ECONOMIC IMPACT OF NEW BRUNSWICK COMMUNITY ENERGY PLANS: PRIMER AND WORKBOOK

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QUEST

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About QUEST
QUEST is a national non-government organization that works to accelerate the adoption of efficient and integrated community-scale energy systems in Canada by informing, inspiring, and connecting decision-makers. QUEST undertakes research, communicates best practices, convenes government, utility, private-sector and community leaders, and works directly with local authorities to implement on-the-ground solutions. QUEST grounds all its activities in the "Smart Energy Community"– a concept that encapsulates the ideal end state of the organization's work.

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INTRODUCTION

Accounting for 59% of energy consumption and over 56% of greenhouse gas (GHG) emissions in Atlantic Canada[1], communities are central and actively working to enable the Province of New Brunswick to achieve its energy and GHG emissions reduction objectives. Though communities are developing Community Energy and Emissions Reductions Plans or Community Energy Plans (hereafter collectively referred to as CEPs) to improve local energy efficiency and reduce GHG emissions, there is limited support for enabling the implementation of those plans.

CEPs are often developed under the leadership of municipalities. However, the goals of these plans are often community[2]-wide, with many stakeholders.

Many municipalities are challenged in maintaining this leadership role as they:

- Don't see energy as the purview of local government
- Are not aware of the changes in energy markets and technologies that bring local benefits
- Are not aware of how this fits with their traditional economic development role in attracting investment and job creation

This Workbook has been developed under a project funded by the New Brunswick Environmental Trust Fund and New Brunswick Power.

WORKBOOK PURPOSE

This Workbook is aimed at articulating the local economic benefits of the development and implementation of CEPs with the goal of improving understanding of the value of implementing CEPs among municipalities and their stakeholders in New Brunswick. In an effort to increase "buy-in" from New Brunswick municipalities, this Workbook will include the following objectives:

- Development of a communication package for local governments that describes and demonstrates the positive local economic impact of developing and implementing CEPs
- Communicate content to local government
- Clarify the economic development role of municipalities in supporting CEPs

This Workbook is the result of previous work by municipalities that have completed some form of community energy plan and have made substantial efforts to establish a baseline of energy use and GHG emissions across their communities. Further, these communities have established targets to reduce their community-wide energy use and GHG emissions thus allowing for the qualitative and quantitative estimates of the local economic impact of achieving these targets.

This Workbook is the outcome of three main activities previously conducted under the auspices of the overall project:

1. A compendium of research that:
    a. Supports a definition and description of the "transitioning energy economy"
    b. Macro level economic impact from technologies, systems and organizations that are related to implementing CEP's that seek to capitalize on the benefits of the "transitioning energy economy"
    c. A summary of the economic models that are used to determine and calculate the economic impact of implementing CEPs
2. Case studies of two selected communities - their quantified energy and emissions profiles, target strategies and resulting economic impact
3. Key indicators that all New Brunswick municipalities can use to calculate and estimate the economic impact of their CEPs

WORKBOOK CONTENTS

This Workbook contains three main components:

- A primer on the elements of a transitioning energy economy and how it has the potential for local economic impact
- How to estimate the local economic impact of GHG reductions and reduced energy use of any specific community that has completed a CEP
- Case studies of two specific New Brunswick communities, Sussex and Saint John

[1] Comprehensive Energy Use Database - Natural Resources Canada

[2] The term "community" or "communities" refers to all infrastructure and residential, commercial, industrial, institutional, transportation, utility, and agriculture activities within a given geographic (or municipal/Indigenous community) boundary. The term "local government" refers to a specific level of government (e.g. municipal government, regional government, Indigenous government)

SECTION ONE:
THE TRANSITIONING ENERGY ECONOMY

Photo on gnb.ca

Before beginning to understand how local economies are impacted by the implementation of CEPs, a clear description of what we mean by a transitioning energy economy will inform the ongoing work of the project·

The terminology of a "transitioning energy economy" is widely understood to have originated in Germany and is commonly referred to as the EnergieWende[3].

TRADITIONAL ENERGY SYSTEMS

At a high-level, the concept of an energy transition is the movement away from traditional energy systems which include large centralized energy generation and distribution systems that maintain considerable carbon content in their fundamental fuel supply.

Figure 1 below is a Sankey diagram showing the source energy inputs and end-uses in the Town of Oakville, Ontario (population approx. 200,000). The relative scale of the diagram is typical for most municipalities and is shown here to demonstrate the waste of centralized energy systems from source to end-use.

The dark connectors in the diagram represent waste - in this case approximately 50%. The costs related to the purchase of the energy to serve the communities end-uses, by definition, include paying for the waste. The cost of maintaining the major infrastructure required to generate and deliver energy with large centralized systems is significant and contributes to inflationary cost pressures. In 2017 the Town of Oakville spent approximately $600 million a year in energy costs. Research has shown that the costs of energy for the Town could increase by four to seven times this annual cost under the current energy supply and end-use framework.

[3] Strunz, S. (2014). The German Energy Transition as a Regime Shift. Ecological Economics,100, 150-158. [reference #38]

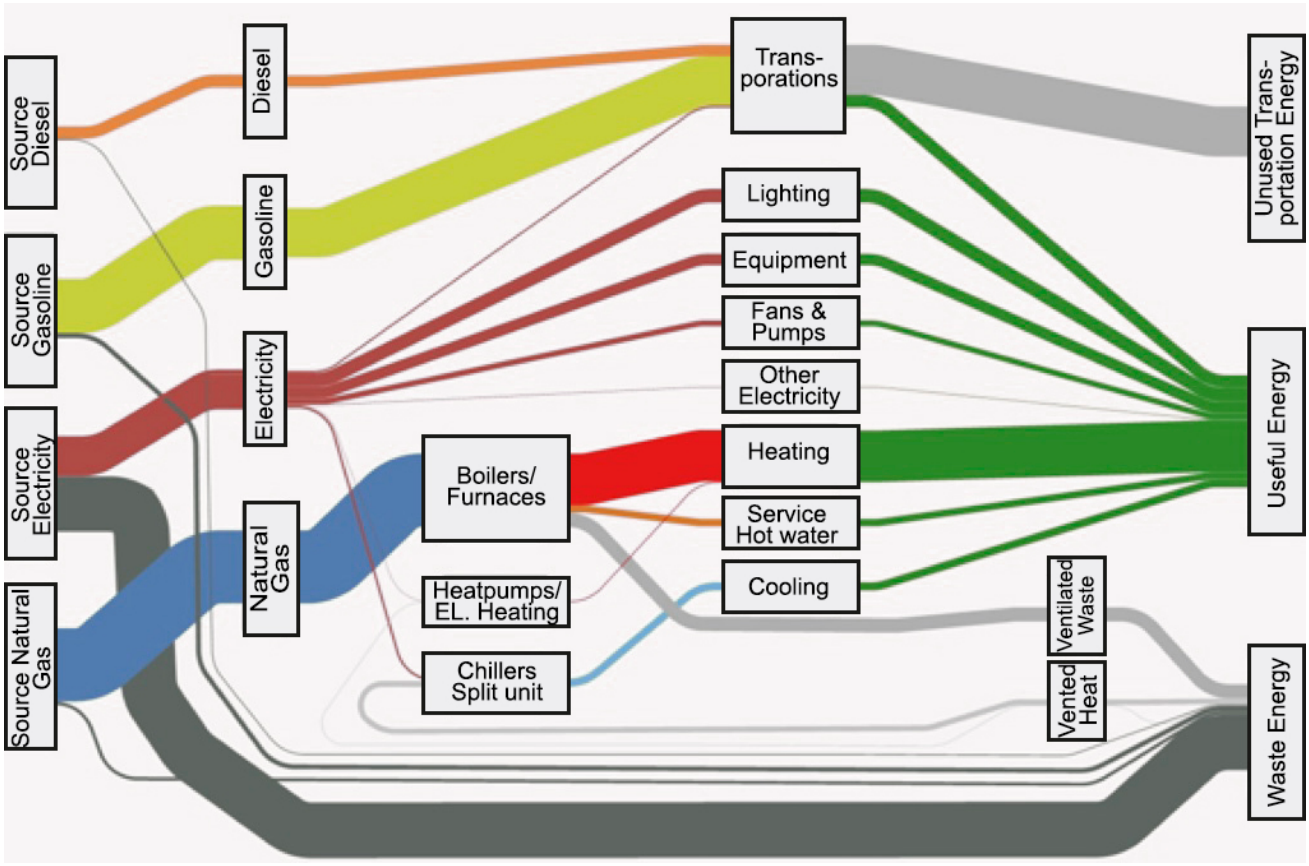


Figure 1 – Town of Oakville, Ontario - Energy Balance 2016

TRANSITIONING ENERGY SYSTEMS

Driven by technological innovation, centralized energy supply and distribution systems are now being challenged by the increase of distributed, local systems. There has been significant growth in the markets for energy efficiency technology that can vastly reduce the demand for end-use efficiency.

What technologies are we talking about when we discuss the distributed energy systems that typically inform CEPs? In order to guide the effective implementation of Smart Energy Communities, QUEST has developed six Smart Energy Community technical principles[4]. These principles can help guide the development and implementation of a CEP.

1. **Improve efficiency** – first, reduce the energy input required for a given level of service
2. **Optimize exergy** – avoid using high-quality energy in low-quality applications
3. **Manage heat** – capture all feasible thermal energy and use it, rather than exhaust it
4. **Reduce waste** – use all available resources, such as landfill gas and municipal, agricultural, industrial, and forestry wastes
5. **Use renewable energy resources** – tap into local opportunities for geoexchange systems, small scale hydro, biomass, biogas, solar, wind energy, and opportunities for inter-seasonal storage
6. **Use energy delivery systems strategically** – optimize use of energy delivery systems and use them as a resource to ensure reliability and for energy storage to meet varying demands

The figure 2 below illustrates how these technologies are integrated into a community context.

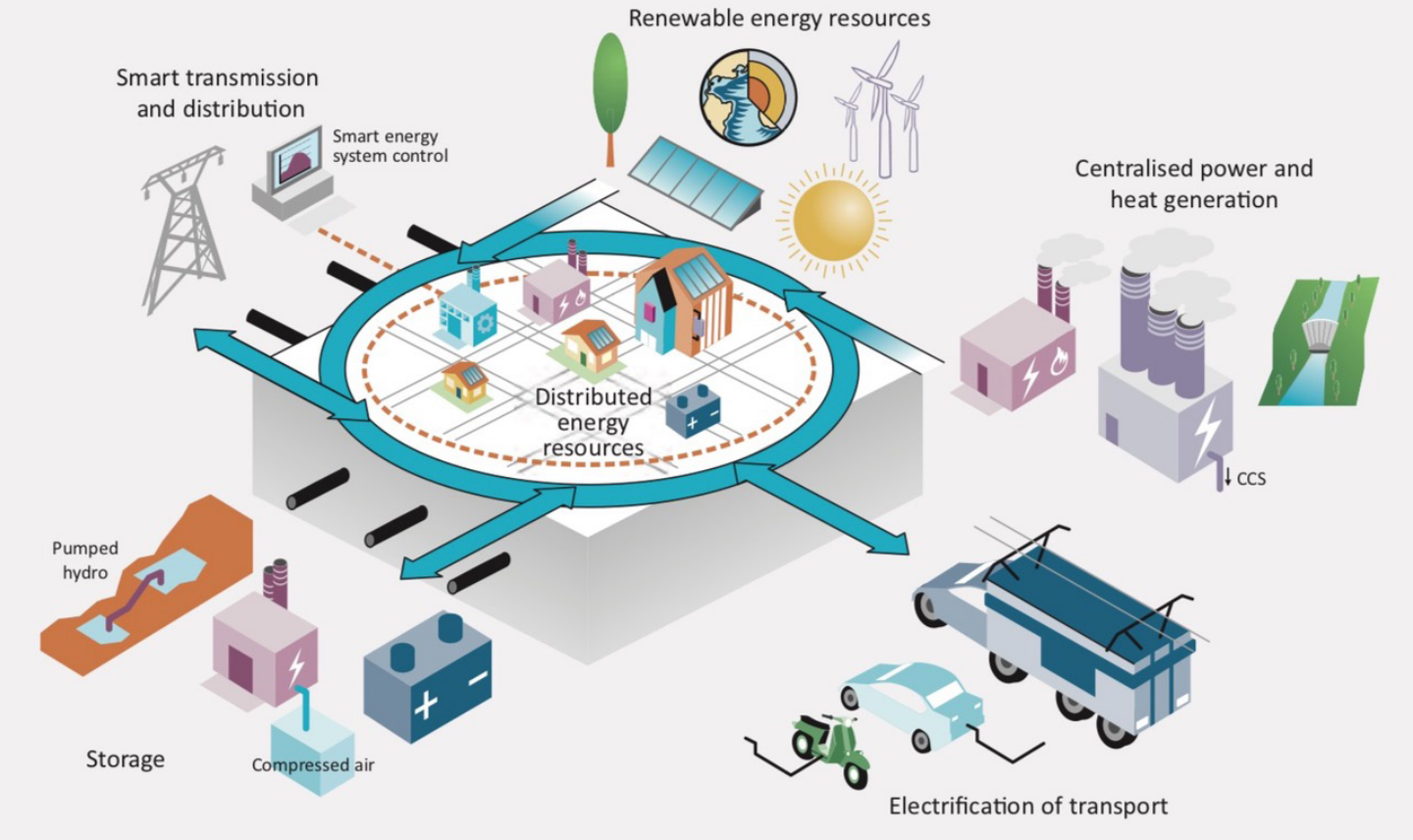


Figure 2 – Distributed (Local) Energy Systems[5]

[4] The Smart Energy Community Principles were developed as part of the Integrated Community Energy Solutions Literacy Series in 2012. The Building Smart Energy Communities white paper provides an overview of Smart Energy Communities (referred to as Integrated Community Energy Solutions) and the principles required for their implementation. The initial six technical principles developed by QUEST were endorsed by the Council of Energy Ministers and Council of Federation in 2009 in the Integrated Community Energy Solutions – A Roadmap for Action

[5] OECD IEA 2014 Energy Technology Perspectives fig. 137, pg. 132 IEA

COMMUNITIES AS MARKET PATHWAYS

Communities and their municipal governments are in a position to play a key role in making their communities significantly more energy efficient and attracting investment in local energy infrastructure. To do so, QUEST has developed policy principles to guide the process of developing and implementing CEPs. These principles are critical in ensuring the maximum potential positive local economic impact.

1. **Match land use needs and mobility options** – understand the energy implication of land use, infrastructure for water and wastewater, waste management, personal mobility, goods movement, and building design decisions
2. **Match energy options to local context** – local climate, building on land use choices, industrial structure, availability of local sources of waste and renewables
3. **Send clear and accurate price signals** – consumers should see and pay full real costs, including external costs
4. **Manage risks and be flexible** – maintain technological and fuel diversity, pursue cost-effective opportunities first and incorporate learning, and assume the need to adapt quickly to market and technological surprises
5. **Emphasize performance and outcomes in policy and regulations** – avoid prescribing fuels and technologies
6. **Pursue policy and program stability** – maintain a consistent and predictable decision making environment to sustain investor confidence

A DEFINITION OF A TRANSITIONING ENERGY ECONOMY

Based on the project's research and the QUEST technical and policy principles, the following definition has been developed for context in the remaining New Brunswick municipal engagements planned for the project.

The intent of the definition is to not to be an all encompassing academic description but to be described in the context of the value to the individual community, who is seeking ongoing political and community support and stakeholder engagement, for the implementation of their CEPs.

The Transitioning Energy Economy is largely defined as the change, over time, from centralized forms of generating and distributing energy in all its forms. This transition has three key attributes that link to a potentially positive impact on local and regional economies.

1. The increase in readily available technologies and services that can serve the local goals of CEPs
2. The vast majority of those technologies are located or implemented locally
3. CEPs create channels to local markets for product and service providers that have a measurable positive economic impact by:
    a. Attracting local investment for local energy infrastructure
    b. Creating more energy-efficient economies

SECTION TWO:
JOB CREATION THROUGH THE IMPLEMENTATION OF COMMUNITY ENERGY PLANS

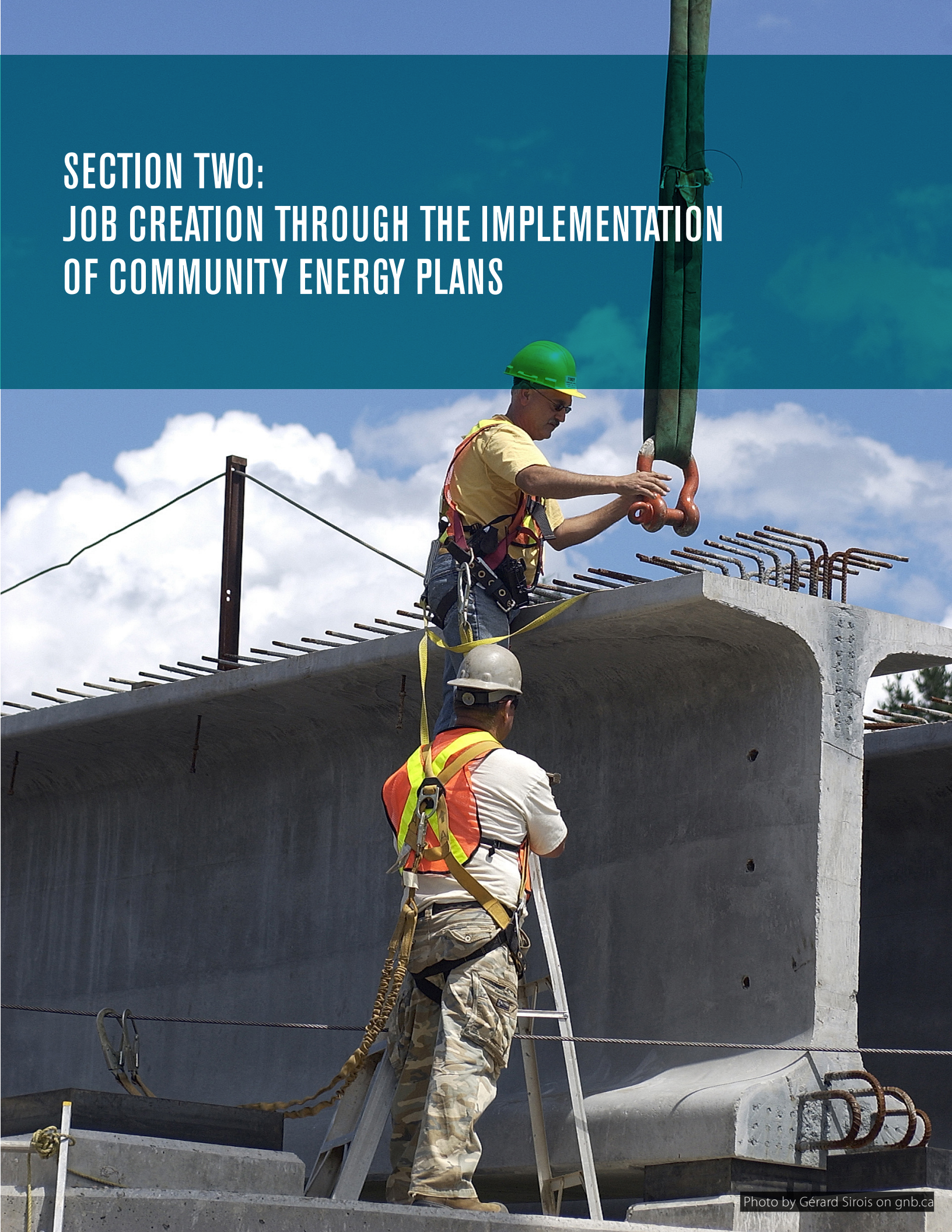


Photo by Gérard Sirois on gnb.ca

THE SCALE OF GLOBAL, NATIONAL, AND REGIONAL TRANSITIONING ENERGY ECONOMY

The size of markets for the products and services that serve the transitioning energy economy has significantly grown in the last 20 years.

The channels to new energy markets are being driven, to a large degree, by local governments coordinating with stakeholders in their communities, as described in the section Communities as Market Pathways.

Local governments, who have an interest and purview over their local economies, are largely motivated by the positive economic impacts that come with the implementation of CEPs.

CEPs are widely seen as having a large number of benefits beyond positive economic impact including environmental, health, and social benefits. Many of these other benefits have related economic benefits. For example, improved health can have a significant positive impact on reducing community-wide health costs to local economies.

However, the scope of this research has been limited to three aspects of economic impact on local economies, as described below.

THREE WAYS JOBS ARE CREATED BY IMPLEMENTING COMMUNITY ENERGY PLANS

Job creation through the implementation of CEPs can be manifest in three ways:

1. Local dollars kept in the community
2. Direct, Indirect, and Induced job creation from these local dollars
3. "New dollars" that can be attracted to investment activities that support CEPs.

RETAINING ENERGY DOLLARS IN THE COMMUNITY THROUGH ENERGY EFFICIENCY

This category has the most direct, calculable, and easily communicated impact on local job generation as a result of implementing CEPs.

Approximately 80% of a communities' energy expenditures on heating, cooling, lighting, industry and transportation leaves the community to fund traditional centralized energy infrastructure.

Municipalities and their communities across New Brunswick are setting energy efficiency targets for their communities and aiming to reduce energy use (and related costs) by as much as 40% in the long term. To use the example of the Town of Oakville, Ontario (see Fig. 1), this could mean as much as $240 million a year (at today's costs) remaining in the community and stimulating direct, indirect and induced jobs as described in above.

Figure 3 demonstrates the cost distribution of a typical electricity bill. Similar distributions apply to natural gas and transportation fuels.

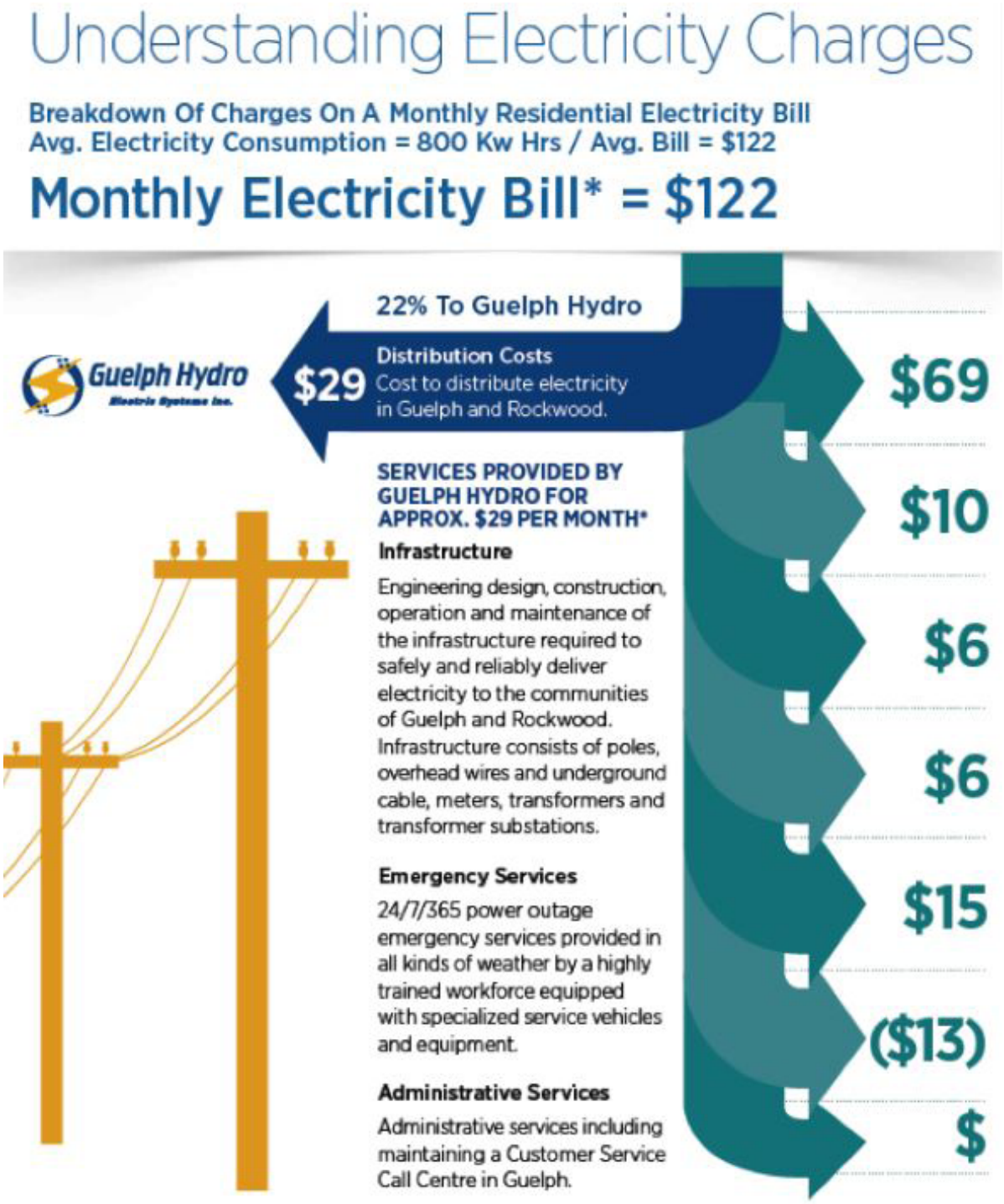


Figure 3 – Electricity Cost Distribution[6]

[6] Guelph Hydro - Annual Report 2015

JOB CREATION FROM KEEPING ENERGY DOLLARS LOCAL

NOTE: Based on the scope of the project and the availability of useful reference material uncovered through research, the "multiplier" approach to estimating economic impact, measured in the form of job creation, is the recommended approach to determining job creation through implementing CEPs.

The multiplier is described as follows: Typically, developing a multiplier involves estimating the average amount of revenue required to support a single worker for one year at full-time or the amount of efficiency investments required to add a dollar to the local or regional gross domestic product (GDP).

In the Multiplier method, as in others, jobs are generally understood to be created three ways:

- **Direct Jobs** - These are the jobs created during the first round of any spending. In the implementation phase, these jobs are often related to the activities that improve energy efficiency and or implement energy generation/distribution systems with the companies or organizations performing those upgrades hiring the appropriate people. The avoided energy costs that come from these activities support the "savings phase" where direct jobs are those created when households spend their savings, often at retail or other service-sector establishments.
- **Indirect Jobs** - These are the jobs created in the supply chains that deliver goods and services to establishments in the direct job category.
- **Induced Jobs** - These are jobs that are created when the newly hired workers in the direct or indirect categories re-spend their new earnings on goods and services.

ATTRACTING MAJOR ACTORS IN THE TRANSITIONING ENERGY ECONOMY

This category of potential job creation from implementing Community Energy Plans is unique in that it does not have specific multipliers that are directly linked to the plan's technical goals and targets.

Across the globe there is evidence of rapidly growing market activity for providers of products and services that support the implementation of CEPs. Companies and related organizations are looking to expand their current market activities or enter into new markets[7].

This is especially true of European companies that have matured under a transitioning energy economy and now looking to export their expertise, reflected in their products and services, to North America.

Which segments of the transitioning energy economy that may locate in any given municipality will depend on many of the factors any company would look for with the addition of the regional opportunities afforded by local, national, and international markets for any given transition technology or service.

In New Brunswick and the general Atlantic Region there are specific opportunities in the areas of water (tidal power), solar, wind, biomass, biofuels and geothermal.

[7] International Energy Agency - Market Report Series, Energy Efficiency 2018, analysis and Outlooks [Reference #64]

SECTION THREE: QUANTIFYING ECONOMIC POTENTIAL AND IMPACT

Photo by Miguel Ángel Sanz on Unsplash

QUANTITATIVE AND QUALITATIVE ECONOMIC IMPACT

Based on the description in section Three Ways Jobs are Created, this section will provide an overview of the "multiplier" quantitative approach to estimating job creation.

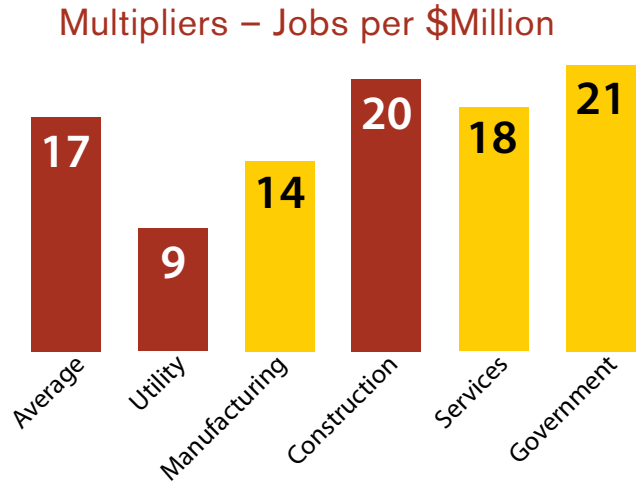
Qualitatively, this section will also look at the macro-scale of the transitioning energy market to provide context and to illustrate the opportunity that all New Brunswick communities have to attract major market actors.

JOB CREATION THROUGH ENERGY EFFICIENCY

Estimating job creation impacts through energy efficiency is a fairly straightforward arithmetic process.

The following Figure 4 overviews several key known multipliers. Specifically, there are three multipliers that will inform the example described below:

- **Average** - This is the blended average multiplier of job creation across all sectors of the economy.
- **Utility** - This is the job creation specific to all aspects of the utility industry - generation and distribution - across the entire system.
- **Construction** - This is a very broad activity but indicative of the job creation from implementing the measures generally described in a Community Energy Plan.



***NOTE**: Columns in red indicate multipliers used in the next section·*

Figure 4– Typical Sector-Based Job Multipliers - US Example[8]

CALCULATING JOB CREATION THROUGH EFFICIENCY

Using the chart indicated in Figure 4 we have two fundamental aspects to job creation through energy efficiency.

Investment Phase

For the investment phase, the "Construction" multiplier (20 jobs/$M) is typically used to define the activities that improve end-use energy efficiency in the community. When compared to the "Average" multiplier (17 jobs/$M), we see that we have a minimum net increase in job stimulation of 3 jobs/$M - i.e. [20 jobs/$M] - [17 jobs/$M].

Savings Phase

The savings phase of job creation is founded on the avoided costs that would normally go to the "Utility" sector (9 jobs/$M) and would now go to the general, or "Average" economy (17 jobs/$M). The simple arithmetic tells us that the net impact through energy efficiency equals 8 jobs/$M in avoided energy costs - i.e. [17 jobs/$M - 9 jobs/$M]. Typically, jobs created through energy efficiency are projected over a 20-year period.

[8] American Council for and Energy Efficient Economy - Fact Sheet, How Does Energy Efficiency Create Jobs? [Reference #51]

Table 1 – Summary of Job Creation Multipliers

Phase	Pre-CEP Implementation Multiplier (Jobs/$M)	Post-Implementation Multiplier (Jobs/$M)	Net Job Creation Benefit (Jobs/$M)
Investment Phase	17 (Average)	20 (Construction)	3
Savings Phase	9 (Utility)	17 (Average)	8

CEPs typically have two fundamental aspects to them that allow for the estimation of job creation impacts:

1. The establishment of a baseline that determines the existing energy end-use in the community
2. A target of energy end-use at a specific future date. This would be the "Savings Phase" as described in the previous section

Estimating the investments required to achieve improved energy end-use is more complex but can be estimated using the assumption that investments will be made with a reasonable expectation of a simple payback in the eight-year range. In other words, an estimate of avoided energy costs, through energy efficiency, of an estimated $10M would be driven by an estimated investment of $80M [$10M X 8 yr. simple payback]. This would allow for an estimate of job creation impact using the calculations described in Table 2 above.

NOTE: The examples shown in this section are based on US-based multipliers. Each region in Canada will have slightly different, but similar multipliers. This summary intends to demonstrate the methodology.

Also note that job creation for energy efficiency is often cited as creating up to 30 jobs in Canada[9]. While this is accepted as an appropriate number for Canada it has not been broken down regionally. Therefore, we have maintained the more conservative US figure of 21. Secondly, it is also important to note that the figure of 21 (or 30 in Canada), in isolation, is not reflective of the net impact of energy efficiency on job creation. It merely indicates the gross number of jobs created and does not take into account how it affects other aspects of the economy.

[9] Dunksy Energy Consulting (2018). The Economic Impact of Improved Energy Efficiency in Canada. Prepared for Clean Energy Canada [Reference #49]

SECTION FOUR:
ESTIMATING THE LOCAL ECONOMIC JOB CREATION FROM YOUR CEP

Photo by Helloquence on Unsplash

The following worksheet supports a process by which you can estimate the job impact potential of your Community Energy Plan (CEP) using information available in your plan and, where applicable, enhanced with additional current data.

ESTIMATING TOTAL COMMUNITY ENERGY EXPENDITURE

There are two approaches to determining your annual energy expenditures, depending on the level of detail available to you.

DETAILED METHOD

Table 1 – Detailed Annual Energy Expenditure

Detailed Energy Breakdown			
Base Year:			
Energy type	**Total (GJ)**	**Unit Cost ($ per GJ)**	**Annual Expenditure ($M)**
	A	B	A x B
Electricity			
Fuel Oil			
Natural Gas			
Heavy Fuel Oil			
Propane			
Gasoline Transportation			
Diesel - Transportation			
Propane - Transportation			
CNG			
TOTAL ANNUAL ENERGY EXPENDITURE			

SIMPLE METHOD

If you are unable to obtain a breakdown of your community's energy use, a total figure may be used. Subsequently, an average range, per GJ, of fuel prices can be applied to determine a total energy expenditure for your community.

Table 2 – Simple Total Annual Energy Expenditure

Detailed Energy Breakdown				
Base Year:				
Total (GJ)	**Unit Cost ($ per GJ)**		**TOTAL Annual Expenditure ($M)**	
	A - High	25.00	C - Total (GJ) X A	
	B - Low	35.00	D - Total (GJ) X B	
			AVG. TOTAL (C + D) / 2	

ESTIMATING TOTAL ENERGY DOLLARS RETAINED IN THE LOCAL ECONOMY

Now that you have estimated the total energy expenditure in your community, you are in a position to determine the retained energy expenditures that will remain in your community as a result of implementing your CEP.

Your CEP will likely have a total energy end-use reduction target. Simply applyi it to the total energy expenditures determined in the previous section.

Table 3 – Total Retained Energy Dollars

Total Energy Expenditures ($M)		**Reduction Target (%)**	**TOTAL Retained Energy Dollars ($M)**
From Table 1 or 2	X		

ESTIMATING JOB CREATION FROM RETAINED ENERGY DOLLARS

As described in Section 3 above and the data illustrated in Table 2 and Figure 4, there are two effects of keeping dollars local to the community.

INVESTMENT PHASE

These are jobs stimulated through the construction related to activities identified in your CEP. For example, home retrofits, installation of solar panels or the development of thermal distribution systems.

As described in Section 3, construction job creation, per $ million of investment, is estimated to have a **net advantage of three jobs** per $ million of investment when compared to the local economy.

Determining the total community investment required to implement your CEP can be broadly estimated by the simple payback (in years) of the investment through energy savings.

Table 4 – Estimating Total Community Investment

TOTAL Retained Energy Dollars ($M)		Estimated Simple Payback (years)	TOTAL Investment ($M)
From Table 3	X	8	

Table 5 – Total Investment-Related Job Creation

TOTAL Investment ($M)		Net Job Creation (per $M)	Total Investment-Related Job Creation
From Table 4	X	3	

SAVINGS PHASE

These are jobs stimulated through the redirection of energy dollars from the payment to utilities for primary and secondary fuel supply to the general local economy.

As described in Section 3, utility job creation, per $ million of investment, is estimated at nine jobs per $ million of investment compared to 17 jobs per $ million of investment in the general local economy. This leads to a **net advantage of eight jobs** per $ million over an estimated 20-year time frame.

Table 6 – Total Savings-Related Job Creation

TOTAL Retained Energy Dollars ($M)		Net Job Creation (per $M)	Total Savings-Related Job Creation
From Table 3	X	8	

TOTAL JOB CREATION

You are now able to finalize the final estimate of job creation from your Community Energy Plan.

Total Investment-Related Job Creation	From Table 5	For term of construction
Total Savings-Related Job Creation	From Table 6	For 20 years

SECTION FIVE: CASE STUDIES

Photo by Tim Foster on Unsplash

2020 | CASE STUDY
ECONOMIC IMPACT OF COMMUNITY ENERGY PLANS
SUSSEX, NB

INTRODUCTION

The project ran from June 2019 to March 2020.

The goals were to:

- Create a compendium of research
- Apply economic development impact analysis to three New Brunswick municipalities
- Develop a model for other New Brunswick municipalities to determine the local economic impact of their Community Energy Plans

Sussex was one of several municipalities identified to work with QUEST to align the initial project research with Sussex's Community Energy Plan and related local economic development objectives.

THE SITUATION

ABOUT SUSSEX

Sussex is a town in Kings County with a population of 4,282 (2016). Sussex is located in south-central New Brunswick, between the province's three largest cities, Saint John, Moncton, and Fredericton. As the heart of Kings County with its 16 covered bridges, Sussex is known as the Covered Bridge Capital of Atlantic Canada.

Today, Sussex is primarily a regional service centre for the surrounding agricultural communities of the upper Kennebecasis River valley. The town is a highway service centre on Route 1, the primary highway between Moncton and Saint John, as well as being the most heavily travelled route in the Maritimes to the United States.

Since 2003, natural gas has been available from the McCully field near Sussex. The potential local natural gas supply and the energy opportunities resulting from the recently closed Potash Company of Canada mine both support the goals of the town's Community Energy Plan and its economic development objectives.

COMMUNITY ENERGY PLANS

The Sussex Community Energy Plan, developed in July 2018, is formally called the Community GHG & Energy Action Plan. The plan has several high-level objectives that seek to reduce energy and GHG emissions, transition to low-carbon technologies and infrastructure and increase local renewable energy production.

Five Key Objectives of the GHG & Energy Action Plan

1. Reduce dependency on fossil energies.
2. Curb down energy use, expenses and reduce GHG emissions.
3. Foster a shift towards low carbon transportation solutions integrating EV infrastructure, and promoting alternative fuel vehicles.
4. Generate income with local renewable energy production.
5. Expand transportation alternatives by setting up a community van service.

The **Community GHG & Energy Action Plan** eight key goals that support the plan's vision of achieving a low carbon and smart energy community in an economically viable way.

Key goals of the GHG & Energy Action Plan

1. Foster a shift toward low carbon technologies.
2. Increase energy efficiency for new and existing buildings.
3. Foster a shift toward low carbon transportation that integrates EV infrastructure, promotes alternative fuel vehicles, low carbon fuel options, as well as public transit and active transportation as mechanisms to reduce the number of vehicles on the road.
4. Create or help adaptive, sustainable, affordable, and reliable local renewable and clean energy supply.
5. Design, build and revitalize neighbourhoods as complete communities that offer multi-modal transportation options.
6. Create new market opportunities for innovative energy solutions that are attractive for local and new businesses, and through high quality, affordable, clean energy services foster retention and growth of existing businesses and industries.
7. Build awareness about energy investment and create a culture of energy conversation amongst residents, businesses, institutions, and industries.
8. Build knowledge, skills, and technical capacity through partnerships that deliver innovative energy solutions at the local scale.

The goal #6 provides a strong link to pursue positive economic impact through the implementation of the **Community GHG & Energy Action Plan** and to be consistent with one of the key principles of the Plan which is to "*create a competitive and economic advantage for the Community*".

ECONOMIC DEVELOPMENT

In February 2017, The Greater Sussex -Hampton Region Economic Development Strategy was developed after considerable consultation with the community.

The Strategy is based on seven key priorities.

7 Priorities of the Hampton-Sussex Economic Development Strategy

- Priority 1: Tourism and Arts & Culture
- Priority 2: Geothermal Energy Development
- Priority 3: Food Production and Processing
- Priority 4: Low-Cost Energy (from existing natural gas sources)
- Priority 5: Warehousing/Distribution
- Priority 6: Targeted and Aligned Retail Development
- Priority 7: Targeted and Aligned Training/ Education

Most notably, priorities #2 and #4 have identified two major energy-related economic development opportunities:

- Using the flooded mines of the close potash plants to develop a geothermal-based heating and/or cooling systems for high-demand applications at a cost substantially below alternative sources.
- There is a natural gas well field that has operated in the Sussex area for over 20 years that had previously provided the potash mines with a reliable energy supply. The local ability to produce and transport natural gas may attract industries and businesses with high-energy requirements and may be a complementary/synergistic offering to the geothermal opportunity.

THE RESULTS: THREE POTENTIAL ECONOMIC IMPACTS

QUEST's research shows that economic impact, through the implementation of Community Energy Plans, is manifest in three key ways:

1. Keeping more energy dollars in the pockets of consumers as a result of significant energy efficiency and spending those dollars in other sectors of the local economy
2. Attracting investment and the resulting job creation from local energy infrastructure that

drives reduced energy use, such as solar system installers, combined heat and power designers and technicians, etc.

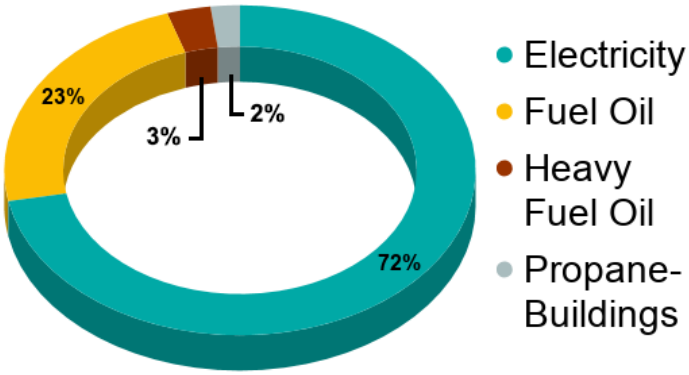
3. Attracting major corporate actors in the transitioning energy economy that are seeking to enter regional, national and North American markets

KEEP THE MONEY LOCALLY

To determine the impact resulting from items #1 and #2, QUEST provided a high-level analysis of potential job creation impact from a key recommendation of the **Community GHG & Energy Action Plan**:

"At least half of residential and commercial [buildings] *improve their energy efficiency"*

Residential and ICI Consumption Breakdown Energy Supply (%)



Based on unit fuel estimates prices generally available, it is estimated that total energy annual costs are approximately $9.1 million. If we assume that a 25% reduction in these costs can be achieved through the targets of the Community GHG & Energy Action Plan then we are able to determine that, at today's estimated energy prices, **approximately $2.3 million could remain annually in the community** as a result of energy conservation and the related costs.

CREATE JOBS

Jobs are created from this economic impact in three ways:

- **Direct Jobs** (Investment Phase) - These are jobs created directly as a result of the activities that drive energy cost reduction - for example, home insulation companies, residential solar installers, etc.
- **Indirect Jobs** (Savings Phase) - These are the jobs created in the supply chains that deliver goods and services to the direct job category.
- **Induced Jobs** (Savings Phase) - These are jobs that are created when the newly hired workers in the direct or indirect categories re-spend their new earnings on local goods and services.

Calculating job impacts is determined by using known typical multipliers[1] for job creation in the status-quo local economy. For example, in a typical multi-faceted local economy, 17 jobs are created per million of spending. Energy-related activity has a higher job-creation effect at an estimated 20 jobs per million of spending. In the saving phase, dollars that are no longer going to utilities (estimated nine jobs per million) are then being spent in the general economy at 17 jobs per million.

Phase	Investment Phase	Savings Phase
Pre-CEP Implementation Multiplier (Jobs/$M)	**17** (Average)	**9** (Utility)
Post Implementation Multiplier (Jobs/$M)	**20**	**17** (Average)
Net Job Creation Benefit (Jobs/$M)	**3**	**8**

To achieve the goal of a $2.3 million reduction in energy costs will drive an estimated investment of $18.6 million (based on an estimated 8-year simple payback).

Applying the estimated investments and the estimated energy cost reductions we have a local impact of **56 jobs during the investment phase and 19 person-years of employment for at least 20 years** during the savings phase.

[1] These multipliers are made available by the American Council for an Energy Efficient Economy: *Fact Sheet How Does Energy Efficiency Create Jobs?*. Specific sector-based multipliers for Sussex are not available. The figures shown are provided to illustrate order of magnitude and comparisons among economic sectors.

ATTRACT MAJOR CORPORATE ACTORS

Aligning energy, climate and economic development policy and strategy can have a very positive impact on attracting resources and investment to the community. This is strongly reflected in the alignment of the **Community GHG & Energy Action Plan** and the **The Greater Sussex -Hampton Region Economic Development Strategy**. Specifically, the recommended Economic Development priority of taking advantage of two local opportunities in the closed potash mines and the local natural gas fields.

The flooded mine shafts of the closed potash plant present a unique economic development opportunity. This infrastructure could be repurposed to provide geothermal-based heating and/or cooling for high-demand applications at a cost substantially below alternative sources. Geothermal opportunity at this scale could provide the basis for an economically viable district energy system that could service a number of new developments in the area such as large-scale greenhouses or any other application requiring a large source of heating/cooling.

This economic objective aligns extremely well with the specific recommendation of the **Community GHG & Energy Action** Plan which calls for "the generation of income from local renewable energy production - geothermal district energy".

The natural gas being produced in the Greater Sussex-Hampton area has the potential to ensure a cost-competitive supply to potential customers, and job creators, in the community and region. In addition, the availability of cost-competitive natural gas in the region can directly serve several goals of the **Community GHG & Energy Action Plan**, specifically:

1. Reducing the dependency on fossil fuels - at least 25% of residential heating oil
2. Promoting alternative fuel vehicles

CONCLUSION

Sussex has demonstrated significant policy and strategy alignment that recognizes the economic development potential of implementing Community Energy Plans through the community-involved development of both their **Community GHG & Energy Action Plan** and the **The Greater Sussex-Hampton Region Economic Development Strategy**.

As Sussex continues to pursue its energy, climate and economic development goals it would benefit further from developing energy efficiency strategies programs for their homes, businesses and institutions that keep energy dollars in the local economy.

Attracting investment into the community through strong policy and strategy alignment is a key signal to investors and product and service providers. This is very evident in the economic priorities related to the local natural gas fields and the closed potash mines.

Sussex has done an excellent job of understanding their local situation and turning them into very scalable opportunities that will economically benefit the citizens of Sussex.

2020 | CASE STUDY
ECONOMIC IMPACT OF COMMUNITY ENERGY PLANS
SAINT JOHN, NB

INTRODUCTION

The project ran from June 2019 to March 2020.

The goals were to:

- Create a compendium of research
- Apply economic development impact analysis to three New Brunswick municipalities
- Develop a model for other New Brunswick municipalities to determine the local economic impact of their Community Energy Plans

Saint John was one of several municipalities identified to work with QUEST to align the initial project research with Saint John's Community Energy Plan and related local economic conditions.

THE SITUATION

ABOUT SAINT JOHN

Saint John is a port city located on the Bay of Fundy in the province of New Brunswick, Canada. Saint John is the oldest incorporated city in Canada; established by royal charter on May 18, 1785. The port is Canada's third largest port by tonnage. Saint John has a population of 67,575 over an area of 315.82 km2 (121.94 sq mi). Greater Saint John covers a land area of 3,362.95 km2 (1,298.44 sq mi) across the Caledonia Highlands, with a growing population of 126,202 as of 2016.

Saint John derived its economy from maritime industries such as shipping, fishing, and shipbuilding. Since 2003, shipbuilding has ended on the scale it once was, forcing the city to adopt a new economic strategy. Saint John maintains industrial infrastructure in the city's East side such as Canada's largest oil refinery.

Saint John Energy, formerly known as the Power Commission of the City of Saint John and Civic Hydro, is the electrical utility reseller of power purchased from NB Power in Saint John, New Brunswick. It was founded in 1922 and now serves over 36,000 customers. The utility sells 950GWh of electricity annually, however the utility has no electrical generating capacity of its own.

COMMUNITY ENERGY PLANS

The Saint John Community Energy Plan, developed in January 2019, is formally called the Saint John Community GHG & Energy Action Plan. The plan has several high-level objectives that seek to reduce energy and GHG emissions, transition to low-carbon technologies and infrastructure and increase local renewable energy production.

The Community GHG & Energy Action Plan eight key goals that support the plan's vision of achieving a low carbon and smart energy community in an economically viable way.

Key goals of the GHG & Energy Action Plan

1. Foster a shift toward low carbon technologies.
2. Increase energy efficiency for new and existing buildings.
3. Foster a shift toward low carbon transportation that integrates EV infrastructure, promotes alternative fuel vehicles, low carbon fuel options, as well as public transit and active transportation as mechanisms to reduce the number of vehicles on the road.

4. Create or help adaptive, sustainable, affordable, and reliable local renewable and clean energy supply.
5. Design, build and revitalize neighbourhoods as complete communities that offer multi-modal transportation options.
6. Create new market opportunities for innovative energy solutions that are attractive for local and new businesses, and through high quality, affordable, clean energy services foster retention and growth of existing businesses and industries.
7. Build awareness about energy investment and create a culture of energy conversation amongst residents, businesses, institutions, and industries.
8. Build knowledge, skills, and technical capacity through partnerships that deliver innovative energy solutions at the local scale.

Goal #6 provides a strong link to pursue positive economic impact through the implementation of the **Community GHG & Energy Action Plan** and to be consistent with one of the key principles of the Plan which is to "*create a competitive and economic advantage for the community*".

ECONOMIC DEVELOPMENT

In 2019, with extensive consultation with community stakeholders, Economic Development – Greater Saint John tabled its Economic Development Plan 2019-2021.

The strategy is based on four areas of focus and four strategic goals of 2019 to 2021.

Four Focus Areas

1. Workforce development
2. Entrepreneur development
3. Business investment & innovation
4. Marketing greater Saint John

Four Strategic Goals

1. 2.5% increase in employment per year
2. 2.5% increase in labour per year
3. 0.5% increase in Gross Domestic Product
4. 1 index pt increase in consumer confidence per year

Implementing the Community Energy Plan has the potential to support all of the focus areas and strategic goals, particularly in the areas of keeping energy dollars in the community, creating jobs and attracting investment.

The current Economic Development Plan has a strong potential to align with the goals of the Community Energy Plan, specifically with:

– The three-year Workforce Development goal of securing significant investment in energy
– The innovation strategy to leverage Saint John Energy as an important regional asset in developing innovative energy solutions
– The Saint John's foundational strengths that include energy infrastructure and support capabilities

THE RESULTS: THREE POTENTIAL ECONOMIC IMPACTS

QUEST's research shows that economic impact, through the implementation of Community Energy Plans, is manifest in three key ways:

1. Keeping more energy dollars in the pockets of consumers as a result of significant energy efficiency and spending those dollars in other sectors of the local economy
2. Attracting investment and the resulting job creation from local energy infrastructure that drives reduced energy use, such as solar system installers, combined heat and power designers and technicians, etc.
3. Attracting major corporate actors in the transitioning energy economy that are seeking

to enter regional, national and North American markets

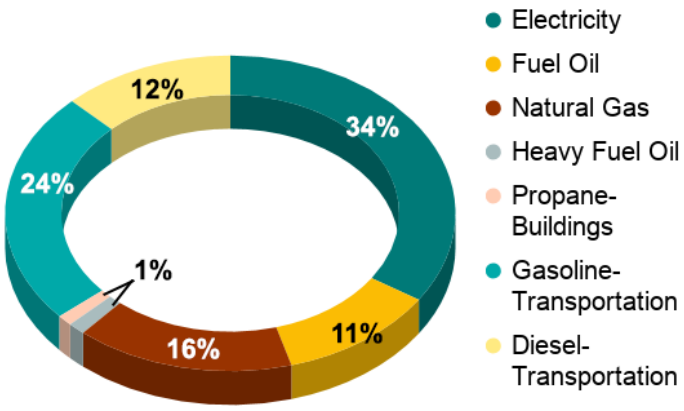
KEEP THE MONEY LOCALLY

To determine the impact resulting from items #1 and #2, QUEST provided a high-level analysis of potential job creation impact from a key recommendation of the **Community GHG & Energy Action Plan**:

"At least half of residential and commercial [buildings] *improve their energy efficiency"*

Based on a 2015 baseline, the related fuel used to heat, cool and light Saint John homes, businesses, offices and institutional buildings is shown in the following figure:

Saint John - Primary and Secondary Energy Distribution Percentage of Total GJ



Based on unit fuel estimates prices generally available, it is estimated that total energy annual costs are approximately $300 million. If we assume that a 9% reduction in these costs can be achieved through the targets of the **Community GHG & Energy Action Plan** then we are able to determine that, at today's energy prices, approximately $27 million could remain annually in the community as a result of energy conservation and the related costs.

CREATE JOBS

Jobs are created from this economic impact in three ways:

- **Direct Jobs** (Investment Phase) - These are jobs created directly as a result of the activities that drive energy cost reduction - for example, home insulation companies, residential solar installers, etc.
- **Indirect Jobs** (Savings Phase) - These are the jobs created in the supply chains that deliver goods and services to the direct job category.
- **Induced Jobs** (Savings Phase) - These are jobs that are created when the newly hired workers in the direct or indirect categories re-spend their new earnings on local goods and services.

Calculating job impacts is determined by using known typical multipliers[1] for job creation in the status-quo local economy. For example, in a typical multi-faceted local economy, 17 jobs are created per million of spending. Energy-related activity has a higher job-creation effect at an estimated 20 jobs per million of spending. In the saving phase, dollars that are no longer going to utilities (estimated nine jobs per million) are then being spent in the general economy at 17 jobs per million.

Phase	Investment Phase	Savings Phase
Pre-CEP Implementation Multiplier (Jobs/$M)	**17** (Average)	**9** (Utility)
Post Implementation Multiplier (Jobs/$M)	**20**	**17** (Average)
Net Job Creation Benefit (Jobs/$M)	**3**	**8**

To achieve the goal of a $27 million reduction in energy costs will drive an estimated investment of $216 million (based on an estimated 8-year simple payback).

Applying the estimated investments and the estimated energy cost reductions we have a local impact of **648 jobs during the investment phase** and **216 person-years of employment for at least 20 years** during the savings phase.

[1] These multipliers are made available by the American Council for an Energy Efficient Economy: *Fact Sheet How Does Energy Efficiency Create Jobs?*. Specific sector-based multipliers for Saint John are not available. The figures shown are provided to illustrate order of magnitude and comparisons among economic sectors.

ATTRACT MAJOR CORPORATE ACTORS

Aligning energy, climate and economic development policy and strategy can have a very positive impact on attracting resources and investment to the community. This is strongly reflected in the alignment of the **Community GHG & Energy Action Plan** and the **Economic Development Plan 2019-2021**. Specifically, the recommended Economic Development priority of taking advantage of two local opportunities in the closed potash mines and the local natural gas fields.

CONCLUSION

Saint John has demonstrated significant policy and strategy alignment that recognizes the economic development potential of implementing Community Energy Plans through the community-involved development of both their **Community GHG & Energy Action Plan** and **the Economic Development Plan 2019-2021.**

As Saint John continues to pursue its energy, climate and economic development goals it would likely benefit further from developing energy efficiency strategies programs for their homes, businesses and institutions that keep energy dollars in the local economy.

Attracting investment into the community through strong policy and strategy alignment is a key signal to investors and product and service providers.

Saint John has done an excellent job of understanding their local situation and turning them into very scalable opportunities that will economically benefit the citizens of Saint John.

To learn more about QUEST,
visit our website: www.questcanada.org
or contact us at info@questcanada.org

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