Towards 100% Renewable Energy: A Study on Community Energy Planning in Oxford County, Ontario

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Abstract

This research examines how Oxford County, a community that includes 7 municipalities in Ontario, Canada is planning to achieve 100% renewable energy (100% RE). Throughout many decades of ongoing energy discussions, Ontario has come a long way by implementing numerous energy policies to address key issues on energy production, distribution and consumption. Ontario's energy policies have been constantly revised to fuel the growth in RE development. Based at least on megawatts (MW) installed, it can be safely stated that Ontario was headed in the right direction until the 2018 cancellation of key environmental and electricity incentive systems undertaken by the Doug Ford government. The goal of this paper is to identify what the Ontario provincial government has done in the past and present in relation to the development of RE in the electricity sector. Also, the paper explores how Ontario municipalities can achieve 100% RE. Achieving that goal involves careful planning and major improvements on current and future RE policies. The good news is that many communities and leading companies have already implemented their own 100% RE initiatives. Furthermore, those leaders have been able to accomplish their own environmental and economic goals while creating many local benefits. In Ontario today (2018), the future of RE development is in peril. The rise of the Doug Ford Conservatives has brought opposition to RE into political power and numerous RE projects have already been cancelled. Oxford County provides both inspiration and a roadmap to reframe the way 100% RE is understood and developed in Ontario and Canada.

Foreword

My interest in global warming and climate change mitigation began when I started my undergraduate Bachelor's degree in Environmental Studies (2011-15) at York University. Through academic and professional studies, I have expanded my background knowledge on various environmental topics, ranging from global warming and loss of biodiversity, to other major issues such as pollution and deforestation. Two key anthropogenic activities, i.e. the burning of fossil fuels and the destruction of ecosystems are responsible for the increase on average global temperatures and detrimental changes in climatic patterns worldwide. However, society is not yet taking the necessary actions to stop those human-made problems.

After I obtained my Bachelor's degree, I enrolled and was admitted into the two-year master's degree in the Urban Planning stream within the same faculty and institution. Over my course of studies, I have learned how global environmental issues require more than just learning about environmental and historical factors. Solving environmental and social problem also require hands-on experience through participation with businesses and individuals worldwide. Different stakeholders need to recognize that many of these global environmental issues are avoidable.

My goal is to synthesize a well-written research paper that would lead to an exciting and interesting job opportunity related to RE development. Before I explore my future options, there are numerous goals I would like to achieve in this paper. Below I reiterate some of the key learning objectives in my Plan of Study (POS). My **renewable energy learning objectives** are accomplished by studying how Ontario's RE policies and other RE reforms over the last several decades have been implemented. Good energy policy will require strong community leadership. I believe a community can achieve 100% RE if municipal and provincial governments can work directly with local councilors and community members in a cooperative way.

My **energy planning learning objectives** are achieved by reviewing different community energy plans (CEP) within Ontario. That approach has helped me understand community priorities around energy planning with a view to improve energy efficiency, reduce greenhouse gas (GHG) emissions, and to drive economic development. Also, I have explored the effectiveness of municipal CEPs and provincial energy plans that can be found under the literature review section of my paper. I have explored different CEP initiatives and identified the ones that were successful. I did come across many CEPs that need substantial improvement in order to address the expected impacts of climate change.

Lastly, my **sustainability learning objectives** are achieved throughout my courses of study. Sustainability is a broad overarching theme in the Faculty of Environmental Studies at York University. Sustainability definitions have largely focused on "the conservation of energy and minimizing emissions, encouraging accessibility without mobility (being able to walk or cycle to local places); In part by public transit that contributes to sustainable patterns of urban

development, and access to the countryside" (Hough, p.221, 2004). Sustainability covers all aspects in environmental studies, but none could be achieved without steep reductions in fossil fuel use and increased production from RE resources. Those reasons explain why I chose RE and energy planning as my other learning objectives as they both have strong ties to sustainability.

My educational and experiential learning inside and outside of classes have provided me with a better understanding of energy planning and RE development. Specific courses like Community Energy and Planning (ENVS 6121) and Fundamentals in Renewable Energy (ENVS 5050) further enhance my knowledge on those topics. Through those courses, I was finally able to identify different RE technologies and applications that could be used to help cities achieve their goal of 100% RE. The instructors in those courses brought excellent guest speakers to discuss RE in detail. I was able to apply their knowledge, lessons and expertise in this research paper.

Acknowledgments

This research has been supported by my fellow colleagues and professors from York University who shared their insights and expertise, which greatly assisted the research, particularly through a lot of engagement, encouragement and valuable feedback. My academic advisor (Justin Podur) and supervisor (Jose Etcheverry) have supported me throughout my research. Justin Podur helped me discover my interests in the early stages of my research. With Jose Etcheverry's expertise on RE, I have understood this area of study more than ever before. He provided the necessary tools that enable me to grasp RE concepts better. I hope my paper will inspire others, especially those who want to create sustainable energy communities for present and future generations to come.

Other prominent professors who have strongly educated me about this topic includes Christopher Wong and the honorable Karen Farbridge. Their courses have altered my way of thinking about how renewable energy and electricity systems work through planning and policy. I also like to thank my close friends and relatives who have supported my education. They have strongly motivated me to work extremely hard throughout my research process. Without the support from my colleagues, professors and family members, I would not have been able to complete this research paper on my own. I would like to again express my sincere gratitude for all their help.

Table of Acronyms and Figures

Acronym	Definition
CCLCA	Climate Change and Low-Carbon Act
CSP	Community Sustainability Plan
FIT	Feed-in Tariff
GEGEA	Green Energy and Green Economy Act
GHGs	Greenhouse Gas Emissions
GWh	Gigawatt Hour
ICLEI	Local Governments for Sustainability
IEA	International Energy Agency
IESO	Independent Electricity System Operator
MWs	Megawatts
MINAE	Ministry of Energy and Environment
OPG	Ontario Power Generation
POS	Plan of Study
RE	Renewable Energy
SEI	Sustainable Energy Initiative
TREC	Toronto Renewable Energy Cooperative
UNFCCC	United Nations Framework Convention on Climate Change
100% RE	100% Renewable Energy

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Introduction

Overview of Research

With the rise in global temperatures and the changes in climatic patterns, many advocate and political groups, including environmental critics, have been alarmed by the consequences climate change may impose on current and future generations to come. Environmental education is crucial to teach children and adults about climate change. Society needs to educate its members about these environmental issues because human beings are the major contributors to the environmental changes that we experience today. Anthropogenic activities are the main driving force in warming and altering earth's climate system. These climatic patterns have impacted the lives of many, from powerful ice storms to category five hurricanes, these are just several extreme weather events to name a few. As we move forward, we must adopt commercial and industrial practices that can help mitigate climate change.

Our commercial and industrial practices continue to emit large amounts of greenhouse gas emissions (GHGs) and other pollutants into the atmosphere. Political leaders including Canada's Prime Minister, Justin Trudeau (2015-2018) and Ontario's Premier Kathleen Wynne (2013-18) have come out in support of strategies to tackle climate change (McCarthy, 2015). Renewable energy (RE) is a solution that can be used to address environmental issues, such as climate change, while helping all levels of government achieve their environmental and economic goals, creating local benefits for residents in Ontario and Canada. Larger cities and municipalities can reduce their carbon footprint since they can produce their own electricity with RE technologies such as wind and solar. RE technologies emit no GHGs or other pollutants

into the atmosphere during their operation. Due to the many social and environmental benefits that RE technologies can provide, both provincial and federal governments need to show solidarity for communities that want to achieve 100% RE. My hope is that communities like Oxford County can inspire politicians regardless of their party affiliation.

Structure of the Paper

This research paper is organized in chronological order. The literature review offers a broad overview of Ontario's RE development since the beginning of the 18th century. Readers will learn how energy planning policies have transformed the energy landscape in our province. The paper then explores how Ontario's provincial energy initiatives have helped drive RE developments at a smaller scale. Oxford County is used as a case study to demonstrate the implementation of a successful community energy plan. The multiple benefits of RE initiatives can still be achieved, even though the current political reality of Ontario presents a serious challenge for local communities like Oxford County.

The next section focuses on the rise of 100% renewable energy worldwide. Many smaller and larger communities, not just in Ontario, have taken long strides to eliminate unsustainable energy sources that emit large amounts of pollutants into our atmosphere. Also, large multinational corporations have joined the battle in the 100% RE movement worldwide. Within Ontario, local communities and large companies have worked to become North American leaders in 100% RE development. The province could really utilize their knowledge to become a world leader in advancing the development of 100% RE. That section enables readers to understand what the province has done to tackle key environmental issues using RE sources

such as wind and solar. The last section summarizes energy strategies and practical solutions to advance 100% RE. There will always be obstacles to overcome before RE strategies get implemented by municipal, provincial, and federal governments. However, by constantly analyzing and revising energy policies, Ontario and Canada will eventually achieve more effective and equitable energy solutions to tackle climate change and to enhance local quality of life.

History of Renewable Energy Development in Ontario

The industrial revolution, that began in the beginning of the 18th century, strongly contributed to the exponential growth of GHG emissions (Hayami et al., 2006; Rosenbloom, 2018). Environmental scientists have acknowledged that the burning of fossil fuels directly result in the GHGs that currently characterize most sectors of our economies (Hayami et al., 2006; Rosenbloom, 2018; Mabee et al., 2012; Miller et al., 2017). GHG emissions have become a major cause in the rise of global temperatures and changing climatic patterns (Granovskii et al., 2006; Hayami et al., 2006; Rosenbloom, 2018). Many politicians are concerned about the rapidly rising GHG levels (Granovskii et al., 2006; Hayami et al., 2006). Political parties who criticize the use of fossil fuels have formed a global movement that outlines precautionary measures to reduce GHGs through better energy planning and energy policy making (Hayami et al., 2006; Rosenbloom, 2018; Mabee et al., 2012; Miller et al., 2017). Many global environmental discussions now focus on reducing fossil fuels and investing in sustainable energy sources such as wind and solar (Hayami et al., 2006; Rosenbloom, 2018). RE is becoming

one of the most viable strategies to help the world reduce its GHG levels. (Hayami et al., 2006; Rosenbloom, 2018; Mabee et al., 2012, Miller et al., 2017).

Renewable energy (RE) refers to energy obtained from sources that are naturally replenished such as wind, solar and hydro (Dincer and Siddiqui, 2017). In Ontario, advocating for RE development first began in the early 1900s, when a Canadian politician and hydroelectricity activist known as Sir Adam Beck founded the Hydro-Electric Power Commission of Ontario, Canada (Mckay, 1983; Rosenbloom and Meadowcroft, 2014). Beck's Hydro-Electric Power Commission was successful in regulating private energy companies and making energy a public entity (Mckay, 1983; Rosenbloom and Meadowcroft, 2014). During that period, hydro power accounted for numerous existing private generating energy plants, one of the largest being the Ontario Power Company's Station, later known as the Sir Adam Beck Generation Station (Mckay, 1983; Rosenbloom and Meadowcroft, 2014). That power generation station was thereafter controlled by the Hydro-Electric Power Commission (Mckay, 1983; Rosenbloom and Meadowcroft, 2014).

Sir Adam Beck's hydro energy movement was criticized by Liberal premier George Ross (1899-1905), whom favored private over public control (Mckay, 1983). Liberal party premier, Ross and his political supporters did not want any government involvement to begin with (Mckay, 1983). The opposition Tories wanted private companies to thrive on their own (Mckay, 1983). At the time many notable citizens also expressed support for private power development in the business community, for example, railway builder William Mackenzie and Frederic Nicholls whom, at the time, controlled the Toronto Electric Company (Mckay, 1983). However, the regulation of private energy companies was in the best interest of the public

(Mckay, 1983; Rosenbloom and Meadowcroft, 2014). On April 11, 1906, approximately 1,500 supporters rallied from Toronto City Hall to the Ontario Legislature, showing support and strength in numbers (Mckay, 1983). With huge support from residents and politicians throughout the province, Beck's hydro energy movement was successful despite his competitive opponents inside and outside of the political realm (Mckay, 1983; Rosenbloom and Meadowcroft, 2014).

Sir Adam Beck fought hard against his opponents to support what he believed to be best for Ontarians. His fight and determination created a hydroelectricity market that would prove to be highly beneficial for the people of Ontario. Beck argued that "increased sales would result in lower costs per kilowatt hour" (Mckay, 1983: 21). His claim became true when a promotion was offered to the businesses and residents of Ontario. The cost of hydroelectricity was discounted due to the "promotional rate structure" – customers were charged less for each succeeding block of power consumed (Mckay, 1983: 31). As a result, hydroelectric power became commonly used to produce electricity in the province (Rosenbloom and Meadowcroft, 2014). In short, Sir Adam Beck was a visionary leader was determined to achieve his goal of bringing power to the people of Ontario (Rosenbloom and Meadowcroft, 2014).

Those, who in the past supported Sir Adam Beck's hydroelectricity movement, today would likely empathize with environmental organizations that have expressed their concerns over the growing amount of greenhouse gas (GHG) emissions caused by industrial and commercial practices that largely contribute climate change. Environmental researchers and scientists have recommended RE options that can help mitigate environmental dilemmas (Mckay, 1983; Dincer and Siddiqui, 2017; Rosenbloom and Meadowcroft, 2014). Beck was

known as one of the first key figures to develop Ontario's clean power future (Mckay, 1983; Rosenbloom and Meadowcroft, 2014). Beck championed RE sources instead of fossil fuels. However, shortly after Beck's death, the opposition Liberal party continuously attacked hydroelectricity in public meetings to a point where Beck's legacy was overturned. As the Liberal party won the 1934 election, they used their new authority to fire all the hydro commissioners, along with key managers and engineers to completely change the face of electricity production in Ontario (Mckay, 1983).

Ontario's political change was followed by the rise of nuclear power and that method for electricity production began to take over hydropower in the 1950s (Mckay, 1983). By the 1970s, approximately one-third of the province's electrical energy became generated by coal (Hayami et al., 2006; Rosenbloom, 2018; Mabee et al., 2012; Miller et al., 2017). The burning of coal further contributed to the growing amount of GHG emissions in Ontario and Canada (Mckay, 1983; Dincer and Siddiqui, 2017; Rosenbloom, 2018). As population growth peaked into the 21st century, higher energy consumption levels soared in cities within Ontario (Mckay, 1983; Dincer and Siddiqui, 2017).

As Ontario moved from the dawn of power (prior to 1906) to endless expansions (1922-1997), the province begun to see a hybrid system (public and private) in the evolution of Ontario's electricity regime. From 1998 to 2000s, the hybrid regime under the McGuinty Liberals is a response to the failed privatized and public models for electricity in Ontario. Instead, climate change issues were better addressed by implementing programs related to demand management, conservation and the promotion of cleaner energy sources (Rosenbloom and Meadowcroft, 2014). That was known as the hybrid model, where burning of fossil fuels

remained in place, but additional RE policies were implemented to specifically address climate change (Rosenbloom and Meadowcroft, 2014).

Since transitioning from hydro to nuclear and then coal electricity sources, Ontario led in the creation of more RE policy and sustainable energy initiatives at the local, provincial, and federal levels of government (Rosenbloom and Meadowcroft, 2014). Many guidelines focused on the reduction of Ontario's GHG emissions, which would bring positive outcomes to tackle environmental issues such as climate change (Rosenbloom and Meadowcroft, 2014). The demand for energy and environmental issues (e.g. climate change) was addressed by having conservation policies and better RE guidelines in place (Dincer and Siddiqui, 2017; Rosenbloom and Meadowcroft, 2014). Whether the province chooses hydro, nuclear or both, RE policy and electricity market reforms will continue to direct Ontario's future energy development methods.

The Ontario Coal Phase-out 2004-2014

In the beginning of 2001, the burning of coal was a significant energy source used for electricity production in Ontario (Rosenbloom, 2018; Mabee et al., 2012; Miller et al., 2017). Whether mining, milling, refining or decommissioning and handling waste, the entire coal production process emits dangerous toxic chemicals such as carbon dioxide, sulphur oxides, methane and nitrogen into the atmosphere (Dincer and Siddiqui, 2017). These particulates contaminate the air and have long-lasting impacts on public health and the environment (Rosenbloom, 2018; Mabee et al., 2012, Miller et al., 2017). After numerous political discussions and public consultations, the provincial government elected in 2004 decided to phase-out coal in Ontario (Rosenbloom, 2018: 130).

Opposition to Ontario's coal phase-out arose from several labor unions (e.g. The Power Workers Union), thinktanks (e.g. Fraser Institute and Energy Probe), and from the Ontario Power Generation (Rosenbloom 2018; Mabee et al., 2012). All those groups made strong efforts to highlight the importance of coal-fired power generation, but they were unsuccessful in overturning the government's decision to eliminate coal in Ontario (Rosenbloom, 2018: 137). As a result of a decade of coordinated efforts by numerous NGOs, civil society groups and the McGuinty Government, Ontario's electricity officially became coal-free in 2014 (refer to figure 1 below). Not only did the province change its supply of electricity by eliminating coal, but it also created a valuable new precedent that has become a national policy to address climate change in Canada. Currently, Ontario's generation capacity consists of 35% nuclear power, 28% gas, 23% hydro, 12% wind power and about 2% solar and/or biofuel (Ontario Independent Electricity System Operator, 2018).

Year	**2003**	**2005**	**2010**	**2011**	**2012**	**2013**	**2014**
Megawatts (MW)	7587	6437	4487	3507	3296	306	0

Figure 1 – Total coal-fired capacity 2003-2014 (Government of Ontario, 2018).

Phasing-out coal by using more sustainable methods for electricity production and conservation have greatly reduced GHG emissions in Ontario (Dincer and Siddiqui, 2017; Mabee et al., 2012). Despite strong opposition forces from The Power Workers Union, Ontario Power Generation and numerous think tanks, their support for coal-fired power did not halt the province from removing coal from the Ontario energy landscape.

Ontario Policy Framework towards Renewable Energy

The Green Energy and Green Economy Act

There is a discernable worldwide shift away from fossil fuels to renewable energy sources, an important transition that can help tackle climate change (Mabee et al., 2012; Rosenbloom, 2018). In Ontario, that trend was accelerated by Liberal Premier Dalton McGuinty, as he and his cabinet decided to implement the *Green Energy and Green Economy Act* (GEGEA) in 2009 (Winfield and Dolter, 2014). The GEGEA was an energy and economic development strategy that has been greatly debated among critics and supporters of the legislation (Winfield and Dolter, 2014). Liberal party members supported that legislation because it promised to boost RE production, while creating new jobs throughout Ontario (Mabee et al., 2012: 480). According to the Liberal government, the legislation would create approximately 90,000 RE jobs, thereby helping to improve Ontario's economy (Ontario Ministry of Energy and Infrastructure, 2018). Many supporters of the GEGEA within the Liberal government supported the legislation because they believed it would bring many tangible social, environmental and economic benefits for Ontario (Mabee et al., 2012).

Despite those social and environmental benefits, detractors became concerned about the GEGEA and were particularly aggravated because this legislation took away municipal power in RE decision-making (Mabee et al., 2012). That decision prohibited many communities from deciding their own energy future (Mabee et al., 2012). The problems with that decision were compounded by the lack of meaningful incentives for ensuring that local community members can choose RE as their energy option (Mabee et al., 2012). It seems that the Ontario

provincial government at the time did not really consider the impacts that the GEGEA would have on community members, they just created this legislation for political gains, but environmental advocate groups wanted much more than that (Mabee et al., 2012). They ultimately wanted a legislation that would offer direct energy incentives for local community members in Ontario and would be financed by foregoing coal and nuclear generation.

Instead, the GEGEA offered very limited energy incentives for local community members (Mabee et al., 2012). Furthermore, Premier McGuinty provided great access to the nascent Ontario RE sector to large multinational corporations, such as Samsung from Korea, to help complete major RE projects in the province. By doing that, critics argued that the province would not be able to create local jobs nor improve economic growth (Winfield and Dolter, 2014). The GEGEA created a much more competitive atmosphere where large multinational corporations fought to obtain government contracts in different local communities (Winfield and Dolter, 2014). Ultimately, the large multinational corporations would largely benefit from the capital generated by the RE deals with Ontario.

The Samsung Corporation and Korea Power Electric Corporation (KPEC) are established South Korean conglomerates that struck a $7 billion deal to manufacture and construct both solar and wind technologies in Ontario (Solangi et al., 2011). The Ontario government invested in sustainable and renewable energy technologies (RETs) because RETs helps the province meet future energy demands (Solangi et al., 2011). Rather than directly investing or generating policy to support RET, the Ontario government funded RET companies to boost solar and wind manufacturing in the province (Solangi et al., 2011). As the province added more RETs into the Ontario energy landscape, the Ontario and Canadian federal government would benefit most

from the creation of jobs, thus boosting the economy. In the end, the $7 billion deal with Samsung Corporation and KPEC was in the best financial interest of the Ontario and Canadian federal government (Solangi et al., 2011). That was a political move on the Liberals part, to bring economic and environmental benefits, while mistakenly limiting the local benefits for communities in the province (Solangi et al., 2011).

Local community members claimed that the $7 billion agreement with Samsung Corporation and KPEC was unreasonable since most of the electricity generated by RETs were installed where Ontario communities do not consume (Solangi et al., 2011). Much of Ontario's electricity continue to emanate from non-renewable energy sources despite adding approximately 2,500 MWs of wind and solar power to Ontario's existing electricity system. While Samsung Corporation and KPEC obtained their $7 billion under the GEGEA, much of the wind and solar electricity was exported to US states (New York, Michigan, and other border regions) for discounted rates, well below what the province initially paid to the Korean corporations. Doing this was really an ineffective strategy in offering local benefits, but rather more of a political move on the Liberals part to meet their economic goals by downloading responsibility into the hands of multinational corporations such as Samsung Corporation and KPEC (Jami et al., 2017). Furthermore, undertaking this process also speeds the RE development process and avoids extensive consultations with opposition forces in different communities across Ontario (Jami et al., 2017).

Although the Liberals created several community funds and a system to help First Nations, their efforts still did not offer enough local incentives and skills needed to understand what the development of RETs is about (Jami et al., 2017). Ontario's wind and solar contracts

signed by the developers and political governments lack public engagement throughout the democratic decision-making process (Jami et al., 2017). There was minimal interaction with community members, which resulted in public opposition (Jami et., 2017). The Samsung Corporation and KPEC deal was missing the active community engagement component in the planning and approval stages (Jami et., 2017). More public engagement increases local acceptance, reduce community ignorance and misunderstanding, helps promote and alter community members attitude towards RET in a positive way (Jami et., 2017; Solangi et al., 2011).

As a result, the implementation of the GEGEA has created a disconnect between developers and communities when it comes to the development of RE projects in Ontario (Jami et al., 2017). Priority is given to developers, the Samsung Corporation and KPEC in this case, over community's energy ambitions, leaving them in the dark. The Ontario and Canadian federal government could address this issue by implementing a strategy that boosts community participation in RE developments. Increase interaction with community members help minimize public opposition. Thus, community participation is extremely important throughout the decision-making process (Jami et., 2017; Solangi et al., 2011).

The Ontario FIT Program

First of its kind in Canada, the Province of Ontario introduced the Feed-in Tariff (FIT) program to support the GEGEA of 2009. The FIT program guaranteed a set price for energy to private investors for feeding power back into the electrical grid (Wong et al., 2010: 1242). The FIT program increases community involvement by raising awareness on benefits related to the development of RE. According to Wong et al. (2010), including other prominent energy

scholars, the FIT program fueled the growth of green jobs, but not nearly as much as what has been predicted by the Ontario Ministry of Energy and Infrastructure.

The FIT program was a great strategy to provide an opportunity for communities to participate in RE development. This program reduces the provincial governments responsibility on RE developments to municipalities. Prior to having the FIT program, there was a lack of community involvement simply because the GEGEA stripped municipal power in RE decision-making and prohibited local communities from deciding their energy future. Community members did not see any incentives when building RE projects in their community at first. From 2009 to 2018, the FIT program offered community incentives that benefited both multinational corporations and community members as well. The program was viewed as a successful policy mechanism for harvesting different renewable electricity sources such as wind and solar (Mabee et al., 2012; Wong, 2010). Of course, community involvement was a key factor in the successful launch of the 2009 FIT program.

The Climate Change and Low-Carbon Act

The *Climate Change and Low-Carbon Act* (CCLCA) was created under bill 172 to further mitigate global warming and climate change in 2016 (Legislative Assembly of Ontario, 2018). The CCLCA was a broad effort to reduce GHGs, involving multiple groups of individuals, businesses, communities and municipalities with the goal of creating a lower carbon society in Ontario (Legislative Assembly of Ontario, 2018). The goal of this legislation was like other energy provisions in the past. The hope was to change the behavior of corporations and individuals who are heavy emitters and make them reduce their emissions moving forward. Yet, the CCLCA still does not offer municipal power in decision making, in most RE projects related to the

reduction in GHGs (Mabee et al., 2012). Under the CCLCA, there was a program with strict monetary penalties for those who exceed the annual limit on overall emissions (Legislative Assembly of Ontario, 2018). The program under this legislation was supposed to further regulate Ontario's GHG emission levels, but all those efforts are now under assault by the Ford regime.

The Cap and Trade Program

Ontario's Cap and Trade program was established under the CCLCA in 2016. This was a carbon pricing system that created an annual limit on overall emissions using trading allowances up to that limit and permitting those able to trade their allowances in a form of carbon credits (Mascher, 2018, p. 1216). This pricing scheme usually applies to Ontario's major industrial GHG emitters that produce at least 25,000 tonnes annually (ECO, 2016). The carbon credits can be distributed to the larger industrial corporations that emit more GHGs than the annual limit, while the ones that produce less GHGs would profit by selling excess permits to those who emit more.

The Cap and Trade Program strengthens economic efficiency and politically reinforce the international emissions regime (Stern, 2008; Garnaut, 2008). Larger industrial corporations have participated in the efforts to reduce GHG emissions, bringing local and international benefits socially, economically and environmentally. Many have considered RE technologies (i.e. solar and wind) as alternatives to non-renewable technologies (i.e. petroleum and natural gas). RE technology helps larger industrial corporations meet their annual limit on overall emissions (Stern, 2008; Garnaut, 2008). With all these benefits, the Cap and Trade Program have had a positive impact on changing the behavior of major industrial GHG emitters, while

creating incentives for heavy emitters and tackling environmental issues at the same time (Stern, 2008; Garnaut, 2008).

Without carbon pricing, there would not be a catalyst on encouraging RE developments, especially for those large industrial corporations that emit a lot (Mishra et al., 2013; Mascher, 2018). Much of Ontario's industry will continue to rely on non-renewable energy sources if the Cap and Trade Program was dismantled because there is no alternative plan. Eliminating carbon pricing will create greater economic costs and eliminate any climate commitments in the past (Mishra et al., 2013; Mascher, 2018). This would complicate strategies where businesses have incorporated a plan that takes carbon pricing into consideration (Mishra et al., 2013; Mascher, 2018). Hence, major industrial emitters would want financial compensation for what they have emitted in the past (Mishra et al., 2013; Mascher, 2018). Supporters of Cap and Trade suggests that the program works and there is absolutely no need to dismantle it (Mishra et al., 2013; Mascher, 2018). As a December 2018, the Ford regime is bent on dismantling Cap and Trade, federally fighting carbon pricing in the courts and introducing a small carbon trust that is a fraction of the Cap and Trade system that it replaced.

Community Power and the Rise of TREC and Solar Share

Community power refers to the participation of local groups that collectively work and support their local economy by investing in RE projects with the potential of innovation in community development (TREC, 2018). By participating in RE projects, the community would increase local jobs, boost energy security and energy system co-benefits, while creating a cleaner and healthier environment (Wustenhagen et al., 2007; TREC, 2018; Koirala et al., 2018). According to many researchers, the concept of community power is relatively new. This

concept brings fairness and trust to the people in their respected communities by means of increasing the level of community consultation (Wustenhagen et al., 2007; TREC, 2018; Koirala et al., 2018). Community power leads to increase social acceptance of investing in local RE projects, a positive form of energy development that would create long-term job opportunities for the local community (Wustenhagen et al., 2007; TREC, 2018; Koirala et al., 2018). Thus, the power of raising public awareness around energy efficiency and sustainable energy are critical, especially when discussing about RE development (Wustenhagen et al., 2007; TREC, 2018; Koirala et al., 2018).

The concept of community power was missing when major provincial energy policies and programs were implemented by the provincial government. The energy policies and programs mostly benefited the provincial government and large multinational corporations, leaving local councilors and residents to burden the costs of energy developments in their communities. As stated earlier, the decision to complete a 7 billion-dollar transaction with Samsung was entirely politically motivated, self-driven by the provincial government and has nothing to do with benefitting municipalities in Ontario (Solangi et al., 2011). The province followed through with the Samsung deal without completing thorough consultations or discussion with community members that are potentially impacted financially. They end up draining the pockets of individual families while large multinational corporations like Samsung profit from the 7 billion-dollar deal with Ontario (Mabee et al., 2012; Winfield and Dolter, 2014. Not allowing local communities to play a big role in the decision-making process is a mistake. Most of long-term residents living in their own communities were not informed by the Ontario Government (Mabee et al., 2012; Winfield and Dolter, 2014). The provincial government really

needs to reconsider community power, especially those key stakeholders who are involved when creating future energy policies or acts that would have a direct impact on communities in Ontario (Wustenhagen et al., 2007; TREC, 2018; Koirala et al., 2018).

The rise of the Toronto Renewable Energy Cooperative (TREC) and Solar Share presents a good example of how a local community can gain support on new energy strategies that would help to accelerate RE development. Their example shows how to empower citizens to take a more active role in guiding local energy initiatives (Koirala et al., 2018). Many RE researchers (Wustenhagen et al., 2007; Koirala et al., 2018), and the many TREC and Solar Share members, strongly believe that RE is an important aspect in community energy development. With the full participation of local groups and support from both organizations, a community could successfully transition to 100% RE within a generation (Koirala et al., 2018; TREC, 2018). Organizations like TREC and SolarShare show that it is much easier for local communities to achieve 100% RE, rather than supporting foreign corporations based on centralized energy models that pollute and take benefits away from local communities in Ontario and Canada. Both organizations believe community power is essential as it offers full participation for the residents to better understand RE. Many individuals have never heard of RE before. As a result, this concept of community power can allow residents to express their challenges and capitalize on the benefits from RE projects.

TREC and SolarShare have offered many local municipalities the support they need for their RE projects, but sometimes there are challenges that are difficult to overcome, even with the help of community power organizations (Aitken, 2010; Wustenhagen et al., 2007). Financing is still a big challenge for RE development. A community may not have the financial capability to

accomplish their RE projects or support offered by the provincial and federal governments (Aitken, 2010; Wustenhagen et al., 2007). Furthermore, community members may reject RE developments because they are reluctant to fund their own RE projects (Aitken, 2010; Wustenhagen et al., 2007). Therefore, community power is essential for the entire community to understand what they intend to do. The community would increase local jobs, boost energy security and energy system co-benefits, while creating a cleaner and healthier environment (Wustenhagen et al., 2007; TREC, 2018; Koirala et al., 2018). There is undoubtfully many positive benefits when the whole community participates together (Wustenhagen et al., 2007; TREC, 2018; Koirala et al., 2018).

The Election of Doug Ford

Rising global temperatures and changing climatic patterns have raised many concerns over human health and environment (Dincer & Siddiqui, 2017; Mabee et al., 2012; Mabee et al., 2012, Miller et al., 2017). Since the 2000s, the Province of Ontario has created several environmental energy policies that would tackle global warming and climate change. RE development has become a major topic in discussions before and after the implementation of the *Green Energy and Green Economy Act (GEGEA)* in 2009 and Ontario's coal phase-out in 2014. The province also implemented RE initiatives to further contribute to the reduction of GHG emissions and other toxic chemicals from 2009 to 2014 (Rosenbloom, 2018; Dincer & Siddiqui, 2017; Mabee et al., 2012). Ontario's RE energy initiatives have been part of a progressive RE strategy to bring RE development to the forefront of many political discussions, both locally and provincially (Wustenhagen et al., 2007; TREC, 2018; Koirala et al., 2018). For example, the FIT Program was an effective tool used for community involvement (Mabee et al.,

2012; Wong, 2010). The FIT program educated many residents about the benefits of RE development (Mabee et al., 2012; Wong, 2010). Many community members were pleased with the outcome of this program (Mabee et al., 2012; Wong, 2010). Another legislation known as *Climate Change and Low-Carbon Act* (2016) and the Cap and Trade Program, which were effective solutions focused on reducing corporate carbon emissions in Ontario (Mabee et al., 2012; Wong, 2010). Both the *Green Energy and Green Economy Act* (2009) and *Climate Change and Low-Carbon Act* (2016) benefited individuals and large multinational corporations, socially, financially and environmentally (Mishra et al., 2013; Mabee et al., 2012; Wong, 2010).

Many policy reforms occurred when the new provincial government swarm into office in 2018. Under the new Doug Ford government (2018), his team unanimously voted to scrap numerous RE projects, including several energy initiatives and plans to eradicate the GEGEA (Kassam, 2018; Hill, 2018). The new opposition Liberals were furious with new provincial plans to scrap key energy policies that existed before the Ford government was elected (Kassam, 2018; Hill, 2018). From cancelling solar and wind RE projects to scrapping drive clean emissions and carbon taxes, the real question becomes how this new Ford government will tackle global environmental issues in the near-term (Kassam, 2018; Hill, 2018). The Ford Government believes that scrapping all these initiatives will help save taxpayers money but does nothing to tackle global warming and climate change (Kassam, 2018; Hill, 2018). So far, no similar or new policy and plan have been used to addressed global warming and climate change (Kassam, 2018; Hill, 2018).

The elimination of several energy policies and energy initiatives under the Ford government has angered opposition parties throughout Ontario and Canada. The Ford

government seems to have zero intention to tackle rising global temperatures and changing climatic patterns (Dincer & Siddiqui, 2017; Mabee et al., 2012; Mabee et al., 2012, Miller et al., 2017). This statement is true because no strong environmental action plan has been developed since the Ford government started in 2018 (Jefford, 2018). Instead, the Ford government eliminated many environmental projects without a good reason why (Jefford, 2018). In fact, many of his own staff members accuse to force them to avoid using the term "climate change" on government social accounts, but he denies that (Jefford, 2018). Federal Environmental Minister Catherine McKenna, who has clashed with Ford over the cancellation of the cap and trade program, has tweeted that his government has no plan on climate (Jefford, 2018). Green Party Leader Mike Schreiner emailed the Ford government to confirm this. In the reply, the email stated that the province takes climate change seriously (Jefford, 2018). The Ford government revealed a new provincial plan known as the "Ontario Carbon Trust" to address climate change (Jefford, 2018). This new plan will replace the Liberal regime's Cap and Trade System with a much smaller initiative that would not encourage local communities to produce cleaner energy but instead help small and large businesses capitalize on RE developments in Ontario.

The Rise of 100% RE

The United Nations Framework Convention on Climate Change (UNFCCC) is the global environmental treaty policy that have been adopted to reduce GHGs and other pollutants in 1992 (Piggot et al., 2018; Bakhtiari, 2018). Under the UNFCCC, almost 200 parties have participated in the global climate regime (Piggot et al., 2018; Bakhtiari, 2018). Asia-Pacific

countries such as China and India and South-Central American countries such as Brazil and Costa Rica are several of the nations that have agreed to scaling-up RE (UNFCCC, 2018). By adhering to international treaty set in the 90s, these countries would be able to successfully transition to 100% RE by 2050 (Piggot et al., 2018; Bakhtiari, 2018). All four of these countries are global leaders in the RE revolution. They have even developed their own national RE policies to deal with energy security and climate change (Wang et al., 2018; Amrutha et al., 2017; Vargas et al., 2018). International cooperative initiatives under the UNFCCC have helped a few countries to commit to the transition towards 100% RE by 2050 (Piggot et al., 2018; Bakhtiari, 2018). Those efforts need to grow exponentially so the planet can avert climate chaos.

China and India

China and India have by far the highest population in the world. As their population continues to grow, both countries have created efficient RE policies to deal with energy security and climate change (Wang et al., 2018; Amrutha et al., 2017). Starting in 2009, China has seen a dramatic increase in coal and natural gas import, reaching 58.9% and 27.6% respectively (Wang et al., 2018: 188). The dominance of these fossil fuels increases the amount of GHGs and other pollutants, which are the main causes of many environmental dilemmas (Wang et al., 2018: 188). Nevertheless, China is investing more than $360 billion in RE resources by 2020 (Wang et al., 2018: 188). China has developed a renewable energy program that targets energy efficiency, carbon intensity, and the share of clean energy resources such as wind and solar power (Wang et al., 2018: 188).

Like China, India is taking a strong position in RE development, in many cases, their energy policies are in fact the same. In India, a model-based approach for planning RE is about to transform their electricity system to a more efficient, low carbon one that produces less GHGs and other pollutants (Amrutha et al., 2017: 1024). India has enabled policy interventions such as Renewable Purchase Obligation (RPO) and Feed-in-Tariff (FIT) program (Amrutha et al., 2017: 1023). Those programs have increased RE capacity from 300 MW in 1995 to 42,752 MW in 2016 (Amrutha et al., 2017: 1023). India has created an ecosystem where RE investments are almost mandatory in every state (Amrutha et al., 2017: 1025). Every state in India must be RPO compliant (Amrutha et al., 2017: 1024). With the energy each state generates from RE technologies, they could sell back to the electrical grid system. This system is identical to Ontario's FIT program introduced in 2009 (refer to Ontario FIT Program).

Energy security continues to be an important challenge in China and India. Both countries are actively working on RE development (Wang et al., 2018; Amrutha et al., 2017). The Chinese renewable energy program promotes different kinds of renewable technologies (e.g. hydro, wind, solar) and a wide application of renewables, RE demonstrations in 81 cities and widespread discussions on energy supply security and clean energy (Wang et al., 2018: 193). India introduced its RPO system where each state must comply to a national RE goal. Furthermore, the Indian FIT program reinforces great opportunities for communities to participate in RE development (Amrutha et al., 2017: 1024). Both China and India are working towards 100% RE and China seems to have a stronger focus on community power. China offers experiential learning and ongoing RE discussions, while India continues to develop RE policies (i.e. RPO), making RE developments mandatory in every state (Wang et al., 2018; Amrutha et

al., 2017). These two Asia-Pacific countries could be the first large scale developing nations to transition to 100% RE in the future.

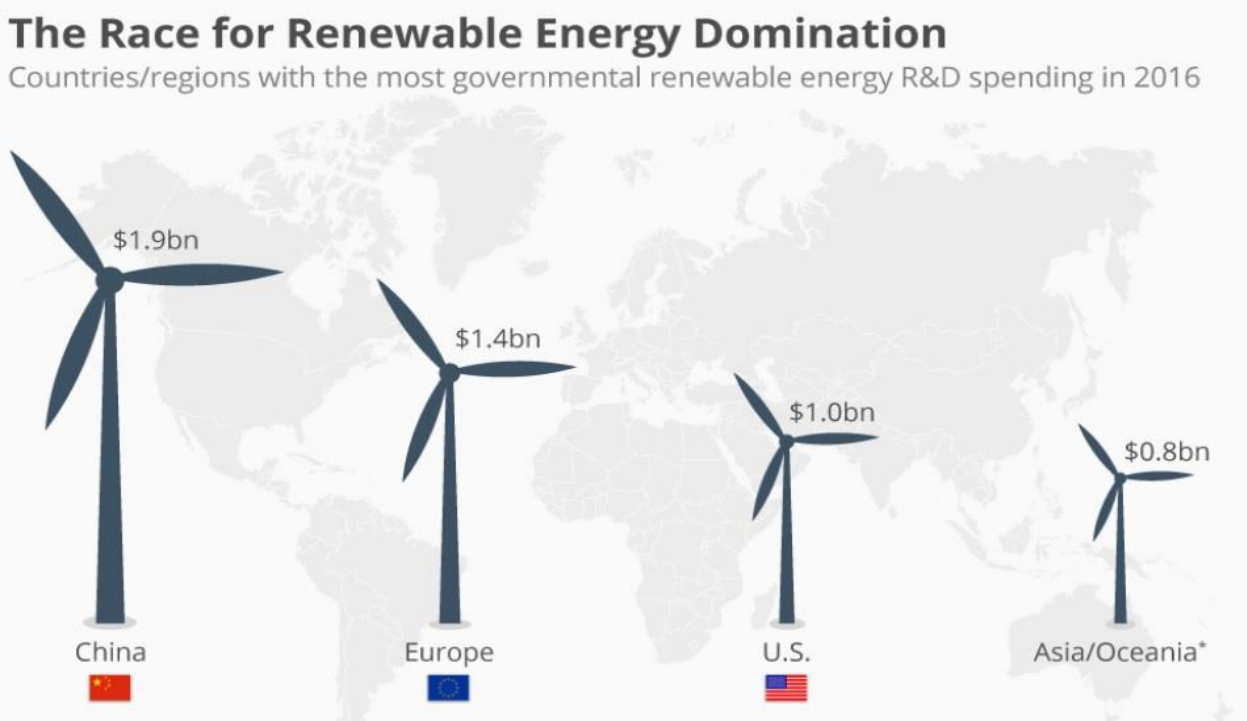

Figure 2 – China is leading the renewable energy revolution (World Economic Forum, 2017).

Brazil and Costa Rica

In South America, Brazil has adopted several environmental measures to tackle GHGs and other pollutants under the guidance of the UNFCCC. The Brazilian government has created an innovative energy policy: the plan is known as "Inova Empresa" ("Company Innovation"), which is the largest energy funding initiative used to support technological energy advancements for a wide range of applications (Mendonca et al., 2018: 710). This program contains 11 sectorial and thematic initiatives calling for new technologies in smart grids, solar and wind generation (Mendonca et al., 2018: 710). Brazil also created PAISS and PAISS 2 aimed to bring Brazil "back into the game" of ethanol productivity and other advanced sugarcane bio-

product (Mendonca et al., 2018: 710). As a result, the government of Brazil sees Inova Empresa, along with PAISS and PAISS 2 as successful environmental programs used to help meet requirements enacted under the UNFCCC (Mendonca, 2018; Bayer, 2018).

In Central America, Costa Rica has partnered with the US government to create a program which serves as a local initiative that would educate and offer experiential learning on renewable electricity (Vargas, 2018: 121). This local initiative known as COOPEGUANACASTE is all about community power. Local leaders created over 400 direct jobs for local communities, including 100,000 end-users in the ecotourism and agro-industry (Vargas, 2018: 121). Furthermore, this initiative has been recognized nationally and internationally, with awards from the Ministry of Energy and Environment (MINAE) and the Chamber of Industries (Vargas, 2018: 121). COOPEGUANACASTE have been celebrated for its solar photovoltaic social programs and its social and environmental responsibility practices in line with the UNFCCC (Vargas, 2018: 121).

Both Brazil and Costa Rica have done their fair share in helping local communities and meet energy objectives that support the UNFCCC goals (Mendonca et al., 2018; Bayer, 2018; Vargas, 2018; Piggot et al., 2018; Bakhtiari, 2018). Community power is a powerful environmental tool to bring RE developments to the local community. Through engagement and numerous energy discussions on the benefits of RE projects, more residents in their respective countries are more knowledgeable, making them more supportive on investing in RE projects with the potential of innovation in community development (Mendonca et al., 2018; Bayer, 2018; Vargas, 2018; TREC, 2018).

Corporate Efforts

Many large and multinational corporations have taken a leadership role in procuring RE across the globe. More than half of the top global companies are involved in RE initiatives such as investing in wind, solar, energy storage, micro-grids and other advanced renewable energy technologies. This type of corporate effort is likely to ramp up as more businesses continue to see corporate RE benefits in the foreseeable future. Large, well-known corporations, like IKEA, Apple, and Walmart, have been part of a much larger corporate effort to achieve 100% RE (RE100, 2018). They are involved in numerous 100% RE initiatives around the world. Those three large multinational corporations are all part of the RE100 Campaign, where more than 150 companies have committed to go 100% renewable (RE100, 2018).

IKEA, the large Swedish multinational corporation that designs and manufactures ready-to-assemble furniture, kitchen appliances and home accessories, is committed to go 100% RE in most of its buildings by 2020 (RE100, 2018). Other large corporations like Apple and Walmart are also committed to 100% RE within the same timeframe as IKEA. Apple is expected to power all their facilities with 100% RE while hoping to install more than 4,000 gigawatt hours of clean RE by 2020. (RE100, 2018). As for Walmart, the company plans to source 100% RE and aim to produce 7,000 gigawatt hours (GWh) of RE by the end of 2020 (RE100, 2018). Apple, IKEA and Walmart are transforming all their facilities into 100% RE by 2020 and show Ontario that being "open for business" means supporting 100% RE.

As part of RE100, many large and multinational corporations have taken significant strides to incorporate RE technologies into their own facilities worldwide. The RE100 campaign is a great corporate effort used to boost corporate involvement in 100% RE development.

Currently, there are at least 150 companies that participate in the RE100 campaign, and this number is expected to grow exponentially to help solve climate change and to lower the costs of RE worldwide.

Figure 3 – IKEA's Wintering Hills wind farm in Drumheller, Alberta (Canada). With 55 wind turbines, this farm could generate 88-MW, which is enough electricity to power 54 IKEA stores (IKEA Canada, 2018).

Figure 4 – Apple's 17-MW solar installation at the new headquarters in Cupertino, California (United States). This solar installation could generate enough power to supply the entire facility (Apple, 2018).

Figure 5 – Walmart signs long-term contracts with renewable developers to supply on-site power generation such as solar, wind and fuel cells for 5 to 20 years (Walmart, 2018).

North American Leaders

Cities generally contribute about 65-75% of the total anthropogenic GHGs worldwide (Bagheri et al., 2018). This statistic reveals how cities are very vulnerable to the effects of climate change (Bagheri et al., 2018). To reduce the amount of GHGs, many governments within different cities have implemented strategic policies (e.g., feed-in-tariff, carbon tax incentives) and programs (e.g., cap and trade) to address the ongoing crisis of climate change (Bagheri et al., 2018). Those government leaders have been very successful with their plans, yet there are also other stakeholders that do not receive enough credit for their actions on climate change (Bagheri et al., 2018).

For example, there are many North American (NA) climate change leaders who have supported cities through the transition to 100% RE. Canada's Renewable Cities Global Program involves various environmental organizations such as the Sierra Club and Local Governments for Sustainability (ICLEI) which are global leaders based in Canada and the United States. Both NA environmental organizations are part of the RE100 campaign that have strongly supported and

advocated for local and provincial governments to develop solutions around climate change, local economics, energy, and natural resources. Supporters of the Renewable Cities Global Program argue that 100% RE is not only possible but better for humanity (Renewable Cities, 2018; Sierra Club, 2018; ICLEI USA, 2018). The challenge that lies ahead is the timeline and the strength of natural gas networks in NA (Renewable Cities, 2018; Sierra Club, 2018; ICLEI USA, 2018). Natural gas networks can complicate the transition to 100% RE, so some would argue that the focus on district energy could start to help cut fossil fuel mining, refining and transporting, while RE can slowly start to emerge (Renewable Cities, 2018; Sierra Club, 2018; ICLEI USA, 2018).

The City of Vancouver (Canada) and San Francisco (United States) are North American leaders in transitioning to 100% RE and on energy efficiency (Renewable Cities, 2018). Both cities work collaboratively with many global organizations that are part of the Renewable Cities Global Program (Renewable Cities, 2018). Local councilors and residents are committed to follow planning guidelines while creating their own local energy policies and plans. Both Vancouver and San Francisco have started to generate its electricity without the use of fossil fuels (Renewable Cities, 2018). Those leading cities are more focused on different RE sources such as hydro, wind and solar (Renewable Cities, 2018). Furthermore, the Renewable Cities Global Program is helping both the City of Vancouver and San Francisco to achieve its climate goals (Renewable Cities, 2018).

Oxford County Community Energy Planning

Known as Oxford County, this relatively small regional municipality in the Canadian Province of Ontario is located west of Hamilton in Southwestern Ontario. Oxford County is easily accessible through highway 401 and 403. This beautiful Canadian municipality have been planned by local community members and councilors from different communities within Oxford County. The objective is to create the most energy efficient community in Ontario and Canada.

According to Oxford County, their definition of 100% RE is when RE generated equals 100% of the annual energy consumed within Oxford (Oxford County, 2018). Oxford County Councilor, Trevor Birtch (Mayor of The City of Woodstock) put a motion to commit to 100% RE by 2050 (Oxford County, 2018). The motion was unanimously agreed by all council members, which meant the municipality would invest heavily in RE projects, in most cases, with or without the support of the provincial government in Ontario. County council members and residents participated in various consultations related to RE projects, which helped to raise awareness on energy efficiency and sustainable energy. It is evident that this community has proved how community power is important. Local participation works in supporting their local economy by investing in RE projects with the potential of innovation in community development (TREC, 2018).

Another huge advocate in 100% RE development is Jose Etcheverry, a professor and researcher who led York University's Sustainable Energy Initiative (SEI). Under Etcheverry's leadership, the SEI have played a role in creating cooperative efforts that promote sustainable energy behaviors, an initiative that works closely with Oxford County (York University, 2018).

This initiative is a great way to address the challenges of global warming and climate change. Like SEI and many other similar initiatives, many scholars believe sustainable energy initiatives in general help promote sustainable energy behaviors that would be a huge catalyst in helping communities achieve their 100% RE goal (Sloot et al., 2018). Through research, teaching, collaboration and innovative partnerships, Oxford County is optimistic that they could achieve 100% RE by 2050 (Oxford County, 2018).

Despite provincial and federal energy policy reforms, local council members and community members of Oxford County will continue to offer their support to help the county achieve their 100% RE goal by 2050 (Oxford County, 2018). Thanks to councilors like mayor Trevor Birtch and warden David Mayberry, Oxford County could become the first municipality to achieve 100% RE and zero waste in Ontario and Canada. Community power will always be an important aspect in helping their county accomplish 100% RE (Oxford County, 2018). This puts the municipality in a great position to reduce GHG emissions and avoid the instability from geopolitical and climatic events (Oxford County, 2018).

Community Energy Planning

Large multinational corporations and global political leaders have participated in the reduction of fossil fuel resources. They work towards the integration of RE technologies such as wind turbines and solar photovoltaics (Piggot et al., 2018; Bakhtiari, 2018; RE100, 2018). The creation of the UNFCCC is one of the first global environmental treaty policy that have been adopted to reduce GHGs (Piggot et al., 2018; Bakhtiari, 2018). Approximately 200 global leaders have been involved in the adoption of this global initiative (Piggot et al., 2018; Bakhtiari, 2018). Corporate leaders have mainly participated in the RE100 Campaign. The RE100 Campaign have brought

many large multinational corporations and organizations onboard. This campaign took significant strides to incorporate different stakeholders, making RE technologies an important feature in many of their facilities worldwide. In wake of this, many local politicians have also taken initiative through educating and engaging with their own citizens and local businesses about the benefits of 100% RE development. There is no doubt that many communities have created their own energy plans which brought benefits to local community members such as more jobs and more health benefits.

Climate change is not just an international issue, national or state/provincial government issue but has taken root in communities as well. In the province of Ontario, the community of Oxford County have created their own Community Sustainability Plan (CSP) that aims to create a more livable community for current and future generations. The community wants to improve the overall health of the surrounding environments through community organization and community building. Oxford County is considered as a leader in the province when it comes to developing a community energy plan to address economic, environmental and social dilemmas. What makes this community so successful is their ability to attract high levels of community participation. Residents and council members have agreed to focus their attention on the reduction of GHGs under their CSP. The community will deploy RE technologies to help achieve 100% RE by 2050 (Sloot et al., 2018; Oxford County, 2018).

Oxford County's Community Sustainability Plan is different from other Ontario communities now and in the past. The community has already demonstrated their ability to create an energy strategy that would help them achieve 100% RE (Please see figure 6). Oxford County offers both inspiration and a roadmap to reframe the way 100% RE is understood in

Ontario and Canada. Their political will of their local leaders, the residents who live and work in their community, including small or large organizations (e.g. TREC and Sustainability Energy Initiative) who have supported their CSP is making it very successful. The CSP fosters the formulation and implementation of a 100% RE target by 2050 (Oxford County, 2018). Unlike other communities, Oxford County's goal of 100% RE is a community-wide goal. The community tracks GHG emission levels in every consumer sector (e.g. residential, industrial, commercial, and agricultural) of their economy (Oxford County, 2018). Every sector is committed to achieve their own requirements in relation to the goals outlined under the Oxford County's CSP.

The Oxford Workforce Development Partnership (OWDP) was also another key stakeholder responsible for "Building a stronger workforce in Oxford by working together to nurture economic prosperity for our community" (Oxford County, 2018). The OWDP is committed to help keep their economy as healthy as possible. Local politicians do not want Oxford County's economy to collapse as a result of the requirements outlined under the CSP (Oxford County, 2018). As Oxford County continues to move forward with their 100% RE plan, they continue to increase their number of stakeholders involved, especially those who strongly believe and support their long-term vision of achieving 100% RE by 2050.

(REFER TO THE MIND MAP UNDER APPENDICES)

This mind map illustrates broader **strategies to advance 100% RE** in Ontario and Canada. The mind map splits into 6 sections, each focusing on a specific strategy to help a community work towards achieving 100% RE. The sections include – Community sustainability plan (CSP), Community involvement, research and development, enhanced net metering, connections to the worldwide RE movement, and RE for public infrastructure and other local businesses.

Specific Strategies to Achieve 100% RE in Oxford County

Virtual Net Metering
• Individuals and businesses can send excess electricity back into the utility grid for a reduction in their electricity bill • Solar, wind, biomass, hydroelectricity are all eligible electricity projects for virtual net metering Oxford County – Accelerate small scale solar PV installations through a net metering solar challenge, solar PV installations help lower electricity cost for many individuals and businesses in the community
Technological Advancements
• Implement leading edge building design and construction techniques • Monitor existing electricity systems to determine existing levels of GHGs and other pollutants • Improve existing RE technologies through ongoing research & development (R&D) Oxford County – R&D in solar PV technologies, explore alternative building designs, smart meters, smart thermostats
Education and Public Outreach Platforms
• Create different programs and initiatives on 100% RE • Create art exhibitions that explore environmental concerns • Create friendly RE competitions in the community Oxford County – Art of Sustainable Energy at the Woodstock Art Gallery (WAG), internet & social media, guest presentations, workshops & public events (i.e. Green Energy Doors Open event)
Community Sustainability Plan (CSP) or Community Energy Plan (CEP)
• Create a CSP or CEP, or any other plan that would demonstrate how the community is working towards achieving 100% RE • A clear roadmap to help guide the local community in their transition to 100% RE Oxford County – Community Sustainability Plan (i.e. target setting, initiatives, programs, job creation, vision, etc.) to achieve 100% RE by 2050, 100% RE Energy Plan – For community comment and input

Connections to The Worldwide RE Movement
• Work with local and global RE organizations to develop additional RE objectives for the community Oxford County – Include social and charity organizations, staff and private citizens in RE discussions, Sustainable Energy Initiative (SEI), World Future Council, Renewable Cities, Ontario Sustainable Energy Association (OSEA), and more

Figure 6 – Strategies to achieve 100% RE in Oxford County (Oxford County, 2018).

Conclusion

Ontario's transition of political power amongst the different political parties has often been influenced by the transformation of Ontario's energy legislations, dating back to the early 1900s. Political parties have recognized that climate change is a major focus in global environmental discussions worldwide. The governing Conservatives and Liberals, and the New Democratic Party (NDP), have all amended environmental measures to tackle climate change. Ontario's political parties have revised their environmental platforms over the years, affecting Ontario's energy development. The environmental platforms have been widely supported and criticized by various groups, including residents, environmental researchers, scientists, energy organizations and political leaders. Currently, Ontario needs to present a better strategy for addressing climate change. Moving forward, Ontario's political parties need to continue to implement effective energy solutions that can help reduce the burning of fossil fuels, while increasing local benefits. Ontario's energy future now lies in the hand of a new provincial government that is weakening RE.

Provincial and federal energy policy reforms have hindered RE development in Ontario. Following Sir Adam Beck's successful hydro energy movement in the early 1900s, the province came a long way to phased-out coal and implement the *Green Energy and Green Economy Act* (GEGEA) in 2009. Liberal premier Dalton McGuinty and his supporters' boosted RE production, encouraged the use of clean energy and created more environmental jobs throughout the province. On the other hand, critics call their efforts legislation a total failure. Critics argue that the province downloaded responsibilities to large multinational corporations (i.e. Samsung. Many community members continue to become unaware about the potential benefits of new RE projects and will remain blind until they actually see RE developments occur in their communities. Under the GEGEA, large multinational RE projects were pursued and were often not widely accepted by community members in Ontario. For many critics, RE projects are only considered as an opportunity only for large multinational corporations.

Tackling climate change must start at the local level – and therefore need to be supported by both provincial or federal levels. Local community engagement and education enables residents to better understand the detrimental impacts on the use of fossil fuels and truly understand the multiple benefits RE projects can bring to the community. Local communities need to help develop their own energy initiatives to tackle environmental dilemmas and work to achieve their own energy objectives. The provincial government's role should be mainly to offer financial aid and expertise to local communities instead of signing huge contracts with large multinational corporations, for example, the $7 billion-dollar RE projects deal with Samsung (Solangi et al., 2011). That approach made little sense because downloading responsibility to large multinational corporations offers no incentives to the

residents who live in local communities. In fact, RE produced under premier McGuinty's legislation has been exported to the US states (New York, Michigan and other border regions) for dirt cheap rates, well below the price the province has paid to Samsung (IEA, 2018; Gallant, 2013). If individual communities become more involved in RE projects, the process it takes to achieve 100% RE would be much more attainable in Ontario. This would also ensure energy is used locally to benefit both local communities and the province.

In Ontario today (2018), the Doug Ford government have made several changes to energy planning and policies that were amended by previous provincial governments without creating a better energy plan that would continue to tackle climate change. Instead, this government chose to scrap several large RE projects and prefers to focus its energy action on strategies related to fossil fuel resources that produces an immense amount of GHG emissions when compared to RE resources such as wind and solar. Thus, the ongoing provincial energy changes and long-term negotiations have been slowing the RE development process. The process would be quicker if the provincial government is willing to set mandatory RE requirements, offer more community incentives and avoid benefitting only those large multinational corporations. This strategy could help every community achieve 100% RE, and the provincial government should fund those communities that want to take the initiative to achieve 100% RE.

There is currently a strong focus on further expanding the global movement towards 100% RE worldwide. The UNFCCC has led the way by creating a global climate regime for the enforcement of tackling GHGs. There are about 200 parties that have taken part in this global movement so far (Piggot et al., 2018; Bakhtiari, 2018). The 100% global RE movement has

attracted many corporate interest groups such as Apple, IKEA and Walmart. They are three out of over 150 corporations who invested in solar or wind technology. Companies want to generate 100% of their energy directly at their facilities by 2020. Thus, support for 100% RE development is not only a provincial and federal responsibility but is also becoming the focus of key corporate players worldwide.

Despite corporate and worldwide efforts in 100% RE development, local communities continue to play crucial roles in facilitating decentralized RE. Planning must be focused in helping communities take control of their own RE energy future. Oxford County is an example of a local community that offers both inspiration and a planning roadmap to reframe the way 100% RE is understood and implemented with a community-focus. Oxford County has successfully created a Community Sustainability Plan (CSP) that focuses on building a stronger and healthier community. Community members and local politicians are working towards achieving 100% RE by 2050. Other communities within Ontario and Canada should follow what Oxford County is doing right now and shift their focus from takers of dirty energy sources towards producers of local clean RE.

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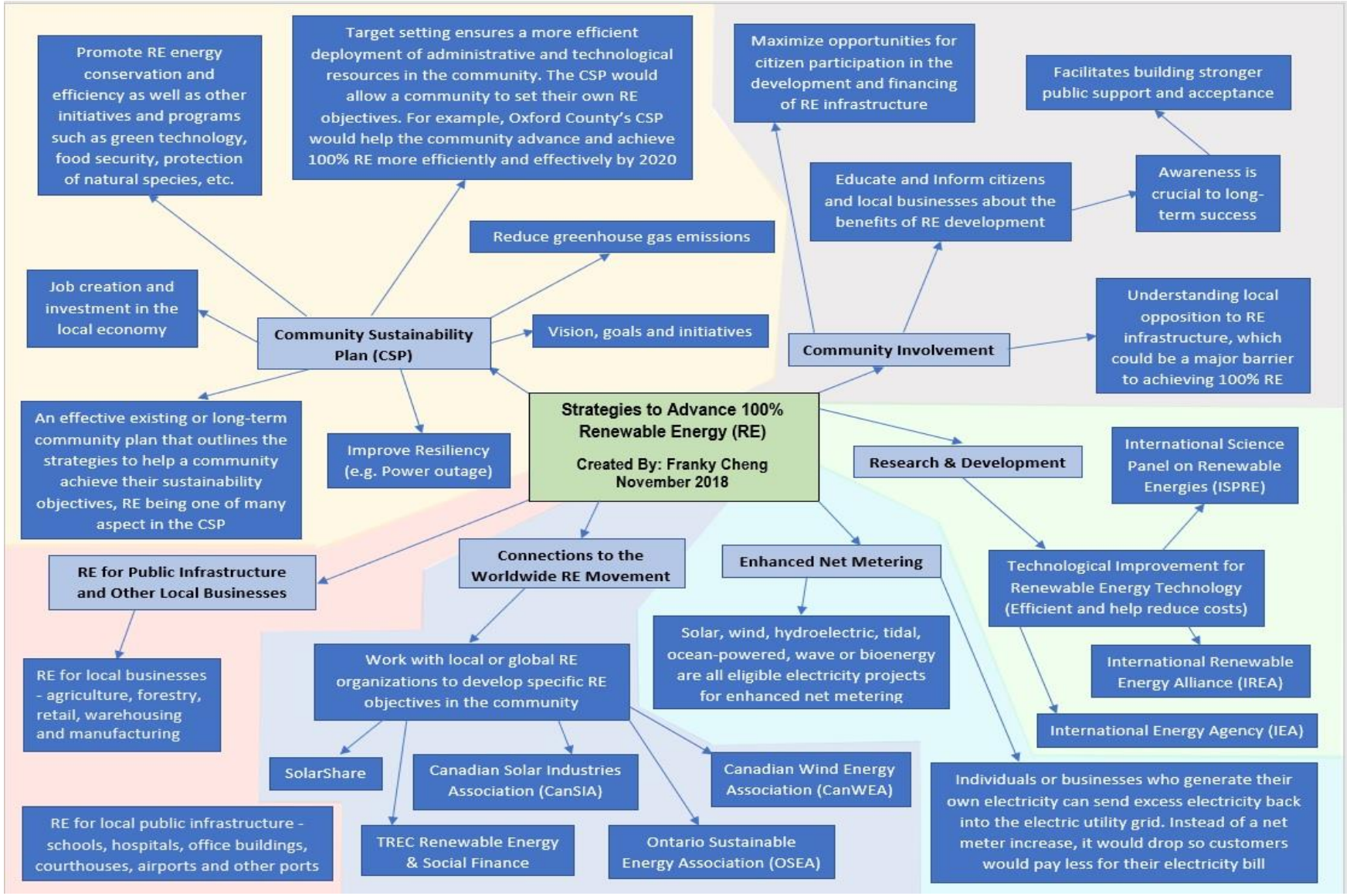
Appendix A


Promote RE energy conservation and efficiency as well as other initiatives and programs such as green technology, food security, protection of natural species, etc.
Target setting ensures a more efficient deployment of administrative and technological resources in the community. The CSP would allow a community to set their own RE objectives. For example, Oxford County's CSP would help the community advance and achieve 100% RE more efficiently and effectively by 2020
Maximize opportunities for citizen participation in the development and financing of RE infrastructure
Facilitates building stronger public support and acceptance
Educate and Inform citizens and local businesses about the benefits of RE development
Awareness is crucial to long-term success
Reduce greenhouse gas emissions
Job creation and investment in the local economy
Community Sustainability Plan (CSP)
Vision, goals and initiatives
Community Involvement
Understanding local opposition to RE infrastructure, which could be a major barrier to achieving 100% RE
An effective existing or long-term community plan that outlines the strategies to help a community achieve their sustainability objectives, RE being one of many aspect in the CSP
Improve Resiliency (e.g. Power outage)
Strategies to Advance 100% Renewable Energy (RE)
Created By: Franky Cheng
November 2018
Research & Development
International Science Panel on Renewable Energies (ISPRE)
RE for Public Infrastructure and Other Local Businesses
Connections to the Worldwide RE Movement
Enhanced Net Metering
Technological Improvement for Renewable Energy Technology (Efficient and help reduce costs)
RE for local businesses - agriculture, forestry, retail, warehousing and manufacturing
Work with local or global RE organizations to develop specific RE objectives in the community
Solar, wind, hydroelectric, tidal, ocean-powered, wave or bioenergy are all eligible electricity projects for enhanced net metering
International Renewable Energy Alliance (IREA)
International Energy Agency (IEA)
SolarShare
Canadian Solar Industries Association (CanSIA)
Canadian Wind Energy Association (CanWEA)
Individuals or businesses who generate their own electricity can send excess electricity back into the electric utility grid. Instead of a net meter increase, it would drop so customers would pay less for their electricity bill
RE for local public infrastructure - schools, hospitals, office buildings, courthouses, airports and other ports
TREC Renewable Energy & Social Finance
Ontario Sustainable Energy Association (OSEA)