Disrupting carbon lock-in:

How a target-based sustainability program for businesses can support the politics of decarbonization in Ottawa, Canada

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Abstract

Human-induced climate change has emerged as one of the greatest sustainability challenges of our time, with significant risks for human health, livelihoods and security. However, technological solutions to phase out the use of fossil fuels in industrialized countries are politically contested. Their adoption depends on disrupting the institutions and behaviours that perpetuate the dependence on fossil fuels, also known as "carbon lock-in". In this study, I use an emerging theoretical framework on the politics of decarbonization to assess the potential of a grassroots climate governance experiment to contribute to a low-carbon pathway for the City of Ottawa, Canada. The Carbon 613 program is part of a broader network of social enterprises in Ontario that provide technical support, peer learning opportunities and recognition to businesses that commit to setting voluntary greenhouse gas (GHG) targets and reducing their operational GHG emissions. I use empirical data gathered from primary and secondary literature and 11 participant interviews to trace the impacts of Carbon 613's activities on the political mechanisms underlying carbon lock-in. The analysis demonstrates Carbon 613 is starting to build a supportive coalition for low-carbon business in Ottawa by recruiting a diversity of small- and medium-sized enterprises (SMEs) and some public sector institutions and larger firms to participate in the fee-based program. Several of these SMEs are beginning to build their internal capacity and adopt new norms related to carbon accounting and GHG reduction actions within their organizations; however broader scaling and entrenchment of low-carbon attitudes and practices have been limited by both internal and external factors. Opportunities to enhance the transformative impact of the program include strategic recruitment of new members, a stronger programmatic link with the City of Ottawa's climate change efforts, and coalition building with a more diverse set of stakeholders within the city. The results suggest Carbon 613 has the potential to catalyze a system improving trajectory within the City of Ottawa.

Key words: carbon lock-in, decarbonization, climate governance experiment, politics, business, green economy, Ottawa

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List of Abbreviations

AQCCMP	Air Quality and Climate Change Management Plan
CO_2e	Carbon dioxide equivalent
FEDCO	Finance and Economic Development Committee
GHG	Greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
SME	Small- and medium-sized enterprise
SWR	Sustainable Waterloo Region

1 Introduction

1.1 Problem definition

Human-induced climate change has emerged as one of the greatest sustainability challenges of our time. The current global scientific consensus is that the consequences of continuing on a business-as-usual pathway for the production of greenhouse gas (GHG) emissions from fossil fuel extraction and use, industrial production and agriculture and land use practices will result in massive declines in biological diversity and the ecological systems on which we depend, with significant risks for human health, livelihoods and security (IPCC, 2014). By the end of this century, unchecked climate change would result in "severe, widespread and irreversible impacts globally" (p.77), eroding food security regionally and globally, deepening poverty traps and increasing risks of violent conflicts, with the biggest impacts being felt by the poorest and most vulnerable people. The latest Special Report by the Intergovernmental Panel on Climate Change (IPCC) indicates anthropogenic carbon dioxide (CO_2) emissions would need to be halved from 2010 levels by 2030 and be reduced to net-zero by mid-century for a reasonable chance of limiting average global temperatures to 1.5°C above pre-industrial levels and avoiding the worst impacts of climate change (IPCC, 2018).

Given this existential threat, the rational response would be for governments and institutions to rapidly phase out fossil fuel-based energy and adopt low-carbon technologies and practices. Studies of low-carbon pathways have shown the technological solutions to decarbonize our societies largely exist today (Deep Decarbonization Pathways Project, 2015) and could generate US$26 trillion in economic gains by 2030 (The New Climate Economy, 2018). However, while the science is clear, the politics of this transition are highly contested. This is currently very visible in Canada, where carbon pricing, a lynchpin policy in the national climate strategy, is being opposed and challenged in court by several provincial governments (Thoms & Yantzi, 2018). Similarly, there is a significant national debate on the construction of major new fossil fuel infrastructure, which some critics argue is incompatible with Canada's national GHG reduction targets and commitments to future action under the Paris Agreement (Berman, 2016; Britten, 2018; MacLean, 2018).

One way to explain delayed policy action on climate change in industrialized countries, despite the known risks of inaction and the existence of cost-effective low-carbon alternatives, is through the lens of "carbon lock-in" (Unruh, 2000, 2002). The phenomenon of "lock-in" arises as technological systems gain dominance in the market, through a combination of increasing returns to scale and

supportive policies and institutions that co-evolve with those technological systems over time in a mutually reinforcing relationship. This creates a process of path dependency whereby there is increasing institutional and behavioural inertia to change as these systems become entrenched – both because powerful individuals and groups that benefit from the status quo continue to shape institutions and policies to their benefit, and because this process also creates norms, cultures and behaviours around the use of these technologies (Seto et al., 2016). In most industrialized countries, fossil fuels have become the dominant form of inexpensive, reliable energy at the foundation of our economies that lock us in to a carbon-intensive trajectory. The challenge of decarbonizing our economies therefore becomes one of finding meaningful ways of disrupting the techno-institutional systems that reinforce carbon lock-in.

Because carbon lock-in involves multiple, interdependent systems, transitioning to a low-carbon development pathway will require transformative action across multiple levels and dimensions of the economy and society (Bernstein & Hoffmann, 2018a; Seto et al., 2016). Encouragingly, a variety of subnational governments and non-state actors have become engaged in responding to climate change in the past 10-15 years. These efforts initially focused on influencing national government policies, but have increasingly emerged as novel forms of climate governance – establishing rules, norms and practices that attempt to steer public and private actors both within and across country boundaries (Bulkeley et al., 2014; Hoffmann, 2011a). These efforts have been termed climate governance "experiments" in the sense that they are happening outside the authority of national governments and international climate change treaties (Hoffmann, 2011a). Within the academic community, some see these interventions as filling a gap left by the failure of multilateral agreements to deliver a strong global response to climate change, while others are concerned they may distract from or undermine these formal channels (Bulkeley et al., 2014). Given the urgency of the climate change challenge, it is critical to understand how these experiments can effectively contribute to a low-carbon transition locally and globally.

1.2 Research purpose

As a professional working with municipal networks on climate change solutions, I'm particularly interested in applied, real-time research that can contribute to greater effectiveness of low-carbon transition efforts at the community level. For this research study, I connected with an Ottawa-based environmental non-profit that runs a program called "Carbon 613" to support local businesses in measuring their GHG emissions and implementing actions to reduce their carbon footprint. The program is part of a network of six hubs located across the Province of Ontario. As a newer hub in

the network, the program is poised to expand over the coming years and program staff are interested in how the initiative could have a greater impact. I have therefore chosen to take an explicitly normative approach to this research in the interest of advancing climate action, while striving to remain rigorous and ethically grounded in my research approach and analysis (Neville & Hoffmann, 2018).

In my thesis, I use the theoretical framework developed by Matt Hoffman and Steven Bernstein as part of a multi-year project on "Transformative Policy Pathways to Decarbonization" to explore the potential of climate governance experiments to contribute to low-carbon pathways. In their 2017 paper entitled "Valuing the Contributions of Nonstate and Subnational Actors to Climate Governance", van der Ven, Bernstein and Hoffman argue that most climate governance experiments tend to be evaluated very narrowly based on their intended outputs and the quantum of GHG emissions reductions they can deliver, and how these can fill the gap in commitments made by national governments under the UN Framework Convention on Climate Change. This approach misrepresents the nature of the challenge posed by climate change – that achieving the targets set out in the Paris Agreement requires more than an accumulation of individual GHG reduction projects but rather a significant transformation in institutions underlying carbon lock-in:

> Decarbonization interventions must therefore be evaluated not just against the volume of GHG emissions they reduce, but also against how much they contribute to broader transformations in key institutions. (p.5)

The aim of my research is to explore how a grassroots climate change intervention may be helping or hindering the disruption of carbon lock-in at the city level, to contribute to academic knowledge on how to accelerate low-carbon transitions and to provide practical recommendations to practitioners leading these efforts. As this theoretical framework is also currently being tested and refined, I aim to provide feedback on how it could be enhanced for future studies on decarbonization pathways.

Research question: How can local climate governance experiments help catalyze a low-carbon transition in the City of Ottawa?

1. How is Carbon 613 attempting to steer the business community and other local actors to reduce greenhouse gas emissions?
2. To what extent are these efforts changing the political dynamics related to fossil fuel-based energy consumption and supporting the scaling and entrenchment of low-carbon practices?
3. How could Carbon 613 strengthen its activities to contribute to a decarbonization pathway for the City of Ottawa?

I use a variety of primary and secondary data sources to answer these questions, including Carbon 613 publications, third-party reports and participant interviews. In section 2 of this report, I further describe the theoretical framework on the politics of decarbonization. In section 3, I explain my approach to data collection and analysis. In section 4, I describe the study location and potential for emissions reductions within the business community, as well as a history of the Carbon 613 program. In section 5, I deconstruct the direct and indirect impacts of Carbon 613's activities on the system using the elements of the framework to help answer the first two sub-research questions. In section 6, I answer the third sub-question by discussing potential avenues for increasing the transformative impact of the Carbon 613 program, as well as the limitations of the framework based on this research. In the final section, I provide some concluding remarks and suggestions for future research.

1.3 Relevance to sustainability science

Sustainability science is an emerging field that is fundamentally about understanding and finding solutions to today's sustainability challenges in a way that embraces the complex and dynamic linkages between natural and social systems (Jerneck et al., 2011). The current study fits this mandate by reframing climate change as a problem of carbon lock-in, which bridges the scientific and technological causes of climate change and the political institutions and social norms that reinforce them at a variety of scales. This study largely takes a problem-solving approach by "seek[ing] to guide tactical actions and increase the efficiency of the existing institutional frameworks" (p.77) while recognizing that new political institutions and power relations may ultimately be required to solve the challenge of climate change and deliver on the global sustainable development agenda.

With this research, I also aim to become what Pim Martens and Jan Rotmans call a "scientivist", referring to "people that are engaged in a systematic activity to acquire knowledge […] to promote, impede, or direct societal change" (Martens & Rotmans, 2012). My intention is for this research to serve the practitioners who are trying to steer the business community and related actors towards low-carbon practices. As a practitioner myself and as an engaged citizen with a vested interest in the City of Ottawa's efforts to achieve ambitious renewable energy and emissions reduction targets, I also hope to put this knowledge in practice in my personal and professional life.

2 Theoretical framework

In their working paper entitled "The Politics of Decarbonization: A Framework and Method" (2016), Bernstein and Hoffman describe the nature of carbon lock-in as a "fractal" problem, in that the characteristics of carbon lock-in are repeating and reinforcing across scales. For example, at the municipal level, "[c]ities are locked into the use of fossil fuels because (among other things) of how they are physically planned, the expectations [and] practices of citizens around transportation and energy use, the political coalitions and institutional capacities that make cities run politically, and the range of technological options that are available to city dwellers" (p.11). These same dynamics occur at a larger scale regionally and nationally and are mutually reinforcing.

A popular approach for studying socio-technical transitions has been the multi-level perspective, which articulates the conditions under which small-scale technological innovations ("niches") can gain momentum and disrupt the socio-technical regime (Geels & Schot, 2007). In this framing, politics are what facilitate or prevent a sustainable innovation from breaking through into mainstream markets (Geels, 2014). The framework on the politics of decarbonization provides a complementary approach that focuses on the political mechanisms necessary to disrupt carbon lock-in at different scales. It begins with a specific governance intervention and traces how it may be changing the political dynamics of the targeted system, and how those changes "shape decarbonization pathways and possibilities" (Bernstein & Hoffmann, 2018b, p.9).

The potential for an intervention to change the system trajectory is based on its ability to leverage the key political mechanisms described below, which are compiled from a cross-section of political science literature on systemic change. Importantly, these political mechanisms are often secondary impacts that fall outside the main objectives of the intervention (van der Ven, Bernstein, & Hoffmann, 2017).

> Normalization: A shift in perceptions on the relevance of climate action, either through proactive communications and advocacy to different stakeholders on what constitutes appropriate action or through the accumulation of everyday practices that shifts the "common sense of a system" (Bernstein & Hoffmann, 2016, p.17)

> Capacity building: Changing the material, institutional or cognitive capacity of actors to take action on climate change. This can occur through "direct funding, education, training, [technical] assistance, and… co- governance via partnerships between public and private

actors and authorities" (Bernstein and Cashore 2012, 593) [or] via demonstration effects that act as policy learning vehicles (Selin and VanDeveer 2005; Rabe 2008)" (p.18).

Coalition building: Creating or strengthening networks of actors with common economic and/or political objectives in support of a low-carbon transition by "identifying and linking "winners" in the move towards decarbonization and neutralizing losers. This entails empowering actors who have an interest in climate change, building constituencies either through creating or altering incentives or by active social movement building, and utilizing larger market forces" (p.19).

These political mechanisms may contribute to the scaling and entrenchment of the intervention or the changes it promotes within the targeted system. Scaling can imply growth in size or range of activities, the spin-off of complementary activities that increase the benefits to those participating, or the "conscious borrowing of ideas or policies" in other places (Bernstein & Hoffmann, 2016, p.21). Entrenchment refers to processes that increase the durability of the intervention or the policies or practices it promotes. The different types of scaling and entrenchment are further described in Table 1 below.

Table 1. Indicators of scaling and entrenchment in subnational climate governance (Bernstein & Hoffmann, 2018b, p.203)

Type of scaling	Indicator *Has the intervention*	Types of entrenchment	Indicator *Did the intervention*
Simple	Attracted more members, expanded in geographic scope, or accumulated more resources?	Lock-in	Use mechanisms that gave it immediate durability?
Self-organized	Inspired symbiotic interventions?	Self-reinforcing	Become more difficult to reverse over time?
		Positive-feedback	Attract non-target members thereby reinforcing the decisions of early adopters?
Modular	Been consciously emulated in a different context?	Increasing returns	Do the benefits to participants from the intervention increase when more participants are brought on board or the longer the intervention is in place?

Ultimately, the intervention can alter the system's trajectory according to three typologies: reinforcement of carbon lock-in, improvement in carbon lock-in (efficiency gains), or decarbonization. The changes to the system's trajectory depend importantly on the feedback between the system effects (scaling and entrenchment) and the political mechanisms. For example,

an experiment may unintentionally result in the rise of counter-coalitions that serve to further reinforce carbon-intensive practices. A visual representation of these dynamics for a single system is found in Figure 1. Since carbon lock-in is multi-scalar, there is also the potential for an intervention to catalyze disruptions in other linked places (Figure 2). However, the current study is focused on impacts within a single jurisdiction, namely the City of Ottawa.
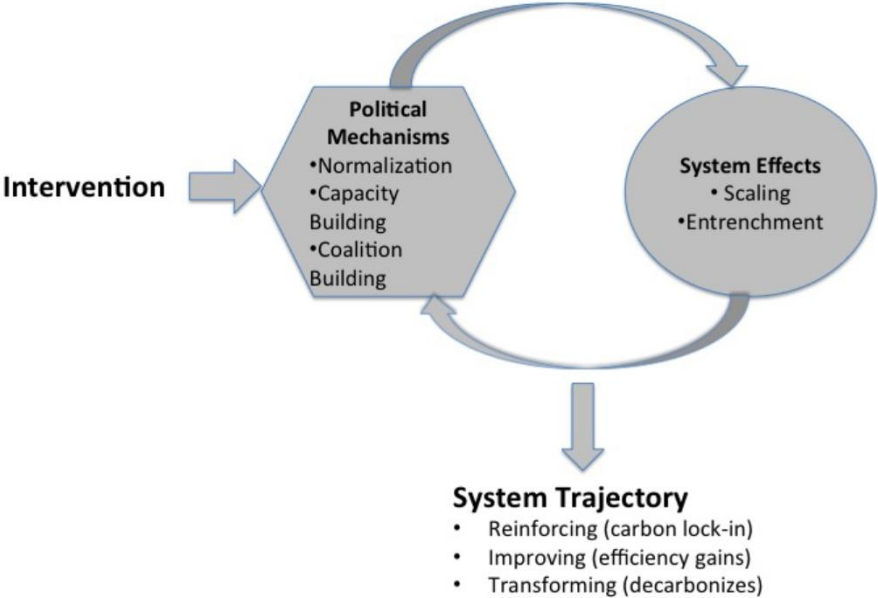
Figure 1. Decarbonization pathway in a targeted part of the system (Bernstein & Hoffmann, 2016, p.14)
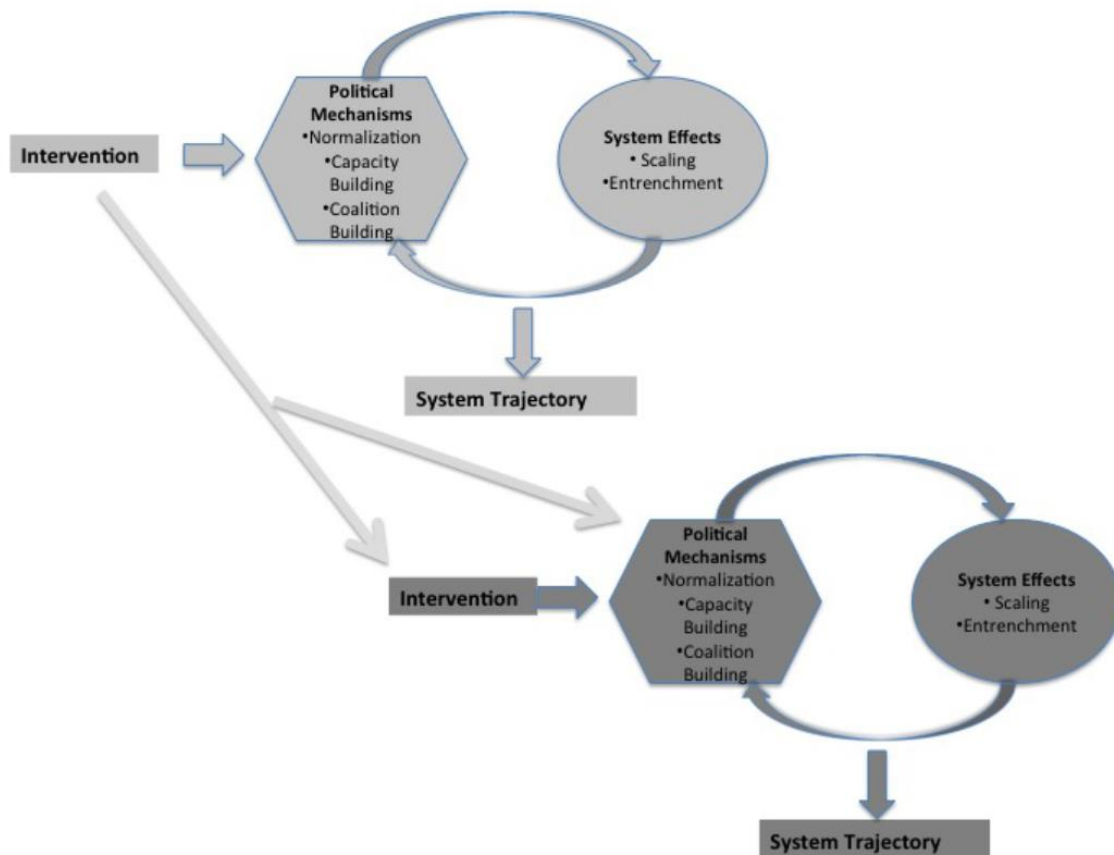
Figure 2. Decarbonization pathways across sub-systems (Bernstein & Hoffmann, 2016, p.15)

The framework is designed to serve as both a theoretical and an analytical tool for retrospective analysis and forward theorizing. The application of the framework to a specific case involves the following components:

1) Constructing a pathway narrative that describes the intervention's activities and intended impact on the targeted system (e.g. a political jurisdiction, market sector, or set of practices);

2) Analyzing how the intervention is generating or contributing to three political mechanisms of normalization, capacity building, and coalition building, and whether this has resulted in the two system effects of scaling and entrenchment;

3) Analyzing the feedback between the system effects and the political dynamics to determine whether the intervention is altering the trajectory of the system now or into the future.

This analysis can serve as the basis for forward-looking policy recommendations by identifying why the intervention may have failed to achieve its objectives or past successes that could be built on (M. Hoffmann, personal communication, August 17, 2018).

3 Methodology

3.1 Qualitative research & case selection

For this study, I apply a qualitative research strategy to a single case study with the goal of interpreting the significance of the Carbon 613 case using the politics of decarbonization as an analytical framework. This mirrors the approach used in analytic induction, in that the research involves assembling all the facts relevant to the analytic frame and "see[ing] if they can be assembled into an image that supports this interpretation (Ragin, 1994, p.101).

Carbon 613 is an example of a local climate governance experiment in that the initiating actor, a local non-profit organization, is attempting to attract implementing actors (local businesses) to voluntarily adhere to a set of rules and activities without any legal authority to do so – what is referred to as "making policy without a polity" (Hajer, 2003 in Hoffmann, 2011b, p.16). In a review of 58 climate governance experiments from around the world, Hoffmann (2011b) defines four typologies of climate governance experiments according to the combination of core functions they employ – networking, planning, direct action, and oversight. Carbon 613 falls under the model of "voluntary actors," which "call on participants to plan, network, and take action but without obvious means of accountability" (p.36). The 18 experiments that fall into this category include a wide range of initiating actors and types of actions being undertaken, but all of them tailor the actions to fit the needs of the target audience and aim to encourage or inspire others.

Given that there is no way of knowing what a decarbonized system will look like, the ideal research approach would be to study a variety of cases covering different initiating actors, targets and scopes of activity (Bernstein & Hoffmann, 2018b). By studying Carbon 613, I aim to contribute to this larger body of research and draw some general conclusions that may be valid for other climate governance experiments operating in similar settings and at similar stages of development.

3.2 Data collection & analysis

To construct the pathway narrative for Carbon 613, I reviewed publicly available documentation, including annual reports and member case studies published on the program website, self-issued news releases and local media coverage, as well as internal documentation available on the member-only section of the website. To better understand the goals of the program, how it operates and the impact of its activities, I conducted semi-structured interviews with three current or former Carbon 613 staff and eight representatives from member and collaborating organizations. Where members

gave their permission, I also reviewed their responses to the 2017 member survey conducted by Carbon 613 in advance of the interview.

The interviewees from member and collaborating organizations were selected by Carbon 613 staff through "convenience sampling" based on availability of individuals in key organizations (Bryman, 2004). I expanded the number of interviews in an effort to obtain a cross-section of organization sizes and types that are engaged with the program. Interviewees included business owners and senior managers as well as some operational staff. The interviews were conducted in person or by phone. To protect individual confidentiality, the interviewees are numbered and identified by participant type, industry sector and organization size. A summary table of the interview participants is found in Appendix I.

The order and nature of the questions posed in the interview varied according to the flow of the conversation and any novel issues that emerged (Bryman, 2004). Each interview lasted between 30 and 90 minutes and was recorded and transcribed for analysis purposes. Sample interview templates for Carbon 613 staff and members are found in Appendix II.

3.3 Limitations

One potential limitation of this approach to data collection is the risk of using self-reported information to characterize the nature and impact of a program, as implementing organizations may exaggerate their activities in communications that publicize the intervention (Hoffmann, 2011b). However, Carbon 613 staff were very candid during the interviews about the challenges the program has faced and potential shortcomings of the delivery model. One of these challenges has been the high staff turnover since the launch of the program, which also means current staff have an incomplete corporate memory of past activities. I interviewed one former staff person to help fill this gap but recognize I may still have an imperfect picture of the scale and impact of past program activities.

The selection of members to participate in interviews was largely brokered by Carbon 613 staff in order to respect their relationships with individuals participating in the program. This sampling approach was limited by the availability of specific individuals during the study period. It also had the potential to insert a positive bias into the study by prioritizing members who have a favorable view of the program. In practice, however, the members interviewed had various degrees of engagement with program activities and were also fairly candid on where the program could be more effective.

4 Overview of the case

4.1 Study area

The City of Ottawa is the capital of Canada and the fourth largest municipality in the country, with nearly a million residents. The city is located along the shores of the Ottawa River and across the river from the City of Gatineau, which together form the National Capital Region. Ottawa's municipal boundary was significantly expanded in 2001 through a provincially mandated amalgamation (Zeemering, 2016). As a result, the municipality covers a vast area of 2,796 km^2 and encompasses a wide variety of land uses, including a dense urban core, mid- to low-density suburban neighbourhoods, a ring of protected greenspaces, as well as significant rural areas (Figure 3). The economy of Ottawa is dominated by the federal public service as well as a growing telecommunications sector, which together account for 37% of Ottawa's total gross domestic product (City of Ottawa, 2006a).
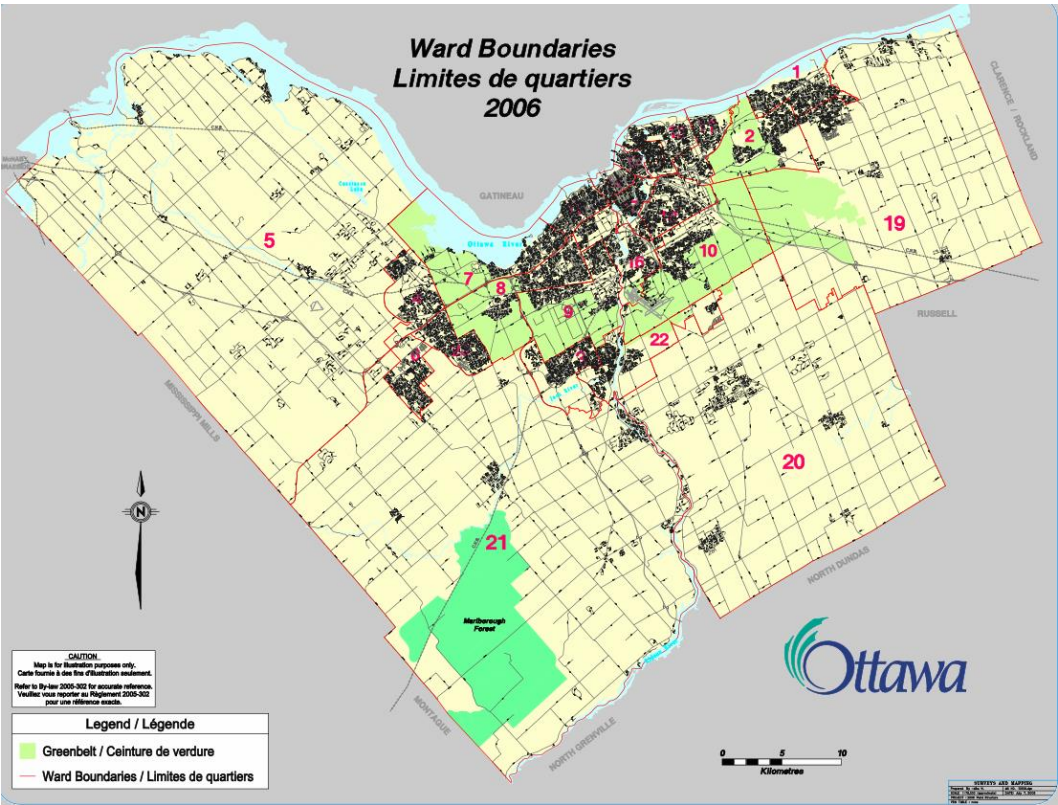
Figure 3. Map of the City of Ottawa by municipal ward (City of Ottawa, 2006b)

The City of Ottawa has a long history of municipally-led action on climate change. As one of the first members of the FCM-ICLEI Partners for Climate Protection program in Canada, the City was recognized in the mid-2000s for leadership in developing and implementing municipal climate action

plans. In May 2014, the municipal council approved an update to the 2005 Air Quality and Climate Change Management Plan (AQCCMP), including a new short-term community target of 12% below 2012 levels by 2024 (City of Ottawa, 2018b). In 2016, the City adopted a long-term community target of 80% below 2012 levels by 2050 and began the development of a complementary plan called Energy Evolution: Ottawa's Community Energy Transition Strategy. Phase I of Energy Evolution was approved in December 2017 along with a three-year action plan "designed to manage energy consumption, promote the use of renewable energy and advance local economic development opportunities in Ottawa" (City of Ottawa, 2018a). Phase II of the strategy is currently under development in consultation with internal and external stakeholders and will focus on opportunities to reduce energy use in the buildings and transportation sectors, which together represent approximately 90% of community-wide GHG emissions.

In the past few years, the City has received increasing criticism from environmental non-profits and community activists on the delays related to the development of Energy Evolution and the lack of significant new public policy changes or investments to achieve Ottawa's emissions reduction goals and targets (Chianello, 2017; Ecology Ottawa, n.d.). In November 2018, the City published updated GHG inventories showing a decrease of 25% in corporate emissions and 11% in community emissions between 2012 and 2016. A portion of these emissions reductions are attributable to the provincial phase-out of coal-fired electricity, which has decreased the carbon intensity of the electricity grid (City of Ottawa, 2018b).

4.2 Carbon abatement potential in the business sector

In 2017, EnviroCentre commissioned a Business Energy and Emissions Profile for the City of Ottawa, which estimated the GHG emissions from over 19,000 businesses representing 71% of businesses and organizations within the city (Climate Smart, 2017). The report indicated Ottawa businesses are directly responsible for 1,281,000 tonnes CO_2e from the following areas of activity: electricity and natural gas use in buildings, fuel use in company vehicles and equipment, and waste. By projecting the emissions from other activities that are part of day-to-day business operations, such as "reimbursed mileage, staff commuting, paper use, refrigerant use, and third party shipping" (p.4), this estimate rises to approximately 2,135,000 tonnes CO_2e. By comparison, the total GHG emissions inventory for the City of Ottawa in 2016 was 6,221,000 tonnes CO_2e (City of Ottawa, 2018b), which indicates the business sector is a key part of the solution for reducing city-wide emissions.

The majority of direct emissions are generated by businesses in three industry sectors: Accommodation and Food Services, Construction, and Office-Based Businesses. The majority of these emissions are from natural gas use for space and water heating, as well as process heat, and from fuel use in company fleets (Figure 4).
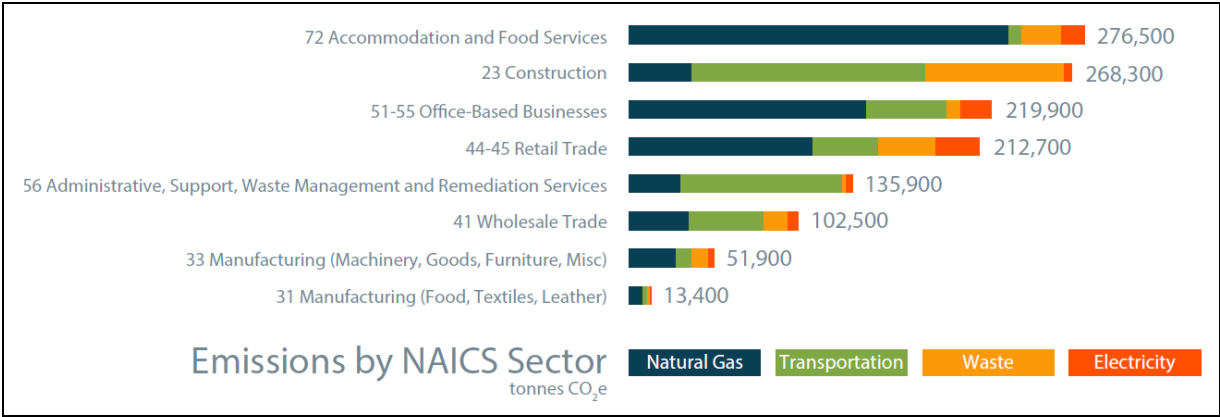
Figure 4. GHG emissions summary by industry sector for the City of Ottawa (Climate Smart, 2017, p.8)

Climate Smart, a social enterprise based in Vancouver, British Columbia, that has worked with over 850 small- and medium-sized businesses to track and reduce their GHG emissions since 2007, has found that participating organizations achieve on average an 11% emissions reduction within three years, representing an average business savings of $397 per tonne of CO_2e reduced (Climate Smart, 2017).

4.3 History of Carbon 613

The Carbon 613 model was created and incubated in Waterloo Region, Ontario by a local environmental non-profit called Sustainable Waterloo Region (SWR). SWR started the Regional Carbon Initiative as a grassroots social enterprise in 2008 to help local businesses "move from an interest in reducing their environmental impact to action" (Standing Committee on Environment and Sustainable Development, 2015, p.1). For an annual member fee, businesses gain access to resources, software and external technical support to set GHG reduction targets and track their carbon footprint, as well as recognition for their progress. The program started with three businesses and by 2015 had grown to 65 organizations representing 14% of the workforce in Waterloo Region that had collectively committed to 55,000 tonnes of GHG reductions.

In 2011, the founder Mike Morrice was approached to replicate the model established by the Regional Carbon Initiative in another region in Ontario. In 2013, Mr. Morrice left SWR to found a non-profit called Sustainability Colab to scale the model to other communities and help businesses "not only to reduce their environmental impact, but also to increase their profitability and at the same time grow the low-carbon economy" (p.1). Sustainabiliy Colab has since rebranded as Green Economy Canada and currently provides behind the scenes support in the form of coaching, resources, peer-to-peer groups and funding opportunities to a total of seven Green Economy Hubs across Ontario.

Carbon 613 arose as one of those hubs through conversations between Sustainability Colab and EnviroCentre, an Ottawa-based environmental non-profit whose mandate is to "[bring] environmental change to life by offering people, organizations and communities practical solutions to lighten their environmental impact in lasting ways" (EnviroCentre, 2018, p.2). In May 2014, the two organizations hosted a series of conversations with Ottawa businesses and community leaders on the creation of an Ottawa-based Hub (EnviroCentre, 2014). Instead of creating a new non-profit, EnviroCentre decided to incubate the Carbon 613[1] program within its existing organizational structure (Interview #8). The program launched in June 2015 with financial support from three sponsors – the Province of Ontario's Ministry of Environment and Climate Change, the TD Bank Group and the Ottawa-Carleton District School Board and opened to members in September of that year. At a time of writing, there were 33 members in the program, ranging from home-based businesses and independent retailers to public sector institutions and local offices of national and multinational companies (Appendix III). A timeline illustrating the evolution of the program is shown in Figure 5.

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[1] Note that "613" refers to the area code for the City of Ottawa and surrounding Eastern Ontario.
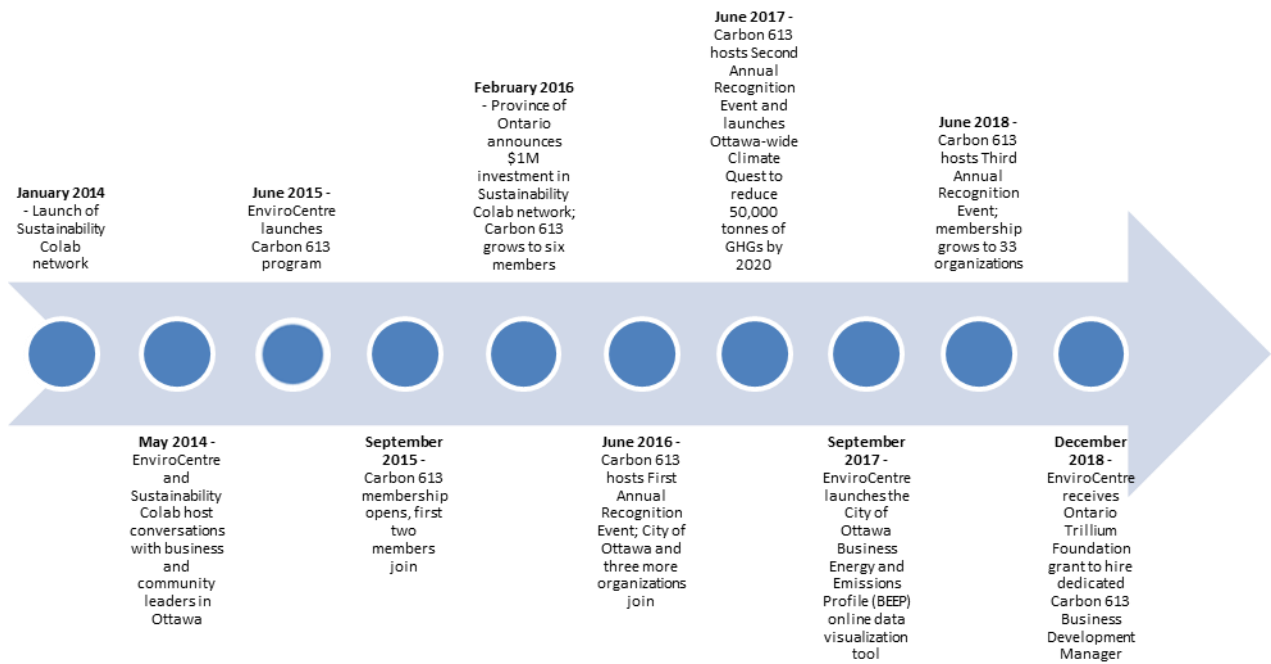
Figure 5. Key landmarks in the evolution of the Carbon 613 program

5 Analysis

5.1 Decarbonization goals and activities

One of the primary goals of the program articulated in Carbon 613's first annual Sustainability Report is to "advance the low-carbon economy" (EnviroCentre, 2016b, p.3). The program aims to do this by providing Ottawa-based businesses with the tools, support and recognition to set and achieve GHG reduction targets within their business operations. Members agree to work towards a series of flexible program milestones that structure their progress within the program (Figure 6). They also commit to following a program framework, which sets out clear standards for accounting and reporting on their business' operational carbon footprint. The program milestones and framework were developed in consultation with a working group of community technical experts who became the program's Advisory Council. The core components of the program framework are listed in Appendix IV.
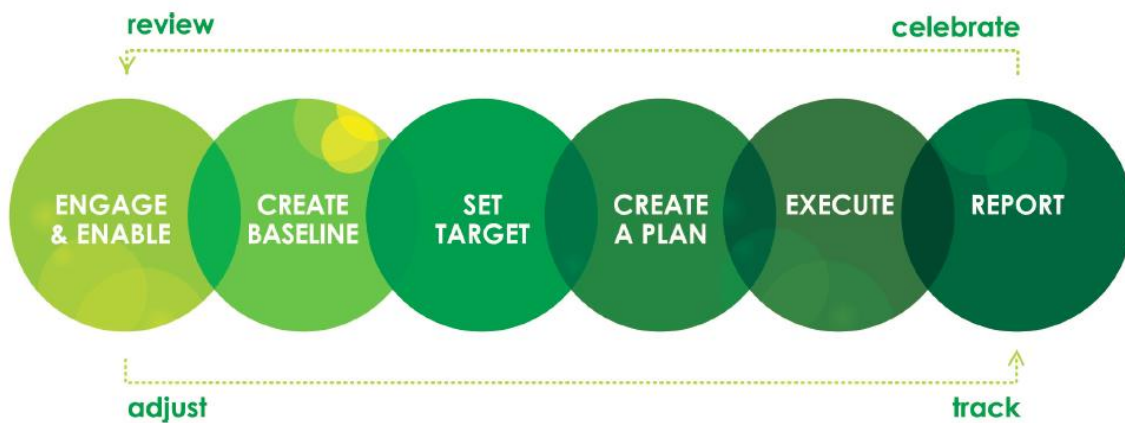
Figure 6. Carbon 613 program milestones (EnviroCentre, 2016, p.2)

Carbon 613 did not initially establish specific goals in terms of targets set or reductions achieved by members. The program did launch an aspirational goal in 2017 for members to reduce 50,000 tonnes of GHGs by 2020, but this goal is currently under review (Interview #1). However, program staff are currently developing an updated framework (A. Plant, personal communication, December 12, 2018), which will include the following new performance standards:

- Members will be required to set a minimum target of 15% reduction target within 10 years.
- Members will be recognized on the levels of commitment in their set targets (Bronze – 15%, Silver – 30%, Gold – 50%).

The expectation embedded within the theory of change for Green Economy Hubs is that member organizations are encouraged to strive for more ambitious targets and actions over time through the process of working to meet their reduction goals and being publicly recognized for their progress (Sustainability Colab, 2017).

Carbon 613 offers members a range of tools and support to help them progress through the program milestones, including online carbon accounting tools and resources, one-on-one support, learning and networking opportunities and recognition (Table 2). The extent to which members access these supports has varied according to their needs as well as the membership packages available. When the program launched, members paid a pro-rated fee of $500–$7,500 per year according to their organization size and received standardized access to resources and one-on-one support. The fee structure was then changed to a base fee of $550 per year with technical add-on packages that members could purchase. The program will be reverting to a fee structure based on organization size in 2019 (Interview #1).

Table 2. Types of support offered to Carbon 613 members

Type of member support	Description
Carbon Accounting Tool	All Green Economy Hubs license an online carbon accounting software from Verisae (an Accruent company) to their members. The tool allows businesses to track and report their activity data related to natural gas, electricity, vehicle fleets, business travel, water and waste, and converts this to tonnes of CO_2e. Users can import large sums of historical data, visualize the data in an interactive dashboard and export summary reports. The tool simplifies the process of compiling a GHG inventory for businesses that may be new to carbon accounting. It also serves as a data repository for the program, so that Carbon 613 can roll up and report on tonnes of emissions committed and reduced.
Online resources	Members have access to guidebooks with ideas and best practices on topics such as employee engagement, energy conservation, sustainable procurement and sustainability policies.
One-on-one support	Members have access to one-on-one coaching and technical support from a Carbon 613 program coordinator. The support provided can include guidance on collecting emissions data, navigating the carbon accounting tool, forming a green team, setting targets or prioritizing actions for emissions reductions and cost savings. Members also receive an annual report card with a summary of their reported GHG emissions, achievements related to emission reduction actions, participation in program activities and suggested goals for the coming year.
Learning & networking opportunities	Carbon 613 hosts learning opportunities for members approximately every two months in a variety of formats (panel discussions, seminars, workshops, webinars, study tours). Past topics have included carbon accounting, employee engagement, sustainable commuting, electric vehicles, communicating sustainability and funding opportunities. These activities often leverage the technical expertise or actions of members and have included walkthroughs of members' facilities to learn first-hand about their energy efficiency and sustainable business practices.
Recognition	Carbon 613 hosts an annual recognition event to celebrate the achievements of its members, including awards for Sustainability Leadership, Best Sustainability Project and Rookie of the Year. Carbon 613 also publicizes member achievements in its annual Sustainability Report, in select case studies on its website, and in social media. Members have access to a Carbon 613 member logo and communications package to promote their involvement in the program.

Carbon 613's latest Sustainability Report at the time of writing indicates some early results that hold the promise of future emissions reductions. Seven members have set targets totalling nearly 3,000 tonnes CO_2e of committed emission reductions. A further 11 members have completed baseline GHG

emission inventories. Additionally, some of Carbon 613's earliest members have implemented projects that will result in concrete progress towards their targets. For example, the Ottawa-Carleton District School Board, which serves over 70,000 primary and secondary school students at over 125 sites, has installed net metered solar photovoltaic panels on the roofs of 40 schools and has invested $3 million in energy saving initiatives in its buildings. Other members have undertaken measures such as completing energy audits on their buildings, adding insulation to their buildings, upgrading heating and cooling systems, lighting and appliances to more energy efficient models, purchasing electric or low-carbon vehicles, diverting waste from landfill and reducing paper consumption, and purchasing renewable energy credits to offset their electricity and natural gas use (EnviroCentre, 2018).

5.2 Transformative political mechanisms

The following political mechanisms help frame the potential for Carbon 613 to catalyze a decarbonization pathway by scaling and/or entrenching low-carbon attitudes and practices within the City of Ottawa. The mechanisms are presented in separate sections for analysis purposes, but in practice they are interrelated.

5.2.1 Capacity changes

One of Carbon 613's main functions is to build the capacity of businesses and organizations to track their carbon footprint, set targets and implement actions to reduce emissions, with the ultimate goal of "embedding sustainability into their operations and gaining a competitive advantage" (EnviroCentre, 2017, p.2). As a member-based program, the primary target audience for this capacity building is businesses that are paying members of the network. Non-member organizations and the general public can also benefit from certain learning opportunities such as workshops and seminars for a fee (Interview #1).

The extent to which capacity is being built within member organizations depends on several factors, including their existing in-house capacity for carbon accounting and emissions reduction activities, the degree of control they have over their operational emissions, and staff availability to attend events. With respect to existing capacity, most Carbon 613 members fall under one of the following three categories:

1) **Small- and medium-sized enterprises (SMEs) that have limited in-house knowledge and skills related to carbon accounting and emissions reductions**

This category represents the majority of SMEs currently in the network. These members are generally benefitting from the Carbon Accounting Tool, program framework and one-on-one support to help them compile GHG inventories and prioritize actions. One member specifically mentioned that having a recommended carbon measurement tool and someone to walk through the basic math behind carbon accounting has helped them both gain the skills and prioritize this work as a small business owner (Interview #4). Other members have used Carbon 613 staff to help them benchmark themselves against other businesses and set realistic targets, and used their step-by-step guide for starting an internal green team (Interview #10).

In terms of implementing low-carbon actions, the members in this group suggested some of these actions would likely have happened regardless of their participation in the program, but the carbon accounting tools and resources bring valuable structure to their existing sustainability goals, and the touch points with program staff help keep their commitment to emissions reductions top of mind (Interview #6, Interview #10). Another member also highlighted the capacity building benefits of undertaking energy efficiency retrofits as part of their program commitment, which has helped them better understand the inner workings of their own facilities and identify opportunities for further reductions (Interview #4).

2) **SMEs that have good in-house knowledge and skills related to carbon accounting and emissions reductions**

There are a small number of SMEs that already have sufficient in-house capacity to do this work and do not require support from Carbon 613. This group includes companies that offer advisory services related to sustainability and climate change. These companies already undertake detailed carbon accounting for their operations and simply provide this data to Carbon 613. They have also already undertaken efforts to minimize their carbon footprints. In one case, a member initiated a composting program for their office on the suggestion of Carbon 613 staff, but largely pursued this without external support (Interview #7). These businesses joined the program primarily to demonstrate leadership and encourage other organizations to join (Interview #7, EnviroCentre, n.d.-a). The main benefit of the program for these members is being connected to a local sustainable business community. Due to their in-house expertise, these members have

participated as technical experts in seminars and workshops and help build the capacity of other members of the network.

3) Large public sector organizations and large businesses (500+ employees)

In Ontario, Broader Public Sector organizations – including municipalities, public utilities, school boards, universities, colleges and hospitals – are legally required to track their energy use and GHG emissions and report these annually to the provincial Ministry of Energy under Ontario Regulation 397/11. They are also required to develop five-year energy conservation and demand management plans (Government of Ontario, 2018). As such, organizations such as the City of Ottawa, Hydro Ottawa and the Ottawa Carleton District School Board already track their carbon footprint to a higher level of detail than required by Carbon 613 and do not require additional capacity building support on carbon accounting.

These members can showcase their own sustainability practices to other members, but their ability to learn from others is currently limited by the number of organizations of similar size and scale within the program. For example, the City of Ottawa suggested it would be valuable to have federal government participation in the program, as they have a large and dispersed building portfolio and fleet similar to the City (Interview #5). In the City of Ottawa's case, however, participation in the program has helped build capacity in a different way; by making municipal staff aware of community stakeholders who are working on reducing energy use and emissions, the City has been able to involve new stakeholders in advisory groups for the development of its Energy Evolution strategy (Interview #5).

There are currently a limited number of large private sector organizations in the program. None were interviewed directly for this study, but the understanding from program staff is they also do not need capacity building support from Carbon 613 and mainly value the visibility and recognition as sustainability leaders (Interview #1).

Carbon 613 also builds member capacity through attendance at events such as seminars and workshops. The most widely appreciated events cited in interviews were the walkthroughs of member facilities, where members' existing green practices and technologies effectively serve as demonstration projects. There is limited evidence to date of diffusion of these best practices from one business to another, but at least one member felt there was potential for replication of certain initiatives at a different scale within their own business, and multiple members have been inspired by

these events to revisit how they could improve their own operations (Interview #1, Interview #4, Interview #10). In one case, one of these tours initiated a partnership between two members that led to the host undertaking a lighting retrofit project (Interview #10). Several members mentioned their attendance at Carbon 613 events is limited by staff availability. One underlying factor seems to be the number of employees within a given business that are engaged in the program – most members have a single lead staff person. The only member who spoke of consistently attending Carbon 613 events was also the only one that had successfully launched a green team and decentralized participation in the program to multiple employees.

Finally, capacity building opportunities are also affected by the amount of agency members have over their operational emissions, where limited agency can constrain their participation in the program. Businesses renting space in a multi-tenant building often have difficulty compiling a meaningful emissions baseline because their electricity and natural gas use are aggregated with other tenants in the building. Furthermore, they generally have little control over the building envelope or heating and cooling systems. A few current members have deferred setting targets for this reason (Interview #6, Interview #7), which has slowed their progress within the program. In an extreme case, one home-based business had already minimized their carbon footprint as much as possible prior to joining the program, and variations in their emissions from year to year depend solely on whether they chose to add or remove a single trip by plane (Interview #3). These examples highlight how businesses with limited operational control may not be the ideal target audience for Carbon 613 in terms of quantifying emissions reductions. This was recognized by program staff and is being addressed in the renewal of the program framework (Interview #1, Interview #2).

While not the focus of this study, there is some evidence that some of the capacity being built is multi-scalar, mainly due to Carbon 613's participation in a network of Green Economy Hubs. For example:
- Carbon 613's member guide and several guidebooks were compiled based on documentation from current and former Green Economy Hubs.
- One member has proactively shared their expertise with other Hubs in the Green Economy Canada network and played a part in recruiting one of their clients to another Hub (Interview #6).
- A member profiled in a Green Economy Canada video was connected by the videographer with similar businesses in other Hubs (Interview #10).
- Knowledge sharing is ongoing between Carbon 613 and the other Hubs via monthly calls, an annual retreat, and an online platform called "the Commons."

5.2.2 Normalization

As mentioned in their 2015 Sustainability Report, Carbon 613 is aiming to normalize two things:

1) The narrative that sustainability is in business' best interest

2) Carbon tracking and reporting as a mechanism for embedding sustainability in business operations and driving the low-carbon economy

Regarding the first point, the businesses currently participating in the program are already convinced of the value of sustainability. But in most cases, this goes beyond the perceived business benefits of sustainability and is linked to the core values of the business owners and operators around environmental stewardship. As one Carbon 613 staff person put it, "we're working with the already engaged, the already converted" (Interview #1). This motivation is a logical one for the approximately one quarter of current members whose core business is to provide an environmental or low-carbon product or service (Appendix III). As one member mentioned, their "whole company mission was based on seeking ways to reduce people's carbon footprint through energy efficiency," and signing up to Carbon 613 was about helping them "talk the talk, walk the walk" in their own operations (Interview #6).

But this is also the case for other types of businesses in the program. One member in the accommodation and food services industry mentioned these values were instilled in the company's culture and operations when it was founded, and joining Carbon 613 was about taking this commitment to the next level (Interview #10). In their Carbon 613 case study, Your Credit Union, a cooperative banking institution, joined the program in order to "contribute to fighting climate change" on behalf of their member-owners (EnviroCentre, n.d.-b). The membership also includes small business owners who are climate activists in their free time and feel that "climate change is the most important problem facing our generation, and we should all do our bit" (Interview #4). This perspective was echoed by a business leader in the renewable energy sector who collaborates with Carbon 613, who sees companies that invest in renewable energy credits in Ontario and across Canada as having "a strong understanding of the nature and the threat of climate change and a desire to be a constructive part of the solution" (Interview #11).

Since businesses are already convinced of the value proposition of sustainability when they join Carbon 613, the opportunity for norm change lies in changing the perceptions of the broader business community and stakeholders that interact with them. This can happen through public

communications that reframe the narrative and/or the accumulation of day-to-day practices that change the "common sense of the system" (Bernstein & Hoffmann, 2016).

At the moment, external communications about the program and the achievements of its members are primarily led by EnviroCentre through social media, the program website and newsletter, and occasional news releases, as well as through word of mouth. Current members are also talking about Carbon 613 and their own carbon reduction efforts with clients and in their business networks. In select cases, this has translated into efforts to directly engage their clientele in the sustainability conversation. For example, Your Credit Union launched a Green Home Mortgage program, in which the bank purchases green electricity and renewable natural gas energy credits to offset a new homeowner's home energy use for one year (Bullfrog Power, 2018).

However, at the time of writing the program had only been covered a handful of times in local media (Appendix V). Furthermore, in the 2018 Ottawa Business Growth Survey conducted with 755 business leaders in Ottawa, only 6% of businesses ranked sustainability as one of the most important issues for Ottawa businesses over the next five years, down from 44% in 2017 (Welch LLP & Ottawa Chamber of Commerce, 2018), which suggests the narrative on sustainability being good for business has not yet been widely or consistently adopted outside the Carbon 613 network.

Regarding the second point, there is evidence Carbon 613 is beginning to normalize carbon tracking and reporting within their membership through their capacity building work with SMEs. A few of the members I interviewed have reported their emissions baseline and are intending to report their updated emissions for 2018, which they anticipate will demonstrate the impact of actions undertaken in the past year. One business owner in particular mentioned their perspective on emissions accounting has completely changed over the past few years. This individual previously saw carbon accounting as unnecessary and diverting attention away from meaningful action. "And then as time went on, I became convinced [this approach] was totally right, and that if you don't force either your own business or public institutions to have metrics and to measure them, then these things will probably not get managed" (Interview #4).

Another member attested that participating in the program has changed the way their organization prioritizes emissions reductions efforts within their daily operations: "Because it's one thing to say that you <u>want</u> to, but unless you set yourself targets and you have people outside of your organizations who hold you accountable for that, it has a different impact, it has a difference in how you prioritize, in how you allocate resources and time and energy to that" (Interview #10).

Carbon 613's approach to carbon accounting is also perceived by members as credible and is valued for communicating the authenticity of their commitment externally and preventing the perception of greenwashing (Interview #3, Interview #4). Based on my online review and interviews, the change in attitudes with respect to carbon accounting and reporting appears to be limited for the moment to businesses working through the program milestones.

5.2.3 Coalition building

The main way Carbon 613 is building political coalitions of support within the business community is by recruiting individual businesses and organizations to join the program. When the City of Ottawa announced its membership in Carbon 613, the Chair of the City's Environment and Climate Protection Committee stated the City was joining the "coalition of the willing" to reduce GHG emissions (Willing, 2016). Several members were brought into the program through Carbon 613 staff's pre-established networks of sustainability professionals or through targeted recruitment of businesses aligned with the program objectives (Interview #1, Interview #8). Although the primary audience is the business sector, the program is open to local industry, government, academia, and non-governmental organizations (EnviroCentre, 2016a). As mentioned previously, Carbon 613 has attracted a small but diverse group of businesses and organizations from a variety of sectors.

One of the main ways Carbon 613 staff builds support for participating in the program is by enhancing public visibility and recognition for its members as sustainability leaders. This is done in part through the annual recognition event, which attracts a cross-section of business leaders and community stakeholders that care about sustainability. Carbon 613 staff also promote the members and their achievements on social media:

> Member CSV Architects took home our Sustainability Leadership Award for this year! Committed to walking the talk, CSV's fingerprints are all over much that was green in Ottawa in 2017. To learn more, visit their website: http://bit.ly/2LZVrXv (Carbon 613, 2018a)

> Energy savings happen in many ways - just ask @openconcept_ca. "Moving our websites to a carbon neutral host was the biggest impact on how we work. We've been doing a lot of education as most people aren't aware of the climate impact of our digital infrastructure." (Carbon 613, 2018b)

However, staff recognized public communications about members' sustainability efforts is an area that could be enhanced (Interview #1, Interview #2). This perspective was echoed by a stakeholder who works for a large property management company in Ottawa that already does carbon

footprinting across their building portfolio, who confirmed that while they support the program, the "reputational benefit" wasn't strong enough for them to justify the member fee (Interview #9).

Carbon 613 also indirectly links "winners" within its network that receive direct business benefits from participating in the program. For example, one member that supplies energy efficient products and services ranked Carbon 613 as the most valuable among all their business networks in terms of giving them visibility and connecting them with other businesses. This has resulted in new business opportunities, which they perceive as a win-win for both growing their own business and helping new clients reduce their energy and emissions (Interview #6). Another member in the accommodation and food services industry has seen a direct benefit from participating in a network of businesses that share similar values around sustainability, in that their service becomes the preferred choice of other members of the network and gives them access to new clients (Interview #10).

In terms of building a broader coalition of support for reducing emissions in the business sector, Carbon 613 collaborates informally with other non-profits and community groups that share common objectives. For example, the program cross-promotes relevant events with the local chapter of the Canada Green Building Council and has sponsored a sustainable business networking event called the Better Buildings Breakfast (Interview #1, Interview #8). Carbon 613 staff also previously collaborated with another grassroots initiative called the Ottawa Centre EcoDistrict, which had built a network of businesses and organizations that supported transforming the downtown business district into a sustainable neighbourhood. The EcoDistrict activities were ultimately taken over by EnviroCentre when the non-profit running the initiative was dissolved and some members of the network were brought into Carbon 613 (Interview #8). Outside of their Carbon 613 mandate, EnviroCentre staff participate in advisory groups for the City of Ottawa's Energy Evolution strategy and collaborate with other local environmental non-profits on a three-year grassroots initiative that seeks to "encourage broader support for innovative and bold policy and investment strategies" related to emissions reductions in new and existing buildings in Ottawa (Sustainable Eastern Ontario, Maison Tucker House, & Ecology Ottawa, 2018).

However, the program does not seem to have garnered broader political support within the City of Ottawa or among key economic development stakeholders. When the City of Ottawa joined the program, it was framed by the Chair of the Environment and Climate Protection Committee as an "opportunity to be a catalyst and encourage other organizations to create their own plans to improve sustainability and reduce GHG emissions" (EnviroCentre, 2016d). While municipal staff actively participate in the program and the Mayor and the Chair of the Environment and Climate Protection

Committee have attended the annual recognition events, the City has not publicly championed the program or the role local businesses can play in helping meet Ottawa's community-wide GHG target and how this can improve their economic competitiveness (Interview #5, Interview #6, Interview #11).

The Ottawa Board of Trade (formerly the Ottawa Chamber of Commerce), which represents the voice of over 1200 businesses in Ottawa, is also a Carbon 613 member and has co-hosted program events related to electric vehicles and cap and trade. But based on an online review, the Board of Trade does not actively cross-promote the program or the business case for emissions reductions on its website[2] or in public communications. Similarly, Invest Ottawa, a non-profit organization that serves as the lead economic development agency for the city, does not have any references on its website[3] about the business benefits of sustainability, energy efficiency, or the low-carbon economy.

5.3 System effects

5.3.1 Scaling

While the program has experienced modest growth to 33 members within the first three years, Carbon 613 staff acknowledged a few challenges that have negatively affected the potential for simple scaling of the program and its impacts within Ottawa. One of these has been high staff turnover at EnviroCentre since the launch of the program, both at the strategic level and among operational staff (Interview #1, Interview #8). The Carbon 613 members I interviewed acknowledged staff retention as a challenge they themselves face, while recognizing this turnover has made it more difficult to establish and maintain relationships with program staff, and in some cases has resulted in them being less aware of the supports available or less active in the program (Interview #4, Interview #6). This turnover has also prevented the program from proactively following up with prospects suggested by existing members.

Another more recent factor was the cancellation of an incentive fund managed by Green Economy Canada, which provided financial compensation to all Green Economy Hubs based on the number of new members and milestones achieved in a given year. The fund was launched in 2016 with a grant from the Province of Ontario's Green Investment Fund (EnviroCentre, 2016c). After the provincial election in June 2018, the new government cancelled the Cap and Trade Program that financed the Green Investment Fund as well as existing contracts. The cancellation of the incentive fund has

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[2] https://www.ottawabot.ca/
[3] https://www.investottawa.ca/

significantly changed Carbon 613's financial model and is one of the reasons for the upcoming change in membership fees (Interview #1).

In spite of these setbacks, there are some promising indicators of the potential to scale up the program, contingent on finding a good balance between the fee structure and the value proposition offered to different types of organizations. Several existing members mentioned clients and business contacts that would be good prospects for joining the program, because they are already making efforts to reduce operational GHG emissions or have made public commitments to that effect. These prospects include national hotel chains, property management companies and local independent businesses. Some members also indicated they are prepared to support these recruitment efforts once the program relaunches its service offering. A property management company that collaborates with Carbon 613 would also be prepared to help onboard entire buildings once the program has buy-in from a few engaged commercial tenants (Interview #9).

Furthermore, 42% of respondents in the 2018 Ottawa Business Growth Survey ranked "lack of skills and knowledge" as one of their top two barriers to becoming more sustainable in their business practices (Welch LLP & Ottawa Chamber of Commerce, 2018), which indicates Carbon 613 is well positioned to fill this gap with its existing business model.

5.3.2 Entrenchment

Entrenchment processes make interventions or the practices they promote "sticky" or difficult to reverse (Bernstein & Hoffmann, 2018b). The most prominent example to date of entrenchment resulting from Carbon 613 is the City of Ottawa's corporate GHG reduction target. When the City joined the program, it had a pre-existing corporate target under the AQCCMP of no increase in corporate emissions between 2012 and 2024, which was not an acceptable target under the program framework. City staff were planning to bring forward a new target of 20% below 2012 levels by 2024 to the City Council for consideration as part of an update to the AQCCMP in 2019. However, the City's Environment and Climate Protection Committee leveraged the commitment made under Carbon 613 to bring forward a motion in committee to adopt the more robust target in June 2018. The target was subsequently approved by the City Council with only one dissent. This is perceived by municipal staff as a significant achievement, since "targets aren't easily set at the City" (Interview #5). This is a form of "lock-in" entrenchment in that the target has immediate durability for institutional reasons (Levin, Cashore, Bernstein, & Auld, 2012).

A parallel although weaker process of lock-in occurs with private-sector businesses that set GHG targets through Carbon 613. Although these targets are not locked in structurally or institutionally

within those organizations, the fact they are communicated publicly by Carbon 613 creates a sense of accountability and reputational risk of not making efforts to meet those targets.

Carbon 613 also holds the promise of another form of entrenchment, "increasing returns," in which the benefits to the actors targeted by the program increase over time (Levin et al., 2012). The members interviewed indicated they would see a lot of value from being able to benchmark themselves against more businesses in their sector or of a similar scale and emissions profile (Interview #5, Interview #6, Interview #10). The continued simple scaling of the program would create a bigger pool of organizations with which to exchange best practices and potentially to leverage new business opportunities. Current members also suggested the participation of more businesses, including more large players, would lend credibility to the program and their participation in it (Interview #2, Interview #4, Interview #6). So the value of the program to its members should continue to grow as its membership grows.

5.3.3 Contestation and opposition

Given that Carbon 613 is a voluntary program and is not currently engaged in advocacy efforts related to public policies or funding, there has not been any active opposition to the change it is trying to create in the system to date. However, the City of Ottawa and Hydro Ottawa were initially reluctant to join the program, due in part to concerns about committing to a program that would publicly report their data (Interview #8). There was a perception from Carbon 613 staff and other early adopters that these institutions needed to be part of the program early on to make it viable. The City of Ottawa ultimately did join to show leadership and encourage others to join, and provided a one-time grant in addition to the member fee to help with the long-term viability of the program (Interview #5).

5.4 System outcomes

Through capacity building, Carbon 613 is starting to enable norm change around measuring and reducing GHG emissions within SMEs in Ottawa that are members of the network. This suggests Carbon 613 could help catalyze a system improving trajectory as more businesses join the network, set targets and undertake actions to incrementally reduce the carbon footprint of their operations. The program is also anecdotally strengthening relationships between City of Ottawa staff responsible for climate protection and community stakeholders that are leading energy efficiency and emissions reductions efforts, which may enhance the City's planning efforts and support more ambitious climate change policies in the future.

There remain outstanding questions as to whether Carbon 613 could lead to widespread decarbonization of the business sector under the right conditions. Green Economy Canada's theory of change predicts that "as the companies learn from each other and the "business as usual" shifts, businesses will be more open to projects with longer paybacks" (Standing Committee on Environment and Sustainable Development, 2015, p.6), which will lead to a ratcheting up of commitments and level of ambition over time to approach science-based targets. There is evidence this is beginning to happen with the Regional Carbon Initiative in Waterloo Region, where some companies have progressed from smaller scale measures like "lighting and thermostats […to] solar and other renewables, LEED building retrofits, larger changes to their fleet" (p.6). Within Carbon 613, most members are currently focused on measures with a reasonable payback period (Interview #2); only one small business owner confirmed they are willing to spend money on energy retrofits that "have a very, very long payback horizon" and are not "economically rationale" in the interest of minimizing their carbon footprint (Interview #4).

For this ratcheting up of actions to happen within the timescale required to avoid severe climate change, this would likely require complementary policies and incentives. Participants in this study highlighted the critical role of incentives in enabling more ambitious action. Several Carbon 613 members and collaborators have taken advantage of provincial government grants to undertake actions such as lighting and other energy efficiency retrofits, purchasing electric vehicles, and installing solar panels. With the change in provincial government and the cancellation of the Cap and Trade Program, many of these incentive programs have been cut, which has caused some planned projects to be scaled back or cancelled as the longer payback period is no longer deemed financially feasible (Interview #2, Interview #4, Interview #5, Interview #6, Interview #9).

There are also a few possible scenarios under which incremental improvements in the carbon footprint of the business sector at scale could indirectly contribute to a broader decarbonization pathway locally and regionally. For example, widespread energy efficiency measures could free up grid capacity for electrification of the transportation sector. Since Ontario's electricity grid is largely powered by low-carbon energy sources, this would enable the decarbonization of the transportation sector and would be more fiscally prudent than building out new generating capacity (Interview #11). Alternatively, investments in on-site renewable energy or renewable energy credits could change planning and decision-making by local utilities and provincial electricity regulators on the need to accommodate greater decentralization of the electricity grid.

5.5 Additional findings

The following observations fell outside the scope of the analysis but are relevant to Carbon 613's potential to have a more transformative impact.

Gaps related to programmatic linkages with the City of Ottawa:

- While the City of Ottawa's community-wide GHG targets are listed on the Carbon 613 new member application form, the interviews revealed a general lack of awareness of the City's targets among members who are not community climate activists.

Evidence of "siloed" environmental and economic development activities:

- The City of Ottawa's Economic Development Strategy, AQCCMP and Energy Evolution strategy are managed as distinct strategic initiatives with separate budget allocations (City of Ottawa, 2015), and there is currently no economic development funding allocated to helping Ottawa businesses improve their energy or resource efficiency (City of Ottawa, 2019). There has also been resistance from the City's Finance and Economic Development Committee (FEDCO) to increase funding for community energy projects (J. Connor, personal communication, July 30, 2018).

- The Ottawa Board of Trade's Environment and Sustainability Committee advocates for these types of incentives, however they have not had an audience with FEDCO or the Mayor's Office. The Mayor's Office is also reluctant to endorse tools like on-bill financing that would allow Hydro Ottawa to incentivize commercial energy efficiency retrofits (Interview #11).

6 Discussion

The preceding analysis traces the activities currently being undertaken by Carbon 613 and the direct and indirect impacts these are having within the City of Ottawa on the political dynamics that reinforce carbon lock-in. In response to the first sub-research question, Carbon 613 is attempting to steer the business community and other local actors to reduce greenhouse gas emissions primarily by directly recruiting them to participate in a fee-based program. These members receive technical support, networking and peer learning opportunities, and recognition for measuring their operational GHG emissions and setting and working towards voluntary reduction targets.

In terms of the impacts on the system (sub-research question #2), this work is starting to build the capacity of SMEs in the program to measure their carbon emissions and normalize these efforts within their organizations. The process of recruiting members to the network is also building a

coalition of support for emissions reductions within the business sector, wherein some SMEs, larger companies and public sector actors do not need the program's capacity building support but are joining to give support to the movement and to gain visibility for their efforts. While Carbon 613 is generally perceived positively by its members and collaborators, the work it is leading has not yet entered the wider public discourse on the relevance of climate action in Ottawa.

To date, there have been limited examples of scaling or entrenchment as a result of Carbon 613 activities, where scaling has been hampered by staffing changes within the host organization as well as provincial policy changes. This finding echoes the research on "intrinsic" challenges faced by many other grassroots intermediary organizations that are promoting sustainability innovations, namely the challenges related to internal organization and management that can leave them vulnerable to shocks like loss of staff, funding cuts or policy changes (Hargreaves, Hielscher, Seyfang, & Smith, 2013; Seyfang & Smith, 2007). Carbon 613 has also encountered what are known in the intermediary literature as "diffusion" challenges in terms of risk aversion by public sector institutions in associating with a relatively small-scale program. This was ultimately overcome and resulted in the one example of lock-in entrenchment, where actors within the City of Ottawa leveraged their participation in the program to set a more ambitious corporate GHG reduction target.

6.1 Opportunities to scale up impact

To answer sub-research question #3, "how could Carbon 613 strengthen its activities to contribute to a decarbonization pathway for the City of Ottawa?", I've used the above analysis and external literature to identify gaps in current program activities as well as opportunities to leverage the political mechanisms of normalization and coalition building to have a more transformative impact within the city.

1) **Strategically recruiting new members to the program**

As mentioned above, promoting the simple scaling of the program by recruiting new members will have benefits in terms of expanding the supportive coalition for low-carbon practices within the business community and generating increasing returns for existing members. However, while all businesses can technically undertake carbon accounting and emissions reductions actions regardless of their size or industry sector, they have different motivations for joining a program like Carbon 613. In particular, SMEs generally do not operate as miniature versions of large firms and may have different motivations for engaging in corporate social responsibility and pro-environmental behaviour (Battisti & Perry, 2011; Hammann, Habisch, & Pechlaner, 2009).

The SMEs interviewed in this study fell into two categories as defined by Williams and Schaefer (2013): businesses with a core mission to provide an environmental good, also referred to as "ecopreneurs", and "environmentally pro-active, normal" SMEs whose core business is not an environmental one but who are still concerned with reducing the environmental impact of their business (p.176). Interviewees from both these groups expressed values around environmental stewardship and a sense of personal responsibility as strong motivations behind their interest in reducing the carbon footprint of their operations.

While these interviewees represent a relatively small sample of environmentally-engaged business leaders in Ottawa, the findings echo other research with small business owners and managers in the United Kingdom and New Zealand, where the behaviour of "environmentally pro-active" SMEs was motivated at least in part by the personal values and concerns of their business owners-managers on environmental sustainability and climate change (Battisti & Perry, 2011; Williams & Schaefer, 2013). In contrast, another group of SMEs were driven primarily by the benefits of environmental sustainability to their financial bottom line (Battisti & Perry, 2011). This suggests the pitch to recruit new SMEs to join Carbon 613 should be differentiated to include both values-based messaging as well as more traditional arguments related to cost savings and competitive advantage. As articulated by some Carbon 613 members, the business case for participating in the program can also be expanded to include the benefits of belonging to a network of like-minded businesses from different industry sectors, with the potential for cross-industry connections that can generate new business opportunities.

There is some evidence SMEs with limited operational control over their emissions will be excluded from the program under the new framework. However, it would be valuable to consider alternative membership packages that would allow such businesses to join the network as "supporters" for coalition building purposes, without the requirement to set targets or report on emissions.

For large public sector institutions and larger firms that do not need Carbon 613's capacity building support to measure their GHG emissions, it will be important to refine the value proposition to ensure these organizations are receiving peer learning, networking and/or reputational benefits for their participation in the program. These stakeholders are important to recruit for the credibility they bring to the program as major employers and as organizations with larger asset portfolios and emissions profiles. One potential opportunity to increase the reputational benefit of participating could be to partner with other organizations to expand the audience of the annual member recognition event and increase visibility within the broader business community.

One specific opportunity for future expansion of the program within this group is with property management companies for Class A buildings (i.e. the highest quality office buildings at the highest rental rates on the market). These companies have generally made environmental and social sustainability part of their value equation in the way they manage their building portfolio. This is in part because their prospective tenants are demanding greener buildings. But these landlords are also largely owned by pension funds that have a longer term view. As one stakeholder put it, "we're not only focused on ensuring that our buildings are providing value in 20 or 30 years for the pensioners, but we're focused on making sure the planet exists for the pensioners" (Interview #9).

2) Strengthening the linkages with municipal climate change efforts

At a tactical level, there is an opportunity to strengthen the voice of the existing coalition by leveraging the City of Ottawa's participation in the program. This could include more opportunities for municipal staff to showcase the work they are already doing to reduce corporate emissions in their facilities and fleets. But as mentioned in the "additional findings" section, it would also be valuable to create a stronger programmatic link between Ottawa's community-wide GHG targets and the efforts of Carbon 613 members. City staff recognized the importance of this connection: "Our community target, 80% reduction by 2050, is a <u>hard</u> target. It's not going to be done through City action alone. And so we need others to commit to these targets and to understand what the end game is" (Interview #5). While most SMEs have a minimal impact individually on city-wide emissions, their ownership of these targets would help strengthen their role as climate ambassadors when communicating with other stakeholders within the city. Furthermore, there are already supportive attitudes for this among members, with one participant stating "I think being part of an organization like this is definitely showcasing the fact that it's important for us as a community member and not just a business operator" (Interview #10).

3) Expanding the coalition to include unlikely allies

At its core, climate governance is about influencing public policy decisions to advance low-carbon objectives. To date, Carbon 613 has primarily focused on sustaining the program and on collaborating with environmental non-profit organizations with similar objectives. This aligns with the overall mandate of EnviroCentre, which frames itself as a "practical, action-oriented organization, in the sense that we are less about advocacy and we are more about just boots on the ground, let's get some things done" (Zeemering, 2016). However, there is an opportunity for Carbon 613 to have a more transformative impact by helping to build political coalitions in support of low-carbon business that reach beyond the businesses participating in the network and other environmental NGOs.

One way to do this is by framing the issue in a way that diverse actors come to support the same policy goals, potentially for different reasons (Béland & Cox, 2016; Bernstein & Hoffmann, 2018b; Levin et al., 2012). This can result in "discourse coalitions" in which these stakeholders subsequently work to advance a particular story-line, which Hajer (1995) defines as "a narrative on social reality through which elements from many different domains are combined and that provides actors with a set of symbolic references that suggest a common understanding" (in Mander, 2007).

In the case of Carbon 613, there are few different actors from the broader business and economic development community that might see common interests and benefits in the "sustainability is good for business" narrative. For example:

- Business Improvement Areas (BIAs): BIAs are defined areas within a municipality representing a commercial main street or business district. BIA associations "[allow] local business people and property owners to join together and with the support of the municipality, to organize, finance and carry out physical improvement and promote economic development in their district" (Ontario Ministry of Municipal Affairs and Housing, 2015). These associations may subscribe to a narrative that includes strengthening the competitiveness and resilience of local businesses.

- Ottawa Board of Trade and other industry associations: In the past few years, there has been strong opposition by the provincial Chamber of Commerce and other business and industry associations to high electricity rates in Ontario, which are perceived as having a negative impact on small business owners, the manufacturing sector and the economy overall (Gallant, 2015). A narrative that helps businesses take ownership in reducing their energy costs might resonate with these stakeholders.

The perceived validity of these narratives may benefit from having a critical mass of local examples from Carbon 613 members that have made progress in reducing GHGs and achieving significant cost savings and other financial benefits by working through the program. These examples can then be used by advocacy groups and local media outlets to help change attitudes and norms on the value of the green economy. Carbon 613 could facilitate this not only by sharing their members' results directly but also by brokering opportunities for these members to speak with other businesses. The later approach is valuable because small business owners and managers tend to perceive other businesses as trusted messengers as compared to advocacy or advisory groups (Williams & Schaefer, 2013).

As mentioned in the "additional findings" section, these efforts could also help bridge the gap between the environmental and economic development priorities at the City and de-risk political decisions in favour of greening business, particularly if key economic development stakeholders perceive investment in green initiatives as a way to increase the competitiveness of local businesses and attract new companies and talent to Ottawa. Given the catalytic effect of financial incentives on low-carbon actions within the business sector, this alignment could help further accelerate actions to reduce emissions.

There is already evidence of this process of normalization through the Regional Carbon Initiative. One of the initiative's earliest members, a metal fabrication company named VeriForm, has implemented over 100 different low-carbon projects in the past 12 years that have cut their GHG emissions by 77% while they doubled their physical footprint and increased their workforce by 25%. These projects have also resulted in $2 million in cost savings (CTV, 2018). VeriForm's story has received repeated coverage in national media, including a recent article in Canada's National Observer that explicitly frames these efforts as good for business and job creation (Meyer, 2018).

One important consideration in framing these narratives is the potential dichotomy between the "low-carbon" versus the "sustainable" economy. According to Beland and Cox (2016), ideas with multiple meanings like "sustainability" have the greatest potential to serve as the focal point for coalition building as they are more likely to appeal to a wide variety of stakeholders. In particular, the language of "sustainability" allows policy entrepreneurs to reconcile corporate profitability and economic growth with environmental goals. It could therefore be argued that Carbon 613 should focus its framing around the "sustainable economy," as Green Economy Canada has done in recent years, while also mitigating the risk of diluting the movement away from emissions reductions. For example, cost saving measures that reduce electricity consumption could be considered as an environmentally "sustainable" action but have limited potential to reduce GHG emissions in Ontario, where the electricity grid is relatively clean.

6.2 Significance of the case study

The goal of this research was to answer the question "how can local climate governance experiments help catalyze a low-carbon transition in the City of Ottawa?" using Carbon 613 as a case study. The analysis reveals Carbon 613 is somewhat of an exceptional case in that the program is currently focused on building the capacity of a closed network of businesses and has not yet engaged substantially in the broader public discourse related to climate change in Ottawa, beyond the pro-

environment community. However, the case does offer some general observations for other market-based experiments targeting voluntary actors:

- Articulate the benefits of sustainability in a way that appeals to both "the believers" and "the opportunists" (e.g. a combination of values-based and financial arguments).
- Differentiate the value proposition by size and motivations of participants to attract a cross-section of target audiences.
- Invest in building relationships early on with key public sector institutions and business associations, and leverage these relationships to generate public visibility and credibility for the initiative.
- Frame the narrative to appeal to the interests of a broad range of stakeholders and build supportive coalitions with unlikely allies.

Furthermore, this study only looked at one geographically defined portion of the system, the City of Ottawa. However, a true low-carbon transition cannot stop at municipal boundaries. The analysis showed some indications Carbon 613 is helping to build capacity across multiple jurisdictions in Ontario through the Green Economy Canada network, but a full exploration of these dynamics was beyond the scope of this study.

This study also suggests some broader considerations for the use of the theoretical framework on the politics of decarbonization:

- The crux of the framework is in tracing the evolution of a specific intervention and how the political mechanisms and system effects it generates can potentially disrupt carbon lock-in. This feedback process was not observable in this case because Carbon 613 has not yet had a significant impact on the system. It may therefore be worthwhile to focus future studies on interventions of a minimum scope or scale to be able to draw out the significance of these processes.
- Given the retrospective focus of the framework, it was difficult to provide forward looking recommendations without delving into complementary literature and expanding the scope of the analysis to other stakeholders that are not currently reached by the intervention. This suggests it may be helpful to use a combination of approaches to study relatively new climate governance experiments—such as network mapping to identify coalition building opportunities—and to give more prominence to the political and institutional context in which the intervention operates and how changes at other scales can enable or inhibit local action. Furthermore, the accumulation of more examples that "[trace] how the political

mechanisms operate in specific contexts" (Bernstein & Hoffmann, 2018b, p.201) could provide more predictive power on the dynamics that could be replicated in other locations.

6.3 Challenging the green growth paradigm

Hoffman's review of 58 global climate governance experiments (2011b) found the vast majority of these experiments propose markets mechanisms, or a combination of market and regulatory measures, as the solution to climate change. Collectively, they shift the narrative on climate action from requiring cost and sacrifice to one of benefit, where emissions reductions and profitability go hand in hand. This perspective of "green growth" has come to dominate the global discourse on sustainable development and is embedded in the UN Sustainable Development Goals and The Climate Economy Report's "New Growth Agenda" (The New Climate Economy, 2018).

While many countries have achieved relative decoupling of their national economies from natural resource use, in that GDP has increased faster than domestic material consumption, recent studies question whether absolute decoupling is possible on a global scale (Giljum, Dittrich, Lieber, & Lutter, 2014; Hickel, 2018). This suggests we need to rethink whether low-carbon transition can be achieved equitably within the current paradigm of never-ending economic growth.

Within the Carbon 613 program, one small business owner had set a "zero growth" goal for their business, but recognized this was a luxury afforded by their stage of life and career. This type of radical rethinking is largely outside the amibition of the program. However, a shift from looking at operational impacts to the full life cycle of products and services could be a positive first step towards rethinking models of production and consumption. It is possible this could be a natural evolution of the program as leading businesses ratchet up their level of ambition, but may require a broader shift in market and regulatory forces to encourage this on a large scale.

7 Conclusion

In this study, I examined the potential for a specific climate governance experiment, a target-based sustainability program working with the business sector, to catalyze a low-carbon transition within the City of Ottawa. Based on an analysis of the political mechanisms and system effects Carbon 613 has mobilized to date, I found the initiative has the potential to catalyze a system improving trajectory within the city as it continues to attract new members and build the capacity of small- and medium-sized businesses to reduce their operational carbon footprints. These results suggest voluntary action by the business sector is likely insufficient on its own to catalyze a low-carbon

pathway. However, by building broader supportive coalitions within the business community, such initiatives may have the potential to politically de-risk policy changes and investments to accelerate the transition within a municipal jurisdiction.

7.1 Future research

To further explore how political dynamics can influence policies and investments in support of a low-carbon transition at the municipal scale, it would be interesting to study other Hubs in the Green Economy network, particularly the Regional Carbon Initiative, which anecdotally has influenced the level of ambition of the Region of Waterloo's climate change target and strategy as well as innovative community projects such as a new net-positive energy office building (M. Morrice, personal communication, August 16, 2018). Researching the impacts of the network as a whole could also reveal whether a network of networks can help scale the impact across jurisdictions, and whether there are unique contextual factors that enable or inhibit this transition in different communities within the same province. On a theoretical level, it would be valuable to apply this theoretical framework to climate governance experiments in other jurisdictions to build a greater understanding of how these experiments can effectively contribute to a low-carbon transition locally and globally.

8 References

Battisti, M., & Perry, M. (2011). Walking the talk? Environmental responsibility from the perspective of small-business owners. *Corporate Social Responsibility and Environmental Management*, *18*(3), 172–185. https://doi.org/10.1002/csr.266

Béland, D., & Cox, R. H. (2016). Ideas as coalition magnets: coalition building, policy entrepreneurs, and power relations. *Journal of European Public Policy*, *23*(3), 428–445. https://doi.org/10.1080/13501763.2015.1115533

Berman, T. (2016, December 6). Pipelines or Paris: Can Canada have its cake and eat it too? *OpenCanada.Org*. Retrieved from https://www.opencanada.org/features/pipelines-or-paris-can-canada-have-its-cake-and-eat-it-too/

Bernstein, S., & Hoffmann, M. (2016). *The Politics of Decarbonization: A Framework and Method [Working Paper 1]*. Retrieved from https://munkschool.utoronto.ca/egl/publication/environmental-governance-lab-working-paper-2016-1/

Bernstein, S., & Hoffmann, M. (2018a). Decarbonisation: The Politics of Transformation. In A. Jordan, D. Huitema, H. van Asselt, & J. Forster (Eds.), *Governing Climate Change: Polycentricity in Action?* (pp. 248–265). Cambridge: Cambridge University Press. https://doi.org/10.1017/9781108284646

Bernstein, S., & Hoffmann, M. (2018b). The politics of decarbonization and the catalytic impact of subnational climate experiments. *Policy Sciences*, *51*(2), 1–23. https://doi.org/10.1007/s11077-018-9314-8

Britten, L. (2018, May 30). Canada cannot profess to be a climate leader if it's buying pipelines, say environmentalists. *CBC News*. Retrieved from https://www.cbc.ca/news/canada/british-columbia/paris-climate-change-trans-mountain-1.4683465

Bryman, A. (2004). *Social Research Methods* (2nd ed.). Oxford, England: Oxford University Press.

Bulkeley, H., Andonova, L. B., Betsill, M. M., Compagnon, D., Hale, T., Hoffmann, M. J., … VanDeveer, S. D. (2014). Introducing Transnational Climate Change Governance. In *Transnational Climate Change Governance* (pp. 1–16). Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9781107706033.001

Bullfrog Power. (2018, April 30). Your Credit Union launches Eastern Canada's first bullfrogpowered mortgage program [Media release]. Retrieved from https://www.bullfrogpower.com/your-credit-union-launches-eastern-canadas-first-bullfrogpowered-mortgage-program/

Carbon 613. (2018a, August 29). Member CSV Architects took home our Sustainability Leadership Award for this year! Committed to walking the talk, CSV's fingerprints are all over much that was green in Ottawa in 2017. To learn more, visit their website: http://bit.ly/2LZVrXv [Tweet]. Retrieved from https://twitter.com/carbon613/status/1034849473392988160

Carbon 613. (2018b, September 27). Energy savings happen in many ways - just ask @openconcept_ca. "Moving our websites to a carbon neutral host was the biggest impact on how we work. [...] most people aren't aware of the climate impact of our digital infrastructure [Tweet]. Retrieved from https://twitter.com/carbon613/status/1045358677149011968

Chianello, J. (2017, November 21). Critics pan city's "inadequate" environment budget. *CBC News*. Retrieved from https://www.cbc.ca/news/canada/ottawa/environment-committee-2018-budget-energy-evolution-1.4412022

City of Ottawa. (2006a). Economy and demographics. Retrieved from https://ottawa.ca/en/city-hall/budget/financial-reports-and-statements/long-range-financial-plans/long-range-financial-plan-iii-part-1-and-part-2/economy-and-demographics

City of Ottawa. (2006b). New ward structure and ward maps [Digital image]. Retrieved from https://ottawa.ca/en/city-hall/planning-and-development/official-plan-and-master-plans/2005-ward-boundary-review/new-ward-structure-and-ward-maps

City of Ottawa. (2015). *City of Ottawa 2015-2018 Strategic Plan*. Retrieved from https://documents.ottawa.ca/sites/default/files/documents/2015_2018_strategic_plan_en.pdf

City of Ottawa. (2018a, June 27). Energy Evolution: Ottawa's Community Energy Transition Strategy, Phase 2 Update [Memo]. Retrieved from http://app05.ottawa.ca/sirepub/cache/2/n2xrlxm0ruzqgluuz5txttfu/5375190115201906042939.PDF

City of Ottawa. (2018b, November 15). 2012 and 2016 Greenhouse Gas Emission Inventories [Memo]. Retrieved from http://app05.ottawa.ca/sirepub/cache/2/n2xrlxm0ruzqgluuz5txttfu/55414401152019055404570.PDF

City of Ottawa. (2019). Economic development funding. Retrieved from https://ottawa.ca/en/city-hall/funding/economic-development-funding

Climate Smart. (2017). *City of Ottawa Business Energy and Emissions Profile (BEEP)*. Retrieved from https://carbon613.ca/beep-report/

CTV. (2018, December 14). How to go green without hurting the economy [Video file]. Retrieved from https://www.ctv.ca/YourMorning/Video/How-to-go-green-without-hurting-the-economy-vid1564985

Deep Decarbonization Pathways Project. (2015). *Pathways to deep decarbonization 2015 report - executive summary*. SDSN - IDDRI. Retrieved from http://deepdecarbonization.org/wp-content/uploads/2015/06/DDPP_EXESUM.pdf

Ecology Ottawa. (n.d.). Urgent Action Needed to Put the City of Ottawa's Renewable Energy Strategy Back on Track [Blog post]. Retrieved from https://ecologyottawa.ca/urgent-action-needed-to-put-the-city-of-ottawas-renewable-energy-strategy-back-on-track/

EnviroCentre. (n.d.-a). Sustainability Stories: The Delphi Group. Retrieved from https://carbon613.ca/the-delphi-group/

EnviroCentre. (n.d.-b). Sustainability Stories: Your Credit Union. Retrieved from
    https://carbon613.ca/your-credit-union/

EnviroCentre. (2014, May 20). EnviroCentre starts the conversation for the creation of a target-based
    sustainability program for Ottawa businesses [Media release]. Retrieved from
    https://www.envirocentre.ca/envirocentre-starts-the-conversation-for-the-creation-of-a-
    target-based-sustainability-program-for-ottawa-businesses/

EnviroCentre. (2016a). *Carbon 613 Member Guide*.

EnviroCentre. (2016b). *Carbon 613 Sustainability Report 2015*. Retrieved from
    https://carbon613.ca/wp-content/uploads/2017/01/annual-report-en.pdf

EnviroCentre. (2016c, February 22). Green Investment Fund to Boost EnviroCentre's Carbon 613
    Efforts to Grow the National Capital Region's Low-Carbon Economy [Media release]. Retrieved
    from https://www.envirocentre.ca/green-investment-fund-to-boost-envirocentres-carbon-613-
    efforts-to-grow-the-national-capital-regions-low-carbon-economy/

EnviroCentre. (2016d, June 2). City of Ottawa, Hydro Ottawa, Ottawa Chamber of Commerce and CSV
    Architects join EnviroCentre's Carbon 613 Target-Based Sustainability Program [Media release].
    Retrieved from https://www.envirocentre.ca/city-of-ottawa-hydro-ottawa-ottawa-chamber-of-
    commerce-and-csv-architects-join-envirocentres-carbon-613-target-based-sustainability-
    program/

EnviroCentre. (2017). *Carbon 613 Sustainability Report 2016*. Retrieved from
    https://carbon613.ca/wp-content/uploads/2017/06/Carbon613-2016-Annual-Report.pdf

EnviroCentre. (2018). *Carbon 613 Sustainability Report 2017*. Retrieved from
    https://carbon613.ca/wp-content/uploads/2018/06/Carbon613-2017-Report-Final-reduced.pdf

Gallant, P. (2015, August 18). Ontario's Power Trip: How Hydro is walloping Ontario business.
    Financial Post. Retrieved from https://business.financialpost.com/opinion/ontarios-power-trip-
    how-hydro-is-walloping-ontario-business

Geels, F. W. (2014). Regime Resistance against Low-Carbon Transitions: Introducing Politics and
    Power into the Multi-Level Perspective. *Theory, Culture & Society*, *31*(5), 21–40.
    https://doi.org/10.1177/0263276414531627

Geels, F. W., & Schot, J. (2007). Typology of sociotechnical transition pathways. *Research Policy*,
    36(3), 399–417. https://doi.org/10.1016/j.respol.2007.01.003

Giljum, S., Dittrich, M., Lieber, M., & Lutter, S. (2014). Global Patterns of Material Flows and their
    Socio-Economic and Environmental Implications: A MFA Study on All Countries World-Wide
    from 1980 to 2009. *Resources*, *3*(1), 319–339. https://doi.org/10.3390/resources3010319

Government of Ontario. (2018). Energy use and greenhouse gas emissions for the Broader Public
    Sector. Retrieved from https://www.ontario.ca/data/energy-use-and-greenhouse-gas-
    emissions-broader-public-sector

Hammann, E.-M., Habisch, A., & Pechlaner, H. (2009). Values that Create Value: Socially Responsible Business Practices in SMEs - Empirical Evidence from German Companies. *Business Ethics: A European Review*, *18*(1), 37–52. https://doi.org/10.1111/j.1467-8608.2009.01547.x

Hargreaves, T., Hielscher, S., Seyfang, G., & Smith, A. (2013). Grassroots innovations in community energy: The role of intermediaries in niche development. *Global Environmental Change*, *23*(5), 868–880. https://doi.org/10.1016/j.gloenvcha.2013.02.008

Hickel, J. (2018, September 12). Why Growth Can't Be Green. *Foreign Policy*. Retrieved from https://foreignpolicy.com/2018/09/12/why-growth-cant-be-green/

Hoffmann, M. J. (2011a). Into the Void. In *Climate Governance at the Crossroads: Experimenting with a Global Response after Kyoto*. Oxford Scholarship Online. https://doi.org/10.1093/acprof:oso/9780195390087.001.0001

Hoffmann, M. J. (2011b). The World of Climate Governance Experimentation. In *Climate Governance at the Crossroads: Experimenting with a Global Response after Kyoto*. Oxford Scholarship Online. https://doi.org/10.1093/acprof:oso/9780195390087.001.0001

IPCC. (2014). *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. (R. K. Pachauri & L. A. Meyer, Eds.). Geneva, Switzerland: IPCC. Retrieved from https://www.ipcc.ch/site/assets/uploads/2018/02/SYR_AR5_FINAL_full.pdf

IPCC. (2018). *Summary for Policymakers*. (V. Masson-Delmotte, P. Zhai, H. O. Pörtner, D. Roberts, J. Skea, P. R. Shukla, … T. Waterfield, Eds.), *Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change*. Geneva, Switzerland: World Meteorological Organization. Retrieved from https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15_SPM_High_Res.pdf

Jerneck, A., Olsson, L., Ness, B., Anderberg, S., Baier, M., Clark, E., … Persson, J. (2011). Structuring sustainability science. *Sustainability Science*, *6*(1), 69–82. https://doi.org/10.1007/s11625-010-0117-x

Levin, K., Cashore, B., Bernstein, S., & Auld, G. (2012). Overcoming the tragedy of super wicked problems: Constraining our future selves to ameliorate global climate change. *Policy Sciences*, *45*(2), 123–152. https://doi.org/10.1007/s11077-012-9151-0

MacLean, J. (2018). Paris and Pipelines? Canada's Climate Policy Puzzle. *Journal of Environmental Law and Practice*, *32*(1), 47–74. Retrieved from https://www.researchgate.net/publication/327716676_Paris_and_Pipelines_Canada's_Climate_Policy_Puzzle

Mander, S. L. (2007). Regional Renewable Energy Policy: A Process of Coalition Building. *Global Environmental Politics*, *7*(2), 45–64. https://doi.org/10.1162/glep.2007.7.2.45

Martens, P., & Rotmans, J. (2012, September 20). Scientivists urgently needed! [Blog post]. Retrieved from https://ideas4sustainability.wordpress.com/2012/09/20/scientivists-urgently-needed/

Meyer, C. (2018, April 10). Ontario businessman who saved millions by going green reveals his secret. *Canada's National Observer*. Retrieved from https://www.nationalobserver.com/2018/04/10/news/ontario-businessman-who-saved-millions-going-green-reveals-his-secret

Neville, K., & Hoffmann, M. (2018, December 11). Studying climate politics in a time of despair [Blog post]. Retrieved from http://duckofminerva.com/2018/12/so-its-all-just-too-late-right-studying-climate-politics-in-a-time-of-despair.html

Ontario Ministry of Municipal Affairs and Housing. (2015, November 5). Business Improvement Area Handbook. Retrieved from http://www.mah.gov.on.ca/Page1529.aspx

Ragin, C. C. (1994). *Constructing Social Research: The Unity and Diversity of Method*. Thousand Oaks, CA: Pine Forge Press.

Seto, K. C., Davis, S. J., Mitchell, R. B., Stokes, E. C., Unruh, G., & Urge-vorsatz, D. (2016). Carbon Lock-In: Types, Causes, and Policy Implications. *Annual Review of Environment and Resources*, *41*, 425–452. https://doi.org/10.1146/annurev-environ-110615-085934

Seyfang, G., & Smith, A. (2007). Grassroots innovations for sustainable development: Towards a new research and policy agenda. *Environmental Politics*, *16*(4), 584–603. https://doi.org/10.1080/09644010701419121

Standing Committee on Environment and Sustainable Development. (2015, June 4). How the private sector in Canada is showing leadership by partnering with not for profit organizations to undertake local environmental initiatives [Evidence]. Retrieved from http://www.ourcommons.ca/Content/Committee/412/ENVI/Evidence/EV8024486/ENVIEV59-E.PDF

Sustainability Colab. (2017). *2016/17 Annual Report: You Belong Here*. Retrieved from https://greeneconomy.ca/wp-content/uploads/2018/03/colab-annual-report-2016-17.pdf

Sustainable Eastern Ontario, Maison Tucker House, & Ecology Ottawa. (2018). *Ottawa Energy Collective Impact: State of the City Report 2017*. Retrieved from https://sustainableeasternontario.ca/wp-content/uploads/2018/03/7.-Collective-Impact-Problem-Statement.pdf

The New Climate Economy. (2018). Report Summary. The 2018 Report of the Global Commission on the Economy and Climate. Retrieved from https://newclimateeconomy.report/2018/executive-summary/

Thoms, Z., & Yantzi, J. (2018, September 28). Ontario to Challenge Federal Carbon Pricing Statute as Unconstitutional [Blog post]. Retrieved from https://www.airdberlis.com/insights/blogs/energyinsider/post/ei-item/ontario-to-challenge-federal-carbon-pricing-statute-as-unconstitutional

Unruh, G. C. (2000). Understanding carbon lock-in. *Energy Policy*, *28*(12), 817–830. https://doi.org/10.1016/S0301-4215(00)00070-7

Unruh, G. C. (2002). Escaping carbon lock-in. *Energy Policy*, *30*(4), 317–325. https://doi.org/10.1016/S0301-4215(01)00098-2

van der Ven, H., Bernstein, S., & Hoffmann, M. (2017). Valuing the Contributions of Nonstate and Subnational Actors to Climate Governance. *Global Environmental Politics*, *17*(1), 1–20. https://doi.org/10.1162/GLEP_a_00387

Welch LLP, & Ottawa Chamber of Commerce. (2018). *Ottawa Business Growth Survey 2018*. Retrieved from http://www.ottawabusinesssurveyreport.ca/

Williams, S., & Schaefer, A. (2013). Small and Medium-Sized Enterprises and Sustainability: Managers' Values and Engagement with Environmental and Climate Change Issues. *Business Strategy and the Environment*, *22*(3), 173–186. https://doi.org/10.1002/bse.1740

Willing, J. (2016, June 2). City signs up with Carbon 613 initiative to fight greenhouse gases. *Ottawa Citizen*. Retrieved from https://ottawacitizen.com/news/local-news/city-signs-up-with-carbon-613-initiative-to-fight-greenhouse-gases

Zeemering, E. S. (2016). What are the challenges of multilevel governance for urban sustainability? Evidence from Ottawa and Canada's national capital region. *Canadian Public Administration*, *59*(2), 204–223. https://doi.org/10.1111/capa.12167

9 Appendices

Appendix I – List of interview participants

Interview #	Date	Participant type	Industry sector	Size of organization (# employees based in Ottawa)
1	October 17, 2018	Carbon 613 staff	Other services	11-25 employees
2	October 17, 2018	Carbon 613 staff	Other services	11-25 employees
3	October 25, 2018	Carbon 613 member	Information	6-10 employees
4	November 2, 2018	Carbon 613 member	Accommodation and food services	1-5 employees
5	November 5, 2018	Carbon 613 member	Public administration – City of Ottawa	500+ employees
6	November 6, 2018	Carbon 613 member	Retail trade	11-25 employees
7	November 6, 2018	Carbon 613 member	Professional, scientific and technical services	11-25 employees
8	November 7, 2018	Carbon 613 staff	Other services	11-25 employees
9	November 12, 2018	Carbon 613 advisory council	Real estate and rental and leasing	26-50 employees
10	November 15, 2018	Carbon 613 member	Accommodation and food services	51-100 employees
11	December 20, 2018	Carbon 613 collaborator	Professional, scientific and technical services	N/A

Appendix II – Sample interview questions

Questions for Carbon 613 staff

- How many years have you been working at EnviroCentre? When did you first become involved in Carbon 613 and what is your current role in the program?

- How did Carbon 613 come about as the Ottawa Hub of Green Economy Canada (originally Sustainability Colab)?

    - What financial support did Carbon 613 receive in order to launch?

    - How was the advisory council formed and what was its role?

    - Who were Carbon 613's earliest members and why did they decide to join?

- How does Carbon 613 communicate the relevance and benefits of environmental sustainability and GHG reductions to current and prospective members?

- What activities are members encouraged to undertake once they join the program?

- What support do members receive from Carbon 613 to complete the steps in the framework? How have these supports evolved since the launch of the program?

- What areas or activities do members need the most support to complete?

- What types of initiatives have members implemented to date to reduce their GHG emissions? How are these initiatives shared with other members or the broader community?

- What kind of financial and non-financial benefits are members seeing through their participation in the program? Have those benefits changed over time?

- How does Carbon 613 give public visibility to its members' commitments and achievements?

- How does the business community in Ottawa view the value of sustainability and emissions reductions? Have you noticed any shifts in this conversation over the past few years?

- How does the Carbon 613 team interact with Green Economy Canada and the other Hubs?

- What role does the City of Ottawa play in the Carbon 613 network?

- Does Carbon collaborate with other groups (e.g. industry associations, academia, other NGOs, governments)? What form does that take?

- How has the membership grown or changed over time? Are there any key industries that are not yet part of the network that you would like to engage?

- What external funding or other resources has the program attracted since launch? Are the program costs fully supported by member fees?

- Does Carbon 613 have a long-term target on the reach of the network, in terms of the % of Ottawa's workforce or total emissions that are covered by the program?

- How have provincial policies on climate and energy impacted the work of Carbon 613 or its members?

Questions for Carbon 613 members

- How long have you been working at your organization? What is your role? How many employees are there at your organization?

- When did your organization join Carbon 613? How long have you been directly involved?

- Why did your organization decide to become a member of Carbon 613?

    o How important is environmental sustainability to your organization's mission or core business?

- Which of the program milestones has your organization undertaken to date (i.e. engage with staff, identify priorities, start collecting data, create an emissions baseline, set a target, implement actions, other)?

    o What is your experience with the Carbon Accounting Tool? Have you found it useful?

    o Has your organization experienced any challenges with adopting the Carbon 613 framework?

- What kind of coaching or technical support have you received from Carbon 613 staff to undertake the program milestones? Which aspects have been most useful?

- Have you participated in any of Carbon 613-organized events (e.g. tours, training workshops, recognition events)?

- Have you worked with or collaborated with other members of the Carbon 613 network on any aspects of the program? If so, how?

- Has your organization changed or adopted new business practices since joining the program?

- Has your organization received increased visibility for your sustainability efforts since joining the program?

- What direct business benefits have you seen since joining the program? Have these changed over time?

- How do other businesses in your sector in Ottawa view sustainability and climate change? Have you noticed any shifts in these perspectives in the past few years?

- Is your organization involved in any other green business networks?

- Do you feel there are any specific barriers that might prevent more organizations in Ottawa from joining the Carbon 613 program?

- What role do you think Carbon 613 should play in advocating on behalf of members, if any?

- Has your organization been impacted by the recent provincial policy and funding changes related to climate change and energy?

- What other kind of support or action do you think is needed to accelerate the green economy in Ottawa?

Appendix III – Carbon 613 members

List of Carbon 613 members as of December 2018

Organization name	Description	Provides an environmental good or service?
IKEA	Multinational home furnishings retailer. Ottawa store located at Pinecrest Shopping Centre.	N
Coop Voisins	Bilingual housing cooperative managing a six storey, 76 unit building in central Ottawa.	N
S.i. Systems	Employment agency for professionals in Information Technology across Canada.	N
Earnscliffe	Public affairs consultancy advising clients across Canada on government relations and regulatory policy issues.	N
Centretown Citizens Ottawa Corporation	Affordable housing owner and operator with over 50 properties and almost 1600 units in Ottawa.	N
Communityworks Non-Profit Housing Corporation	Affordable, non-profit housing provider with a focus in the east Ottawa area.	N
OpenConcept Consulting	Team of web development consultants specialized in open-source development with Drupal.	N
Co-op d'habitation Desloges	Housing cooperative managing 129 apartments and townhouses in a francophone community.	N
Unity Non-Profit Housing Corporation Ottawa	Affordable housing owner and operator with two buildings in Hintonburg and Vanier neighbourhoods.	N
Alt Hotel Ottawa	148 room hotel in the Ottawa business district.	N
Waller St. Brewing	Craft brewery and tasting bar located in the basement of a heritage building.	N
Community Foundations of Canada	National network for Canada's 191 community foundations.	N
Electronic Distributors International	E-recycling, IT asset management and precious metal refining with headquarters and processing facility in Orillia and offices in Ottawa and Raleigh, North Carolina.	Y
TD	Banking and financial services in Canada and the US.	N
LUNCH	Local catering company with food courts and street locations.	N
Black Gold Coffee	Locally-owned company in the coffee service industry.	N
Posterity Group	Consultancy advising governments and commercial, industrial and institutional clients across Canada to advance the transition to the low-carbon economy.	Y
Performance Court at 150 Elgin	360,000 ft^2 LEED Gold, Class A office tower in Ottawa's central business district.	Y
Rimikon	Manufacturer of smart, eco-friendly and extra low voltage lighting.	Y
Delphi Group	Canadian strategic consultancy providing innovative solutions in the areas of climate change and corporate sustainability.	Y
Ottawa-Carleton	Seventh largest board by school population in the	N

District School Board	province of Ontario serving over 70,000 students at over 125 sites.	
Banfield	Full-service marketing communications agency.	N
Arborus Consulting	Knowledge-based engineering consultancy focused on high performance buildings and renewable energy design and development.	Y
Smarter Shift	Content development and communications firm.	N
Your Credit Union	Co-operative banking institution located in Ottawa and Cornwall.	N
Canadian Museum of Nature	Canada's national natural history museum.	N
Lightenco	Supplier of turnkey LED lighting solutions.	Y
City of Ottawa	Municipal government in Eastern Ontario covering an area of 2,796 km^2 and serving close to one million residents.	N
Hydro Ottawa	Regulated electricity distribution company operating in the City of Ottawa and the Village of Casselman. Wholly-owned by the City of Ottawa.	N
Stratos	Management consultancy for governments, businesses and civil society organizations advising on complex environmental, socio-economic and governance issues.	Y
Ottawa Board of Trade	Membership association representing over 1200 businesses in Ottawa, which provides networking and business advancement opportunities and advocacy services.	N
CSV Architects	Ottawa-based architectural practice focused on the sustainable design of institutional, commercial and multi-unit residential projects.	Y
Angela's Bed & Breakfast	Eco-conscious bed and breakfast in the Glebe neighbourhood.	N

Appendix IV – Program framework

Core requirements of Carbon 613 program framework (EnviroCentre, 2016a, A. Plant, personal communication, December 12, 2018)

Program component	Minimum requirements	Details
Baseline year	Up to three years before joining	
Emissions inventory	Scope 1 & 2 – Mandatory • Scope 1 – direct emissions from fuel used in buildings and in company vehicles, fugitive emissions from refrigeration, air conditioning, and fire suppression equipment • Scope 2 – indirect emissions from purchased electricity Scope 3 – Optional • indirect emissions from other business operations, including business travel, employee commuting, waste disposal, water usage	For members with no operational control (tenants/lease holders), the following hierarchy will apply for Scope 1 and 2 emissions: actual energy use; building specific estimation; generic building estimation. For these members, a minimum of one Scope 3 activity is mandatory. **Proposed new requirements for multi-tenant buildings (2019):** Members that occupy more than 1/3 of a shared building space can estimate energy use, however, energy can only account for 50% or less of annual emissions inventory reported.
Target	Within three years of joining. Either intensity-based or absolute target, with mandatory reporting of absolute emissions. Minimum of 10 years between baseline year and target year. **Proposed new requirements (2019):** Members must set a reduction target within one year of establishing the baseline year. Minimum of 15% reduction target within 10 years.	Opportunity to align with the City of Ottawa's community-wide targets of 12% below 2012 levels by 2024 and 80% below 2012 by 2050. **Proposed (2019):** Members will be recognized on the levels of commitment in their set targets (Bronze – 15%, Silver – 30%, Gold – 50%).
Reporting	Emissions data reported annually **Proposed new requirement (2019):** Members must submit a minimum of one year of energy data to Carbon 613 within six months of joining the program.	
Offsets	Maximum of 49% can be counted towards GHG reduction target	Applies to purchased carbon offsets, renewable energy credits, and on-site renewable energy generation under provincial feed-in-tariff contracts

Appendix V – Media coverage of Carbon 613

Article title	Publication	Date	URL
Green initiative aims to reduce business emissions	The Record	June 29, 2015	https://www.therecord.com/news-story/5700857-green-initiative-aims-to-reduce-business-emissions/
City signs up with Carbon 613 initiative to fight greenhouse gases	Ottawa Citizen	June 2, 2016	https://ottawacitizen.com/news/local-news/city-signs-up-with-carbon-613-initiative-to-fight-greenhouse-gases
Hydro Ottawa joins local environmental leaders in the fight against climate change with Carbon 613	Cision in Canada	June 2, 2016	https://www.newswire.ca/news-releases/hydro-ottawa-joins-local-environmental-leaders-in-the-fight-against-climate-change-with-carbon-613-581646761.html
City joins Carbon 613 program	Ottawa Business Journal	June 3, 2016	http://www.obj.ca/article/city-joins-carbon-613-program
Advocates raise a glass to help green the capital	Centretown News	February 21, 2017	https://centretownnews.ca/advocates-raise-a-glass-to-help-green-the-capital/
#OwnOurOttawa Spotlight: Envirocentre	Catherine McKenna, Member of Parliament for Ottawa Centre	November 27, 2017	https://cmckenna.liberal.ca/news-nouvelles/ownourottawa-spotlight-envirocentre/
Group tracking the carbon footprint of Ottawa's buildings	Capital Current	November 8, 2018	https://capitalcurrent.ca/group-tracking-the-carbon-footprint-of-ottawas-buildings/