

**Undertaking #120:** Mr. Dunsky to provide employment impact study of energy efficiency, if it becomes public prior to end of the hearing.

**Response:**

Mr. Dunsky will forward this as soon as it is made public, assuming this occurs between now and the end of the NFAT process. In the interim, he has attached the summary results for the province of Quebec, which were developed in 2012 as part of the initial study covering Quebec and the Maritime provinces. The Manitoba study will be of a similar nature, though the results will of course be different, accounting for the specific nature of Manitoba's economy.

# Energy Efficiency: Engine of Economic Growth in Québec



Results from a Macroeconomic Modeling and Tax Impact Assessment

May 2012

Energy efficiency – an abundant, clean, and low-cost energy resource – is an important component of modern energy systems and has emerged as a key policy tool to help address high energy costs, improve productivity, and spur economic growth. Energy efficiency also: reduces the burden on existing energy infrastructure, and the need for new and costly upgrades; reduces the energy burden of vulnerable populations, freeing income for other basic needs such as food, housing, and medication; and, cost-effectively reduces and avoids greenhouse gas and other air emissions.

As investments in energy efficiency programs increase, it is necessary to understand economic effects on individual program participants and on the economy as a whole. ENE conducted a study to quantify the macroeconomic impacts – increased GDP, income, and employment – of expanded energy efficiency investments in Québec, New Brunswick, Nova Scotia, and PEI. The results – summarized below for Québec – offer targeted information to help decision-makers advance local, regional, and national energy policy reforms. The full report is available at: <http://www.env-ne.org/resources/energy-efficiency-engine-of-economic-growth-in-canada>

## Results for Québec

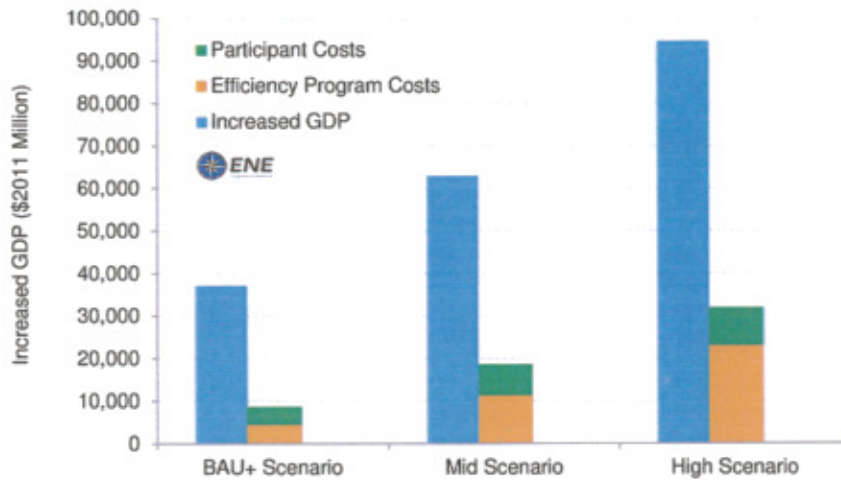
The analysis considered scenarios of expanded investment in energy efficiency programs for electricity, natural gas, and/or liquid fossil fuels (heating oil, propane, and kerosene), over a 15-year period. The expanded investment levels represent incremental growth over existing spending (Business As Usual +) and levels that approach and potentially capture all the cost-effective efficiency resource (Mid and High). Cost-effective energy efficiency refers to efficiency that is lower cost than supplying additional energy.

The macroeconomic modeling result for the scenarios where Québec invests in energy efficiency programs across all fuel types are presented in Table QC-1 and Figures QC-1 to QC-3. Table QC-1 also includes economic “spill over” effects in the other provinces, resulting from the increased economic activity in Québec and cross-province interdependencies for labour and other goods and services. Provincial and regional results by fuel type are available in the full report.

**Table QC-1: Summary of Québec Economic Impacts from Electric, Natural Gas, and Liquid Fossil Fuels Efficiency Programs (2012-2040) – Cases where province implements all fuel programs simultaneously**

All Fuels – Québec	BAU+	Mid	High
<b>Total Efficiency Program Costs (\$2011 Millions)</b>	<b>4,531</b>	<b>11,337</b>	<b>23,058</b>
<b>Increase in GDP (\$2011 Millions)</b>	<b>37,070</b>	<b>62,892</b>	<b>94,447</b>
Maximum Annual GDP Increase (\$Millions)	2,577	4,480	6,668
<b>Increase in Employment (Job years)</b>	<b>273,918</b>	<b>479,508</b>	<b>732,631</b>
Maximum Annual Employment Increase (Jobs)	20,222	34,402	46,188
Job-Years per \$Million of Program Spending	60	42	32
Job-Years per \$Million of Program & Participant Spending	32	26	23
<b>Rest of the Four Provinces Economy</b>			
Increase in GDP (\$Millions)	715	1,156	1,676
Increase in Employment (Job Years)	3,385	5,613	8,392

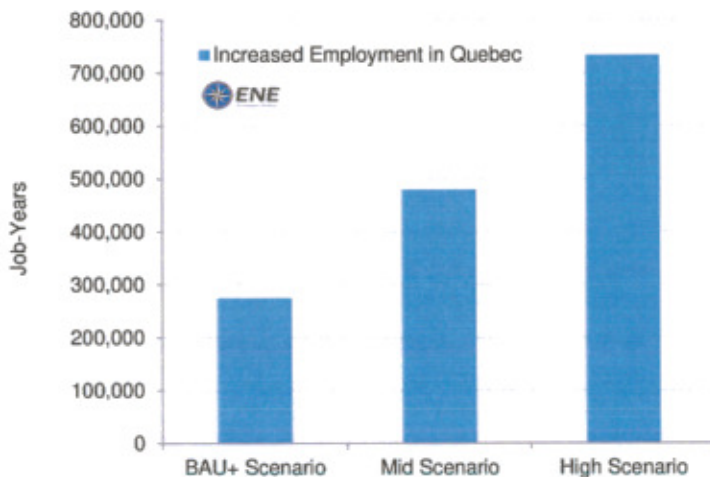
**Figure QC-1: Net Increase in GDP (Millions \$2011) in Québec from Expanded Electric, Natural Gas, and Liquid Fossil Fuels Efficiency Programs (2012-2040) – Cases where the province acts alone and implements all fuels programs simultaneously**



The Québec simultaneous all fuels scenario would increase GDP by approximately \$37.1 billion (BAU+ scenario), \$62.9 billion (Mid scenario), or \$94.5 billion (High scenario) from 2012 to 2040, as consumers spend energy bill savings in the wider economy. This is a net increase that incorporates the total cost of implementing the programs. Total employment is presented in Figure QC-2. The total increase in employment over the period of study is equivalent to approximately 274,000 job years (one full-time job for a period of one year), 479,500 job years, or 732,600 job years, respectively.

Québec is already accruing some of these economic benefits from existing programs. However, positioning the province among leaders in energy efficiency will require a sustained commitment and an increase from the current investment level of approximately \$308 million to a first year budget of \$350 million. Prioritizing cost-effective efficiency in the province’s energy resource mix will save Québec residents and businesses money, and stimulate the local economy to a larger degree than many other forms of investment.

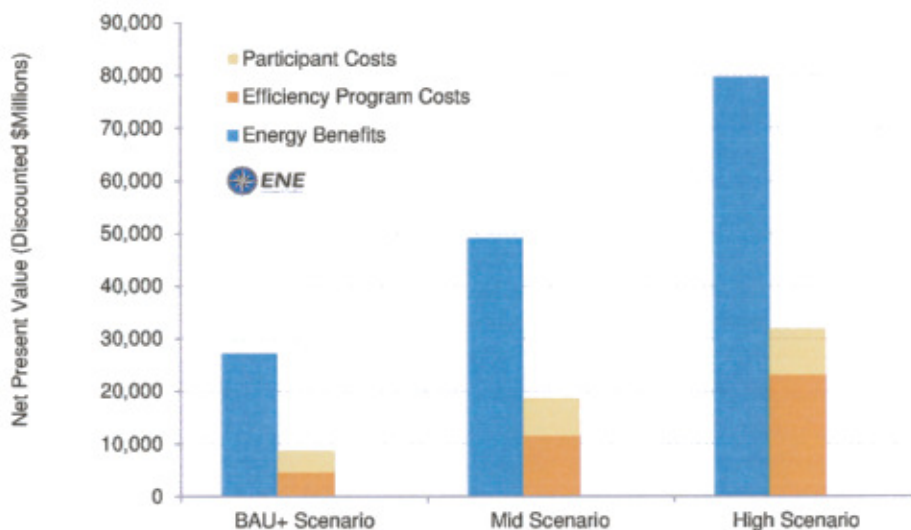
**Figure QC-2: Increased Employment (Job-Years) in Québec from Expanded Electric, Natural Gas, and Liquid Fossil Fuels Efficiency Programs (2012-2040) – Cases where the province implements all fuels programs**





The macroeconomic benefits of efficiency derive from changes in the economy that occur as a result of increased spending on efficiency measures and decreased spending on energy. The majority of these impacts (70-90%) result from the energy savings realized by households and business. Lower energy costs cause other forms of consumer spending to increase. Lower energy bills reduce the costs of doing business in the region, bolstering the global competitiveness of local employers and promoting additional growth.

**Figure QC-3: Energy Cost Savings versus Program and Participant Investment – QC All Fuels Scenarios**



The program and participant investment and resulting energy savings (avoided costs) form the basis of the macroeconomic analysis. As illustrated by Figure QC-3 and Table QC-2, the direct energy savings and reduced greenhouse gas emissions associated with the modeled levels of efficiency investment are significant. Under the Mid investment scenario, average annual savings are 97 petajoules (PJ) and \$1,678 million per year. Residents and businesses save approximately \$4 for every \$1 of program spending under this scenario.

**Table QC-2: Summary of Québec Energy Saved and Greenhouse Gas (GHG) Emissions Avoided (2012-2040) – Cases where QC implements a program for each fuel type at “Mid” investment levels**

	Electricity	Natural Gas	Liquid Fossil Fuels
<b>Energy Savings</b>	<b>(GWh)</b>	<b>(Mm<sup>3</sup>)</b>	<b>(PJ)</b>
Maximum annual savings	25,685	969	57
Maximum savings vs. Business as Usual	14%	19%	27%
Lifetime savings (15 years of programs)	371,738	17,437	1,022
<b>Avoided Energy Costs</b>	<b>(\$Million)</b>	<b>(\$Million)</b>	<b>(\$Million)</b>
Net Present Value of Energy Savings	32,377	3,490	13,252
<b>Equivalent GHG Emissions Avoided</b>	<b>(kt CO<sub>2</sub>e)</b>	<b>(kt CO<sub>2</sub>e)</b>	<b>(kt CO<sub>2</sub>e)</b>
Maximum annual avoided emissions	8,411	1,832	4,190
Maximum annual avoided emissions vs. QC 2010 total emissions ( 82,000 kt CO <sub>2</sub> e)	10%	2%	5%
Lifetime avoided emissions (15 years of programs)	45,610	32,973	45,420

## Tax Revenue Impact Assessment

A high-level tax revenue impact assessment was conducted to supplement the results of the macroeconomic impact study. The analysis applied effective tax rates to REMI model outputs, which were used as proxy tax bases. In Québec, under the all fuels Mid scenario, the estimated annual (net) gain in personal income tax, corporate income tax, and sales tax revenue equals \$243 million in provincial revenue (Québec only) and \$312 million in federal revenue (total across all four provinces in the study), based on the current tax structure. The estimates represents a net gain as average annual direct sales tax losses from reduced fuels sales – estimated at \$125 million (provincial) and \$73 million (federal) – are captured by the assessment. The results indicate that while energy efficiency reduces provincial and federal sales tax collections on fuels, the significant increase in economic activity generates additional revenue that should more than compensate for the losses.

### About the Study

The study uses a proprietary, multi-state policy forecasting tool by Regional Economic Models, Inc. (REMI) to project macroeconomic impacts of policy options as compared to a baseline. For this study, the model operates using assumptions about efficiency program budgets, costs to achieve energy savings, and energy prices and consumption levels during the modeled period, which were developed by Dunsky Energy Consulting and ENE. The modeling assumptions and results of the report were vetted by a project Steering Committee of provincial government representatives and an Advisory Board of industry professionals, program administrators, and others experienced in the field and in the region. Expanded efficiency programs were modeled over 15 years, including a ramp-up period. The model continues for another 13 years to approximately capture the economic benefits achieved over the life of efficiency measures (Note: Canadian data for the REMI model was only available to 2040). In reality, programs would likely continue beyond this 15 year window of investment, and benefits will accrue beyond 2040.

For each type of scenario, three investment levels (BAU+, Mid, and High) were modeled. This approach helps overcome limited information on the efficiency potential in each province, and offers the added value of projecting a range of benefits based on a wider scope of potential investment. Further, in order to investigate the complementary nature of efficiency programs across fuel types and/or jurisdictions, in addition to modeling scenarios where each province acts alone to implement one fuel type, the analysis included scenarios where a province implements programs for all fuel types at once, and scenarios where all provinces implement programs for one or all fuel types simultaneously. In all cases, all fuels or simultaneous, multi-province action resulted in greater economic benefits to Québec and the region (see full report).

The goal of the analysis is to understand the overall macroeconomic benefits of expanded energy efficiency programs, and provide data that can be applied to specific investment levels to generate estimates of economic benefits for a chosen provincial ramp-up plan. The factors for GDP and jobs may differ from previous studies for a number of reasons, including: (1) higher avoided costs, which has a significant impact because 70-90% of the impact is the re-investment of savings, and (2) the REMI model takes into account changes to a business' production function from energy cost savings, and how its relative competitiveness and increased trade among translates into increased local economic growth.



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Environment Northeast is a non-profit organization that researches and advocates innovative policies that tackle our environmental challenges while promoting sustainable economic development. ENE is at the forefront of state and regional efforts to combat global warming with solutions that promote clean energy, clean air and healthy forests.