing structure. TOU could increase participation in the net metering program due to higher returns and lower break-even points for BTM system investments.

While these barriers continue to negatively impact net metering in the province, some barriers to participation are being rectified through various legislative and regulatory amendments, including:

- Implementing third-party ownership and virtual net metering of BTM renewable-low carbon generation projects; these changes should come into effect in 2018;

[114] Power to Lead. (2016). Ontario Society of Professional Engineers. Retrieved from https://www.ospe.on.ca/public/documents/advocacy/submissions/OSPE_2017_LTEP_Submission.pdf

- Allowing renewable energy generation technologies to be paired with energy storage technologies (O. Reg. 541/05);
- Removing the OEB Distribution System Code's 1% limit on net metering capacity due to a new rate design for electricity distributors that allows LDC to fully recover distribution system costs; and
- Removing the 500 kW project capacity size limit on net metered facilities (O. Reg. 541/05).

On top of these amendments, Distributed Energy Resources Credits are currently being considered by the OEB as a strategy to increase the rate of adoption of DER systems in areas requiring capacity upgrades. DER credits would incentivise clean energy projects, which in turn would lower GHG emissions significantly in areas reliant on fossil fuels. Additionally, the ICI has been expanded in Ontario increasing opportunities for Class A participants to invest capital in BTM generation or other conservation initiatives. While this action is positive for reducing GHG emissions associated to the electricity sector, the move also has a negative impact for Class B residential and commercial consumers as it redistributes costs onto them making non-participating ICI customers carry much of the cost load.

One current unknown is the new capacity auction's impact on the electricity sector and CEP in general. As mentioned, the market should be sophisticated enough to allow all cost effective generation technologies to successfully compete where they provide value. Differentiation among the various economic, technical and environmental requirements could lead to more small-scale, community renewable resources being deployed throughout the province. This would help Ontario avoid an increased use of GHG emitting fossil fuels, e.g., natural gas.

BEHIND-THE-METER PROGRAMS, INITIATIVES, AND TECHNOLOGIES IN BRITISH COLUMBIA

Net Metering

Net metering allows residential and commercial customers to generate electricity (up to 100kW) via DER (e.g. solar PV, run-of-river or wind) to offset their personal consumption BTM. In British Columbia, if the consumer's annual outflow (amount of electricity sent to the grid), is greater than their inflow (electricity from the grid flowing to the residence), the utility will pay the consumer for the net annual excess electricity at the customer's retail rate. BC Hydro currently pays customers 9.99 cents per kWh and FortisBC (FBC) pays customers 10.1 cents per kWh for Tier 1 (first 1,600 kWh) and 15.6 cents/kWh for Tier 2 (all additional kWh).[115]

This annual payout for excess electricity has been an ongoing concern for the utilities as the retail rate is much higher than the price they pay for power from third parties. The utilities believe paying the retail rate for excess power has led to an increase in net metering customers implementing BTM projects for reasons beyond meeting their own electricity loads. An increase in large generating systems, which are sized to create surplus power and reimbursed at the retail rate, will leave regular customers paying more for surplus electricity.[116] But, according to the British Columbia Sustainability Energy Association, this is not realistic as the "retail price covers not only the utility's cost of delivered energy but also the utility's cost of being able to meet system peak demand (which includes transmission) and a large portion of the utility's cost of providing billing and customer contact services (the rest being covered by the basic charge)."[117]

This issue led FBC to file a Net Metering Program Tariff Update Application with the British Columbia Utilities Commission (BCUC), and in December 2016 they ruled that the utility could not expel existing net metered customers from the program if they generate surplus electricity annually; but, the commission also ruled that FBC can deny new customers access to the net metering program if their BTM generation surpasses their own annual consumption.[118]

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115 Net Metering with BC Hydro and FortisBC. (n.d.). Integrated Power Systems. Retrieved from http://ipwr.net/net-metering-bc-hydro-fortisbc/

116 Andrews, B. (2016). Don't throw the baby … BCSEA. Retrieved from https://www.bcsea.org/bcsea-news/dont-throw-baby-out-with-bathwater-bcsea-pushes-better-net-metering-rules

117 Ibid.

118 Andrews, B. (2017). Utility not allowed to kick out net metering customers. BCSEA. Retrieved from https://www.bcsea.org/bcsea-news/utility-not-allowed-to-kick-out-net-metering-customers

Additionally, the commission rejected the utility's proposed change in the purchase price of Net Excess Generation, and therefore FBC is still compensating its net metering customers at the retail rate.[119]

More recently, BC Hydro has also submitted an application to amend the net metering service to make the program unavailable to customers that seek to generate more electricity than they consume on an annual basis.[120] Additionally, BC Hydro intends to submit an additional application to the BCUC seeking further changes to the net metering program. These additional changes could come in the form of a reduction in price credited to customers selling surplus electricity to the utility.[121] Unfortunately, these barriers impact CEP as they discourage greater participation in the net metering program, which in turn reduces the number of clean, local energy projects accessing the grid.

Virtual Net Metering

In British Columbia, VNM or Community Net Metering is an emerging concept that still faces specific regulatory barriers, including a requirement for customers to own the land in which the renewable energy project resides. This excludes a significant portion of the population from participating in net metering projects, for example, renters and condor owners. BC Hydro and FortisBC should consider expanding the net metering program rules to accommodate community owned and managed distributed energy resources.

Through the allocation of kWh credits from a shared, clean, community energy project, ratepayers could reduce and control their energy costs while helping to reduce GHG emissions within their community.[122] In the City of Nelson, British Columbia, VNM is possible as the municipality owns the local utility, Nelson Hydro, and its electricity grid. This ownership allowed the municipality to develop and implement Canada's first Community Solar Garden in June 2017. Members of the community invest in the solar energy production on a per panel basis and in turn their electricity bills are credited in proportion to their investment on an annual basis

119 BCUC. (2016). Decisions and Reports. Retrieved from https://www.ordersdecisions.bcuc.com/bcuc/decisions/en/item/214348/index.do

120 Application to Amend Net Metering Service. (2018, Apr). BC Hydro. Retrieved from https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/integrated-resource-plans/current-plan/amended-rate-schedule-1289-net-metering-apppendix-b.pdf

121 Farrell, N. (2018, Apr). Death knell for net metering. In-Sights. Retrieved from https://in-sights.ca/2018/04/20/death-knell-for-net-metering/

122 Meeting Future Electricity Needs. (2017, Oct). Saltspring Solar. Retrieved from http://saltspringsolar.ca/2017/11/12/meeting-future-electricity-needs/

for 25 years.[123] The diverse group of investors includes renters, homeowners, co-ops, churches, schools, and business owners. This centralized solar array produces approximately 70,000 kWh annually and consists of 248 solar modules; the project was developed through Nelson Hydro's EcoSave Energy Retrofits Program.[124]

Two-Tier Billing

The two-tiered rate system was implemented in British Columbia in 2008 to encourage energy conservation from both residential and commercial customers. Due to the rate systems failure to influence commercial consumer behaviour to conserve electricity, the BC Utilities Commission approved a request by BC Hydro to scrap the tiered system for commercial customers but keep a two-tiered rate design for residential customers.[125]

Maintaining the two-tiered rate for residential customers has been met with much frustration from the community as it has the unintended consequence of incentivizing fossil fuel use for heating and hot water, among other issues. In many cases it is much cheaper in British Columbia to heat a home with natural gas. Furthermore, the rate system does not differentiate between large and small homes or the number of people residing in a particular dwelling. Many families cannot stay within the Tier 1 class annually, which had led to examples of fuel switching from renewable electricity to fossil fuels.[126]

Similar to Ontario, in many locations where natural gas is both available and cheap, the two-tiered billing structure also does not financially benefit a net metering customer enough to justify the investment in a DER system. FBC found that heating a home with natural gas is approximately 3 times cheaper than with electricity in some areas.[127] BC Green Party leader, Andrew Weaver, believes a move to time-of-use billing would be a more effective way to encourage energy conservation while lowering electricity bills for households.[128] It would also

123 Nelson's Community Solar Garden. (n.d.). City of Nelson. Retrieved from https://www.nelson.ca/223/Community-Solar-Garden
124 Ibid.
125 Bennett, N. (2017, Jan). Two-tiered hydro billing system for business to be scrapped. BIV. Retrieved from https://biv.com/article/2017/01/two-tiered-hydro-billing-system-business-be-scrapp
126 Weaver, A. (2017, Nov). Unintended consequences of BC Hydro's two-tier billing. Retrieved from http://www.andrewweavermla.ca/2017/11/01/unintended-consequences-bc-hydros-two-tier-billing/
127 Wilson, D. (2017, Oct). BC Hydro 2-tier rates up for review, premier says. *CBC*. Retrieved from http://www.cbc.ca/news/canada/british-columbia/hydro-rates-two-tier-review-horgan-mungall-weaver-1.4380417
128 Weaver, A. (2017, Nov). Unintended consequences of BC Hydro's two-tier billing. Retrieved from http://www.andrewweavermla.ca/2017/11/01/unintended-consequences-bc-hydros-two-tier-billing/

benefit the net metering program as it would increase uptake due to higher returns and lower break-even points for net metering customers.

BTM Storage

BTM energy storage in British Columbia is still in a nascent stage, certainly in comparison to the province's major energy storage hydro projects, such as WAC Bennett Dam and the new Site C project. Although personal energy storage products are available to customers in British Columbia, including the Tesla Powerwall, the benefits of ownership are diminished by the fact that ratepayers can send surplus generation from DER to the grid for credits on their electricity bills via the net metering program, and consume electricity from the grid when their DER system is not providing sufficiently. TOU billing is also not utilized in the province meaning ratepayers cannot charge batteries when electricity is cheap and use it when prices are at their highest.

Where battery storage is useful for British Columbia residents is in providing reliable backup power during outages. This can be critical, especially for institutions that run essential equipment, such as hospitals. It is also very useful for individuals residing off-grid, capturing and expending electricity for homeowners when required and available.

Additional factors impacting the BTM storage market in British Columbia include the government's decision to not implement a FIT program, which if applied would provide a greater business case for linking solar PV to batteries, and Hydro BC's increasingly stringent eligibility criteria for the Standing Offer Program.[129] Due to issues such as these, energy storage companies in British Columbia have refocused their efforts towards export markets in the province. They are spending far more resources working to exploit opportunities abroad where the regulatory and investment climate is comparatively more favourable.[130]

129 BC Clean Energy Supply and Storage Market Sector Report. (2012). Globe Advisors. Retrieved from http://globe.ca/wp-content/uploads/2012/10/GLOBE_BCCleanEnergyReport_FINAL.pdf

130 Ibid.

PST Exemption for Renewable Energy Sources

Since April 1, 2013, alternative energy sources such as solar PV, solar thermal, wind electric and micro-hydro renewable energy systems are all exempt from the 7 per cent PST in British Columbia.[131] Additionally, materials and equipment used to prevent heat loss from buildings are also eligible for this incentive program; this includes thermal insulation material, polystyrene forming blocks, and weather stripping and caulking materials.[132] Considered a generic item, battery storage does not qualify for the exemption under the program rules. This financial incentive increases the affordability of community and residential clean energy projects, in turn providing support for the province's net metering program.

Micro-Standing Offer Program

The Micro-Standing Offer Program (Micro-SOP) applies to small-scale clean energy projects over 100 kW up to 1MW. This non-competitive program was designed to deliver a more streamlined approach in comparison to the Standing Offer Program, with benefits including a reduced cost to participate and simplified interconnection requirements.[133] The intended targets are First Nations and community groups throughout British Columbia; eligible community groups include municipalities, not for profit community or cooperative group, the public sector (e.g. schools and hospitals) and the agriculture sector (e.g. on-farm operations using organic waste). Electricity generated must serve the customers' needs first with the excess generation being sold back to the utility "net-of-load" based on hourly surplus.[134] To apply, the developer and project must meet various eligibility requirements, including the following:

- Must be a Community or First Nations group
    - Community groups – must have at least 50% control and beneficial ownership of the project

131 Pay No PST: Solar & Wind. (2015, Aug). Terratek Energy. Retrieved from http://terratek.ca/pay-no-pst-solar-wind/

132 Provincial Sales Tax (PST) Bulletin. (2017, Nov). Government of British Columbia. Retrieved from https://www2.gov.bc.ca/assets/gov/taxes/sales-taxes/publications/pst-203-energy-conservation-ice-fund-tax.pdf

133 At a glance: Micro-Standing Offer Program launch and Standing Offer Program updates. (2016, Mar). BC Hydro. Retrieved from https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/independent-power-producers-calls-for-power/standing-offer/sop-and-micro-sop-updates.pdf

134 Ibid.

  - First Nations – must have significant beneficial ownership and prove community will actively participate in the development, construction, or operation of the project in a meaningful way

- Must possess all material permits
- Must demonstrate site control over the entire project area
- Must be clean energy generated from a clean or renewable resource
- Must be directly interconnected to the Distribution System [135] [136]

As of August 18, 2017, BC Hydro has suspended all applications for the Micro-SOP in order to conduct a program review.[137]

Feed-in Tariff Program

In 2010, the Government of British Columbia released the Clean Energy Act, which includes a provision for a feed-in tariff program. The regulation states, "to facilitate the achievement of one or more of British Columbia's energy objectives, the Lieutenant Governor in Council, by regulation, may require the authority to establish a feed-in tariff program."[138] The word "may" is important here as it allows BC Hydro to not adhere to this piece of the legislation. According to the BC Hydro website, the utility has no plans to implement a FIT program at this time in order to mitigate electricity rate increases.[139] And, with the Site C centralized clean energy project expected to come online in 2024, BC Hydro and the BC government look to avoid acquiring uneconomic sources of intermittent power, which it may then have to sell at a loss.[140] Regardless of Site C, there is still broad support across British Columbia for cleaner, renewable distributed generation. Organizations such as the Pembina Institute and the BC Sustainable Energy Association have called on the BC government to implement the feed-in tariff legislation, as it

135 Ibid.

136 Micro-SOP Program Rules. (2016, Mar). BC Hydro. Retrieved from https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/independent-power-producers-calls-for-power/standing-offer/micro-sop-program-rules.pdf

137 Standing Offer Program. (n.d.). BC Hydro. Retrieved from https://www.bchydro.com/work-with-us/selling-clean-energy/standing-offer-program.html

138 Clean Energy Act. (2010). BC Laws. Retrieved from http://www.bclaws.ca/civix/document/id/consol24/consol24/00_10022_01#section16

139 Customer Produced Power - Improving Bc Hydro Policy. (2016). BC Chamber of Commerce. Retrieved from http://www.bcchamber.org/policies/customer-produced-power-improving-bc-hydro-policy

140 Ibid.

would be an effective support policy that increases transparency, resiliency, and stability of British Columbia's energy system.[141]

Micro-Hydro Energy Systems

Although over 95% of the net metering customers choose to install solar PV,[142] micro-hydro energy systems are also a utilized resource in British Columbia. Micro-hydro is classified as a system with an installed capacity in the range of 5 kW and 100 kW; [143] projects 100 kW and less are eligible to access British Columbia's net metering program. These renewable energy systems have become (1) a viable solution to replacing diesel generators in remote communities, and (2) a technology used under the net metering program to both meet and exceed household electricity consumption. According to BC Hydro, some micro-hydro projects are producing approximately 40 to 50 times the electricity required for their homes.[144] Of the 230 customers operating at surplus generation, 6 customers running micro-hydro net metering projects received payouts from between $10,000 and $60,000 for excess power.[145]

Examples such as these have led BC Hydro to seek an amendment from the BCUC to make the net metering program unavailable to customers that seek to generate more electricity than they consume on an annual basis. Although not considered BTM, the City of Fort St. John's micro-hydro project is a great example of an innovative renewable energy project working within the net metering program to mitigate GHG emissions and pollution. The project was the first 100 kW net metering project in British Columbia. It generates enough electricity to power approximately 70 homes annually and produces roughly $80,000 per year in revenue for the city.[146]

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141 British Columbia Renewable Energy & Community Energy Overview. (2016). People, Power, Planet Partnership. Retrieved from http://peoplepowerplanet.ca/wp-content/uploads/2016/01/BC_RECE_Overview_PPP.pdf

142 Generating your own electricity. (2018). BC Hydro. Retrieved from https://www.bchydro.com/work-with-us/selling-clean-energy/net-metering.html?WT.mc_id=rd_netmetering

143 Customer Produced Power - Improving Bc Hydro Policy. (2016). BC Chamber of Commerce. Retrieved from http://www.bcchamber.org/policies/customer-produced-power-improving-bc-hydro-policy

144 Lazaruk, S. (2018, May). B.C. Hydro hopes to cut back … *Vancouver Sun*. Retrieved from http://vancouversun.com/news/local-news/b-c-hydro-will-no-longer-pay-homeowners-for-extra-power-they-generate

145 Ibid.

146 Micro Hydro Project Backgrounder. (n.d.). Fort St. John. Retrieved from http://www.fortstjohn.ca/sites/default/files/public_notice/Micro%20Hydro%20Project%20-%20Backgrounder.pdf

Smart Metering Program

As it works to modernize its electricity system, BC Hydro is encouraging customers to accept an upgrade to a smart meter at zero cost. Smart meters are the utilities preferred technology due to their ability to (1) capture and relay electricity use data periodically to the LDC, (2) detect outages and restore services faster, (3) inform customers of their electricity usage which in turn helps them to make more informed decisions and save them money, and (4) provide customers with more accurate billing.[147] Additionally, smart meters are a key component towards the widespread use of small scale, green distributed electricity generation including solar and wind power in British Columbia.

Approximately 850 customers are now using solar panels across the province. [148] To accommodate customers not wanting to upgrade to a smart meter, BC Hydro introduced the Meter Choices Program. The program provides customers with two additional options: the radio-off meter and the legacy meter. Fees associated to selecting a non-standard meter include a monthly fee ($20 radio-off meter and $32.40 legacy meter) and a set-up and exit fee for radio-off meter customers ($22.60 set-up and $55 exit).[149] According to BC Hydro, the smart metering program has delivered $235 million in benefits and is expected to deliver $1.1 billion in total benefits.[150] Since 2013, the utility has installed 1.93 million smart meters across the province.[151]

Conclusion: In British Columbia, DER is used by an assortment of First Nations and community groups (e.g. municipalities and not for profit community groups), the public sector (e.g., schools and hospitals) and the agriculture sector. DER is also used by local citizens to reduce electricity bills and to reside off-grid, often in areas where grid infrastructure and electricity is not available. In 2004, the net metering program was implemented in the province to allow individuals and groups to generate their own electricity, and sell excess generation back to the utility. Beyond net metering and the PST exemption for renewable energy sources, there is little legislative support for BTM DER in British Columbia, for example:

147 Smart Metering Program. (2016, Dec). BC Hydro. Retrieved from https://www.bchydro.com/news/press_centre/news_releases/2016/smi-fact-sheet.html
148 Ibid.
149 Meter Choices. (2018). BC Hydro. Retrieved from https://app.bchydro.com/accounts-billing/rates-energy-use/electricity-meters/meter-choice.html
150 Smart Metering Program. (2016, Dec). BC Hydro. Retrieved from https://www.bchydro.com/news/press_centre/news_releases/2016/smi-fact-sheet.html
151 Ibid.

- In 2017, BC Hydro's Micro-Standing Offer Program was suspended in order to conduct a program review;

- A provision for a feed-in tariff program was included in the Clean Energy Act but not enacted, according to BC Hydro, to avoid electricity rate increases. It was also not essential as the province currently generates enough clean electricity from its large hydro power projects. The BC government says it is looking to avoid acquiring uneconomic sources of intermittent power, which it may then have to sell at a loss;

- Due to surplus payments made to net metering customers for excess electricity beyond personal requirements, FBC filed a Net Metering Program Tariff Update Application with BCUC to request changes to the program. BCUC ruled the utility can deny new customers access to the net metering program if their BTM generation surpasses their own annual consumption, but it rejected the utility's proposed change in the purchase price of Net Excess Generation;

- Due to the rate systems failure to influence commercial consumer behaviour to conserve electricity, BC Hydro scrapped the tiered system for commercial customers but kept a two-tiered rate design for residential customers. Current issues with the two-tiered system for residential customers, include: (1) the rate system does not differentiate between large and small homes or the number of people residing in a particular dwelling, which has led to fuel switching from renewable electricity to fossil fuels; (2) the rate system does not financially benefit a net metering customer enough to justify the investment in a DER system. FBC found that heating a home with natural gas is approximately 3 times cheaper than with electricity in some areas; and (3) the rate system does not provide the benefits available under the time-of-use structure. TOU would increase uptake due to higher returns and lower break-even points for net metering customers;

- BTM energy storage in British Columbia is still in a nascent stage. Because net metering customers can send surplus generation from DER to the grid for credits on their electricity bills and consume electricity from the grid when their DER system is not providing sufficiently, the business case for BTM storage is greatly diminished;

- Virtual net metering is not available to individuals who do not own the land in which the renewable energy project resides. This excludes a significant portion of the population from participating in net metering projects, for example, renters and condor owners.

One example of a successful initiative supporting BTM DER in British Columbia is the Smart Metering Program. Since 2013, BC Hydro has installed 1.93 million smart meters across the province, which has delivered $235 million in benefits and is expected to deliver $1.1 billion in total benefits.[152]

ALIGNMENTS, MISALIGNMENTS AND GAPS IN THE LEGISLATIVE AND REGULATORY SYSTEMS

As CEP has a significant range of activities and actions under its rubric, its impact is very broad in terms of local governance. Due to this point, considerable climate, energy, and land use policies either directly (e.g. MEPP) or indirectly (e.g. Home Energy Labelling) impact CEP. To build a further understanding, the following sections list a broad range of alignments, misalignments and gaps in the legislative and regulatory systems that impact CEP in Ontario and British Columbia.

ALIGNMENTS IN ONTARIO

Legislative CEP Alignments in Ontario: Through the Provincial Policy Statement (PPS), local governments are expected to demonstrate energy conservation, and to do so through land use planning, urban design, and alternative and renewable energy systems. To help achieve this requirement, multiple supporting plans and programs have been implemented in the province.

First, the ***Ontario Municipal Energy Plan Program*** was established as a support mechanism. The MEPP is a funding program "designed to help municipalities better understand their local

[152] Smart Metering Program. (2016, Dec). BC Hydro. Retrieved from https://www.bchydro.com/news/press_centre/news_releases/2016/smi-fact-sheet.html

energy use, identify opportunities for energy efficiency and clean energy, and develop plans to meet their goals."[153]

Second, the ***Climate Change Action Plan*** was implemented in 2016. This plan creates a major lift to community energy plans due to the significant funding budgeted for plan projects that reduce GHG emissions proposed by a municipality. The CCAP supports the planning and development of low-carbon communities through various actions, including:

- Strengthening climate change policies in the municipal land use planning process, e.g., require electric vehicle charging in surface lots and setting green development standards;
- Supporting municipal and other stakeholder climate action e.g., supporting community energy planning, mapping and platforms;
- Reducing congestion and improving economic productivity, e.g., reduce single-passenger vehicle trips. [154]

Providing further support to CEP is the ***Municipal GHG Challenge Fund***. Part of the CCAP, this fund aims to support community-led action on climate change. Eligible municipalities can receive up to 100% of the costs for projects—up to $10 million per project—that reduce GHG emissions.[155] To obtain funding, the municipality must have completed a community energy or GHG plan and meet program eligibility criteria. Municipalities participating in the MEPP can utilize this path towards eligibility.

Third, the ***2017 Long Term Energy Plan*** enables CEP through its support for regional solutions and infrastructure, near and net zero carbon emission buildings, energy conservation and efficiency, and distributed energy resources. Additionally, the document addresses the data dilemma in the province, and provides a reminder that the CCAP committed to increase data transparency through an expanded Green Button initiative province wide. It also informs that Ontario intends to collaborate with the province's electricity, natural gas and water utilities to adapt the Green Button standard. These actions would have a significant impact on CEP as it

153 Chandhoke, N. (2016). Ontario's Municipal Energy Plan Program. Government Grants Canada. Retrieved from http://www.governmentgrantscanada.ca/ontarios-municipal-energy-plan-program-mep/
154 Ontario's Five Year Climate Change Action Plan. (2016). Government of Ontario. Retrieved from http://www.applications.ene.gov.on.ca/ccap/products/CCAP_ENGLISH.pdf
155 Municipal GHG Challenge Fund. (2017). Government of Ontario. Retrieved from http://www.grants.gov.on.ca/GrantsPortal/en/OntarioGrants/GrantOpportunities/PRDR017538

would boost consumer awareness, spur behavioural change, and improve a communities reporting and benchmarking capabilities.[156]

Fourth, the IESO's ***Aboriginal Community Energy Plan program*** funds the development of community energy plans built to assess the current energy needs and priorities of the community and explore options for conservation and community-led renewable energy projects and initiatives. Due to this program, approximately 100 First Nations and Métis communities are currently developing and/or implementing an energy plan. Financial support for this program will come from a $10 million fund provided by the IESO to support various programs.[157]

Fifth, the updated 2017 ***Growth Plan for the Greater Golden Horseshoe*** makes reference of CEP as one of the tools local governments should be using to effectively manage their energy use and to achieve conservation. The plan supports CEP through policies focused on a culture of conservation. For example, "municipalities will develop and implement official plan policies and other strategies in support of energy conservation for existing buildings and planned developments, including municipally owned facilities".[158] This can be achieved through various actions, including:

- Identification of opportunities for conservation, energy efficiency and demand management, as well as district energy generation, renewable energy systems and alternative energy systems and distribution through community, municipal and regional energy planning processes, and in the development of conservation and demand management plans;
- Land use patterns and urban design standards that support energy efficiency and demand reductions, and opportunities for alternative energy systems, including district energy systems; and
- Other conservation, energy efficiency and demand management techniques to use energy wisely as well as reduce consumption.[159]

156 Ontario's Long-Term Energy Plan. (2017). Government of Ontario. Retrieved from https://files.ontario.ca/books/ltep2017_0.pdf
157 Ibid.
158 Growth Plan for the Greater Golden Horseshoe. (2017). Ontario Ministry of Municipal Affairs. Retrieved from http://placestogrow.ca/index.php?option=com_content&task=view&id=430&Itemid=14
159 Ibid.

The document also aligns itself with the Ontario Climate Change Strategy and Ontario Climate Change Action Plan, committing the Growth Plan to the goal of moving towards low-carbon communities, with the long-term goal of net zero communities.

Climate Change Action Plan, Municipal GHG Challenge Fund and Municipal Energy Plan program: This plan/program/fund alignment supports CEP for municipalities with a community-wide GHG inventory, emissions reduction targets and a strategy/plan to reduce emissions. Due to significant interest in the Municipal GHG Challenge Fund, the eligibility requirements were extended to communities that demonstrate a commitment to completing their community-wide GHG inventory, targets and plan within 18 months.[160] The Municipal GHG Challenge Fund is part of Ontario's Climate Change Action Plan to mitigate GHG emissions and transition to a low-carbon economy. Because applications are scored via evaluation criteria (e.g., project alignment with municipal GHG emissions planning), communities participating in the MEPP are in an advantageous position to receive program funding.[161]

Local Improvement Charge financing: In 2012, the Ontario Ministry of Municipal Affairs and Housing enabled Local Improvement Charge (LIC) financing for municipalities to allow upfront financing for voluntary energy and water efficiency work on private properties. This allows municipalities, with local Council approval, to offer LIC financing to local property owners for energy efficiency upgrades and other work as defined by the municipal program. This amendment (Ontario regulation 322/12) helped the City of Toronto implement the Residential Energy Retrofit Pilot Program in 2014. The programs two streams —the Home Energy Loan Program and the High-rise Retrofit Improvement Support Program—have been extended to December 31, 2018.

160 Municipal GHG Challenge Fund. (2017). Government of Ontario. Retrieved from http://www.grants.gov.on.ca/GrantsPortal/en/OntarioGrants/GrantOpportunities/PRDR017538

161 Municipal GHG Challenge Fund Program Guide. (n.d.). Climate Change Action Plan. Retrieved from http://www.grants.gov.on.ca/prodconsum/groups/grants_web_contents/documents/grants_web_contents/prdr017561.pdf

MISALIGNMENTS AND GAPS IN ONTARIO

While the Green Energy Act requires mandatory reporting by the MUSH (municipalities, universities, school boards and hospitals) sector, the required data is difficult to obtain making reporting and benchmarking challenging: In 2012, the Green Energy Act, 2009, was amended with a requirement for mandatory annual energy reporting for all buildings owned by the broader public sector. Under Ontario Regulation 397/11, the MUSH sectors annual energy reporting has been used to assist Ontario with reducing its energy use and GHG emissions and to help identify energy efficiency opportunities in the province's public buildings.[162] This regulation has resulted in the collection of energy data for thousands of public sector buildings over the last 6 years and has led to a greater uptake of corporate energy planning. This new requirement has also impacted CEP as it has worked to enable community energy plan development to a variable degree.

But difficulties do exist for entities within the MUSH sector on collecting relevant data. Take for example municipalities; municipalities have experienced difficulties accessing data due to various issues, including consumer privacy concerns. Depending on the capacity of the municipality to engage with a utility, LDCs may be unwilling to share data.

Moreover, data sharing between regional and lower-tier municipalities has also experienced road blocks as regional municipalities may not be willing to share consumption data between jurisdictions, for example, the Region of Peel and the City of Burlington. Obtaining data, e.g., water consumption, for activities such as community energy planning and annual energy reporting can be very challenging due to such barriers. This gap in the regulatory environment has led to inaccuracies in data reporting as the required data is unattainable, and therefore assumptions are used.

To address with this issue, British Columbia developed and implemented the Community Energy & Emissions Inventory (CEEI), an "indicative inventory of energy use, greenhouse gas emissions and supporting indicators at the community level."[163] The CEEI provides municipalities with data for each local government jurisdiction to support community energy planning and climate change commitments.

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162 Annual Energy Conservation Progress Report – 2015/2016. (2016). Public Building. Retrieved from http://docs.assets.eco.on.ca/reports/energy/2015-2016/ECO_Conservation_Lets_Get_Serious-04.pdf

163 Community Energy & Emissions Inventory. (n.d.). Government of British Columbia. Retrieved from https://www2.gov.bc.ca/gov/content/environment/climate-change/data/ceei

Support for community energy plan development and implementation available but no funding support for the process to get to implementation: In Ontario, support for CEP development and implementation exists through various policies, plans and programs, including the MEPP and the Municipal GHG Challenge Fund, but support for getting to CEP implementation is lacking. This gap in support has been identified as a barrier to implementation as many municipalities do not have the required resources available after plan development to proceed further.

The transition from development to implementation includes actions such as stakeholder engagement, pilot and demonstration project research and development, and partnership building. Building collaborative partnerships between municipalities, research institutions, and the private sector to fund energy sector innovations is key as it mitigates risk making it easier for municipalities to participate in pilot projects. These types of collaborations often lead to the private sector deploying innovative demonstration technologies into a municipal setting. Commercialization of the innovation can then lead to its widespread adoption into other communities. Funding programs to support this stage of CEP would lead to more community energy plans reaching and surpassing CEP implementation.

Barriers and challenges within Ontario's statutory framework impede the evolution of LDCs, impacting CEP: CEP requires the participation of multiple stakeholders, including local utilities. But barriers and challenges in the statutory framework are impacting the abilities of LDCs to fully participate in CEP. The following issues have been identified:

- First, distribution system access rules require updating. Due to the now cancelled FIT program, and the Green Energy Act, renewable generation was given priority access to distribution systems to increase uptake. Other DER have not been granted this priority, e.g., EV connections, bringing into question if other non-emitting DER should have equal access? This question is important for LDCs as they plan and implement distribution system upgrades.[164]

- Second, some DER services require greater definition. Within the OEB's DSC, there is little guidance for DER that provides both load and generation, such as storage. Although storage provides multiple benefits to various entities, e.g., the distribution system, the

[164] Power to Connect. (2018, Feb). EDA. Retrieved from https://poweroflocalhydro.ca/wp-content/uploads/2018/02/2018_EDA_Vision_Paper.pdf

lack of clarity creates uncertainty with how these services can be stacked; for example, it is unclear how utilities and customers can access potential revenue streams stemming from battery storage services.[165]

- Third, LDCs are licensed to provide the distribution and sale of electricity by the OEB, but it does not grant them the option to control and/or operate privately owned DER connected to their distribution network. This makes it unclear if utilities can control customers' resources to provide system benefits, e.g., demand response.[166]

Support for CEP in Ontario legislation, plans and programs exists but province lacks policies that go beyond encouraging voluntary action at the local level: Ontario's LTEP 2017 highlights the value of CEP (mentioned 21 times) but it does not go beyond encouraging voluntary action at the local level. Similarly, the CCAP reinforces it support for CEP through funding programs and initiatives, including support for community energy mapping and platforms, but also does not recommend specific actions to make CEP mandatory for all single-tier and upper-tier communities.

In the updated 2017 Growth Plan for the Greater Golden Horseshoe, the plan does require upper-tier and single-tier municipalities to develop policies in their official plans to identify actions that will reduce GHG emissions, an encouraging development, but does not promote a stand-alone master plan focused on CEP.[167] Furthermore, the growth plan only encourages lower-tier municipalities to take action on climate change issues, including the development of GHG inventories for transportation, buildings, waste management and municipal operations; and the establishment of municipal interim and long-term GHG emission reduction targets that support provincial targets and reflect consideration of the goal of low-carbon communities and monitor and report on progress made towards the achievement of these targets.[168]

This strategy differs from the Northwest Territories, where the development of community energy plans is mandatory under the 2010 Federal Gas Tax Agreement. Under this agreement, the federal government required all communities across the territory to develop community

165 Ibid.
166 Ibid.
167 Growth Plan for the Greater Golden Horseshoe. (2017). Ministry of Municipal Affairs. Retrieved from http://www.mah.gov.on.ca/Page16430.aspx
168 Ibid.

energy plans to access federal gas tax funding. The results were successful: 28 CEPs developed in 2010 (33 CEPs total), which represents 100 per cent of communities covered by a community energy plan. Although this requirement was successful at community energy plan development, it is important to note that the implementation of the plan was not a requirement.

Misalignments between community energy plans and regional planning documents exist, but improving: Most current community energy plans established within the last decade were not developed with the same mindset of the regional electricity plans because they were drafted within two different periods and with two different approaches.

The Province of Ontario planned for regional power utilizing a central system planning mindset and at the time did not consider a system that utilized DER, such as micro grids, BTM technologies, or Block Chain. A central system was built to accommodate large baseload requirements, so the infrastructure required today to accommodate DER is lacking, but improving.

As community energy plans are developed with a local energy mindset, the aligning of priorities, both regional and local, is essential to building a system that delivers reliability, affordability, and capacity. Working with LDCs to ensure capital investment plans align with community energy plan aspirations and provincial priorities is one example.

Currently, the IESO centralized procurement (e.g., RFP and auctions) does not consider LDC planning, so it lacks consideration of local impacts.[169] This can lead to resources being procured that are inconsistent with LDC priorities laid out in their Distribution System Plans (DSP) and local community energy plans, leading to a possible reduction in system optimization and cost increases. Improved coordination between the IESO and LDC would lead to DER being deployed in locations along the distribution network that would support DSP and community energy plans while delivering maximum benefits to both communities and customers.[170]

[169] Power to Connect. (2018, Feb). EDA. Retrieved from https://poweroflocalhydro.ca/wp-content/uploads/2018/02/2018_EDA_Vision_Paper.pdf
[170] Ibid.

Market-achievable CHP impacted by the Climate Mitigation and Low-Carbon Economy Act: The Climate Mitigation and Low-Carbon Economy Act is projected to decrease market-achievable CHP potential by approximately 20 per cent due to the carbon price being added to the cost of the natural gas used by CHP facilities.[171] Because CHP facilities emitting 10,000 tonnes or less of emissions do not participate in the cap and trade program, and therefore not eligible for free allowances, they are subject to a carbon fee on their natural gas bills. Facilities over 10,000 tonnes of emissions are eligible for free allowances and therefore not impacted by the levy, although for large commercial and industrial facilities (not including hospitals and universities), free allocations will decline over time.[172]

CHP market potential was reduced further by additional considerations, including increased payback period and other financial considerations. Research by Navigant found that under the cap and trade program, market potential for BTM CHP is 81 per cent in comparison to market potential for CHP without the carbon fee on natural gas. This unintended consequence eliminates the positive impacts that small-scale CHP has on the efficiency of energy use in the grid[173] and reduces the options available for municipalities working to increase energy efficiency, resiliency and reliability, while reducing costs and mitigating GHG emissions.

Conservation incentive programs for behind the meter CHP ended: On July 1, 2018, conservation incentive programs for BTM CHP fueled by natural gas will end according to the Ontario LTEP 2017. This includes programs offered under the Conservation First Framework and the Save On Energy program such as Process and System Upgrade and the Industrial Accelerator Program.[174]

The Ontario CHP Consortium, a group consisting of electricity and gas utilities, technology/service providers and customers has called on the government to continue the Save On Energy Process and Systems CDM program for BTM CHP delivered by electric utilities and "change Ontario's energy market rules to allow for distribution-connected BTM CHP projects, individually or in aggregate, to participate in the ancillary services market in an effective and

171 Ontario CHP program succeeding quietly. (2017, Dec). APPrO. Retrieved from https://magazine.appro.org/news/ontario-news/5361-1515982082-ontario-chp-program-succeeding-quietly.html

172 Laszlo, R. (2016, Oct). Cap and trade basics for Combined Heat and Power. APPrO. Retrieved from https://magazine.appro.org/news/ontario-news/4487-1477876468-cap-and-trade-basics-for-combined-heat-and-power.html

173 Ibid.

174 Benedetti, C., Olsheski, M., & Timm, D. (2017, Oct). Analysis of Ontario's 2017 Long-Term Energy Plan – Delivering Fairness and Choice. Sussex. Retrieved from http://sussex-strategy.com/posts/analysis-of-ontarios-2017-long-term-energy-plan-delivering-fairness-and-choice

practical manner, including sale to the grid when beneficial. This will allow for CHP and other forms of distributed generation (e.g. solar, storage) to address the "residual 20% of emissions" from grid supplied power."[175] Residual emissions are sourced from the province's fleet of natural gas peaking plants.

According to the consortium, conservation CHP provides firm peak reduction and electricity conservation outcomes and is therefore one of the few conservation programs in the province that actually helps reduce the run-time for the centralized gas stations.[176] Programs such as the Process and System Upgrade and the Industrial Accelerator Program have assisted municipalities to reduce GHG emissions significantly via efficient cogeneration projects; for example, Magna International Inc.'s Polycon Industries received an $8-million incentive through the Save On Energy Process and Systems Upgrades Program to install an 8MW natural-gas fired CHP plant in the City of Guelph.

According to Guelph Hydro, the CHP plant is expected to reduce typical peak demand load of 12MW by almost 50%, and reduce the plant's annual electricity consumption from the provincial grid by approximately 50,760 MW/hrs annually.[177] Further conservation will be achieved via the capture and use of waste heat to generate steam and hot water used in the organization's plastic forming process.[178]

The move to cancel this program reflects the government's agenda to align Ontario's Conservation First Framework with its Climate Change Action Plan and commitment to provincial and national GHG emissions reductions target of 30 per cent below 2005 levels by 2030. This action came as little surprise to many within the energy and development industries as providing incentives for a fossil fuel supplied technology can be viewed as contradictory to the policy of reducing GHGs.[179] The impact from this cancellation will likely result in smaller CHP projects focused on energy savings over climate change adaptation as smaller projects would

175 Ontario CHP program succeeding quietly. (2017, Dec). APPrO. Retrieved from https://magazine.appro.org/news/ontario-news/5361-1515982082-ontario-chp-program-succeeding-quietly.html
176 Ibid.
177 Francoeur, R. (2016, June). $8-million incentive for Polycon Industries' CHP plant in Guelph. Energy Manager. Retrieved from https://www.energy-manager.ca/news/$8-million-incentive-for-polycon-industries-chp-plant-in-guelph-2675
178 Ibid.
179 Carss, B. (2017). Long Term Energy Plan reframes CDM incentive. Remi Network. Retrieved from https://www.reminetwork.com/articles/long-term-energy-plan-reframes-cdm-incentive/

struggle to provide resiliency benefits to the grid.[180] CHP investment payback periods will also increase, with estimates ranging from approximately 8 to 12 months longer.[181]

The cancellation of the conservation incentive programs for behind the meter CHP in Ontario is a misalignment between Ontario's need to reduce GHG emissions via conservation and efficiency measures and the de-incentivizing of an effective and highly efficient technology and conservation program. The cancellation of the conservation incentive programs for BTM CHP fueled by natural gas negatively impacts the options available to municipalities to reduce GHG emissions. It will also negatively impact existing community energy plans with CHP goals and objectives; for example, the Guelph CEP has target to achieve 30% of electricity requirements being provided by cogeneration by 2031.[182]

Global Adjustment (GA) charge for non-participating ICI Class A and Class B consumers' impacts DER uptake: The GA charge to mid-sized commercial and industrial consumers, otherwise known as non-RPP Class B consumers, is a fixed charge that is the same regardless of the time that electricity is consumed. Applying the GA this way (energy charges instead of capacity charges) undermines the deployment of storage technologies as storage cannot be used to lower GA costs via load balancing or other strategies.[183] Furthermore, this lowers the incentive for Class B customers to invest in other DER technologies and services.

GA costs for Class B customers are also impacted by the number of customers participating in the ICI. The greater reduction on aggregate in GA costs for Class A customers from utilizing DER, including Demand Response, the greater the redistribution of GA costs from ICI participating Class A consumers to non-participating Class A and Class B consumers. This redistribution will also increase as the threshold for entry into the ICI program has been lowered to 1 MW, meaning more customers are now eligible to lower their GA costs via DER. These rules make it impossible for Class B consumers to use clean electricity at the same low price as Class A consumers participating in the ICI program. This lack of incentives for Class B consumers to utilize DER has a negative impact on CEP objectives and goals.

180 Ibid.
181 Ibid.
182 Guelph Community Energy Plan. (2007). City of Guelph. Retrieved from https://guelph.ca/wp-content/uploads/report_communityEnergyInitiative.pdf
183 'The Good, the Bad & the Ugly:' Ontario's Engineers Respond to the Province's 2017 Long-Term Energy Plan. (2017). Society Notes. Retrieved from https://blog.ospe.on.ca/advocacy/5037/

ALIGNMENTS IN BRITISH COLUMBIA

Alignments between the Local Government (Green Communities) Statutes Amendment Act, the BC Climate Action Charter, the Community Energy Emissions Inventory, the Climate Action Revenue Incentive Program & the BC Hydro Sustainable Communities Program: The ***Local Government (Green Communities) Statutes Amendment Act*** (Bill 27) requires local governments to include targets, policies and actions associated with the reduction of GHG emissions in their Official Community Plans and Regional Growth Strategies. The bill's purpose is to provide municipalities with broader authority in relation to energy conservation, GHG mitigation, and sustainable communities.[184] The amendments in Bill 27 work to enable the signatories of the ***BC Climate Action Charter*** as they work to meet the following Charter requirements: (1) become carbon neutral in their corporate operations, (2) measure and report their community's GHG emissions, and (3) create complete, compact, more energy efficient communities.[185] Local governments choosing to voluntarily join the charter as signatories are eligible to receive a grant equal to 100 per cent of their carbon tax paid directly via the ***Climate Action Revenue Incentive Program*** (CARIP). These funds are paid directly to support a host of municipal actions, including community energy projects and initiatives.

Supporting the BCCAC is the ***Community Energy Emissions Inventory***. The CEEI provides local governments with energy use and emissions data to assist municipalities with measuring and reporting their community's GHG emissions. Also aligned to these community energy support tools is the ***BC Hydro Sustainable Communities Program*** (BCHSCP). This program offers municipalities funding and resources to develop community energy and emissions plans and to hire community energy managers to oversee CEP.

Expertise, education and financial incentives support BCCAC signatories with achieving program requirements via (1) the development of community energy plans, e.g., energy plans help communities build complete, compact, and more energy efficient communities, and (2) funding to hire a full-time community energy manager dedicated to achieving all Charter requirements. Community energy projects and initiatives funded by CARIP are also indirectly

184 Summary of New Climate Change Legislation that Affects Local Governments. (2008). Environmental Law Centre. Retrieved from http://www.elc.uvic.ca/wordpress/wp-content/uploads/2015/01/Summary-of-New-Climate-Change_2008Oct.pdf

185 Climate Action Charter. (n.d.). Government of BC. Retrieved from https://www2.gov.bc.ca/gov/content/governments/local-governments/climate-action/climate-action-charter

aligned with BCHSCP, i.e., community energy projects funded by BCHSCP will be included in energy plans and supported by energy managers.

Alignment between municipal and provincial governments on BC Energy Step Code: In April 2017, the Government of British Columbia implemented the BC Energy Step Code, an incremental approach to achieving greater energy efficiency in buildings that surpasses the requirements of the base BC Building Code.[186] This provincial standard aligns with British Columbia's target to make buildings net zero energy ready by 2032 (the deadline is 2025 in Vancouver).[187] When enacted, the BC Energy Step Code was voluntary, but in December, 2017, local governments had the option to require builders to meet one or more steps in the code. One and a half years later, 28 municipalities now reference the standard in a policy, program or bylaw; for example, in the City of North Vancouver, the municipality "targets buildings city-wide at lower levels of the BC Energy Step Code, with incrementally higher steps within the city's Rezoning Policy, and at highest steps in exchange for density in specific neighbourhoods."[188] The BC Energy Step Code supports common CEP objectives and goals, including the high-performance energy efficient building objective and the net zero energy ready by 2032 goal.

MISALIGNMENTS AND GAPS IN BRITISH COLUMBIA

While the Carbon Neutral Government Regulation requires mandatory reporting by all public sector organizations (PSOs), the required transportation data is difficult to obtain making reporting and benchmarking challenging: Similar to other jurisdictions, one of the largest contributors of GHG emissions in British Columbia communities is the transportation sector. Vehicles in the province contribute approximately 38% percent[189] of the emissions output, making this sector an important consideration during CEP. Currently in British Columbia, certain data is inaccessible due to various issues, including privacy concerns and policy gaps. These gaps reduce accuracy as more assumptions are required for emissions reporting. Sectors wishing to track and report GHG emissions voluntarily, or by law, are therefore placed in a disadvantageous position. According to the Carbon Neutral Government Regulation, it is

186 Weir, D. (2018, April). Municipalities now referencing BC Energy Step Code. VRCA. Retrieved from https://www.vrca.ca/municipalities-referencing-bc-step-code/
187 Ibid.
188 Implementation Updates. (2018, June). Energy Step Code. Retrieved from https://energystepcode.ca/implementation_updates/
189 Environment and Energy Bulletin, (2013, July). Business Council of BC. Retrieved from http://www.bcbc.com/content/960/EEBv5n3%20-%20Transportation.pdf

mandatory for all PSOs to report annual emissions, but this has been challenging due to these issues.

In the past, this problem was resolved in the province via the AirCare initiative, a program that monitored vehicle exhaust emissions in Metro Vancouver.[190] During this process, odometer readings were captured and recorded, providing a rich dataset that included a significant portion of vehicle owners in the province. On December 31, 2014, AirCare was phased out, ending this important data collection tool. With the loss of this program, key transportation data, e.g., vehicle kilometers travelled, has become unavailable to municipalities. Work is currently being done in the province to rectify this issue. One solution being pursued by the Government of British Columbia is to work with its sole automobile insurance company providing basic insurance—the Insurance Corporation of British Columbia—to collect and share the data required to improve the CEEI and emissions reporting overall.

Misalignment between top-down federal inventories data and bottom-up community inventories: British Columbia receives its provincial GHG inventory annually via the National Inventory Report, the federal government's national GHG emissions estimate and its disaggregated provincial and territorial inventories. This report is a comprehensive, sectoral snapshot of individual jurisdictions in the country. It is prepared and submitted annually to the United Nations Framework Convention on Climate Change as per the organization's reporting guidelines. Using this top-down approach to acquire provincial inventories has been found to conflict with bottom-up community inventories.

The issue arises once community level data is aggregated to the provincial level. The combined total of community level GHG emissions data contrasts significantly with the emissions estimate provided via the National Inventories Report. This discrepancy is understandable as top-down federal inventories rely heavily on assumptions and modelling in comparison to bottom-up, activity based data. The BC government has recognized this misalignment and is currently working to establish a new provincial inventory that bridges top-down and bottom-up inventories into one inventory called the BC Inventory. This would require top-down sectors to be informed by bottom-up data to improve accuracy.

190 AirCare emissions program ending for Metro Vancouver vehicles. (2014, Dec). *CBC*. Retrieved from https://www.cbc.ca/news/canada/british-columbia/aircare-emissions-program-ending-for-metro-vancouver-vehicles-1.2885573

These modifications will allow the province to show the impacts of community level actions sooner than an inventory relying heavily on large scale top-down assumptions; for example, a large infrastructure project, e.g., new subway route, may not appear in the dataset for a number of years using top-down assumptions, but the impacts of using bottom-up data would be exposed almost immediately via key performance indicators, including (1) vehicle-kilometer traveled, (2) number of vehicle registrations, and/or (3) an increase in number of trips by public transport. Understanding the positive impacts from community energy plan and climate change initiatives quickly is important to maintaining the momentum on climate action in the province.

Although British Columbia has committed to building energy benchmarking, no legislation currently exists to require building owners to submit building energy use data for larger buildings: British Columbia is a signatory to the Pacific Coast Climate Leadership Plan[191] and the Pan-Canadian Framework on Clean Growth and Climate Change[192], both of which commit the province to implement benchmarking requirements for larger buildings. According to the Canada Green Building Council's Energy Benchmarking, Reporting & Disclosure in Canada: A Guide to a Common Framework, British Columbia was considering three regulatory options to address this gap in 2016, but to date, no action has been taken.[193] Research suggests energy benchmarking is a cost effective, market-based means to achieve multiple benefits for government, building owners, managers, investors and consumers.

Planning misalignments exist between regional and municipal governments and between municipalities themselves: British Columbia is comprised of 162 municipal governments and 27 regional districts, making it a unique system in Canada.[194] Within this system, planning misalignments have been identified between regional and municipal governments and between municipalities themselves, for example, misalignments in growth projections. Discrepancies were discovered when comparing a regional district's overall growth projection against the sum-total growth projection for municipalities within that region. One particular case found the combined municipal growth projection was almost double that of its regional district. To address

191 Pacific Coast Climate Leadership Action Plan. (2016). Pacific Coast Collaborative. Retrieved from http://pacificcoastcollaborative.org/wp-content/uploads/2016/06/PCC_Leadership_Action_Plan_060116_Signed.pdf

192 Pan-Canadian Framework on Clean Growth and Climate Change. (2018) Government of Canada. Retrieved from https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework.html

193 Energy Benchmarking, Reporting & Disclosure in Canada: A Guide to a Common Framework. (2016). Canada Green Building Council. Retrieved from https://www.cagbc.org/cagbcdocs/CaGBC_National_Energy_Benchmarking%20_Framework_April_2016.pdf

194 Regional Districts. (n.d.). Ministry of Municipal Affairs and Housing. Retrieved from http://www.cscd.gov.bc.ca/lgd/pathfinder-rd.htm

the issue, a regional districts role in growth management should be strengthened to provide greater alignment between regional and municipal planning documents, including community energy plans and official plans. Greater collaboration between these entities could also lead to benefits such as improved land use planning and policy.

Conclusion: Legislative and regulatory alignments impacting CEP in Ontario directly are limited. Currently, the MEPP and the ACEPP are the only two programs directly supporting CEP with funding to pay for the development of community energy plans, with the remaining legislation, plans, and programs providing indirect support by enabling actions and activities that operate under the umbrella of CEP. With no integrative planning framework for CEP in place and no provincially mandated requirement for communities to develop and implement a local energy or climate action plan, municipalities must act on their own accord with their own resources and capacity, for the most part, which has proven challenging for many. The MEPP and the ACEPP help with plan development, but this research has shown a funding gap is impacting the progression of a plan as it moves from development to implementation.

A lack of data and barriers to its access is another issue facing communities as emissions reporting is mandatory for the MUSH sector. This gap in the regulatory environment has led to inaccuracies in reporting as the required data is unattainable, and therefore assumptions are required. To address this issue in British Columbia, the province developed and implemented the CEEI.

A variety of other misalignments and gaps were identified during this research, including:

- LDCs unable to fully participate in CEP: Barriers and challenges are impacting utilities' participation in CEP. Issues include the need for (1) updated distribution system access rules, (2) superior definitions for some DER services, and (3) an option to control and/or operate privately owned DER connected to their distribution network.

- Community energy plans and regional planning documents misalign: Traditionally, regional power planning utilized a central system planning mindset while CEP utilizes a local energy mindset. This has led to a misalignment of priorities.

- CHP impacted by recent policy choices: In a move to align Ontario's Conservation First Framework with its Climate Change Action Plan, the Government of Ontario cancelled conservation incentive programs for CHP. Moreover, the carbon price in Ontario is expected to decrease market-achievable CHP potential by approximately 20 per cent.

- GA charge impacting DER uptake: As the GA charge is a fixed charge for Class B customers, DER uptake is negatively impacted; for example, storage cannot be used to lower GA costs via load balancing or other strategies. Additionally, Class B customers are also negatively impacted by the ICI program. The greater the number of Class A customers equals a greater redistribution of GA costs onto Class B consumers. This reduces the ability for Class B to achieve the same benefits as Class A for DER investments.

In absence of a framework for CEP in Ontario, addressing the assortment of misalignments and gaps identified in this research would help to accelerate CEP in the province. This research suggests more funding is required at the provincial level for CEP pre-implementation and implementation initiatives. More funding and resources aimed at developing a provincial energy use database would also be highly supportive. The removal of barriers and disincentives impacting the actions and activities that enable CEP both directly and indirectly is also recommended. This would deliver multiple benefits, including a greater range of options available to communities for reducing GHG emissions.

In British Columbia, alignments in the legislative and regulatory systems that directly impact CEP are more robust due to the existence of a provincial level planning framework. This includes legislation that requires local governments to include GHG targets and policies and actions associated to their reduction in Official Community Plans and Regional Growth Strategies. This helps BCCAC signatories achieve Charter requirements, including the creation of complete, compact, more energy efficient communities. The CEEI provides vital support to both initiatives and makes available valuable community resources as this information is provided provincially and therefore not required locally. Additionally, the CARIP provides indirect financial support to CEP as it funds projects and initiatives that reduce GHG emissions. The BC Energy Step Code is another highly effective regulation indirectly impacting CEP. As

buildings are a major component of community energy plans, the Energy Step Code is driving the building sector towards greater energy efficiency and the provincial goal of net zero energy ready by 2032.

Although British Columbia has the CEEI, the province still struggles with access to transportation data. This gap reduces the accuracy of emissions reporting as assumptions are used as a substitute. Working with the sole basic insurance provider to resolve this issue is one potential path forward.

Other misalignments and gaps identified in this research include:

- Top-down and bottom-up inventory misalignment: Top-down federal level emissions data (assumptions and modelling) contrasts significantly with aggregated bottom-up community level emissions data (activity based). Bridging top-down and bottom-up inventories into one inventory called the BC Inventory is one solution being considered.

- Building energy benchmarking: British Columbia is committed to implementing benchmarking requirements for larger buildings under the Pacific Coast Climate Leadership Plan and the Pan-Canadian Framework on Clean Growth and Climate Change. No legislation exists at this time.

- Regional and municipal planning misalignments: Due to reasons such as a lack of collaboration, and system design, planning misalignments exist between regional and municipal governments and between municipalities themselves. One example is misaligned growth projections between the regional district’s overall growth projection and the sum-total growth projection for municipalities within that region.

In terms of CEP, British Columbia has achieved significant progress due to a variety of legislative and regulatory alignments. The province does not have a provincially mandated requirement for communities to develop and implement a local energy or climate action plan, but it does require the inclusion of targets, policies and actions associated with the reduction of GHG emissions in Official Community Plans and Regional Growth Strategies. Moreover, it requires municipal signatories under the BCCAC to (1) become carbon neutral in their corporate operations, (2) measure and report their community's GHG emissions, and (3) create complete,

compact, more energy efficient communities. This is mandatory for the 187 out of 190 communities participating in the Charter. To date, this has proven to be a successful approach; however, misalignments and gaps do exist, although many of them are recognized by the province with solutions being discussed internally. Addressing the issues provided in this section would further drive CEP in the British Columbia while also assisting the province achieve its new 2030 emissions target—a 40 per cent reduction below 2007 levels by 2030.

RECOMMENDATIONS

In order to address some of the issues identified in this paper, multiple recommendations are provided in this section for provincial and municipal policy-makers. These recommendations aim to rectify some of the misalignments and gaps identified with the objective of further enabling CEP in Ontario and British Columbia.

RECOMMENDATIONS FOR ONTARIO

Provincial Planning and Management Framework for CEP

Recommendation 1*: In order to drive CEP in Ontario, the province should design and implement an integrative planning and management framework for CEP that guides municipalities towards building clean and resilient smart energy communities.*

Currently, the Province of Ontario does not have an integrative framework for CEP, just an assembly of plans, programs and initiatives that contribute directly and indirectly. This leaves CEP a sole responsibility of individual communities and municipalities in the province, which is challenging as many lack the necessary resources, capacity and authority to move forward. To drive local energy planning in the province, Ontario should develop and implement an integrative planning and management framework for CEP. This would assist communities with planning and integrating the many elements existing under the umbrella of CEP into an overall energy plan at the local level.

Provincial Energy Use Database

Recommendation 2*: To address the "data dilemma" that exists in Ontario, the province should establish a comprehensive provincial shared energy information database that incorporates electricity, natural gas, and water data at the meter level to assist communities with energy and climate change planning.*

This database would act as a central hub where energy data is collected, used, shared and reported at a high-level to improve accountability; it would be foundational for helping communities' baseline their energy use, while also improving transparency, program delivery, and development. Providing more disclosure on energy use would help communities (1) improve decision-making capabilities, (2) build a better understanding of successful and unsuccessful policy choices, and (2) improve progress reporting, a significant issue currently for energy planners. It would also reduce costs for municipalities as data collection and interpretation is time and resource intensive. These saving could be redirected towards community energy plan implementation with an aim to increase successful outcomes for energy plan initiatives and goals. Additionally, it is essential that the data repository be designed with easy to access processed data in a user friendly format and shared in a manner that does not breach privacy concerns. To support this initiative, the IESO is currently working on depersonalized data that will still be localized. The data should be accessible within the next few years.

While the LTEP commits to expanding the Green Button initiative province wide to enable consumer access to data on water and energy consumption, data to support CEP is still required. Data should be collected, processed and aggregated to the provincial level and made accessible to Ontario communities for planning and decision-making purposes.

Provincial Community Energy Plan Pre-Implementation Fund

Recommendation 3*: The Province of Ontario should expand the Ontario MEPP to include funding support for the process of getting to implementation for municipalities that complete community energy plans through the program or via other avenues. Developing a standalone funding program to support the transition is another viable option.*

Often communities do not have the necessary funds after plan development to support this process, which includes actions such as stakeholder engagement, pilot and demonstration project research and development, and partnership building. Potential funding sources are Ontario's Green Investment Fund and the Federal Low Carbon Economy Leadership Fund (LCELF). In Ontario, approximately $420 million will be invested in communities via the LCELF/CCAP to help them deliver on leadership commitments to reduce GHG emissions. The Federation of Canadian Municipalities Green Municipal Fund is another potential funding source.

Provincial Local Improvement Charge Program

Recommendation 4: *The Province of Ontario should develop and implement a well-funded Local Improvement Charge program to support voluntary energy and water efficiency work on private properties.*

A province wide LIC program would deliver multiple benefits, including:

- De-risk certain aspects of an LIC program for municipalities e.g. low uptake, risk of default on payment, or administrative cost over-runs, etc.;
- Reduce barriers e.g. resistance from legal/financial departments in municipal government;
- Allow smaller and cash strapped communities to participate;
- Increase the efficient use of funding, e.g. one well-funded marketing campaign vs. multiple;
- Increase the reach required to achieve economies of scale. This would allow for administration costs to be spread over a sufficient number of participants reducing costs.

On a voluntary basis, communities of all population densities could subscribe to the provincial program. To enable the provincial entity, a new by-law would be required providing use of the

municipality's LIC mechanisms. The municipality would be responsible for the facilitation of the transaction between provincial LIC program and the property owner. The Green Ontario Fund is a potential source of funding to support the program.

Marketing and outreach important to program success: According to Dunsky Energy Consulting, the creation of sufficient marketing capital is required to achieve successful community participation. After analyzing PACE and LIC programs, the company established five fundamental program principles based on successes and failures and included marketing as key.[195] Unfortunately, the City of Vancouver learned this the hard way. After one year the city's LIC pilot project was terminated because it received very little interest from the public. The pilot targeted 500 homes but received less than 10 applications.[196] It was found that poor marketing had a key role on the low take-up rate of the program.[197]

Align LIC and Conservation Programs

Recommendation 5: *To increase impact and up-take, alignments should be made between a provincial LIC program and local/provincial conservation programs*.

For example, the IESO province-wide energy efficiency program *Save On Energy Heating & Cooling Incentive program* for residential customers could be combined with low rate financing from an LIC program, which would likely enhance the up-take of this already successful initiative.

Mandatory Home Energy Labelling

Recommendation 6: *To improve the transparency in the efficient use of energy and accelerate retrofits and emissions reductions, mandatory home energy labelling should be implemented on existing buildings throughout the province.*

This action would support (1) the Federal Government's Pan-Canadian Framework objective to work with provinces to implement a labelling requirement of building energy use by as early as 2019, and (2) the Ontario Climate Change Action Plan objective that states "energy audits [will]

195 Persram, S. (2016). FAQ. Sustainable Alternatives Consulting. Retrieved from http://www.cleanairpartnership.org/wp-content/uploads/2016/08/FAQ.pdf

196 Assessment of the Local Improvement Charge (Lic) Mechanism to Foster Building Retrofits. (n.d.). Received from http://app05.ottawa.ca/sirepub/cache/2/zs5d3y4czb01ksjdzjswfx0z/19144503032018031115445.PDF

197 Ibid.

be required before a new or existing single-family home can be listed for sale, and the energy rating will be included in the real estate listing".[198] Other benefits of implementing mandatory home energy labelling at the time of listing is encouraging the uptake of retrofit incentive programs and providing consumers/renters with more information on a property which can boost awareness and influence their investment decisions.[199]

Sophisticated Capacity Auction

Recommendation 7: *To ensure an optimal supply mix of cost effective generation technologies that continue to reduce GHG emissions while delivering low cost clean electricity, the IESO's planned Capacity Auction must be designed to allow all types of generation to compete effectively on the value they provide, i.e. the market must differentiate among the various economic, technical and environmental requirements.*

For example, capacity auctions provide an unfair advantage to energy sources that provide firm power (natural gas) over many renewable generation options that cannot guarantee firm energy supplies for specific time periods (wind power). Additionally, the low carbon price of $50 per tonne of C02 does not sufficiently impact the price of natural gas, allowing the fossil fuel to outprice renewables such as solar and wind. This could lead to increased natural gas generation in Ontario, which would increase GHG emissions and pollution and make it harder for the province to achieve its goals in the Climate Change Action Plan.

198 Ontario's Climate Change Action Plan. (2017). Government of Ontario. Retrieved from http://www.applications.ene.gov.on.ca/ccap/products/CCAP_ENGLISH.pdf
199 Ibid.

RECOMMENDATIONS FOR BRITISH COLUMBIA

Zero Emission Ride-Sharing Service

Recommendation 1: *British Columbia should implement legislation requiring transportation network companies in the province to incorporate and utilize a percentage of EVs in their business model.*

Currently, a regulatory framework governing ride-sharing in the province is being discussed. This provides a unique opportunity for government to design and implement a service that supports zero emission vehicles. Requiring transportation network companies such as Uber and Lyft to use a percentage of EVs could be mandated and supported at the provincial level, and supported and enforced at the municipal level.

This would provide significant environmental and economic benefits to municipalities and service providers, for example, GHG emission reductions and vehicle expense savings for drivers. In New York and San Francisco, it was estimated that 1.5 billion pounds of carbon could be offset if half of all cab and ride-sharing service vehicles were electric.[200] Additionally, full-time ride-sharing drivers could save $5,200 annually in total vehicle expenses with an EV over a gas vehicle.[201]

The EV ecosystem strategy - a $3 million fund to expand access to public charging as well as expanding it in homes, workplaces, and new buildings – could support this endeavor.

Align Community Level Reporting Approaches

Recommendation 2: *To increase efficiency and free up valuable resources for municipalities, the Province of British Columbia should standardize one mandatory community level reporting approach for emissions reporting.*

In British Columbia, community-scale GHG emissions' reporting is required by municipalities if they are signatories to the BC Climate Action Charter. Since its launch in 2007, almost every local government in the province has signed the agreement – 187 of 190 municipalities, regional

200 Fitzgerald, G. (2018, Apr). Electric Cars Could Save Ride-Sharing Drivers $5,200 a Year. GTM. Retrieved from https://www.greentechmedia.com/articles/read/electric-cars-could-save-uber-and-lyft-drivers-5200-a-year#gs.2bjnHF4

201 Ibid.

districts and the Islands Trust.[202] To calculate and report GHG emissions to the province, multiple tools can be utilized, including the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories, the Partners for Climate Protection Milestone Tool, and the CEEI. In some cases, local governments simply use their own spreadsheets to track and report emissions. On top of reporting to the province, some municipalities use multiple community level GHG inventory tools and report to different programs to receive accolades. Vancouver, for example, completes four community level inventories based on four different approaches to report to four different programs. This commits a significant amount of capacity and resources working to achieve the mandatory requirements of each protocol or program.

Standardizing the approach used in the province, or aligning community level reporting approaches into one would significantly reduce time spent completing and perfecting inventories, i.e., complete one inventory and move forward to reduction strategies. If the overall goal of the community is to reduce GHG emissions, time spent working on a reduction strategy for the bulk of emissions could be a more efficient and effective use of time and resources.

Include Climate and Energy Criteria in All Major Investment Decisions

Recommendation 3: *The Government of British Columbia should include climate assessment criteria in all major investment decisions.*

To ensure climate considerations are systematically evaluated in all project developments, the provincial government should have all major investment decisions evaluated on a variety of criteria, including climate and emissions impacts. This would align big infrastructure spending with community energy plan and climate action goals and objectives.

[202] Climate Action Charter. (n.d.). Government of BC. Retrieved from https://www2.gov.bc.ca/gov/content/governments/local-governments/climate-action/climate-action-charter

Zero-Emissions Vehicle Standard

Recommendation 4: *British Columbia should implement a zero-emissions vehicle standard where the supply of zero-emission vehicles (ZEVs) and low-emission vehicles (LEV) is increased to provide greater access to plug-in motor vehicles.*

Currently in Canada, Québec is the sole provincial jurisdiction to adopt a ZEV standard. The standard's purpose is to drive the market to design, develop, and supply a greater number to low-carbon vehicles to consumers.[203] Similar to Québec, the standard could target automakers that sell or lease over 4500 new vehicles on average annually. More stringent requirements would target automakers that sell or lease over 20,000 new vehicles on average per year. Automobile dealerships would be exempt from ZEV legislation and regulations as the objective is to increase supply to dealerships to enable them to respond to consumer demand when necessary.[204] A ZEV standard would support CEP goals and objectives such as increased ZEV and LEV uptake in combination with reduced GHG and other pollutant emissions.

Building Energy Benchmarking

Recommendation 5: *British Columbia should pass legislative amendments requiring annual mandatory building energy use data from large building at least 50,000 square feet.*

Building energy benchmarking is an energy management strategy to assist decision-makers with measuring and tracking a building's energy performance. Energy managers can track performance metrics to determine if a building is getting more or less efficient over time. It is an effective tool to drive continuous improvements that can deliver significant economic and environmental benefits. As a signatory to the Pacific Coast Climate Leadership Plan and the Pan-Canadian Framework on Clean Growth and Climate Change, the province committed to expand large building energy benchmarking and disclosure in the region.[205] British Columbia should pass legislative amendments requiring annual mandatory building energy use data from large building at least 50,000 square feet. This would be similar to the Province of Ontario's *Reporting of Energy Consumption and Water Use* regulation implemented in 2017 as an amendment to the

[203] The zero-emission vehicle (ZEV) standard. (2018). Government of Quebec. Retrieved from http://www.mddelcc.gouv.qc.ca/changementsclimatiques/vze/index-en.htm
[204] Ibid.
[205] Pacific Coast Climate Leadership Action Plan. (2016). Pacific Coast Collaborative. Retrieved from http://pacificcoastcollaborative.org/wp-content/uploads/2016/06/PCC_Leadership_Action_Plan_060116_Signed.pdf

Green Energy Act.[206] The data collected would "support the pursuit of strategic investments in achieving building improvements and energy and GHG emissions reduction targets."[207]

Recommendation 6: *British Columbia should make available non-confidential building energy benchmarking data to municipalities to inform their community energy and climate change plans, policies, and programs.*

Providing reliable data on energy use would be invaluable to community energy planners and decision-makers. The data would (1) improve the accuracy of emissions reporting, (2) help build the business case for capital investments (retrofits) in buildings, (3) help municipalities better prioritize funding towards poorly performing facilities for immediate improvement, and (4) assist local energy planners with developing a comprehensive community energy or climate action plan.[208]

Require and Incentivize BC Energy Step Code Program

Recommendation 7: *To achieve greater uptake in homeowners and builders seeking to attain step 4 (R-2000) or 5 (Net Zero Ready) of the BC Energy Step Code, the Government of British Columbia should offer financial incentives to individuals upgrading a building envelope with high-performance windows, high-grade insulation, or other energy efficient improvements.*

Provincial rebates would help to drive the province towards its goal of achieving "net zero ready" status for all new buildings by 2032.[209] The BC Energy Step Code rebate program could be structured similar to Ontario's *Green Ontario Fund*, a successful program that provides rebates to homeowners for investing in energy efficient renovations; GreenON rebates include up to $5,800 for ENERGY STAR certified air source heat pumps, or pumps that meet program requirements, and up to $5,000 to replace windows that meet program requirements.[210]

206 Measure energy and water use for large buildings. (2017). Government of Ontario. Retrieved from https://www.ontario.ca/page/measure-energy-and-water-use-large-buildings

207 Energy Benchmarking, Reporting & Disclosure in Canada: A Guide to a Common Framework. (2016). Canada Green Building Council. Retrieved from https://www.cagbc.org/cagbcdocs/CaGBC_National_Energy_Benchmarking%20_Framework_April_2016.pdf

208 Energy benchmarking: the basics. (2018). Natural Resources Canada. Retrieved from http://www.nrcan.gc.ca/energy/efficiency/buildings/energy-benchmarking/building/18260

209 Energy Step Code. (2018). Retrieved from https://energystepcode.ca/

210 Smith, A. (2018, Jun). GreenON rebates: A warmer, more energy-efficient home and money in your pocket. *Ottawa Citizen*. Retrieved from http://ottawacitizen.com/life/homes/greenon-rebates-a-warmer-more-energy-efficient-home-and-money-in-your-pocket

***Recommendation* 8**: *To further drive and incentivize energy efficiency while achieving wide-spread adoption of the BC Energy Step Code, the provincial government should require all new buildings to meet a mandatory step in the code (TBD).*

As of December 15, 2017, municipalities can implement bylaw requirements for builders to meet one or more steps of the BC Energy Step Code due to a Building Act amendment, but this is not mandatory. To ensure all new buildings in the province are progressing towards the net zero energy ready requirements by 2032, the Government of British Columbia should implement legislation requiring all new buildings to meet a mandatory step in the code.

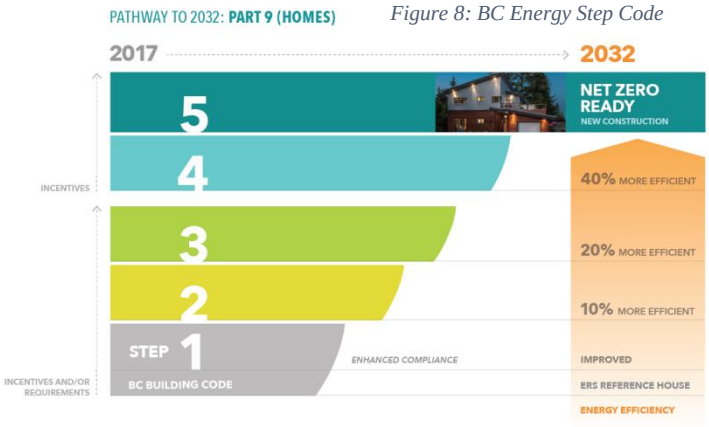

Figure 8: BC Energy Step Code

Communities across the province are currently referencing the BC Energy Step Code in policies, programs and/or bylaws, but no standardized approach has been implemented. Various municipalities are using policy tools to incentivize the Step Code, while others are implementing bylaws making it mandatory. This recommendation would standardize the approach making it mandatory for all new buildings in the province to meet a specific step in the BC Energy Step Code.

CONCLUSION

Provincial research has shown dependence on "old" energy production, e.g., nuclear and large scale hydro, has had a negative impact on wide-scale DER adoption in the jurisdictions studied. In Ontario, the provincial strategy is focused heavily on ensuring nuclear power remains a large part of the province's energy future. The Darlington and Bruce Power nuclear refurbishments will lock the province into long-term contracts and vastly reduce the need for large scale DER deployment.

In British Columbia, the situation is similar. The recent decision by the provincial government to continue with the Site C dam development is viewed by many as a lost opportunity to expand

DER in the province. Research shows that provinces with highly developed and profitable nuclear and hydro resources are not overly incentivized to develop alternative and community energy policy as existing production meets provincial electricity (and market entity profit) needs sufficiently.[211]

Although Ontario and British Columbia have renewed their commitment to large, centralized generating capacity, both provinces are quite progressive in terms of community energy planning and climate action. This could be due to a number of factors, including current governing ideologies in both provinces and a federal government that supports a progressive climate change narrative as it works to meet its commitments under the Paris Climate Accord.

Ontario

Although progressive, research on Ontario climate and energy policy found the province lacks legislation that requires CEP at both the provincial and local levels, but all major land use policy incorporates energy planning and conservation into their sphere of influence to some degree. The electricity sector is highly regulated by the OEB with the IESO playing a major role in managing the power system in real-time and planning for the province's future energy needs. Major provincial legislation impacting CEP include the Green Energy Act, the Conservation First Framework, and the Climate Change Action Plan. Additionally, Ontario's Long Term Energy Plan 2017 is another key document designed to ensure the province delivers a reliable and innovative energy system.

Recent actions impacting CEP in the province include (1) the cancellation of the FIT and microFIT programs and the implementation of the replacement net metering program; (2) new rate designs for commercial and industrial customers (gross load billing), and electricity distributors (fixed charges), are being applied. This has allowed for the elimination of the OEB Distribution System Code's 1 per cent limit on net metering capacity; and (3) the consideration of DER Credits to increase the rate of adoption of DER systems in targeted areas that benefit the provincial energy system.

211 McMurtry, J. (2017). Canadian Community Energy: Policy, Practice, and Problems.

Although the province has taken steps to seriously address the issue of climate change, Ontario lacks a provincially mandated integrative planning framework for CEP. This framework would be very beneficial for assisting communities with integrating the many elements existing under the umbrella of CEP into an overall energy plan at the community level. In absence of this framework, municipalities, for the most part, must move forward utilizing their own resources and capacity, which is challenging for many as these assets are often lacking at the local level.

However, Ontario has developed various programs and initiatives that enable community energy plan goals and objectives, for example, the cap-and-trade program. This program has provided significant funding for the CCAP's initiatives, many of which indirectly support CEP. Due to these factors, combined with the diverse range of areas and activities existing under the rubric of CEP, the alignments, misalignments and gaps identified in this research paper relate to a variety of direct and indirect legislation, policies, programs, and initiatives all impacting CEP to varying degrees. From this research, it is clear there are a variety of legislative and regulatory links strengthening CEP in Ontario, but there are also significant misalignments and gaps working to impede its progress. Due to the multiple benefits provided by CEP in Ontario, efforts should be taken by all levels of government to address the issues identified in order to remove inefficiencies and barriers to CEP within this provincial jurisdiction.

To further drive CEP in Ontario, the provincial government should consider the recommendations presented in this paper, including the development of (1) a provincial energy use database to support communities with emissions reporting and community energy plan development, and (2) a provincial community energy plan pre-implementation fund to financially assist communities with getting to implementation. Most importantly, Ontario should work to design and implement an integrative planning and management framework for CEP that guides municipalities towards building clean and resilient smart energy communities.

British Columbia

In British Columbia, the framework that enables CEP is quite broad and supportive. Even though the province recently eliminated its 2020 GHG reduction target, BC is still one of the nation's most progressive provincial jurisdictions in terms of climate action. The provincial government

recently set a new GHG emissions target aiming to achieve a 40 per cent reduction below 2007 levels by 2030.[212]

Helping the province to meet this new target is BC's carbon tax. This price on carbon was implemented in 2008 and was a first for Canada. This tax has achieved some success at mitigating GHG emissions and the use of petroleum products in the province. In addition, British Columbia's Climate Action Charter will also assist with reducing provincial emissions. This voluntary agreement requires local governments to (1) become carbon neutral in their corporate emissions, and (2) reduce community-wide emissions overall via the creation of more complete, compact and energy efficient communities. The Charter now has 187 out of 190 communities participating.

As a signatory since 2007, the City of Vancouver is one of British Columbia's most progressive jurisdictions at mitigating pollution. The municipality has the lowest GHG emissions per person of any major North American city and is working towards the goal of becoming 100 per cent renewable before 2050.[213] British Columbia also provides strong support for action plans, tools, funding programs, and strategies that support CEP. Initiatives such as the landfill gas regulation, the Solar Hot Water Ready Program, the Bioenergy Strategy, and the BC Energy Step Code are a few examples.

Moreover, British Columbia enables CEP through:

- Strong supportive policies designed to be less prescriptive. This increases flexibility for communities, which helps them utilize their available capacity where it is most effective;
- Solid provincial and municipal policy alignments within and between levels of government to provide greater support to existing legislation; and
- Significant decision-making authority for municipalities. This autonomy allows communities to enact site specific rules and regulations that help drive CEP progress throughout the province.

212 Laanela, M. (2018, May). B.C. government drops greenhouse gas target for new 2030 goal. *CBC News*. Retrieved from https://www.cbc.ca/news/canada/british-columbia/b-c-government-drops-greenhouse-gas-target-for-new-2030-goal-1.4653075

213 City of Vancouver. (2018). Renewable City Action Plan. Retrieved from https://vancouver.ca/green-vancouver/renewable-city.aspx

In order to further support CEP in British Columbia, the province should address the misalignments and gaps identified within this research and look to remove many of the barriers facing BTM DER in the province. For example, the recent ruling by the BCUC to allow FBC (and possibly BC Hydro) to deny new customers access to the net metering program if their BTM generation surpasses their annual household consumption should be repealed. This ruling discourages greater investment in clean and low carbon/renewable DER projects and reduces participation in the net metering program.

Furthermore, the Government of British Columbia should consider the recommendations provided in this research paper as they support CEP goals and objectives, including the mitigation of GHG emissions in the transportation sector. Additionally, these recommendations contribute to the transition to clean and resilient smart energy communities.

Overall, CEP in Canada is progressing due to a societal shift towards decarbonisation influenced by various social, political, environmental, medical, and long-term technical and economic concerns. CEP provides a planning and management strategy for communities to address many of these concerns, including pollution and GHG emissions, grid resiliency and energy security, and job creation and investment opportunities. The benefits are vast, and indicate why CEP, and its relevance, is growing across Canada.

EPILOGUE

On June 7th, 2018, Conservative Party Leader Doug Ford was elected new Ontario Premier with a majority government. Running on a platform to eliminate much of Ontario's progressive energy and climate change action framework, Doug Ford has begun to implement a variety of campaign promises. The following legislation, policies and programs have been cancelled or are under threat of being cancelled:

- *GreenON Program cancelled*. This popular program offered residential and commercial rebates for energy-efficient renovations.
- *Cap-and-Trade Program cancelled*. On July 3rd, the new Ontario government revoked the cap-and-trade regulation, and Doug Ford has threatened to fight federal rules that would

impose a carbon tax on provinces without their own carbon pricing system.[214] Due to these changes, the Federal Government is reconsidering $420 million in funding for Ontario under the Low Carbon Economy Leadership Fund. The federal government considers this move as equivalent to withdrawing from the capital's national climate change framework.[215]

- *Electric and Hydrogen Vehicle Incentive Program cancelled*. This act will have a significant impact on EV sales in the province as research shows cancelled EV subsidies in British Columbia dramatically reduced sales in the province.[216]
- *Electric Vehicle Charging Incentive Program cancelled*.
- *758 renewable energy contracts cancelled*. The government claims this move will save provincial ratepayers $790 million, but that figure is being widely disputed.[217] Industry officials believe it will mostly lead to job losses for small business, and have a major impact on small local projects owned by municipalities, First Nations groups and schools.[218] Potential lawsuits against the provincial government are also a highly plausible outcome.
- *The Green Energy Act*: Premier Ford has threatened to end the Green Energy Act. Justification for this action is to reduce hydro rates.

The Province of Ontario is currently in the midst of change in terms of renewable-low carbon energy and climate action. These first acts will likely have a variety of outcomes, including (1) job losses in the building and clean energy sectors, (2) lawsuits due to cancelled renewable energy contracts and the elimination of the cap-and-trade program, (3) environmental consequences due to an increased reliance on fossil fueled technologies and the cancellation of the carbon market, and (4) billions of dollars squandered from cancelled projects and wasted resources; the provincial government, for example, has threatened to cancel a wind project in

214 Green renovation rebates under Ontario's cap-and-trade system cancelled. (2018, June). *Global News*. Retrieved from https://globalnews.ca/news/4284165/green-renovation-rebates-ontario-cap-and-trade-cancelled/

215 Rabson, M. (2018, July). Doug Ford Cancelling Ontario's Cap-And-Trade Program Puts $420M In Federal Funding Under Review. *Canadian Press*. Retrieved from https://www.huffingtonpost.ca/2018/07/05/doug-ford-cap-trade-ontario_a_23475428/

216 Bickis, I. (2018, July.). *National Observer*. Retrieved from https://www.nationalobserver.com/2018/07/15/news/end-ontario-electric-vehicle-rebate-program-expected-hit-sales

217 Jeffords, S. (2018, July). 758 renewable energy contracts cancelled by Ontario government, millions in savings promised. *Global News*. Retrieved from https://globalnews.ca/news/4330595/ontario-renewable-energy-contracts-cancelled/

218 Ibid.

Prince Edward County that has been under development for almost 10 years. It is estimated the project's cancellation could cost the province more than $100 million.[219]

This dramatic shift in provincial policy direction will also have a significant impact on CEP as existing and future community energy plan projects and initiatives are threatened or cancelled. This reduces the ability of municipalities to reduce GHG emissions, which in turn impacts their ability to meet emission targets and other goals and objectives. The elimination of these programs and initiatives will have lasting, long-term environmental, social and economic repercussions for years to come as climate change continues to worsen around the world.

[219] Jeffords, J. (2018, July). Cancelling Prince Edward County wind project could cost over $100M, company warns. *Global News*. Retrieved from https://globalnews.ca/news/4325378/prince-edward-county-wind-project-cancellation/

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APPENDIX

- Ontario CEP Policy
- BC CEP Policy
- Interview Protocol