



## **GE ENERGY FINANCIAL SERVICES STUDY: Canada's ecoENERGY Investment in Renewables Pays Off for Taxpayers**

**By Steve Taub,  
Senior Vice President  
GE Energy Financial Services**

GE Energy Financial Services, a unit of GE (NYSE: GE), estimates that a C\$ 1.5 billion expansion of the Canadian government's ecoENERGY incentive program that leads to 5.2 gigawatts of new wind projects would have a positive net present value of C\$287 million to the Treasury (representing a 5.3 percent internal rate of return). This analysis indicates that ecoENERGY for Renewable Power can be viewed as an investment by the government that yields a financial return. Beyond boosting government revenues, these new wind projects will provide a source of carbon-free electricity and help create thousands of Canadian jobs in manufacturing, construction and operations.

### **Canada's Renewable Energy Policies**

Canada's provincial utilities own large amounts of renewable hydroelectric generating capacity but there is an increasing trend to buy energy from wind farms and other renewable projects owned by independent developers. These developers compete to win contracts to sell power to the utilities, and they obtain financing for their projects based on the contracted revenue stream.

To encourage the production of renewable energy, the Canadian government established the ecoENERGY for Renewable Power program in 2007 and committed C\$1.48 billion to it. These funds are awarded to project developers through a competitive process. Projects selected for a contribution agreement receive 1 cent (before tax) per kilowatt-hour (kWh) for the first 10 years of power production. EcoENERGY for Renewable Power payments provide an important part of the developers' return on investment while reducing the price that utilities and their customers pay for the energy. (Other ecoENERGY programs encourage renewable heat production, energy efficiency, and biofuels production.) Funding is awarded on a "first in construction, first served" basis. The applications have to be submitted by December 2009, and projects must be constructed before March 31, 2011 to be eligible.

The ecoENERGY for Renewable Power program has been a great success, with funding requests far exceeding the program's budget. Nearly 10,924 megawatts of projects have registered to receive funds. As of January 2010, Natural Resources Canada has signed ecoENERGY contribution agreements with 4,154 MW of projects, for a total C\$1.308 billion. GE estimates that 69 percent of the funds have been awarded to wind projects, 26 percent to hydroelectric projects, 5 percent to biomass projects, and 0.5 percent to solar projects.<sup>1</sup> Approximately C\$123 million remain unallocated but cannot be awarded because the program has now lapsed. As of January 2010, 144 projects registered with ecoENERGY for Renewable Power had not received contribution agreements. GE estimates that fully funding

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<sup>1</sup> These percentages differ from the shares in the chart because payments are based on electricity production, and the technologies have varying levels of electricity production per megawatt of installed capacity.



these projects would require approximately C\$2.2 billion, indicating a shortfall of as much as \$2.1 billion.<sup>2</sup> Figure 1 provides a breakdown of contribution agreements awarded to date and other registered projects.

In addition to ecoENERGY for Renewable Power, the Capital Cost Allowance (CCA) system provides a tax incentive for renewable energy investments. The 2005 Federal Budget created Class 43.2, providing an increase in the rate of depreciation of highly efficient fossil fuel and renewable energy generation equipment acquired before 2012 from 30 percent to 50 percent. The CCA deduction allowed by Class 43.1 provides owners of wind farms a tax shelter by significantly reducing the owner's overall taxable income. The CCA deduction, however, in certain cases is limited to the taxable income generated by the wind farm and the CCA deduction shelters the wind farm from paying tax for 8-12 years.

The government's costs for the ecoENERGY for Renewable Power program are clear and easy to measure, but the financial benefits are not, because they come from a variety of sources. Projects receiving ecoENERGY payments pay taxes on their profits, and people employed directly in building and operating those projects pay taxes on their income. However there are also "multiplier effects," because a dollar of spending leads to more than a dollar of economic activity. For example, individuals employed directly by the projects buy goods and services from other companies that employ more people, all of whom pay taxes on their income.

### Methodology

To analyze wind project economics and taxes, GE Energy Financial Services used a detailed wind project finance model it created to evaluate investments in actual Canadian wind projects. The model was calibrated to assume energy production, capital and operating costs, power prices, and returns on investment that are typical in GE's experience as an investor in Canada.

GE Energy Financial Services derived an estimate of the multiplier effects in the Canadian economy using the "Jobs and Economic Development Impact" (JEDI) Model published by the US National Renewable Energy Laboratory<sup>3</sup>. To derive an estimate of the economic effects of wind projects in Canada, GE Energy Financial Services chose a US state as an analog for each Canadian province based on size and economic structure. These were combined into an average weighted by the amount of wind capacity online plus projects reasonably likely to be built. (See Appendix A for the Province-State mapping used in the study.)

The JEDI model addresses three types of impacts:

- Direct – the effect of immediate expenditures to construct and operate projects
  - Example: Construction: truck drivers, crane operators, linemen; Wind turbine manufacturing; Operations: field technicians, plant managers
- Indirect – the effect of increased economic activity
  - Example: Supply chain: component manufacturing, raw materials; bankers, lawyers, and accountants involved in project development and operations
- Induced – the effect of increased consumer spending by people directly and indirectly employed
  - Example: Retail purchases, home improvement projects

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<sup>2</sup> The actual shortfall is smaller because some of the registered projects have been cancelled.

<sup>3</sup> For more information on the JEDI model:

[http://www.eere.energy.gov/windandhydro/windpoweringamerica/filter\\_detail.asp?itemid=707](http://www.eere.energy.gov/windandhydro/windpoweringamerica/filter_detail.asp?itemid=707)



Because comparable economic impact models were not available for hydroelectric power, solar energy, biomass, or other eligible forms of renewable energy, the GE analysis assumes that an expanded ecoENERGY program would support only wind projects.

It was beyond the scope of this study to assess economic output or jobs that may be lost as a result of increased investment in renewable energy projects.<sup>4</sup>

## Results

Assuming a typical production level for Canada, C\$1.5 billion would be sufficient to provide ecoENERGY for Renewable Power funding for 5.2 gigawatts of new wind capacity. Using these models, GE Energy Financial Services estimates that over a 25-year life, these wind farms would generate:

- C\$1.12 billion net present value of ecoENERGY payments over 10 years
- C\$684 million in net present value of taxes on project income (includes the effect of an immediate use of Capital Cost Allowances)
- C\$601 million in NPV of income tax on individuals' wages
- C\$82 million in NPV of income tax on vendors' profits
- C\$43 million in NPV of income tax on lease payments and royalties to landowners

In addition to these financial benefits, 5.2 gigawatts of wind capacity would directly or indirectly create 49,000 full-time equivalent jobs during construction and over 1,800 permanent jobs (See Table 1).

The study did not include property taxes or sales taxes which generate additional revenue for Provincial and local governments.

The total NPV to the Canadian government was C\$1.41 billion, greater than the C\$1.12 billion NPV of the ecoENERGY payments – resulting in a net inflow to the Treasury of C\$287 million (See Figure 2).

## Key Assumptions

Project-level impacts (ecoENERGY payments and project income taxes) were calculated using conservative estimates, with a generic wind project model similar to the one used by GE Energy Financial Services when it invests in actual wind projects. Project inputs were calibrated to represent what GE Energy Financial Services believes to be the market's expectations of the costs, performance, and profitability of an average Canadian wind project financed in 2009 for startup in 2012: C\$2500/kW project cost, 33 percent average lifetime capacity factor, 7.3 ¢/kWh revenue, and average O&M cost of C\$30/kW per year.<sup>5</sup>

Because the bulk of the tax payments come after the tenth year of operation, we assumed the Canadian government would borrow money to finance the tax credits, to be repaid later from tax proceeds (See Figure 3). As a result, the net

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<sup>4</sup> For example, increased use of renewable energy could result in reduced coal mining in Canada and a loss of associated jobs.

<sup>5</sup> A wind farm's capacity factor determines how much electricity it produces. With 8,760 hours in a year, a project with a 33 percent capacity factor would produce 2.890 kWh per year for every kW of capacity.



present value (NPV) calculations used a 4 percent discount rate. We assumed 2 percent annual inflation in operating costs and power sales prices. EcoENERGY payments are not adjusted for inflation.

Wages and corporate revenues were translated into an estimate of income taxes using economy-wide average tax rates and operating margins. These calculations use average tax rates, rather than higher marginal tax rates, on the conservative assumption that the wind projects will provide the majority of the profits and wages for the firms and individuals involved in a wind farm's construction and operation. Economy-wide average tax rates are based on the most recent statistics from Revenue Canada:

- 15.7 percent average individual tax rate on wages
- 10.2 percent average corporate tax rate on business profit
- 3.4 percent average operating margin for businesses (based on US data because no economy-wide Canadian data were available).

GE's calculations assume that the project sponsor is able to use the Capital Cost Allowances completely as they are generated. If, as is often the case in Canada, the sponsors cannot use the CCAs as they are generated (for example if the sponsor has not developed sufficient tax liability for the CCAs to offset) the NPV for the government would be greater than shown in this study.

Calculations assume 25 percent of wind turbines and blades and 50 percent of towers are sourced within Canada, consistent with Provincial targets of 25 percent local content for 2010 in Ontario. (Local content requirements increase to 50 percent by 2012) GE assumed that the remainder of the materials, parts, equipment and services for wind projects are sourced within Canada.

Where necessary, the calculations assume an exchange rate of 0.90 Canadian dollars per US dollar.

#### **About the Author**

*Steven Taub is Senior Vice President, Investment Strategy at GE Energy Financial Services. He works closely with GE's investment professionals to evaluate project finance and venture capital investment opportunities and to create and develop new ones.*

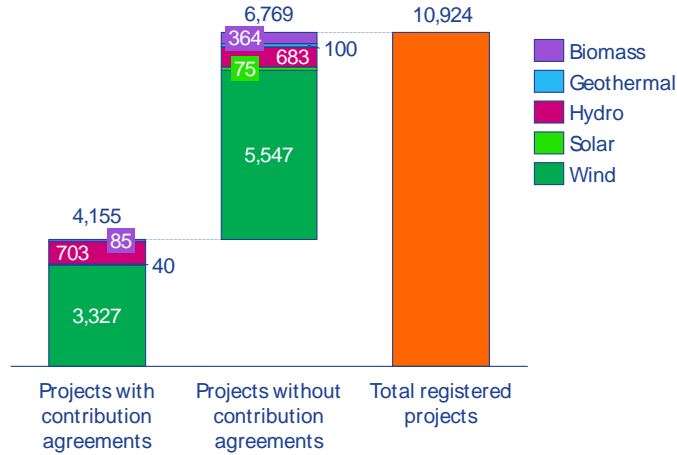
*Prior to joining GE, Mr. Taub was with Cambridge Energy Research Associates (CERA), where he was engaged in research and strategic consulting on energy technology and electric power for a wide range of clients worldwide. Mr. Taub has also worked for the U.S. Department of Energy offices of Environmental Management and of New Production Reactors.*

*Mr. Taub earned master's degrees in Mechanical Engineering and Technology and Policy from the Massachusetts Institute of Technology and a bachelor's degree in Mechanical Engineering from Columbia University. He also completed a US DOE engineering training program at Virginia Polytechnic Institute and State University and classwork in corporate finance at the Harvard University Extension School.*



**Figure 1**

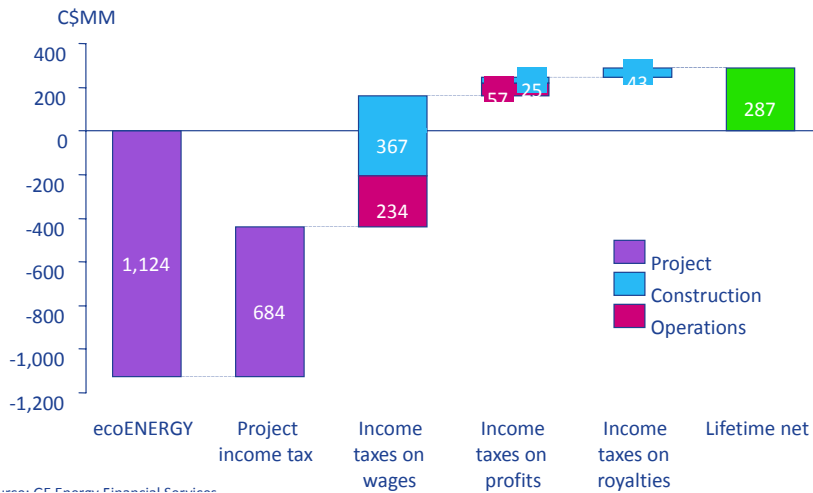
Status of ecoENERGY program as of January 2010 (megawatts)



Source: GE Energy Financial Services using data from NRCan

**Figure 2**

Net Present Value of C\$1.5 B ecoENERGY Program

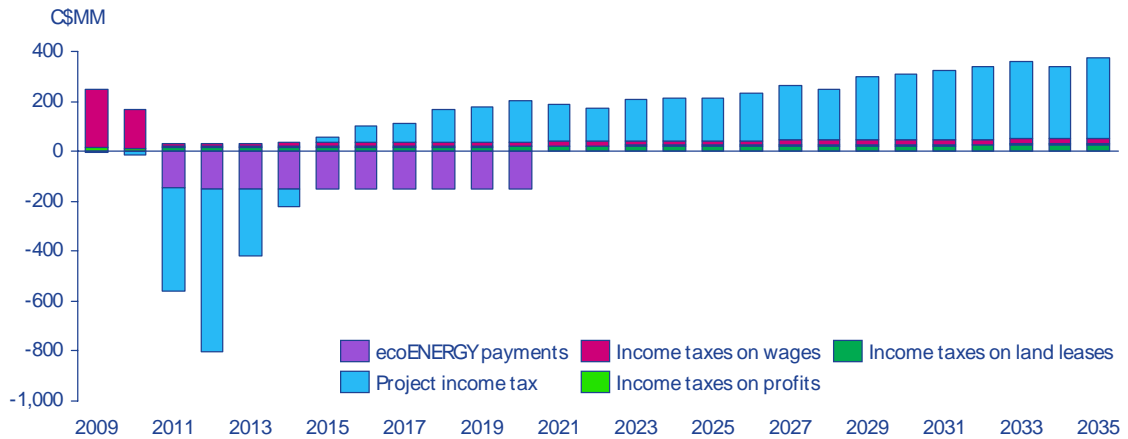


Source: GE Energy Financial Services



**Figure 3**

## Cash Flows to Canadian Government From 5.2 GW of Wind with ecoENERGY



Source: GE Energy Financial Services

IRR of cash flows is 5.5%

NPV = C\$319 MM using 4% government discount rate



**Table 1**

	<b>Jobs*</b>
<b>During construction period</b>	
Direct Impacts	23,172
Construction Sector Only	10,900
Manufacturing Sector Only	11,255
Other Industry Sectors	1,017
Indirect Impacts	11,328
Induced Impacts	15,126
<b>Total Impacts (Direct, Indirect, Induced)</b>	<b>49,626</b>
<b>During operating years (annual)</b>	
Direct Impacts	1,009
Plant Workers Only	469
Non-Plant Workers	540
Indirect Impacts	255
Induced Impacts	578
<b>Total Impacts (Direct, Indirect, Induced)</b>	<b>1,842</b>

\* Jobs refers to full-time equivalent employment for one year



## Appendix A Mapping of Canadian Provinces to US States

Province	Population	Installed wind MW	Pipeline wind MW	Total wind MW	US state analog	Province shares
Newfoundland and Labrador	507.9	54	0	54	AK	1 percent
Prince Edward Island	139.8	152	12	164	ME	2 percent
Nova Scotia	938.3	59	245	304	ME	4 percent
New Brunswick	747.3	96	213	309	ME	4 percent
Quebec	7,750.5	532	2,822	3,354	MI	41 percent
Ontario	12,929.0	1,162	1,170	2,332	MI	29 percent
Manitoba	1,208.0	104	300	404	ND	5 percent
Saskatchewan	1,016.0	171	25	196	ND	2 percent
Alberta	3,585.1	524	201	725	CO	9 percent
British Columbia	4,381.6	0	271	271	WA	3 percent
Yukon	33.1	1	0	1	AK	0 percent
Northwest Territories	43.3	0	0	0	AK	0 percent
Nunavut	31.4	0	0	0	AK	0 percent
<b>Canada total</b>	<b>33,311.3</b>	<b>2,854.8</b>	<b>5,259.0</b>	<b>8,113.8</b>		

Sources:

Population: Statistics Canada, <http://www40.statcan.gc.ca/l01/cst01/demo02a-eng.htm>

Wind capacity: Windpower Monthly, Canada Special Report, Sept 2009