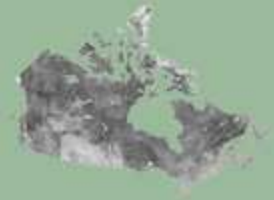


321

DD3

Projet de parc éolien Nicolas-Riou dans
les MRC des Basques et de Rimouski-
Neigette **6211-24-085**



ecoENERGY
an ecoACTION initiative



Getting the Facts on Wind Energy in Canada: Notable Information Derived from the Federal Wind Programs

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Natural Resources Canada

CanWEA 2011 - 27th Annual Conference and Exhibition
October 3-6, 2011
Vancouver, BC



**Natural Resources
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Canada 

Presentation Overview

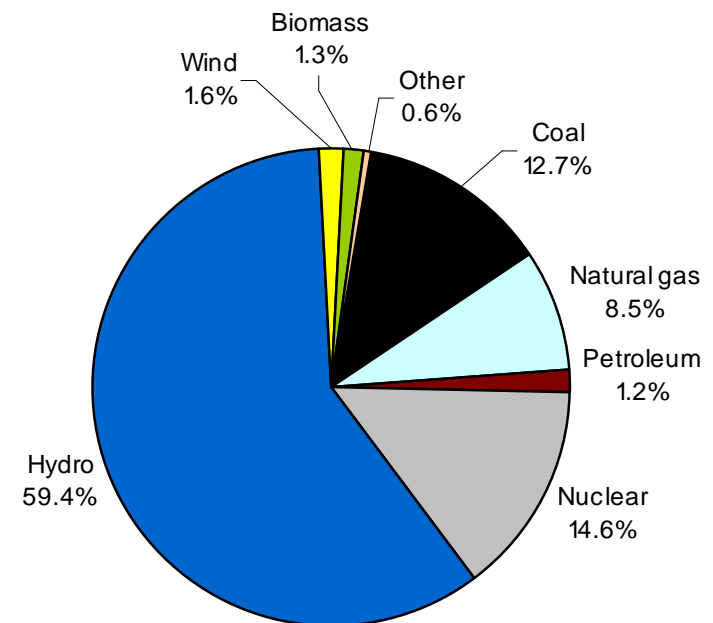
- **Status of Wind Energy in Canada**
- **Results of the ecoENERGY for Renewable Power Program**
- **Performance of Wind Projects**
- **Additional Information from the Incentive Programs**
- **Conclusions**



Status of Wind Energy in Canada

- By end of 2010, installed wind capacity totalled 4 074 MW
 - This generated 1.6 percent of Canadian electricity
- By end of August 2011, wind capacity totalled 4 820 MW
 - 746 MW added in first half of 2011 (almost as much as all of 2010)

Electricity Generation in Canada 2010

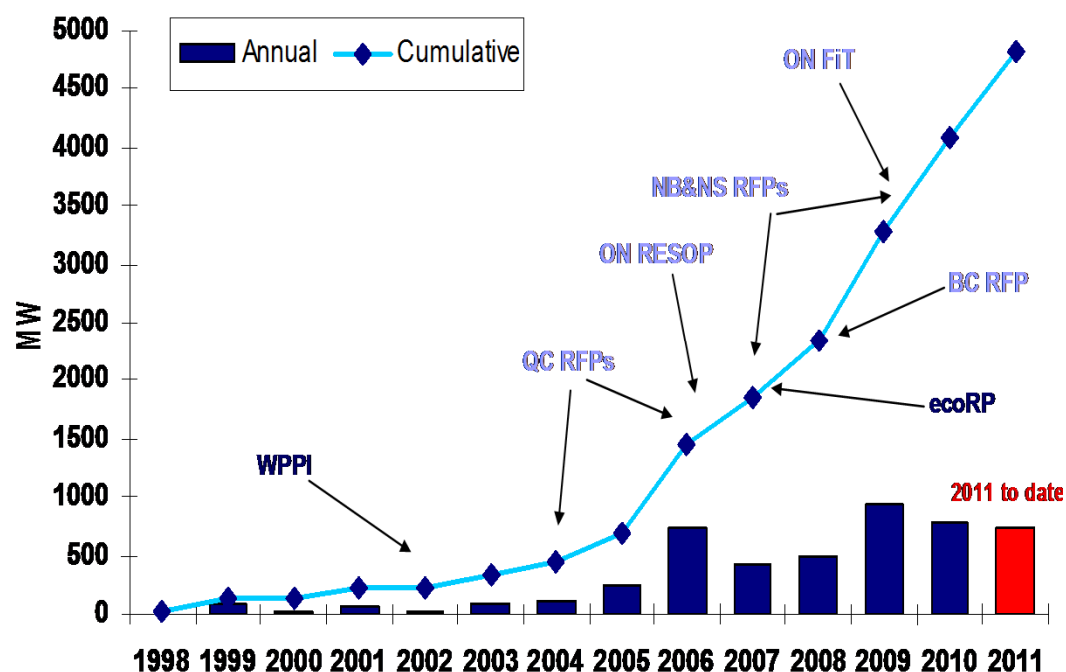


Source: Statistics Canada 57-202 data for 2010



Role of Federal Incentives

- The WPPI and ecoERP incentives played a significant role in kick-starting the wind market in Canada
- WPPI started in 2002, before any provincial initiatives
- ecoERP started in 2007, along with other provincial initiatives
- Since then, all provinces have implemented measures to support wind projects*:
 - Request for Proposals
 - Renewable Portfolio Standards
 - Standard Offer or Feed-in-Tariffs
 - Offset program



Source: CanWEA and NRCan's internal data

Not all provincial initiatives shown

* Note: Electricity is a provincial responsibility



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Federal Initiatives for Clean Energy

- Tax policy
 - Accelerated depreciation of capital assets (Class 43.2) - improve project's rate of return
 - Canadian Renewable and Conservation Expense (CRCE) – full deduction of intangible costs related to project development
- Production incentives
 - Purchase of Electricity from Renewable Resources (PERR): Started 1998 - 145 GWh from Wind and Hydro
 - Wind Power Purchase Initiative (WPPI): Started 2002 - 924 MW Wind
 - ecoENERGY for Renewable Power (ecoERP): Started 2007 – 4 458 MW Wind, Hydro, Biomass and PV
- R,D and D programs
 - Number of programs that support research, development and deployment of renewable technologies – bring cost down
- Enabling Activities
 - Development of codes and standards for renewable technologies



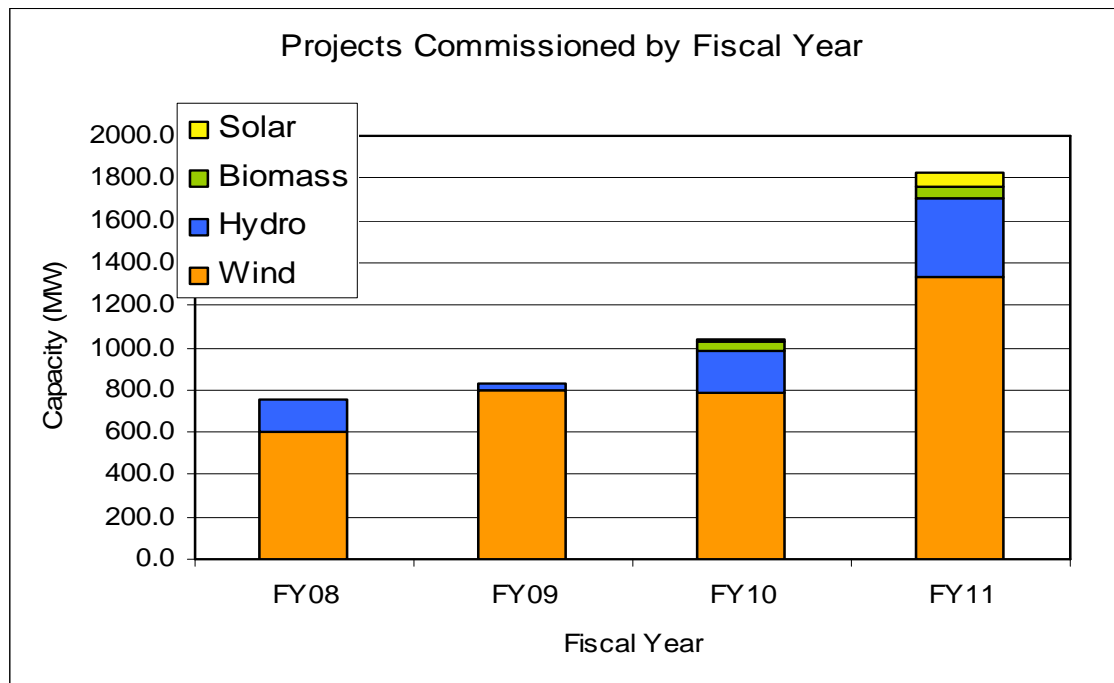
Results of ecoERP Program

- 104 projects with signed contribution agreements:
 - 4 458 MW of installed capacity (target was 4 000 MW)
 - \$1.39 billion in funding over 10 years
 - Expected annual production: 14.2 TWh
 - Expected annual GHG emission reductions*: 6 to 6.6 Mt CO₂

* Using 465.88 Tonnes CO₂ displaced per GWh clean electricity production based on provincial mix at margin



ecoERP Commissioned Projects



Total ecoERP

- Wind: 3,518 MW
- Hydro: 767 MW
- Biomass: 93.5 MW
- Solar PV: 80 MW

67 wind projects were allocated \$1.01 billion in funding over 10 years

- Note that from October 2010 to April 2011, 23 wind projects were commissioned or 1 210 MW in six months!
 - The Canadian wind industry is mature: it can build quickly, in any terrain and in any weather conditions.





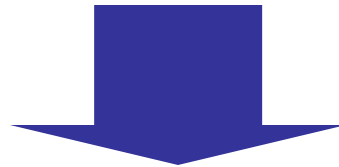
Performance of Wind Projects

Caribou Wind Park, Caribou, NB

Canada

Performance of Wind Projects

- Selection of wind projects in analysis:
 - Data available from WPPI and ecoERP programs
 - In operation for at least one year



**59 projects
meet these criteria**

Note: Data is weighted by size and numbers of days in operation



Projects Included in Analysis

Prov.	Project Name	# Projects	Capacity (MW)
AB	Blue Trail Wind Farm	1	66.0
	Chin Chute Wind Farm	1	30.0
	Kettles Hill Wind Project	1	54.0
	Magrath Wind Power Project	1	30.0
	McBride Lake Windfarm	1	75.2
	Soderghen Wind Power Project	1	70.5
	Summerview Wind Farm Phase II	1	66.0
	Summerview Wind Turbine	1	1.8
	Summerview Windfarm Phase I	1	68.4
	Taber Wind Power	1	81.4
	AB Total	10	543.3
MB	St. Leon Wind-Energy Project	1	80.9
MB Total		1	80.9
SK	Centennial Wind Farm	1	149.4
	Cypress Wind Power Facility Expansion	1	4.6
	Cypress Wind Power Project	1	5.9
SK Total		3	160.0
Prairies Total		13	784.2

NB	Caribou Wind Park (Phase I)	1	99.0
	Kent Hills Wind Farm	1	96.0
NB Total		2	195.0
NS	Dalhousie Mountain Wind Farm	1	51.0
	Glance Bay Langan Wind Farm	1	11.5
	Maryvale Wind Farm	1	6.0
	Pubnico Point Wind Farm	1	27.0
NS Total		4	95.5
PE	Aeolus Wnd PEI Turbine	1	3.0
	East Point Wind Plant	1	30.0
	North Cape Wind Farm-Phase II	1	5.3
	Norway Wind Park	1	9.0
	Summerside Wind farm	1	12.0
	West Cape Wind Park (Phase II)	1	79.2
PE Total		6	138.5
Maritimes Total		12	429.0

BC	Bear Mountain Wind Park	1	102.0
BC Total		1	102.0
NL	Fermeuse Wind Project	1	27.0
	St. Lawrence 27 MW Wind Energy Project	1	27.0
NL Total		2	54.0
Not Used Regional Breakdown		3	156.0

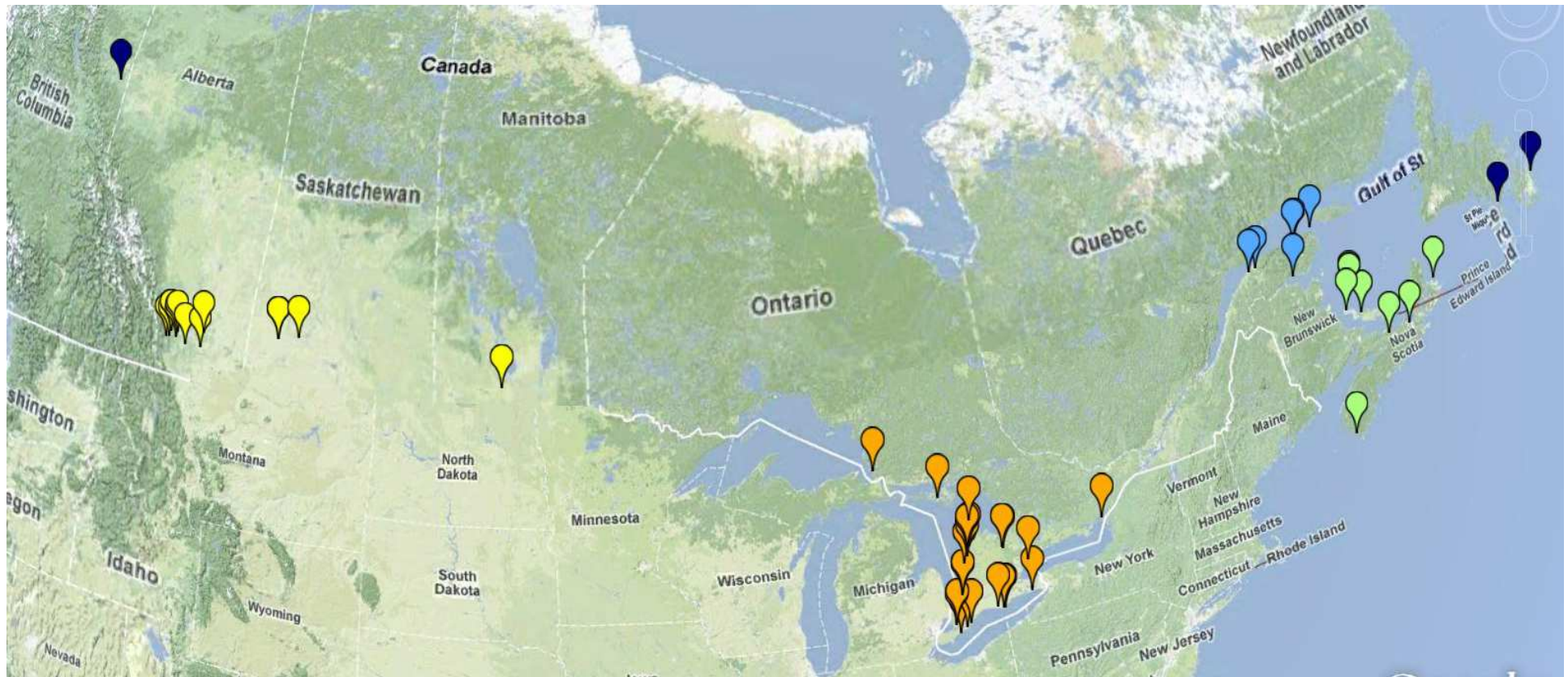
Prov.	Project Name	# Projects	Capacity (MW)
ON	Bisnett Wind Farm	1	10.0
	Clear Creek Wind Farm	1	9.9
	Cruikshank Wind Farm	1	8.3
	Cultus Wind Farm	1	9.9
	Enbridge Ontario Wind Power Project A & B	1	181.5
	Erie Shores Wind Farm	1	99.0
	Ferndale Phase II Wind Farm	1	3.3
	Frogmore Wind Farm	1	9.9
	Front Line Wind Farm	1	10.0
	Huron Wind	1	9.0
	Kingsbridge Wind Power Project-1	1	39.6
	Kruger Energy Port Alma Wind Power Project	1	101.2
	Marsh Line Wind Farm	1	10.0
	Melanchton Grey Wind Project	1	67.5
	Melanchton II Wind Project	1	132.0
	Mohawk Point Wind Farm	1	9.9
	Prince Wind Energy Project	1	189.0
	Proof Line Wind Farm	1	6.6
	Providence Bay Wind Farm	1	0.8
	Ravenswood Wind Farm	1	9.9
	Ripley Wind Power Project	1	76.0
	Swanton Line Wind Farm	1	10.0
	Toronto Waterfront Wind Turbine Project	1	0.8
	Wolfe Island Wind Project	1	197.8
ON Total		24	1,201.8

QC	Parc éolien de Baie-des-Sables	1	109.5
	Parc éolien de Carleton	1	109.5
	Parc éolien de l'Anse-à-Valleau	1	100.5
	Parc Éolien du Mont Copper	1	45.0
	Parc Éolien du Mont Miller	1	54.0
	Parc Éolien Jardin D'Éole	1	127.5
QC Total		6	546.0

Grand Total		59	3,117.0
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Regional Breakdown



BC

- 1 project
- 102 MW

Prairies

- 12 projects
- 652 MW

Ontario

- 18 projects
- 957 MW

Quebec

- 5 projects
- 419 MW

Maritimes

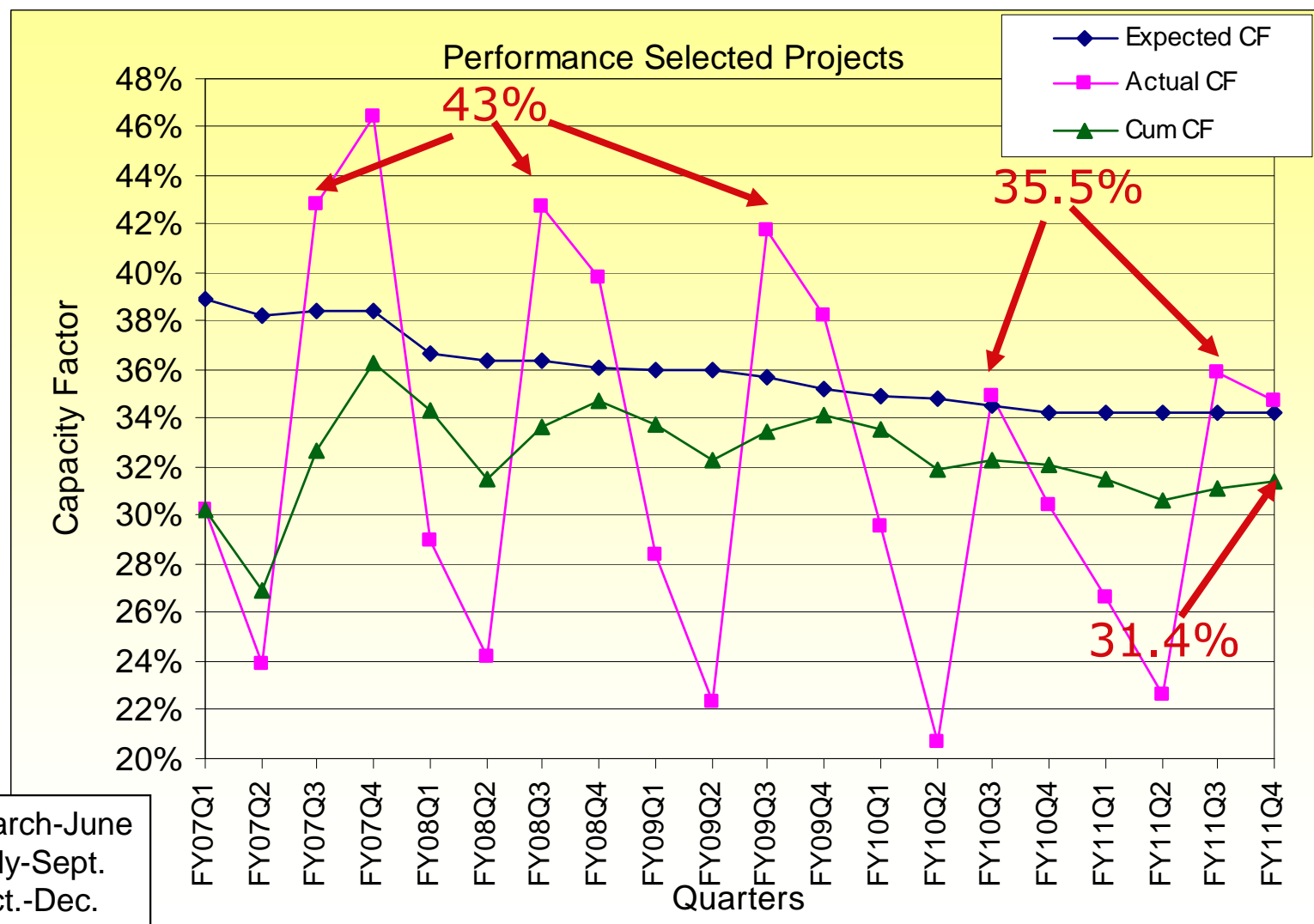
- 9 projects
- 288 MW

NFLD

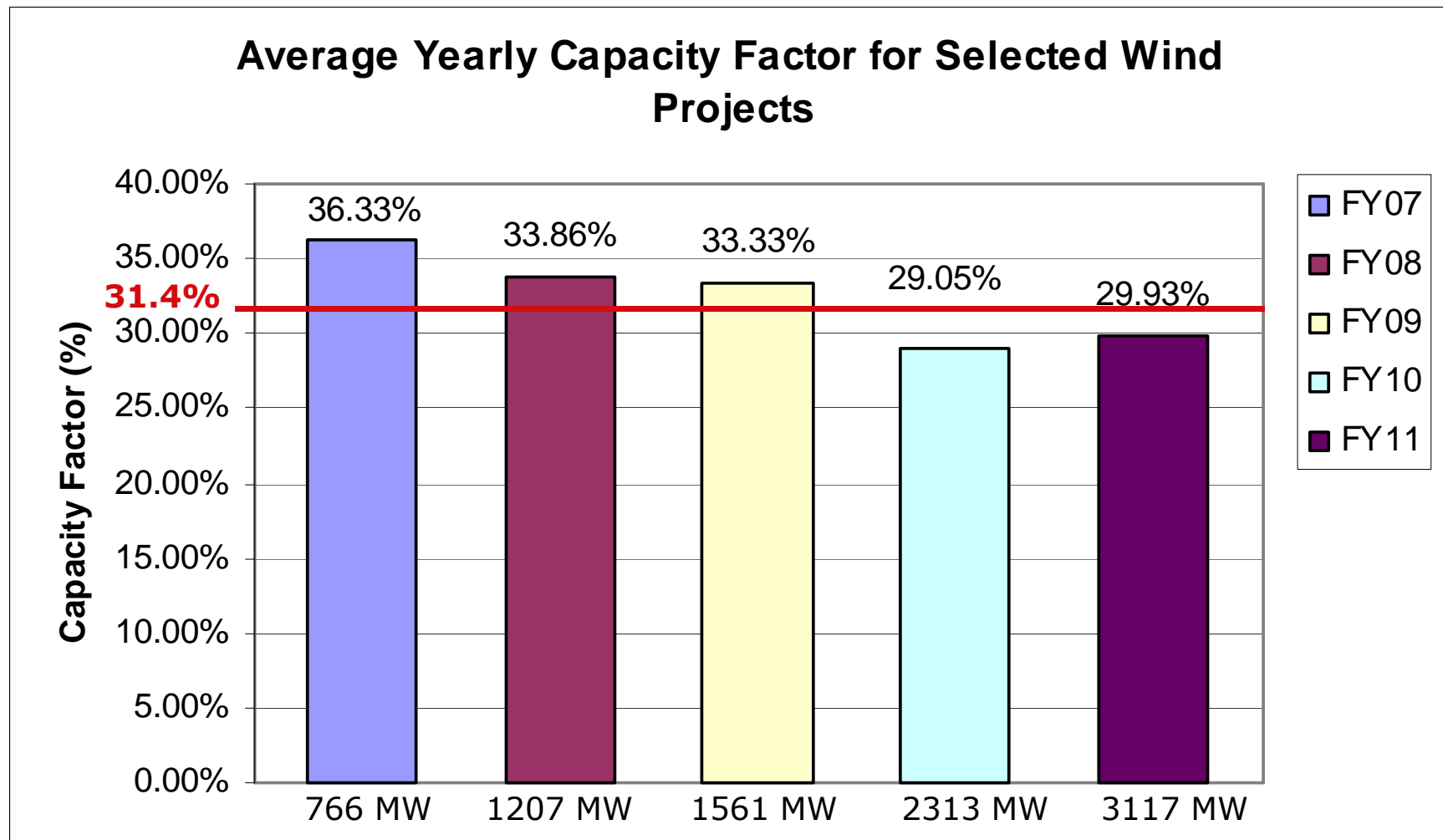
- 2 projects
- 54 MW



Performance of 59 Wind Projects by Quarter



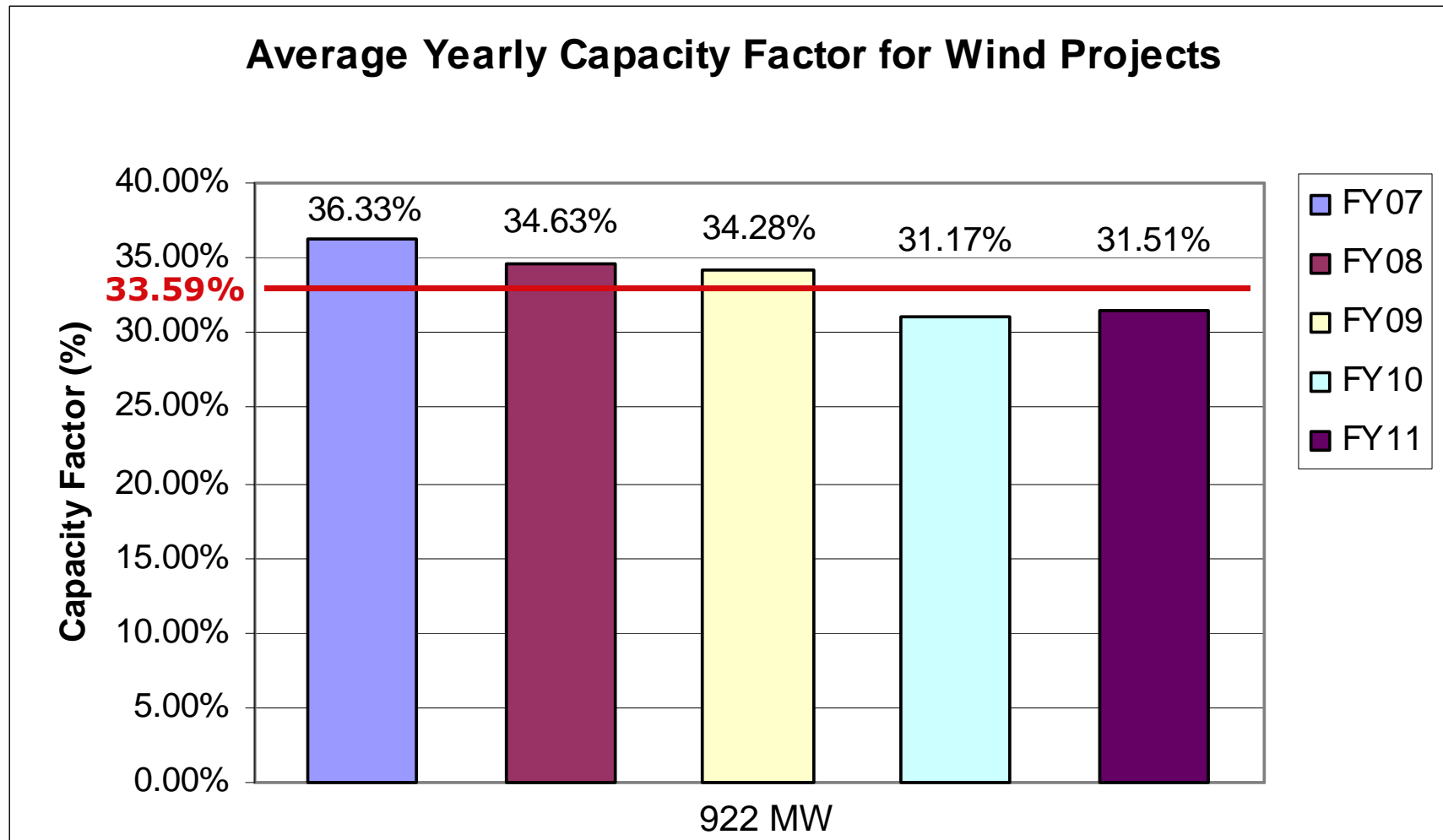
Annual Performance 59 Wind Projects



Red line shows cumulative capacity factor for the 5 years shown



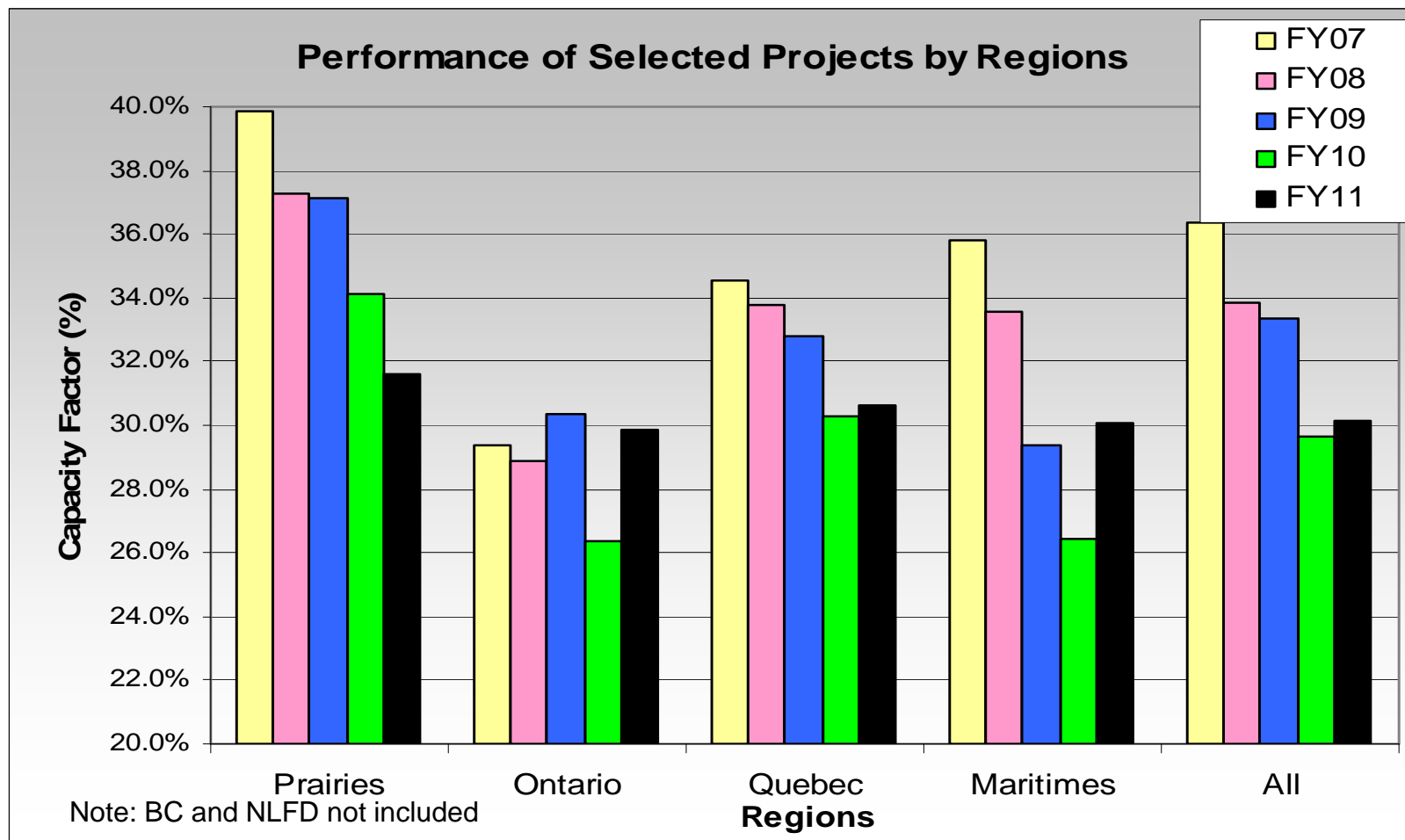
Annual Performance (WPPI Only)



Red line shows cumulative capacity factor for the 5 years shown



Regional Performance Summary



- Variation of performance is different from region to region and does not follow the same yearly pattern.

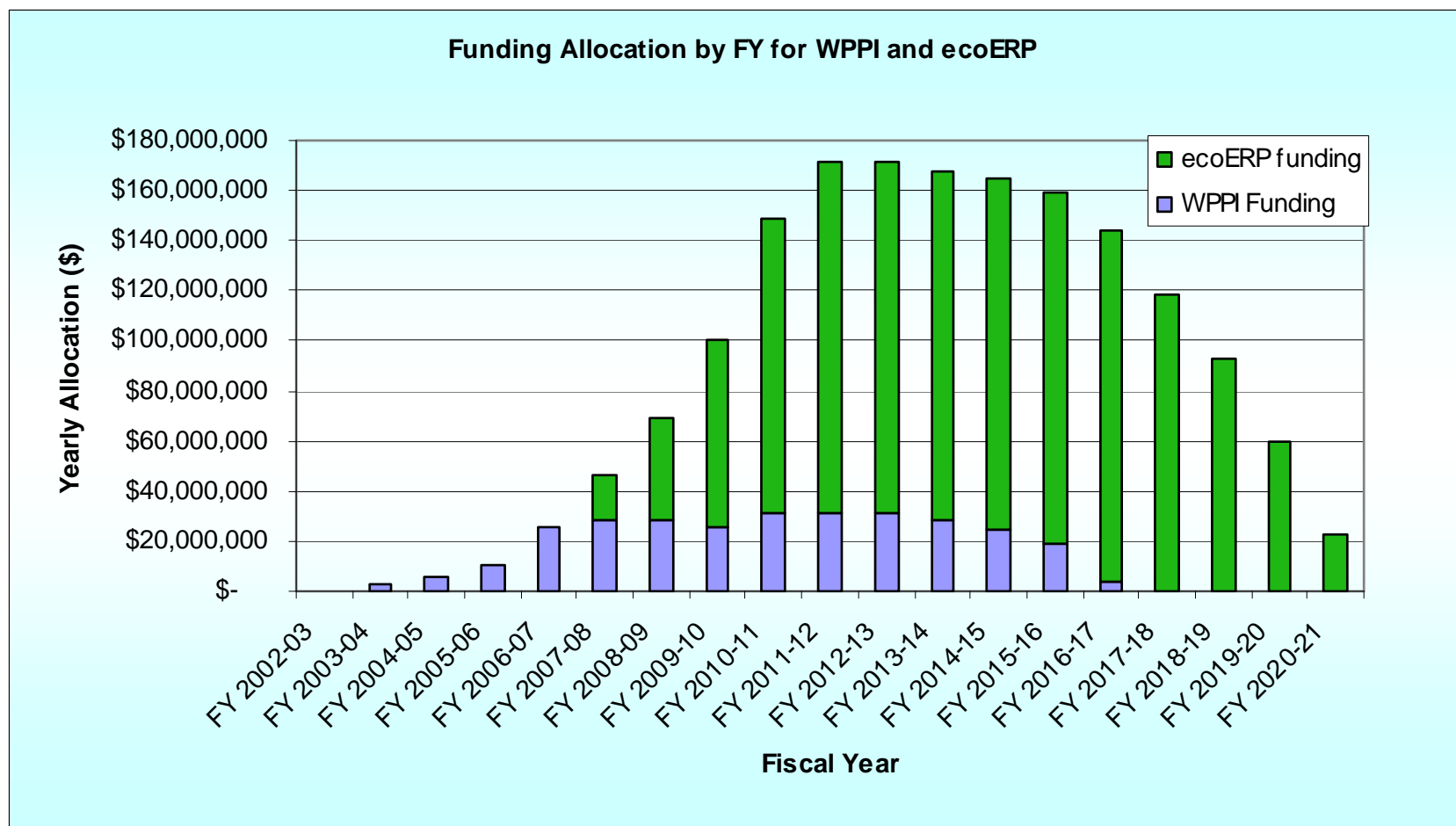




Additional Information from the Incentive Programs

Kent Hills Wind Farm Expansion, Kent Hills, NB

On-Going Incentive Programs



- Both WPPI and ecoERP are on-going; the programs end in March 2017 and March 2021.
- The federal government will be paying more than \$160 millions per year during the next 5 years. The last projects will be funded until March 31, 2021.

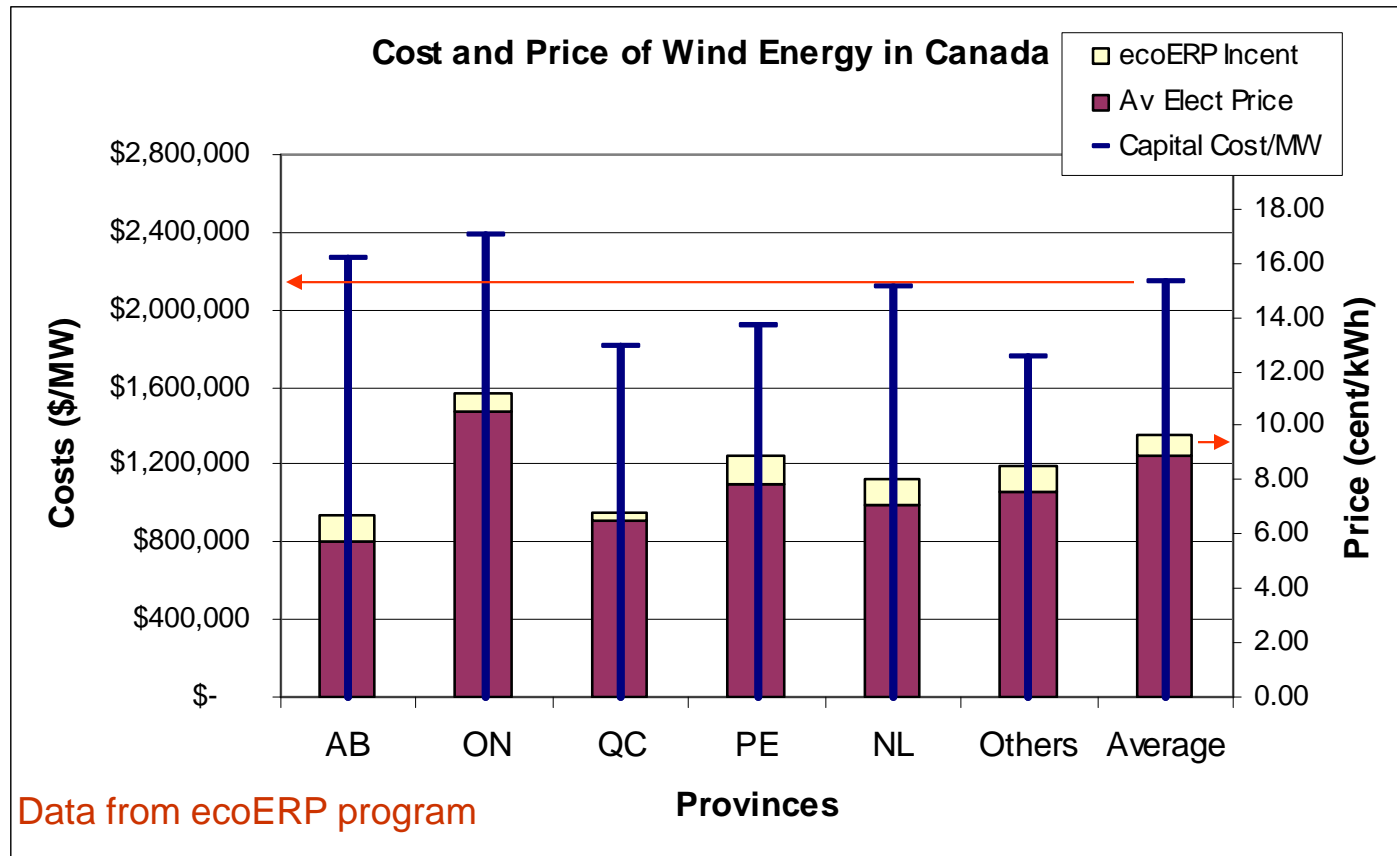


Specific Results of Incentive Programs

- Wind Power Production Initiative (WPPI):
 - Capacity: 924 MW
 - Expected Yearly Production: 3.1 TWh for 10 years
 - Expected emission reduction: 1.1 MtCO₂/year
- ecoENERGY for Renewable Power (ecoERP):
 - Capacity: 4458 MW
 - Expected Yearly Production: 14.2 TWh for 10 years
 - Expected emission reduction: 6 to 6.6 MtCO₂/year
- Total GHG reduction over 20-year average project life:
 - 140 to 150 Mt CO₂ reduction from WPPI and ecoERP funded projects between 2002 and 2031



Cost and Price of Wind Energy (ecoERP)



- Average capital cost of installing wind farms between 2007 and 2010: 2.14 M\$/MW
- Average electricity price obtained from these projects: 9.67 cents/kWh (with ecoERP incentive)



Conclusions...

- Importance of federal programs in implementing wind and renewable projects:
 - WPPI and ecoERP kick-started the development of wind and renewable markets until provinces started their own initiatives
 - All provinces have implemented measures that support implementation of wind projects
 - Wind represents 1.6% of electricity generation (2010) in Canada and is growing at a fast pace
 - Wind capacity is likely to be over 5 000 MW by end of 2011



...Conclusions

- Results of Incentive Programs:
 - The WPPI and ecoERP programs will pay a total of \$1.68 billion for renewable projects between 2002 and 2021 (\$1.31 billion for wind alone)
 - The programs funded 5 382 MW of new clean renewable energy capacity, of which 4 442 MW is from wind
 - Projects are expected to generate about 17.3 TWh per year for a minimum lifetime of 20 years, well after both programs have ended
 - These will displace from 140 to 150 Mt CO₂ emission reduction until 2031
 - On average, projects are underperforming by about 5 to 10% of expectation (not just wind). This will have an impact on expected results





Thank You / Merci!

- Visit our web site / Visitez notre site internet:
 - <http://ecoaction.gc.ca/ecoRP>
 - <http://ecoaction.gc.ca/ecoER>
- Contact us / Contactez-nous:
 - E-mail: ecoenergyrp@nrcan.gc.ca
 - Courriel: ecoenergieer@nrcan.gc.ca

Front Line Wind Farm, Morpeth, ON

