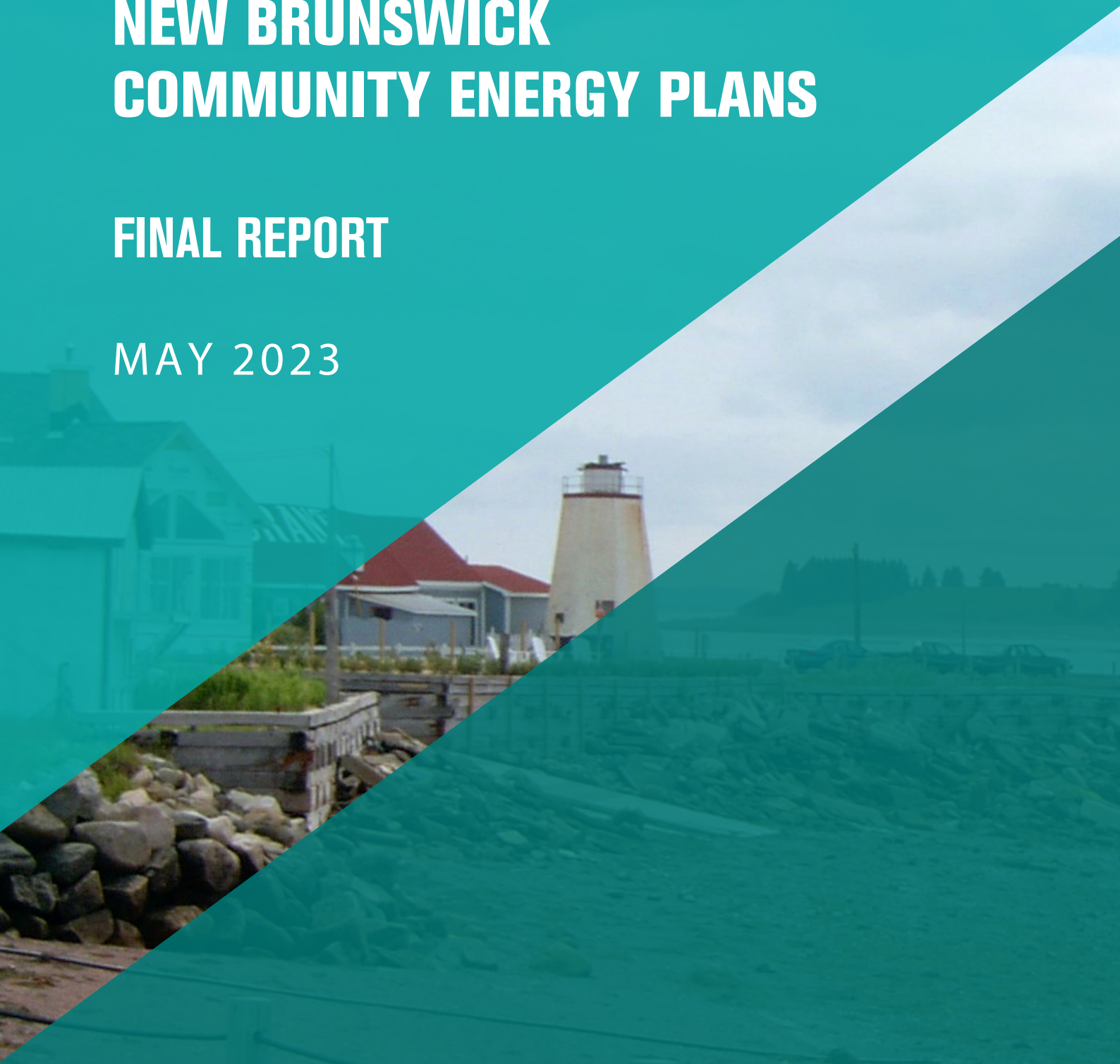
ECONOMIC IMPACT OF NEW BRUNSWICK COMMUNITY ENERGY PLANS

FINAL REPORT

MAY 2023



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About QUEST Canada

QUEST Canada is a national non-profit that supports communities in Canada on their pathway to net-zero. Since 2007, we've been facilitating connections, empowering community champions and influencing decision-makers to implement efficient and integrated energy systems that best meet community needs and maximize local opportunities. We develop tools and resources, convene stakeholders and rights holders and advise decision-makers — all with the goal of encouraging and enabling communities to contribute to Canada's net-zero goals. Visit us at www.questcanada.org.

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1.0 INTRODUCTION

In 2021 the Atlantic Canada Opportunities Agency (ACOA) engaged QUEST Canada to review existing Community Energy Plans (CEPs, also known as Community Energy and Emissions Plans, Climate Action Plans, etc.) in the province of New Brunswick to determine the potential economic impact at the local and provincial level. QUEST Canada has extensively engaged with New Brunswick's municipal governments, and their communities, for some time through its Smart Energy Communities Accelerator (SECA) program and has identified and secured collaboration with six communities to undertake an economic impact assessment: Quispamsis, Woodstock, Florenceville-Bristol, Perth-Andover, St. Stephen and Saint Andrews.

The six participating communities mentioned above are part of a larger cohort of 51 municipalities in New Brunswick that have completed CEPs and achieved Milestones three of five as part of the Federation of Canadian Municipalities' (FCM) Partners for Climate Protection Program (PCP). In New Brunswick and Prince Edward Island, QUEST Canada represents and supports the PCP Program as part of its overall SECA program activities.

A complete CEP provides the basic input needs of a community, providing a quantitative and qualitative approach to determining the positive economic impact to the community and beyond. The CEPs reviewed in this Study offer a baseline of greenhouse gas emissions and energy use, as well as a greenhouse gas emissions target (with a specific date and a provisional list of measures that reduce both greenhouse gas emissions and energy end-use).

The analytical approach described in this report will focus on the job creation effect of reducing energy use through the implementation of a CEP that keeps energy expenditures (that are currently leaving the community) circulating in the local economy. Although it will not be quantified, job creation through the attraction of new businesses in the transitioning energy economy will be considered through the recommendations of aligning the objectives of CEPs with local and regional economic development strategies.

Beyond the scope of this Study, but addressed anecdotally, is the effect of creating aggregated demand across the province for the technologies identified in the communities' Community Energy Plans that have the potential to attract product and service providers in the transitioning energy economy. See **Section 4.3** for more details on energy transition.

This report will provide a summary description of the six participating municipalities (as reflected in their CEPs), a description of the methodology that provides a quantitative approach to determine their job creating potential of implementing their plans, and an empirical calculation of the potential number of jobs that could be created as a result of their CEPs.

Further, this report will take the results of the six participating municipalities and utilize a number of publicly available statistics with the objective to answer the following question:

“What would be the aggregated, provincial-level impact on job creation if all municipal governments, and their communities, implemented their Community Energy Plans?”.

As in all analytical processes, the availability and quality of data inputs are critical to the credibility and accuracy of the outcomes. This report will describe, in detail, the data quality and assumptions used in the analytical process.

2.0 MUNICIPAL PROFILES

2.1 FUNDAMENTALS OF A COMMUNITY ENERGY PLAN

Although they may vary in expression, the majority of the 51 existing CEPs in New Brunswick follow a number of fundamentals that will guide their implementation and result in positive local economic impact. The majority of these plans also acknowledge that implementation will create a competitive and economic advantage for their communities.

The CEPs reviewed in this Study are typically based on the following fundamental concepts:

- Advocate for urgent action to address climate change
- Set achievable reduction targets
- Maximize benefits for the municipality and the community
- Ensure and enhance a sustainable energy system
- Maximize efficient use of energy
- Design model and innovative projects
- Build on existing programs and funds
- Demonstrate global leadership

Links to the publicly available CEPs for each of the six participating municipalities can be found in **Appendix 3**.

2.2 PARTICIPATING MUNICIPAL PROFILES

Although most CEPs follow a similar approach, structure, guiding principles and goals, each of the six municipalities engaged in this Study have unique attributes related to their greenhouse gas emission and energy profiles, future emissions reduction targets, target years and the measures identified to achieve those targets.

Below, Table 1 summarizes the main attributes, relevant to this Study, of their respective CEPs.

Table 1 - CEP Attributes of Participating Communities

Municipality	Total Energy (GJ)	Energy Total ($M)	Target (%)[1]	Base Year	Target Year
Quispamsis	1,806,244	$84.84	16%	2018	2035
Woodstock	721,972	$32.5	14%	2015	2035
Florenceville Bristol	284,536	$10.5	10%	2017	2027
Perth Andover	233,290	$10.6	34%	2015	2035
St. Stephen	601,710	$25.6	30%	2015	2050
Saint Andrews[2]	247,338	$11.2	30%	2020	2034

The highlighted columns (Energy Total and Target) provide a fundamental starting point to determine the potential local economic impact of implementing a CEP.

NOTE: The estimated total community-wide energy costs, as shown in Table 1, are based on fuel costs that are current to the writing of this report and have been updated from the figures used in the individual Case Studies (Appendix 3) for the study's participating municipalities. See Appendix 4 for the fuel costs used in this study.

3.0 MUNICIPAL ECONOMIC DEVELOPMENT STRATEGIES

3.1 CEP OBJECTIVES IN ECONOMIC DEVELOPMENT STRATEGIES

The Study reviewed local and regional economic development strategies to determine connections and relatedness to CEPs and policy-support documents.

[1] This report assumes that the energy end-use reduction target is the same as the greenhouse gas emissions target in each communities respectives CEPs. See **Section 5.5 Assumptions** for further detail.

[2] Saint Andrews' Council approved its Greenhouse Gas Emissions Mitigation Plan, which sets out a GHG reduction target of 30% below 2020 levels by 2034. The existing Mitigation Plan is mainly aimed at corporate activity. For illustration purposes this report will assume a similar target for a future Community Energy Plan. The actual reduction in energy costs related to a future community target is ultimately a function of the fuel and electricity reductions of each individual project activity as described in Appendix 1 of this report.

The level of reference to climate and energy in the local and regional economic development strategies of the participating municipalities varies considerably. As can be seen in the individual case studies (**Appendix 3**), each report provided a common theme of recommending the integration of each CEP's goals and objectives into local and regional economic development strategies.

Implementing Community Energy Plans has the potential to support, or enhance, the climate and economic development objectives of local and/or regional economic development strategies. More specifically, implementation of a CEP has the potential to support with the retention of energy dollars in a local community, which leads to job creation and investment in the following key ways:

- Local consumers save money as a result of achieving significant energy efficiency. In turn, such savings have the opportunity to boost other sectors of the local economy via spending these savings on local commodities and services.
- Attracting local investment will be strengthened, increasing job creation from local energy efficient infrastructure such as solar system installers, combined heat and power designers, technicians, etc.
- Attracting major corporate actors in the transitioning energy economy that are seeking to enter regional, national, and North American markets.

NOTE This study focuses on the first two job creation drivers listed above when quantifying the potential for job creation. It does not attempt to quantify job creation potential from the attraction of private sector actors in the transitioning energy economy. However, several sections in this study identify and make recommendations for the integration of energy and climate objectives, as reflected in local CEPs, into local and regional economic development strategies.

4.0 HOW ARE JOBS CREATED THROUGH CEP IMPLEMENTATION?

To determine the economic impact resulting from keeping energy dollars local, QUEST Canada provided a high-level analysis of the economic impact as measured by potential local job creation.

This section provides:

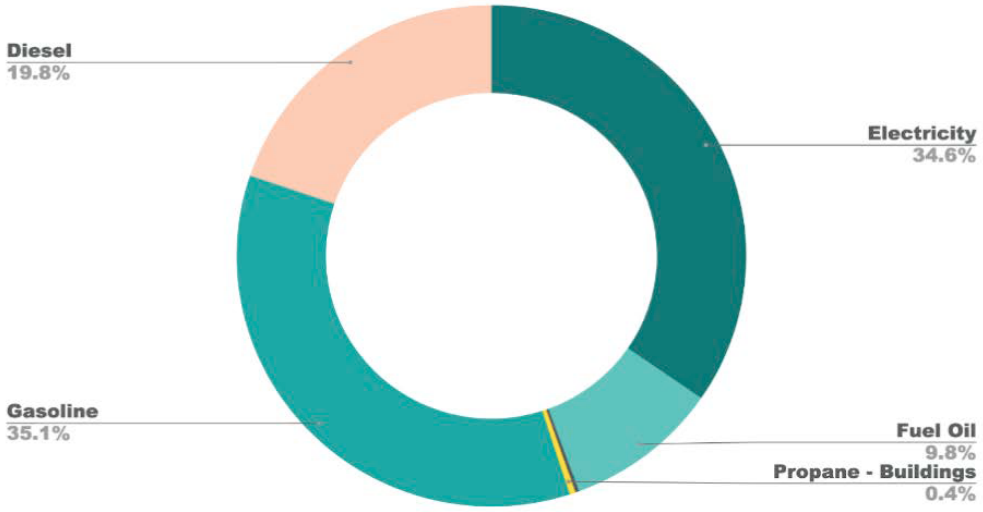
- Background on the transitioning energy economy.
- The fundamentals on how jobs are created.
- Calculated estimates on the potential of local job creation of each of the participating communities CEPs.
- Background on how investments in CEP implementation are made.
- The role of the municipality in the community context.

4.1 LOCAL ENERGY ECONOMY THROUGH THE LENS OF A GHG INVENTORY

The Community Energy Plans reviewed for each of the six participating municipalities provided a starting point in the form of greenhouse gas emissions profiles for each of the participating municipalities.

Below, Figure 1 indicates the representation of a baseline originally measured in greenhouse gas emissions but now reflected in the primary and secondary fuel types of a community-side baseline measured in GJ.

Figure 1 - Primary and Secondary Fuel Baseline Allocations (sample: Quispamsis)



Once we have established the total community energy use (as provided in the CEP) by fuel type we are in position to apply current fuel prices to the energy profile and thus arrive at a total energy cost for the community.[3] Next, we apply the reductions in energy costs (anticipated by the implementation of the CEP) in order to estimate the resulting job creation effects.

4.2 PRIMARY, SECONDARY AND TERTIARY EFFECTS

The implementation of a Community Energy Plan achieves increased job creation in the following ways:

- **Direct Jobs (Investment Phase)**
  Jobs are created directly as a result of the activities that drive energy cost reduction (e.g. home insulation companies, residential solar installers, etc.).

[3] Primary and secondary fuel costs at the time of writing this report are provided in **Appendix 5**.

- **Indirect Jobs (Savings Phase)**
  More jobs are created in the supply chains that deliver goods and services, meeting the new demand needs of the direct jobs category.

- **Induced Jobs (Savings Phase)**
  Jobs are created when the newly hired workers in the direct or indirect categories spend their new earnings on local goods and services.

There are two job creation impact phases:

- **Investment Phase:** The actual design, engineering and installation of the potential recommendations identified in a future Community Energy Plan.

- **Savings Phase:** The ongoing energy cost savings as a result of the operation of the recommendations identified in the Community Energy Plan. Typically, these savings are estimated to continue for 20 years.

4.3 CREATING JOBS THROUGH REDIRECTED ENERGY DOLLARS

To understand how local economies can be stimulated through job creation, all participating municipalities were presented with a basic description of the three stages of transitioning energy economies as illustrated in Figures 2 through 4 below. Figure 2 illustrates the pre-industrial era of decentralized, community managed, renewable and small-scale efficiency. Figure 3 illustrates the current state of our energy systems that are highly centralized, regionally managed, fossil-fuel based and highly inefficient with the majority of local expenditures on energy purchases leaving the community. Finally, Figure 4 illustrates the current stage of the energy transition that is largely driven by the technologies that are mainly identified in the Community Energy Plans of the participating communities.[4]

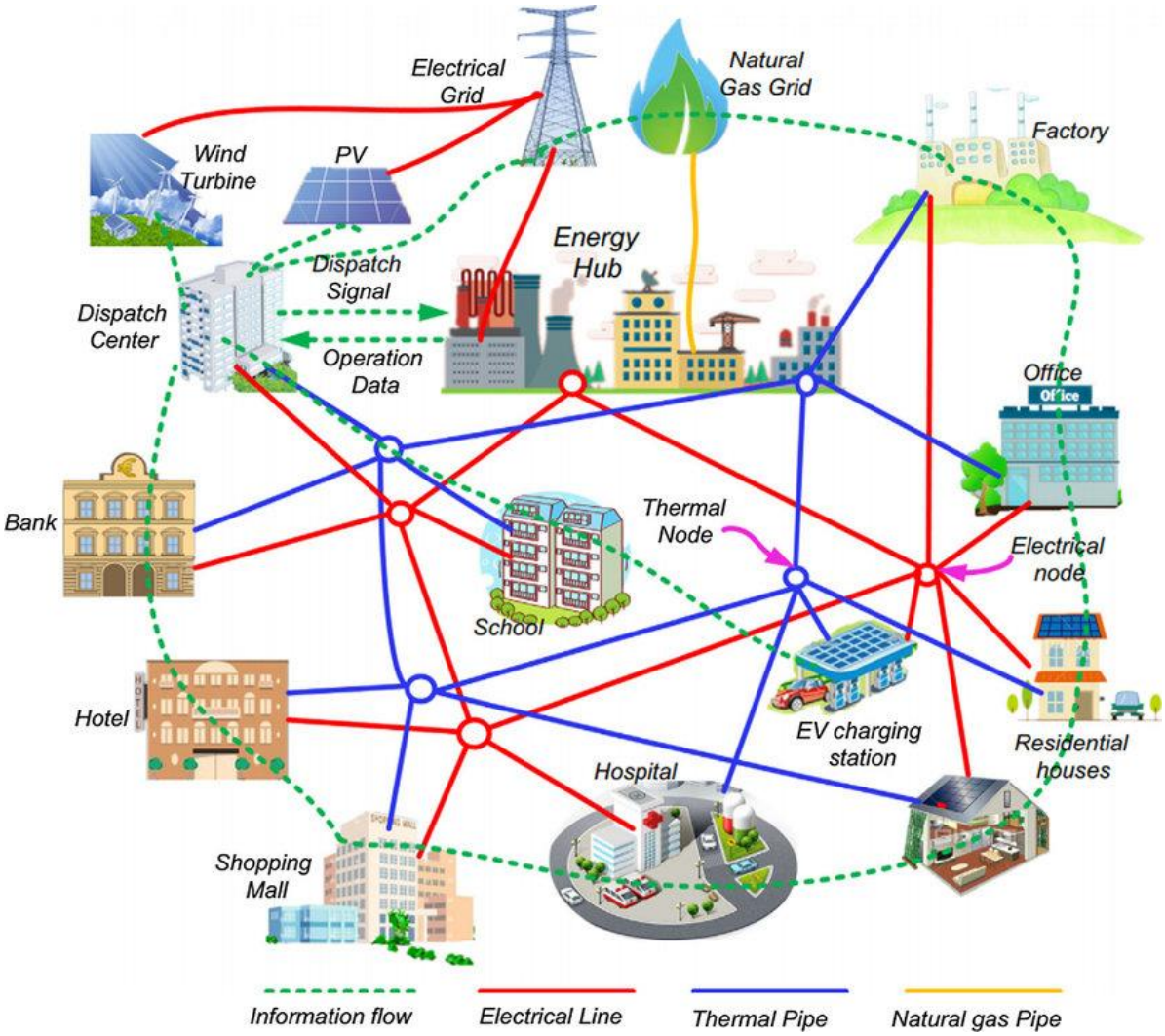
Figure 2 - Pre-industrial Energy Systems

[4] **Appendix 1** indicates a typical list of measures and related technologies identified in the CEPs of the participating municipalities.

Figure 3 - Industrial Era Energy Systems

The fundamental premise is that energy dollars are currently leaving the community to support the current energy supply infrastructure framework. These current energy systems are largely inefficient and centralized, resulting in a large percentage of the community-level energy expenditures on electricity, heating, and transportation fuels withdrawn from the community.

Figure 4 - Transitioned Energy Systems[5]



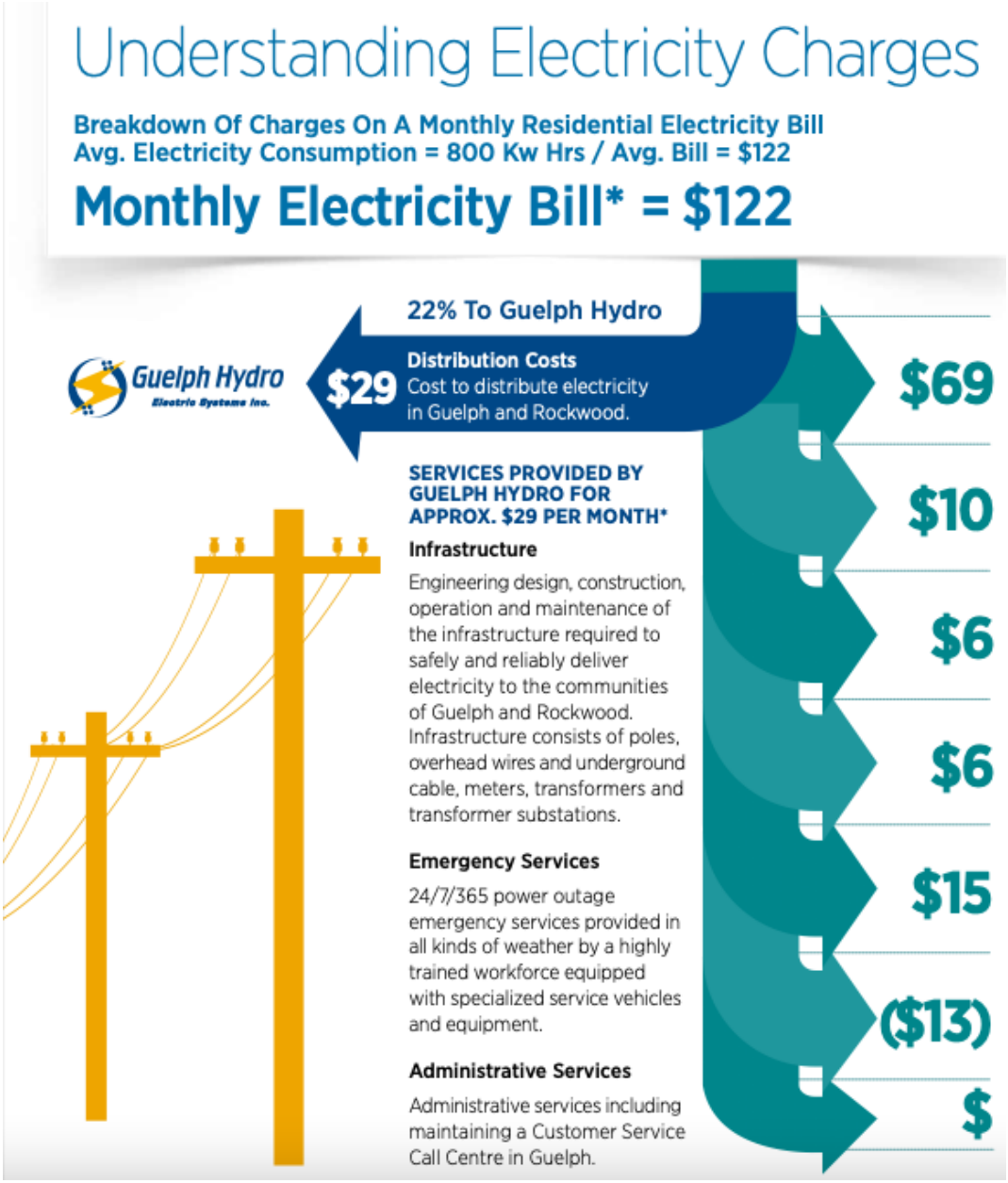
[5] School of Industrial Technology and Business Studies, Dalarna University, Falun, Sweden

Keeping energy dollars local is the main positive economic benefit of implementing approved CEPs that reflect a transitioned energy system as illustrated in Figure 4. Energy dollars under a transitioned energy system keep energy expenditures local through energy efficiency, conservation and local energy generation (i.e. solar photovoltaic) as well as through capital investment in projects typically identified in a CEP.

Approximately 80% of the costs of a local electricity bill supports generation and distribution infrastructure as well as administration and program costs (as shown in Figure 5).[6] This concept of large centralized energy generation and supply systems is generally true for all fuel types, specifically those most relevant to a typical New Brunswick Community Energy Plan (natural gas, propane and transportation fuels).

[6] Guelph Hydro 2013 Sustainability Report. https://www.guelphhydro.com/en/about-us/resources/Documents/Previous-Annual-and-Sustainability-Reports/2013-Sustainability-Report---Accessible-version.pdf

Figure 5 - Distribution of a Typical Electricity Bill



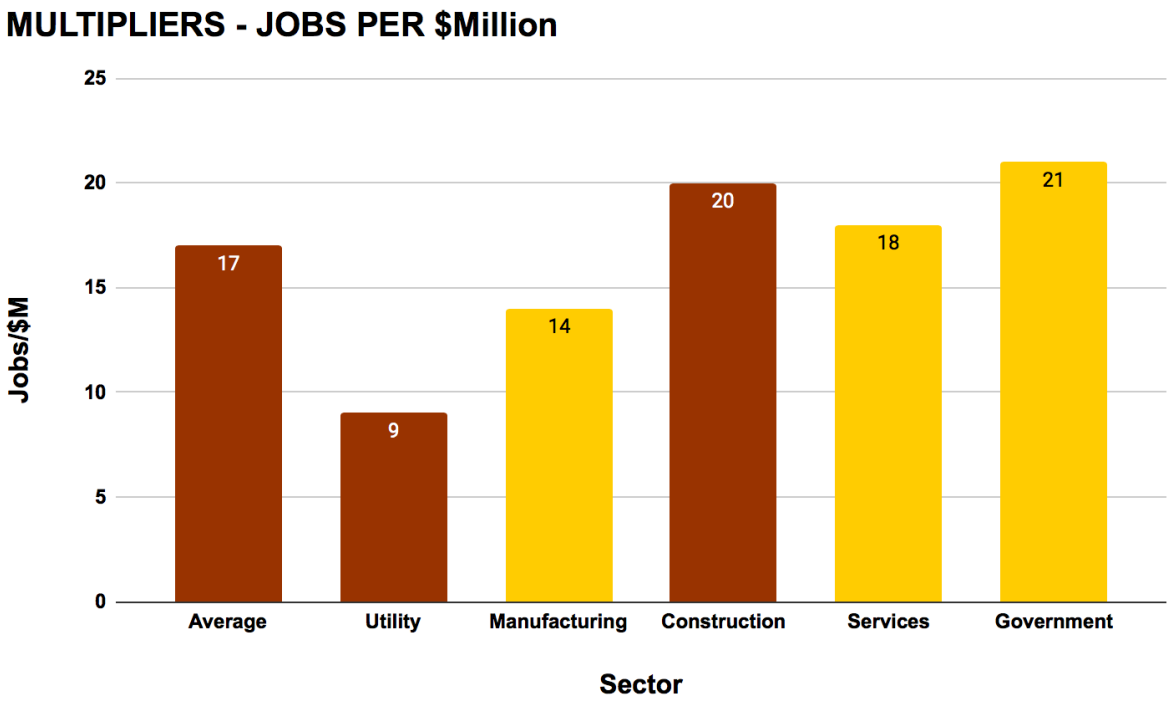
Calculating job impacts is determined by using known typical multipliers for job creation in the status-quo local economy as shown in Figure 6. The columns indicated in maroon are the main multipliers used in estimating the job creation effects of implementing CEPs and reducing the energy expenditures of the entire community.

In effect, expenditures that would normally go to utilities, or other energy providers, for electricity, heating, and transportation fuels could instead be redirected to:

- The implementation of CEP measures (i.e. construction)

- Expenditures to the general economy (i.e. average).

Figure 6 - Economic Activity Sectors and Job Creation Per Million Dollars of Activity[7]



Below, Table 2 illustrates the multipliers that apply to a pre and post implementation of the CEP.

[7] 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 New Brunswick municipalities are not available. To create locally specific multipliers is beyond the scope of this Study. The figures shown are provided to illustrate order of magnitude and comparisons across economic sectors.

Table 2 - Job Creation Impact of Redirecting Energy Dollars

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

* Prior to implementation of CEP
** During implementation of CEP
*** After implementation of CEP

Once an estimate of the potential savings and investment requirements of the Community Energy Plan have been determined, the multipliers presented in Table 2 can be applied to determine job creation impacts as a result of a CEP's implementation.

Table 3 below provides a summary of the potential job creation impact if participating communities implement their CEPs.

These calculations are based on ***two major assumptions***, detailed below:

- The reviewed community energy plans did not provide energy end-use targets. All the CEP focussed on is developing greenhouse gas emissions reduction targets. The calculations in Table 3 assume an energy end-use reduction target that is the same as the greenhouse gas emissions reduction target.
- The job creation impact of the investment phase is based on the total investments required to implement the CEPs of the participating communities. The CEPs reviewed for this Study did not provide cost estimates for their recommended activities. In order to determine a reasonable estimate of investments required to implement the CEPs, it was estimated that the aggregated measures would provide an eight year simple payback through the energy cost avoidance provided by the implementation of all measures that will achieve the estimated energy cost-avoidance target (as mentioned above). The formula used to determine a gross CEP implementation target is as follows:

Total Energy Expenditures	x	CEP Target	x	8 (years simple payback)	=	Total Estimated Investment

Note, an eight year simple payback has been used in order to estimate the total investment required to implement the total package of measures identified in a typical Community Energy Plan. The CEPs reviewed in this Study did not provide detailed financial analysis of any given measure included in a CEP. For illustration purposes, **Section 5.6.2** of this report identifies the impact on job creation for simple payback estimates of three years and six years.

Table 3 - Summary of Job Creation Calculations for Study Participants

Investment Phase	Total Energy Expenditures ($M)[8]	Target	$ Remaining in the Community ($M)	Estimated Total Investments ($M)	Jobs/$M Savings Phase	Net Job Impact**
Quispamsis	$84.84	16%	**13.5**	**128.0**	**3**	**384**
Woodstock	$32.5	14%	**4.5**	**36.4**	**3**	**109**
Florenceville Bristol	$10.5	10%	**10.5**	**84**	**3**	**252**
Perth Andover	$10.6	34%	**3.6**	**28.8**	**3**	**86**
St. Stephen	$25.6	30%	**7.7**	**61.5**	**3**	**184**
Saint Andrews	$11.2	30%	**3.4**	**26.8**	**3**	**80**
TOTALS	**175.24**		**43.2**	**365.8**		**1,095**

Savings Phase	Total Energy Expenditures	Target	Estimated Annual Savings - $$s Remaining in the Community ($M)	Jobs/$M Savings Phase	Net Job Impact ($M)
Quispamsis	$84.84	16%	**13.5**	8	**108**
Woodstock	$32.5	14%	**4.55**	8	**36**

[8] Please note that the total energy expenditure figures for this final report are marginally higher than the figures presented in the individual case studies (see **Appendix 3**). They reflect current prices at the time of writing this report.

Florenceville Bristol	$10.5	10%	**10.5**	8	**84**
Perth Andover	$10.6	34%	**3.6**	8	**29**
St. Stephen	$25.6	30%	**7.7**	8	**62**
Saint Andrews	$11.2	30%	**3.4**	8	**81**
TOTALS	**175.24**		**43.25**		**400**

*** Investment Phase** jobs are only created over the course of project development and installation**.**
** **Savings Phase** jobs are annual and maintained as long as an implemented recommendation from a future Community Energy Plan is delivering energy cost savings or avoided costs.

4.4 WHO MAKES INVESTMENTS IN A COMMUNITY ENERGY PLAN

Municipalities play a critical leadership role on behalf of their communities, in developing their Community Energy Plans. Often, this can lead to the assumption that the municipality will carry the burden of covering the costs of implementing a Community Energy Plan. However, investments in the measures identified in a Community Energy Plan can come from a myriad of sources. These various sources have been detailed below:

- The federal and provincial governments continue to support municipalities and communities with incentive and grant programs that support the implementation of the measures identified in the Community Energy Plan.

- The Federation of Canadian Municipalities (FCM) continues to provide substantial granting and other financial support for communities implementing their Community Energy Plans.

- Economic Development agencies such as the Atlantic Canada Opportunities Agency (ACOA) increasingly understands the positive economic development opportunities linked to the implementation of Community Energy Plans across New Brunswick.

- Private sector investors are beginning to see the investment potential of activities defined in Community Energy Plans. For example, renewable energy projects, such as solar PV, home retrofit programs and car charging infrastructure have all stimulated a great deal of investment activity from the private sector.

4.5 THE ROLE OF THE MUNICIPALITY[9]

Municipalities can play a significant role in mobilizing their resources to enable investments and related activity when determining how to implement their Community Energy Plans.

[9] From QUEST Canada's Blog, March 16, 2022. https://questcanada.org/project/mobilizing-local-climate-action/

Continued Leadership
Municipalities have played a key leadership role in developing community energy and climate plans as well as engaging communities throughout the process. As communities pivot to implementation, this leadership role remains critical for championing plan goals.

Municipalities are important stakeholders throughout the implementation process. They play a vital role in advocating (through their provincial and federal associations and to other orders of government) for their support to provide the necessary legislative and regulatory tools.

Municipalities can play a critical role in seeking and securing funding support for their communities through existing incentive and grant programs that further the implementation of community energy plans.

Governance
The development of CEPs typically includes the creation of a community-based task force (or similar) consisting of key implementation stakeholders. The oversight role of this task force can be developed by ensuring the following conditions:

- Creating legal structures that allow for interaction with private sector partners.
- Developing financial relationships and formal partnership agreements.

This oversight entity can be tasked with both oversight and reporting responsibility through the development of organizational and operational strategies (including financing, management and reporting responsibilities, etc.) to initiate the measures typically defined in a community energy plan.

Leveraged Legislative Tools
Municipalities have many powerful tools at their disposal to support CEP implementation, governance and priority projects.

Most provincial legislation across Canada (through municipal acts or equivalents) allow municipal service corporations to interact with the private sector for activities that are consistent with the public good and consistent with municipal objectives. A municipal service corporation could provide a strategic avenue for attracting the necessary investments to implement a community energy plan.

In most Canadian provinces mechanisms exist to allow municipalities to recuperate the costs of public infrastructure upgrades by adding a local improvement charge to the property taxes of eligible properties. These mechanisms are sometimes referred to as Property Assessed Clean Energy (PACE) or low-cost long-term efficiency financing. PACE financing has the potential to attract private capital for home (and other building) retrofits that support energy and emissions reductions strategies.

Planning Integration
Integrating CEPs into official and secondary plans, planning application processes, as well as approvals, permitting, and inspections provides a municipality with the opportunity to mobilize its most effective mechanism enabled under Provincial legislation. The municipality can then guide the growth and renovations of their communities towards an energy-efficient low-carbon future, defined in their plans.

Economic Development
Integrating CEP objectives into economic development strategies is critical during implementation.

4.6 ATTRACTING MAJOR CORPORATE ACTORS IN THE SMART ENERGY SPACE

In the last 20 years low-carbon economy markets have grown significantly, providing increased access to related products and services. The channels to new energy markets are being largely driven by municipalities that are coordinating with stakeholders in their communities, as they plan to implement their CEPs.

The size of the smart energy market, for the provision of products and services, which is reflected in the measures and recommendations of virtually any CEP, cannot be underestimated. This market continues to grow in North America at a pace that is on par with, or exceeds, most other major market sectors.

In a 2018 survey ECO Canada reported that close to 51,000 energy efficiency establishments generated $82.6 billion in operating revenues, $14.9 billion in employment income and created over 435,000 jobs (projected to 472,000 in 2019).[10]

It is evident that the smart energy marketplace is competitively large and expanding. These businesses and establishments will be seeking places to expand and/or locate their businesses. Municipalities that have aligned their economic development practices with the goals and implementation strategies of their CEPs can greatly improve their in-bound investment and job creation opportunities.

5.0 PROVINCE-WIDE ECONOMIC POTENTIAL

5.1 INTRODUCTION

Based on a number of key data inputs and indicators developed through the Study, an estimate has been made to determine the economic job-creation potential across the entire province of

[10] https://eco.ca/new-reports/energy-efficiency-canada/

New Brunswick should all 104 municipalities[11] develop and implement Community Energy Plans.

5.2 STATUS OF MUNICIPAL CLIMATE MITIGATION ACTIVITY

Currently, a total of 51 out of 104 New Brunswick municipalities have completed Community Energy Plans. These CEPs encompass a population of 408,587 which represents 75.7% of the Province's municipal population of 539,411 and 52.7% of the Province's total population of 775,610.[12] It is important to note that as a result of very recent municipal reform in New Brunswick, there are no longer 104 municipalities and that many of the previous CEPs will need to be adapted to integrate expanded municipal territories and assets.

5.3 MAJOR INPUTS

The Community Energy Plans of the Study's six participating municipalities provided empirical inputs to estimate the Province's energy use by population. In order to increase the volume of empirical inputs, similar analysis from two municipalities in a previous QUEST Canada project[13] have been included in this Study's Province-wide analysis. Table 4 below summarizes their data details:

Table 4 - Municipalities From Previous QUEST Projects Included in Study

Municipality	Total Energy (GJ)	Energy Total (M$$'s)	Target (%)	Base Year	Target Year
Saint John	10,076,748	$424.07	9%	2015	2025
Sussex	550,770	$23.8	30%	2015	2035

By including these additional two municipalities, the Study has a representative sample of municipalities with CEPs that represent a total population of 108,051 or 20% of the Province's municipal population.

5.4 ANALYSIS

The next stage of analysis categorizes municipalities with completed CEPs based on population size. Municipalities were divided into four categories, based on population size: over 50,000 people, 10,000 to 30,000 people, 4,000 to 10,000 people, and under 4,000 people. Table 5

[11] 104 New Brunswick municipalities were identified in the 2021 Statistics Canada census. This total figure may vary due to the amalgamation of local governments.
[12] Statistics Canada 2021. Full table of New Brunswick Municipalities can be found in Appendix 6.
[13] In 2018 through 2019, New Brunswick's Environmental Trust Fund and New Brunswick Power supported QUEST Canada with engaging two New Brunswick Municipalities, Sussex and Saint John, to review the economic potential of their Community Energy Plans.

summarizes the categorical representations, by percentage population, of the eight municipalities reviewed in this Study.

Table 5 - Categorical Representations of Study Municipalities

Category	Total Category Population	Participating Municipalities	Total Participating Municipalities' Population	% Study Representation by Category
> 50K	212,481	-Saint John	69,895	32.9%
10K to 30K	141,772	-Quispamsis	18,768	13.2%
4K to 10K	88,033	-Sussex -Woodstock -St. Stephen	14,408	16.4%
< 4K	97,125	-Florenceville Bristol -Perth Andover -Saint Andrews	4,980	5.1%

It was determined that the existing CEPs that were reviewed in this Study (and the previous work with Saint John and Sussex) provided a good representation across the varying municipal populations of the Province.

Therefore, the next stage of analysis determined the energy use per capita in each of the four categories based on the empirical information available in the participant's CEPs. Energy use per capita was then applied to the total population of each category. Table 6 below summarizes energy use and energy costs per capita in each category.

Table 6 - Energy and Energy Costs Per Capita in Each Population Category

Category	Total Participating Municipalities' Population	Total Participant's Energy Use (GJ)	Total Participant's Energy Costs ($$M)[14]	Per Capita Energy Use (GJ)	Per Capita Energy Costs ($)
> 50K	69,895	10,076,748	424.1	144	$6,067
10K to 30K	18,768	1,806,244	84.84	96	$4,520
4K to 10K	14,408	1,874,452	81.87	130	$5,682
< 4K	4,980	765,164	32.27	154	$6,479

Per capita energy use and per capita energy costs can then be applied across municipal populations in each category. Table 7 shows total energy use in each category.

Table 7 - Total Energy Use in Each Population Category

Category	Per Capita Energy Costs	Total Category Energy Use (GJ)	Total Category Energy Costs ($$M)[15]	Total Category Municipal Population	Per Capita Energy Use	Per Capita Energy Costs
> 50K	$6,067	10,076,748	424.07	212,481	144	$6,067
10K to 30K	$4,520	1,806,244	84.84	141,772	96	$4,520
4K to 10K	$5,682	1,874,452	81.87	88,033	130	$5,682
< 4K	$6,479	765,164	32.27	97,125	154	$6,479

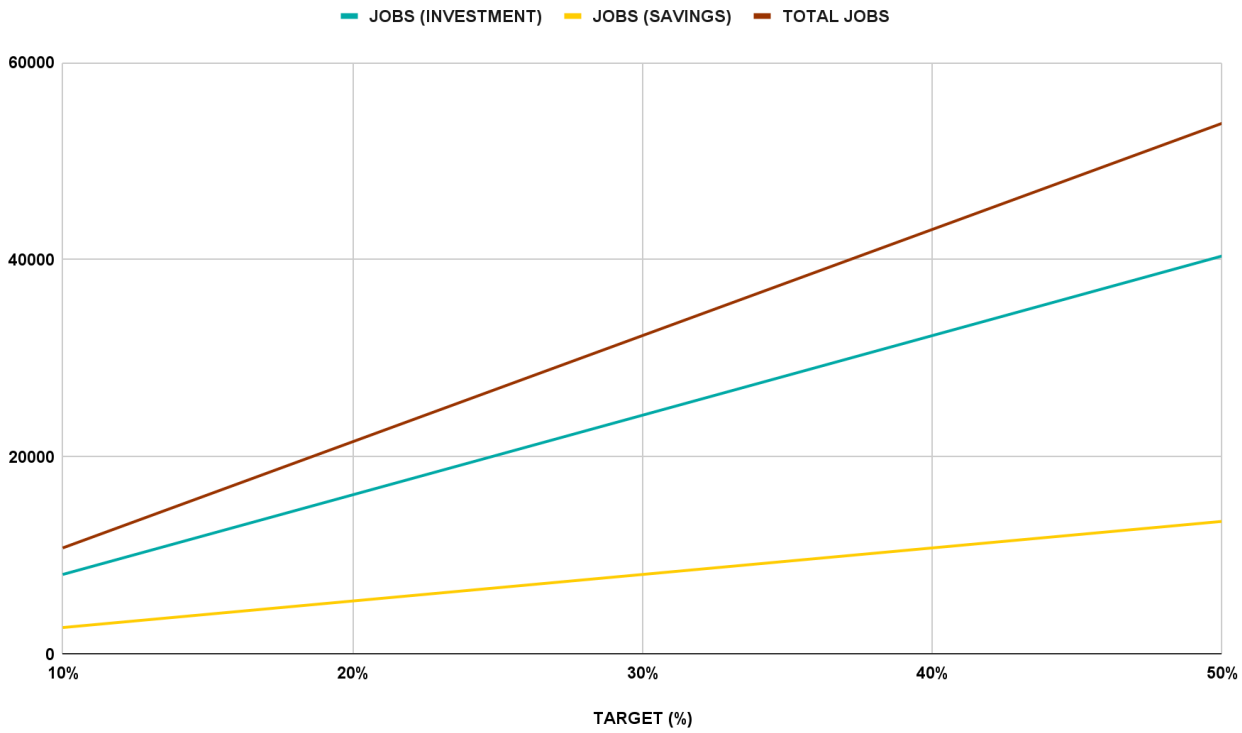
[14] Please note that the total energy expenditure figures for this final report are marginally higher than the figures presented in the individual case studies (see **Appendix 3**). They reflect current prices at the time of writing this report.

[15] Please note that the total energy expenditure figures for this final report are marginally higher than the figures presented in the individual case studies (see **Appendix 3**). They reflect current prices at the time of writing this report.

Applying the multipliers presented elsewhere in this Study and applying them to the total estimated energy expenditures in each population category showcases job creation impact as a result of reducing these expenditures by implementing Community Energy Plans.

Greenhouse gas emissions and energy end-use reduction targets in the participating communities' CEPs varied considerably. The Province-wide estimate of job creation has been calculated at 10% through 50%, in 10% increments, as demonstrated in Figure 7 below.

Figure 7 - Job Creation at Incremental CEP Targets (10% to 50%)



5.5 ASSUMPTIONS

There are a number of critical assumptions made in the development of this analytical approach to the calculations demonstrated in this Study. Assumptions are examined below.

Fuel Costs - Fuel costs vary widely and have been updated to current costs. The fuel costs indicated in this Study are updated from the costs used in the development of the participating municipalities' case studies.

Populations - This Study utilizes the municipal population of the Province by calculating the full potential of all municipalities. The municipal population totals 539,411, which is 69.5% of the total Provincial population of 775,610.

Targets - The Study assumes that the greenhouse gas emission reduction targets, established in the reviewed CEPs, is the same as the energy end-use reduction targets. It is important to note that none of the CEPs developed an energy end-use reduction target. Energy end-use reduction targets can vary from greenhouse gas emissions targets and are subject to the implementation measures identified in the CEP and the carbon content of the related fuel use reductions.

Paybacks - The Study utilized an estimated eight year simple payback to determine the estimated investment requirements to achieve a specific energy end-use reduction target. In reality, a package of measure identified in any given CEP will have a variety of simple paybacks. The CEPs reviewed for this Study did not provide the level of detail necessary to determine more specific payback details. However, Section 5.6 provides a sensitivity analysis of aggregated simple paybacks that are less than eight years.

Energy Inflation - The job creation calculations provided in this Study are based on the best available current primary and secondary fuel costs. Future energy pricing increases are difficult to predict. To indicate the impact of energy inflation on a sensitivity analysis has been provided in Section 5.6.

Carbon Tax - In March 2022, the New Brunswick government announced[16] its intention to increase the tax on carbon-emitting products by $10 to $50 per tonne in keeping with federal requirements. In 2020, the provincial government implemented a carbon tax plan to replace the one imposed by the federal government. It is designed to allow the government to decide how best to return the revenue from the tax back to New Brunswickers. Because it is not known, at the time of writing this report, exactly how the government will return the carbon tax to the general economy, cost avoidance specific to carbon taxes as a result of energy efficiency in the community has not been included in the assumptions or calculations used in this report.

5.6 SENSITIVITY

Of all the variables and assumptions that have been included in this Study and discussed in this report, arguably the two most impactful variables are the **future costs of energy** and the **actual investments required** to implement the CEPs in a New Brunswick municipality. This section will illustrate the impact, or sensitivity, on variations in the future cost of energy and the variations in investment requirements to implement a typical New Brunswick CEP.

5.6.1 ENERGY INFLATION

All calculations performed in this Study are based on the best reasonable estimate of current primary and secondary energy prices (See **Appendix 4**) in order to determine the costs of energy end-use in any given community. However, energy costs are anticipated to increase into the future. The challenge is to make a reasonable estimate of the rate of “energy inflation” in order to determine its impact on job creation. Based on discussions with staff from the New

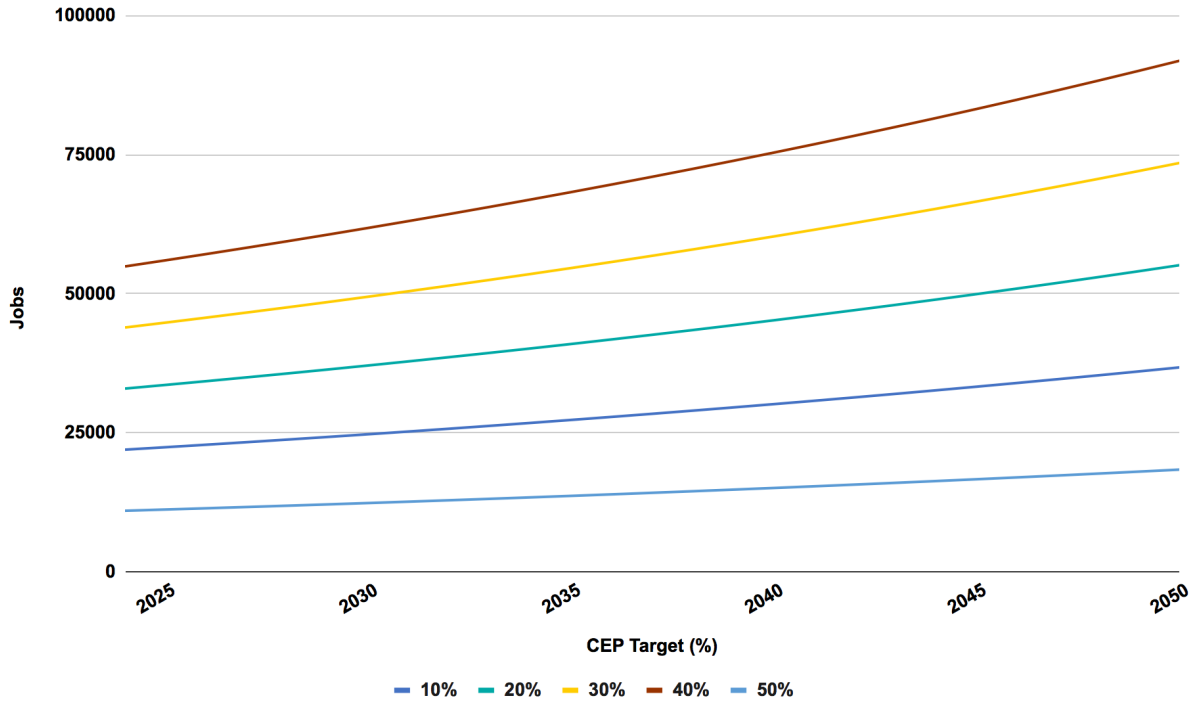
[16] https://www2.gnb.ca/content/gnb/en/news/news_release.2022.03.0168.html

Brunswick Ministry of Natural Resources and Energy Development, an estimated range of 2% to 4% annual inflation was considered a reasonable estimate to determine future energy costs.

Figure 8 below compiles the results of Figure 7 and applies a 2% annual inflation of energy costs. Simply put, higher costs in the future means a higher value of energy dollars retained in the community and therefore a higher impact on job creation.

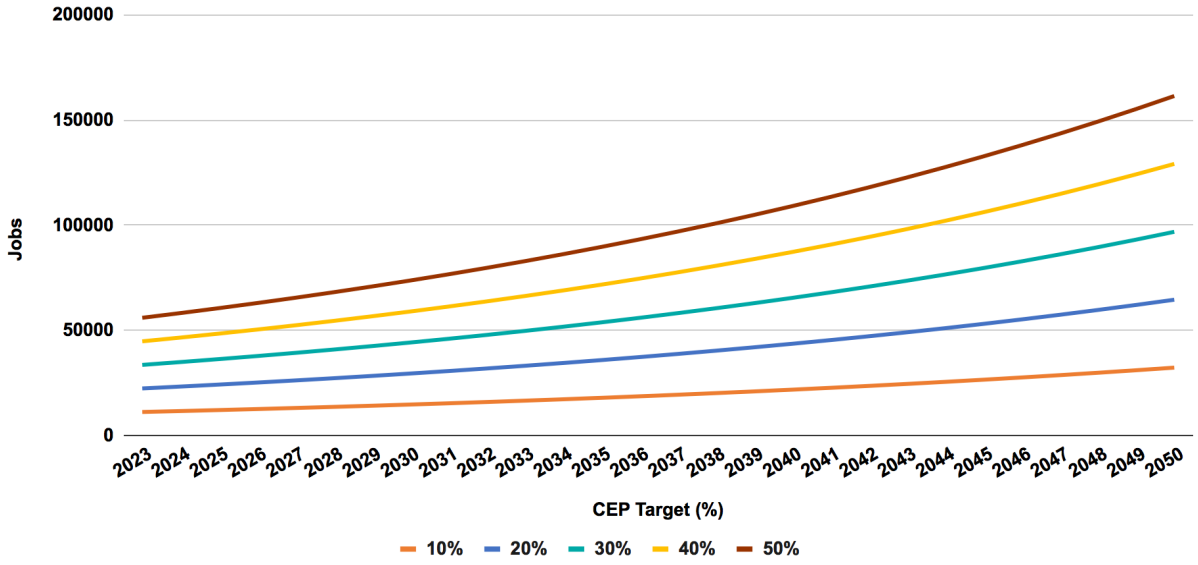
Figure 8 demonstrates that even a 2% annual increase in energy costs can have a significant impact on job creation when comparing today's costs to 2050 predictions.

Figure 8 - Energy Inflation Impact on Job Creation at 2% Per Year



Below, Figure 9 provides the same analysis as Figure 8, but future energy pricing has been calculated at a 4% annual increase. The impact on future job creation is significantly more pronounced with job creation potential at almost three times the amount by 2050 when compared to today's energy prices.

Figure 9 - Energy Inflation Impact on Job Creation at 4% Per Year



5.6.2 PAYBACK VARIABLES

In this Study, job creation impact estimates have been based on an assumed eight year simple payback for investments that would be required to implement the total package of measures identified in a typical Community Energy Plan.

The CEPs reviewed in this Study did not provide detailed financial analysis of any given measure included in a CEP. For illustration purposes, and in order to understand the impact on job creation potential, Figures 10 and 11 have identified the impact on job creation for simple payback estimates at three years and six years.

Figure 10 - Impact on Job Creation - Six Year Simple Payback

As demonstrated in Figure 10, the job creation impact of a total CEP implementation cost with a six year simple payback (when compared to an eight year simple payback as shown in Figure 7) will have less job creation impact simply because the overall cost of implementing the CEP will be less and fewer investment dollars will be required. Jobs created from ongoing energy savings would remain the same.

Figure 11 - Impact on Job Creation - Three Year Simple Payback

Simple collective CEP implementation paybacks at three years have a significant impact on job creation. There is approximately a 50% reduction in job creation impact when Figure 7 (eight year payback) is compared to Figure 11 (three year payback).

5.7 CONTRIBUTION TO THE ECONOMIC OBJECTIVES OF THE NB CLIMATE CHANGE ACTION PLAN

Municipalities and their communities account for approximately 40%[17] of the Province's greenhouse gas emissions. The potential for the implementation of Community Energy Plans across the municipal sector in the Province will contribute significantly to the objectives of the three pillars of the New Brunswick's Climate Change Action Plan (2022-2027).

Virtually all of the actions identified in the province's 30-point Action Plan will have synergies with the activities identified in a typical New Brunswick Community Energy Plan.

Implementing Community Energy Plans directly align with two specific actions in the Climate Change Action Plan:

- Section 2.10 - Building Low-Carbon Communities
- Section 2.11 - Growing Economic Opportunities in the Low-Carbon Economy

[17] New Brunswick's Climate Change Action Plan (2022-2027), Page 34.
https://www2.gnb.ca/content/dam/gnb/Corporate/Promo/climate/climate-change-action-plan.pdf

The following two sections describe this alignment further in Sections 5.7.1 and 5.7.2, below.

5.7.1 BUILDING LOW CARBON COMMUNITIES

As demonstrated in this Study, 51 of the 104 municipalities in New Brunswick have developed a Community Energy Plan, representing 75.7% of the Province's municipal population and 52.7% of the Province's total population.[18] This puts the Province well on its way of delivering on its objectives of having GHG reduction plans that are updated and completed for 50% of all local governments and rural districts by 2025 and 100% by 2030[19]. Further, the methodologies and protocols used to develop New Brunswick's existing Community Energy Plans enables local governments ability to provide ongoing reporting[20] to the Province as well create the basis for developing implementation plans and schedules[21].

5.7.2 GROWING ECONOMIC OPPORTUNITIES IN THE LOW CARBON ECONOMY

As illustrated in this Study, significant positive local economic impact correlates strongly with the implementation of Community Energy Plans. Findings show that provincial support of CEP implementation could lead to the creation of 150,000 jobs, depending on the greenhouse gas emission target and total investment requirements.

This in effect will create significant demand for two main implementation needs, as detailed in the Province's Actions Plan.

- The development and support of medium and small businesses, industries, technology development and investment streams to serve the transitioning energy and climate economy.[22]
- Promotion of skills and workforce development to serve the transitioning energy and climate economy.[23]

6. REPORT CONCLUSIONS

Six CEPs (CEPs represent 20% of the Province's municipal population) were reviewed for the purposes of this Study. This creates a meaningful basis to make estimates of the investments required to implement the measures and actions identified in the existing Community Energy Plans. This provides the groundwork for estimating the job creation impact of CEP implementation, using referenced job multipliers, from the impact of keeping energy dollars

[18] Again, as a result of very recent municipal reform in New Brunswick, there are no longer 104 municipalities and that many of the previous CEPs will need to be adapted to integrate expanded municipal territories and assets.
[19] New Brunswick's Climate Change Action Plan (2022-2027). Action 19.b.
[20] New Brunswick's Climate Change Action Plan (2022-2027). Action 19.a.
[21] New Brunswick's Climate Change Action Plan (2022-2027). Action 19.c.
[22] New Brunswick's Climate Change Action Plan (2022-2027). Action 20.
[23] New Brunswick's Climate Change Action Plan (2022-2027). Action 21.

local through energy efficiency and conservation and the impact of attracting the necessary investments.

This Study has attempted to make reasonable assumptions, and to test the sensitivity of these assumptions, for the variables that go into calculating job creation impacts.

The main variables that have a significant impact on the variability of job creation are listed below:

- **Targets** – Existing CEPs have a range of targets for greenhouse gas emission reductions, but do not include energy end-use reduction targets. For the purposes of this Study, it has been assumed that both targets would be equal. The Study has analyzed the job creation impact of targets ranging from 10% to 50%.
- **Investment** – The cost of implementing existing CEPs has not been analyzed in any of the existing CEPs. Therefore, estimates had to be created based on the simple payback expectations of the investors in the measure identified in the CEPs. These investors may be from the public or private sectors. An initial figure of an eight-year simple payback was used to develop initial estimates followed by a sensitivity analysis of six-year and three-year simple paybacks, respectively.
- **Energy Inflation** – All calculations on current energy expenditures in the Study's participating municipalities are based on the best available energy costs for electricity, natural gas, propane, gasoline, diesel, and CNG.

The results of the Study's calculations as well as the sensitivity analysis are summarized in the table below.

Table 8 - Province-Wide Job Creation Summary

	Jobs					
Simple Payback Amount (in Years)	Today's Energy Costs		2% Energy Costs Inflation		4% Energy Costs Inflation	
	10% Target (2050)	50% Target (2050)	10% Target (2050)	50% Target (2050)	10% Target (2050)	50% Target (2050)
8 Year Simple Payback	**10,800**	**53,800**	**18,750**	**93,700**	**32,300**	**161,400**

6 Year Simple Payback	**8,700**	**43,700**	**15,200**	**76,200**	**26,200**	**131,200**
3 Year Simple Payback	**5,700**	**28,600**	**10,000**	**49,800**	**17,200**	**85,800**

Continuing to pursue the actions identified in New Brunswick's Climate Change Action Plan (2022-2027) will support the continued development and implementation of the Province's existing Community Energy Plans and the creation of CEPs for the remaining local governments.

In order to further articulate the economic development and job creation potential of CEP implementation, it is recommended that future planning and reporting endeavors seek to identify the costs of implementing the measures and actions identified in those plans.

APPENDICES

Appendix 1 - Typical Community Energy Plan Measures

The following example is extracted from a workshop conducted by QUEST Canada in collaboration with the Town of St. Stephen. The following summary is an excerpt from Section 4.0 from the *Community Energy Plan Development Workshop Summary Report - Recommendations Report for the Town of St. Stephen's GHG and Energy Action Plan*, QUEST, March 2022.

In summary, the high priority actions are (to start by 2022–2023):

1. Encourage businesses and homeowners to utilize incentives from NB Power for energy efficiency upgrades.
2. Utilize incentives provided by NB Power to upgrade and retrofit heritage buildings with energy efficiency improvements.
3. Continue to collect data from NB Power on commercial, residential, and heritage building incentive utilization.
4. Collaborate with community partners (e.g. businesses) to explore opportunities for integrating waste energy or expanding district heat.
5. Conduct a technical and financial feasibility Study for waste and/or district heat utilization opportunities.
6. Conduct a Study for an option, or various options, for solar PV and solar thermal energy in the community.
7. Launch an education campaign to encourage citizens to forgo single occupancy vehicles for active transport.
8. Apply for funding to increase fuel efficiency and/or electric vehicle replacement within the municipal fleet.
9. Create an anti-idling (or idle-free) social media marketing campaign.
10. Develop public awareness tools to promote idle-free behavior in the community.
11. Adopt a public and/or internal policy or bylaw that clearly states unnecessary idling is unacceptable.
12. Conduct a feasibility Study to identify measures to optimize water and wastewater systems.
13. Upgrade stormwater management policies and implement measures to reduce peak flow.

The medium priority actions are (to start by 2023–2024):

1. Create a public education campaign to encourage the adoption of energy efficiency actions/behaviors.

2. Conduct a Study to determine needs, and technical and financial feasibility. Then undertake a pilot to improve energy efficiency in heritage buildings.
3. Work with community partners such as Future St. Stephen, public works organizations, and others to explore the installation of solar PV on buildings.
4. Apply for FCM funding to undertake rooftop solar projects in the community.
5. Apply for NB Environmental Trust Fund funding for the educational components of a solar pilot project, or to help finance the pilot itself.
6. Apply for suitable NB Power Incentive Programs (e.g. a Total Home Energy Savings Program, a Commercial Buildings Retrofit Program, a Net Metering Program, etc.) for suitable solar PV projects.
7. Study potential micro-hydro sites for flow, distance to grid, and potential generating capacity to determine feasibility.
8. Adopt policies to encourage compact, mixed-use, and transit-oriented developments with a diversity of building types.
9. Update policies or processes in place to support energy efficiency in new developments across the community.
10. Apply for FCM GMF funding to provide infrastructure and encourage active transportation.
11. Support the development and adoption of multi-use trails in the community.

The low priority actions are (to start by 2024 or later):

1. Adopt building code bylaws requiring minimum energy performance/efficiency standards or rating/labeling for different types of buildings (e.g. Energy Star, net zero), and collect information through the permitting process (e.g. energy/GHGs saved through high-efficiency or net-zero development).
2. Launch a community retrofit project or community efficiency financing program (or Study) with funding from the FCM's Green Municipal Fund.
3. Develop a bylaw to require connections to district heat.
4. Identify opportunities within the community to produce/use renewable natural gas.
5. Conduct a campaign to educate citizens, promote benefits of switching to fuel efficient vehicles (e.g. energy cost savings, GHG reduction, etc), highlight available rebates/programs, and address barriers (e.g. range anxiety).
6. Explore opportunities in the community for organic waste collection, such as municipal and/or commercial compost.

Appendix 2 - Community Energy Plans of Participating Study Municipalities

1. **Quispamsis's Community GHG & Energy Action Plan**
   https://quispamsis.ca/wp-content/uploads/2015/04/UMNB-FINAL_Community-Action-Plan_Quispamsis-2018.pdf

2. **Woodstock Community GHG & Energy Action Plan**
   https://drive.google.com/file/d/1mM192ih8hkQl1IGwNpj0cdkKGFphG8g-/view?usp=sharing

3. **Florenceville-Bristol Milestone 3: Climate Action Plan**
   https://www.florencevillebristol.ca/_files/ugd/3213ba_3fb73ca582a94ac48266672186b86d9a.pdf

4. **Perth - Andover's Community GHG & Energy Action Plan**
   https://perth-andover.com/images/client/pdf/Perth-Andovers-Community-GHG--Energy-Action-Program.pdf

5. **Town of St. Stephen Partners for Climate Protection: Milestone 1**
   https://drive.google.com/file/d/129lwomcxOFgrRS8lKjc2_Hm0HDbyroy2/view?usp=sharing

6. **Town of Saint Andrews Greenhouse Gas Emissions Mitigation Plan**
   https://www.townofsaintandrews.ca/wp-content/uploads/2022/04/SA_GHGMitigation_LocalActionPlan_Final.pdf

As described in Section 5.3, CEPs from previous QUEST Project were used to provide input to data to the analysis described in this Study.

1. **Saint John Community GHG & Energy Action Plan**
   https://pub-saintjohn.escribemeetings.com/filestream.ashx?DocumentId=266

2. **Town of Sussex Community GHG & Energy Action Plan**
   https://sussex.ca/media/UMNB-CCEI_Com_IAP_Sussex-2018-07.pdf

Appendix 3 - Compiled Case Studies of Participating Study Municipalities

1. Economic Impact of Community Energy Plans - Case Study: Town of Saint Andrews, NB
2. Economic Impact of Community Energy Plans - Case Study: Town of Florenceville-Bristol, NB
3. Economic Impact of Community Energy Plans - Case Study: Village of Perth-Andover, NB
4. Economic Impact of Community Energy Plans - Case Study: Town of Quispamsis, NB
5. Economic Impact of Community Energy Plans - Case Study: Town of St. Stephen, NB
6. Economic Impact of Community Energy Plans - Case Study: Town of Woodstock, NB

Appendix 4 - Fuel Cost Utilized in This Study

* GJ Conversion

	Cost	Pricing Source	Unit	GJ/unit	Cost/GJ
Electricity	$0.118	1	kWh	0.0036	32.78
Fuel Oil	$2.360	2	litre	0.0397	59.45
Natural Gas	$22.580	3	GJ	1	22.58
Heavy Fuel Oil	$2.250	6	litre	0.0397	56.68
Propane - Buildings	$1.130	2	litre	0.0256	44.14
Gasoline	$1.540	2	litre	0.0342	45.03
Diesel	$2.620	2	litre	0.0380	68.95
Ethanol - Transportation	$1.580	4	litre	0.0300	52.67
Propane - Transportation	$1.130	2	litre	0.0256	44.14
CNG	$2.850	5	GGE	0.1213	23.50

Pricing Source:

1. New Brunswick Energy and Utilities Board
2. Liberty Utilities (Fuel)
3. CBC News
4. Canada Natural Gas Vehicle Association
5. Estimate - No Direct Reference Available
6. Estimate - No Direct Reference Available

Appendix 5 - New Brunswick Municipal Statistical Summary

New Brunswick Municipalities - By Population Category

CEP Complete or Pending		Name	Municipal type	2021 Census of Population	POP.
X	1	Moncton	City	79,470	Over 50K
X	2	Saint John	City	69,895	
X	3	Fredericton	City	63,116	
X	4	Dieppe	City	28,114	10K to 30K
	5	Riverview	Town	20,584	
X	6	Quispamsis	Town	18,768	
X	7	Miramichi	City	17,692	
	8	Edmundston	City	16,437	
X	9	Tracadie	Regional municipality	16,043	
X	10	Bathurst	City	12,157	
X	11	Rothesay	Town	11,977	
	12	Oromocto	Town	9,045	4K to 10K
	13	Shediac	Town	7,535	
	14	Campbellton	City	7,047	
	15	Beaubassin East	Rural community	6,718	
X	16	Sackville	Town	6,099	
X	17	Woodstock	Town	5,553	
	18	Grand Falls	Town	5,220	
	19	Memramcook	Village	5,029	
X	20	Grand Bay-Westfield	Town	4,967	
	21	Hanwell	Rural community	4,743	
X	22	St. Stephen	Town	4,510	
X	23	Sussex	Town	4,440	
X	24	Hampton	Town	4,395	
X	25	Beresford	Town	4,294	
X	26	Caraquet	Town	4,285	

	27	New Maryland	Village	4,153	
X	28	Haut-Madawaska	Rural community	3,720	
X	29	Atholville	Village	3,290	
X	30	Dalhousie	Town	3,223	
	31	Cocagne	Rural community	2,757	
X	32	Shippagan	Town	2,672	
	33	Grand Manan	Village	2,595	
X	34	Bouctouche	Town	2,513	
X	35	Cap-Pelé	Village	2,503	
	36	Salisbury	Village	2,387	
	37	Minto	Village	2,234	
	38	Upper Miramichi	Rural community	2,175	
X	39	Saint-Quentin	Town	2,141	
X	40	Saint Andrews	Town	2,048	
X	41	Kedgwick	Rural community	1,986	
X	42	Petit-Rocher	Village	1,954	
X	43	Eel River Crossing	Village	1,844	
X	44	Saint-André	Rural community	1,794	< 4K
	45	Saint-Antoine	Village	1,791	
X	46	Neguac	Village	1,692	
	47	Balmoral	Village	1,603	
	48	St. George	Town	1,579	
X	49	Perth-Andover	Village	1,574	
X	50	Florenceville-Bristol	Town	1,573	
X	51	Petitcodiac	Village	1,476	
	52	Sussex Corner	Village	1,458	
X	53	Richibucto	Town	1,411	
	54	Norton	Village	1,410	
	55	Hillsborough	Village	1,348	
	56	Belledune	Village	1,325	
	57	Charlo	Village	1,323	
X	58	Saint-Léonard	Town	1,322	
X	59	Bas-Caraquet	Village	1,311	

	60	Lamèque	Town	1,301
	61	Chipman	Village	1,201
X	62	Rogersville	Village	1,193
X	63	McAdam	Village	1,173
X	64	Bertrand	Village	1,153
	65	Plaster Rock	Village	1,002
X	66	Nigadoo	Village	997
X	67	Saint-Louis de Kent	Village	981
	68	Nackawic	Town	962
	69	Tide Head	Village	951
	70	Campobello Island	Rural community	949
	71	Hartland	Town	933
	72	Blackville	Village	914
	73	Blacks Harbour	Village	907
X	74	Dorchester	Village	906
	75	Sainte-Anne-de-Madawaska	Village	891
X	76	Rexton	Village	874
X	77	Pointe-Verte	Village	865
X	78	Sainte-Marie-Saint-Raphaël	Village	820
X	79	Saint-Isidore	Village	810
	80	Doaktown	Village	808
	81	Gagetown	Village	787
	82	Le Goulet	Village	749
X	83	Rivière-Verte	Village	744
	84	Grande-Anse	Village	731
	85	Drummond	Village	729
	86	Fredericton Junction	Village	719
X	87	Paquetville	Village	718
	88	Cambridge-Narrows	Village	715
	89	Lac Baker	Village	685
X	90	Saint-Léolin	Village	615
	91	Tracy	Village	610
X	92	Maisonnette	Village	535

	93	Centreville	Village	508	
	94	Bath	Village	440	
	95	Harvey	Village	402	
	96	Stanley	Village	397	
X	97	Port Elgin	Village	381	
	98	Riverside-Albert	Village	348	
	99	Canterbury	Village	320	
	100	St. Martins	Village	320	
	101	Aroostook	Village	313	
	102	Alma	Village	282	
	103	Millville	Village	274	
	104	Meductic	Village	180	
			Sub-total cities	***293,928***	
			Sub-total regional municipalities	***16,043***	
			Sub-total rural communities	***24,842***	
			Sub-total towns	***133,350***	
			Sub-total villages	***71,248***	
			Total municipalities	***539,411***	
			Province of New Brunswick	**775,610**	
			Percentage Prov. Total	**69.5%**	
			Total CEP Municipalities	**51**	
			Total CEP Population	**408,587**	
			CEP Percent Municipal	**75.7%**	
			CEP Percent Provincial	**52.7%**	