



CEKAP

Community Energy Knowledge - Action Partnership



Community Energy Knowledge - Action Partnership Case Studies
ON THE PATH TO NET-ZERO COMMUNITIES
INTEGRATING LAND USE AND ENERGY
PLANNING IN ONTARIO MUNICIPALITIES

Community Energy Knowledge Action Partnership (CEKAP)
A project of the Ontario Climate Consortium (OCC)

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ABOUT THE AUTHORS

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Dr. Karen Farbridge is the President of Karen Farbridge and Associates Ltd. and brings over 25 years of experience connecting people and ideas to build more sustainable and resilient communities. She spent 17 years in municipal politics, 11 of them as the mayor of Guelph, Ontario where she promoted policies and program in support of community sustainability and energy. Karen Farbridge is a partner in CEKAP, Chair of the QUEST (Quality Urban Energy Systems of Tomorrow) Ontario Caucus and member of the Sustainable Energy Initiative at York University.

Dr. Kirby Calvert is an Assistant Professor in the Department of Geography at the University of Guelph. Dr. Calvert is Co-Director and Principal Investigator of the Community Energy Knowledge-Action Partnership (CEKAP); a national partnership of Canadian universities, municipalities, and other non-academic partners with shared interests in improving the process and outcomes of community energy planning (www.cekap.ca). He has studied energy policy issues in Ontario and elsewhere using both qualitative and quantitative techniques for approximately eight years, with a focus on land-use issues and the trend toward decentralized energy governance.

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ABOUT THE COMMUNITY ENERGY KNOWLEDGE - ACTION PARTNERSHIP (CEKAP)

The Community Energy Knowledge - Action Partnership (CEKAP) was established in spring 2016 as a project of the Ontario Climate Consortium (OCC) with a Partnership Development Grant from the Social Sciences and Humanities Research Council of Canada (SSHRC). Combining strengths from Canadian universities, local and regional governance partners and civil society organizations across three provinces, CEKAP's overall goal is to improve thought and practice around community energy planning. CEKAP's research program is building from the principles of 'community engaged scholarship'. In this model, the non-academic community provides direct input into the research agenda: i.e., establishing core challenges that can be met with research (the big picture), articulating key themes (the research programs), and then identifying clear and timely research initiatives (the research projects). Input from non-academic partners is considered by the academic research team in light of existing resources and expertise to formulate near term research objectives (1-3 years) as well as a longer-term research plan (5-10 years).

ABOUT THE ONTARIO CLIMATE CONSORTIUM

The Ontario Climate Consortium is a network of academic institutions and local and regional governance partners that provides independent advice, research and analysis to support the development and implementation of policies that enable adaptation to the changing climate and the transition to a low carbon society. The OCC Secretariat, based within the Toronto and Region Conservation Authority (TRCA), leverages the wide-ranging expertise of our academic members to provide an evidence base for Ontario provincial and municipal government policy making through timely and objective research. Researchers in four of Ontario's leading Universities are members of the OCC: McMaster University, University of Guelph, Western University, and York University.



EXECUTIVE SUMMARY

Context

The Government of Ontario has set a 2050 target to reduce greenhouse gas emissions by 80 per cent below 1990 levels. De-commissioning coal-fired electricity generators across the province was a major step toward this goal. Attention must now focus on the building (heating), industrial, and transport sectors, which are almost entirely reliant on carbon-intensive fossil fuels. Among these sectors, buildings will likely need to experience relatively deeper reductions in order to compensate for sectors where emissions reductions may be more challenging (e.g. industrial process-related emissions; long-range freight transportation; air travel). Therefore a net-zero carbon building sector by mid-century is seen as a critical piece of the climate action puzzle in Ontario.

The most cost-effective pathway to a net zero building sector involves highly energy efficient buildings combined with an integrated community-based approach of district energy systems (thermal networks and electricity micro-grids). Developing these net-zero communities requires strategic system-level interventions. The building practices, technologies, and user interface of a net-zero community are all disruptive to status-quo. Furthermore, the traditional role of the local electricity distribution company (LDC) is called into question. Provincial legislation and regulations, municipal land-use planning policies, by-laws and operational practices (e.g. engineering and building standards), energy regulations, utility practices, development industry business models and suppliers will all need to co-evolve. This suggests a critical role for the planning system at all scales.

There are some promising trends. Through the Ontario Climate Change Action Plan (2016-2020) and proposed changes to the Growth Plan for the Greater Golden Horseshoe, the Ontario government has begun to establish the policy framework for net zero buildings and communities. Meanwhile, municipalities hold a range of policy levers that can influence emissions across the building sector, particularly for new developments. How these existing and emerging policy levers are used will determine whether we are successful in the drive to net zero communities. Success has been modest to date. While many Ontario municipalities have had climate and GHG plans in place for many years, low carbon project development and implementation at the community-scale has lagged and emissions trends aren't aligned with achieving Ontario's 2050 target.

Project objective and methodology

The purpose of this research is to evaluate the role of planning and planning policies in facilitating net-zero developments at the local level. Through a case study approach that looked at five developments, each in a different Ontario municipality, this report builds understanding of the conditions that lead to successful net-zero community developments, and helps to establish greater awareness of the technical and business cases for policy and business model innovation. Furthermore, the research provides an assessment of how 'net-zero' concepts are discussed and treated within and across provincial-level planning policies.

Net zero definitions

Definitions of net-zero buildings and communities vary across technical and policy literature (see Appendix). When developing a workable and practical definition for municipal land use planning and policy frameworks, the definition must consider, and be consistent across at least four dimensions:

1. **Priorities:** is the focus on balancing energy use/generation or carbon emissions/sequestration?
2. **Scale:** is the focus on individual buildings, or on the community-scale?
3. **Scope:** which activities and sectors should be included in the net-zero calculus?
4. **Boundaries:** should carbon offsets or renewable energy credits generated by activities outside of the building or community boundaries be eligible for inclusion in the net zero calculus?

Our research shows that definitions of ‘net-zero’ within Ontario’s municipal and provincial land-use planning and energy planning documents are (1) not sufficiently described along these four dimensions and (2) are not consistent across these dimensions (see Table 2). As a result, the regulatory framework is more uncertain, and less effective.

Moving forward, the provincial government should work with key stakeholders (builders, utility companies, municipal government), and build from their established definitions and protocols for ‘net-zero’, to embed a clear definition of ‘net-zero’ into the planning framework. In addition to being clear, the definition must also be consistent. To achieve this goal, we suggest a ‘nested’ approach, in which the definition would vary in ‘scale’ and ‘scope’ to account for varying degrees of authority and influence. Priorities and boundary issues would be aligned; the scope would expand with authority and jurisdiction, and lower levels would work to be ‘net-zero ready’ in areas beyond their primary scope to enable the efforts of upper levels. A proposed model for this approach is presented in Table 1.

Table 1: A proposed ‘nested approach’ to defining net-zero in Ontario’s land-use planning policy framework

	Development Industry Policies & Protocols	Municipal Energy & Land-Use Planning Policies	Provincial Energy & Land-Use Planning Policies
Priority	Energy-related GHG emissions		
Scale	Buildings	Communities	Regions
Primary Scope	Built environment	Plus municipal services (e.g., transit fleets), personal transportation within the city	Plus personal transportation within and between commutes, regional public transit, agriculture and other industries
Secondary Scope	‘Net-zero ready’ for transport options, consistent with municipal & provincial policies	‘Net-zero ready’ for commuters and industrial transport	‘Net-zero ready’ for industrial transport and airline options
Boundaries	<ul style="list-style-type: none"> • Limited use of offsets; • Source-based emissions accounting (i.e. inclusion of electricity transmission and distribution related emissions) • Exclusion of embodied energy in materials 		



Net-Zero Energy Emissions Community (NZEEC)

In the context of municipal and regional planning, then, we propose the following definition: a net-zero energy emissions community balances energy-related energy emissions from buildings (electricity plug loads, space and water heating), transportation (excluding long-haul freight and personal travel outside of regional boundaries), and municipal services (e.g. water treatment and distribution, wastewater management, and waste management). This is met through a combination of energy efficiency gains while procuring energy supply from sustainable zero GHG emission sources, ideally generated within community boundaries. Offsetting emissions are permitted only where alternatives are not feasible. The community is prepared to support 'net-zero energy emissions' regions, by preparing for net-zero initiatives in the heavy transport and agricultural sectors.

On the path to net zero: key lessons learned from case studies

Provincial enabling roles

- Continue to set the context for municipal ambition on climate action and net zero communities – establish clear direction in terms of what 'net-zero' means, consistent with the nested approach described above. This will require complementary amendments to the Ontario Building Code, Municipal Act, Planning Act, and the Growth Plan, to mainstream net zero policy objectives into land use and energy planning framework for municipalities. Alternative regulatory and market frameworks to enable LDCs to act as platforms for energy services, including generation and storage, are needed.
- Enable municipal/community level implementation through regulatory policy tools - consider introducing a tiered approach in the building code that enables municipalities to require higher than minimum code levels of energy performance in new building development. Municipal authority to establish mandatory connection by-laws in areas suitable for district energy is needed, however attention needs to be paid to ensure transparency and accountability of district energy systems to avoid potential cost increases for developers and building users.
- Revise energy planning and regulatory framework to enable innovation in Local Distribution Company (LDC) business models – LDCs are struggling to stay relevant in the era of disruptive innovation in energy systems (e.g. distributed energy technologies, storage, and EVs). Policy and regulatory barriers limit their ability to serve as generators, and as aggregators of distributed energy assets. Policy innovation is needed to support LDCs ability to develop economically viable district energy networks in areas slated for growth.
- Enable municipal/community level implementation through fiscal policy tools – Seed capital for low carbon district energy systems is needed. Funding for demonstrations and pilot projects of innovative development approaches is needed to build awareness of technical and economic feasibility.
- Engage in multi-level collaboration, particularly in context of major urban redevelopment projects, to enable innovation - multi-level government collaborations, particularly in the context of major urban redevelopment projects, can set the context for policy alignment and innovation. Consider leveraging Infrastructure Ontario land dispositions to require private developers to innovate towards net zero community building.
- Support research and development, workforce training and skills development related to net zero community construction - support workforce training and certification programs that build capacity for net zero community planning and development and address the lack of talent and practical experience in the contracting industry.

Municipal enabling roles

- Create a supportive high-level policy context – Integrate energy and climate into Official Plans; create Community Energy and/or Climate Action plans to support OP implementation. Clarify roles of upper vs lower tier in the regional municipal governance context.
- Use authority provided by Planning Act and Municipal Act to incent low carbon and net zero development - The Planning Act provides municipalities with authority to mandate sustainable urban design through site plan approvals, however only a few innovator municipalities are using this authority.
- Use major redevelopment area opportunities (e.g. Brownfields) to create a test-bed for policy and technology innovation - Former industrial areas, often located close to urban centres, provide an opportunity for revitalization of vacant or underutilized employment areas. Developing new low/zero carbon districts can attract innovative knowledge industries and talent.
- Support/enable champions in both political and staff (i.e. technical) ranks. Political leadership on municipal Council is needed to establish local ambition on climate and energy and to build key relationships between industry innovators, public institutions, and the broader community. Municipal energy managers, staff level technical champions, are able to break down intra-municipal silos and engage with energy stakeholders in the community.
- Where LDCs are municipally-owned, support business model innovation – Several of the case studies provided examples of specialized local energy companies (e.g. Hydro Ottawa, London Hydro, and Enwave) partnering with the private sector to develop community-scale low carbon energy generation and distribution networks. These partnerships need support from municipalities to scale-up.

Development industry role

- Engage early and often with key municipal government and energy stakeholders - By putting the net zero vision forward early in the development process, and aligning the business case with existing municipal and provincial policy objectives, developers can build a base of support which enables flexibility in policy and business model innovation.
- Demonstrate the marketability of net zero communities and alignment with housing affordability agenda - net zero homes and net zero communities can save homeowners and tenants money in the long-run through reduced energy costs. Demonstrations are needed to build public awareness.
- Demonstrate alternative governance models for implementing district heat and district electricity partnering with municipalities and local utilities – In the absence of a supportive energy planning framework for district energy solutions, engage with municipalities and LDCs to establish public-private partnerships to implement community-scale micro-utilities.





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