The Effect of Climate Change Programs on the North American Renewable Power Sector

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Introduction

- Climate Change and the Kyoto Protocol
- Climate Change Programs in North America
- North American Renewable Power Sector
- Effect of Climate Change Programs on the North American Renewable Power Sector
- Conclusions

Climate Change Programs – Kyoto Protocol

- Negotiated in 1997
- Requires an average 7% reduction in GHG emissions over 1990 baselines by 2012 from 38 Annex I countries
- Non-Annex I countries not required to reduce but may reduce emissions and sell credits
- Emissions trading integral part of program
  - Between Annex I countries
  - From projects in Annex I countries (Joint Implementation “JI”)
  - From projects in Non-Annex I countries (Clean Development Mechanism “CDM”)
- Will enter into force for 128 parties on February 16, 2005.

Climate Change Programs - US

- Opted out of Kyoto
  - No emission reduction requirements
  - No emission trading opportunities for projects in the US but US firms may invest in projects outside the US and sell credits
- Federal Level
  - Administration
    - Voluntary 18% reduction in GHG emissions intensity by 2012
    - Voluntary emissions reporting
  - Congress
    - McCain-Leiberman/Gilchrest-Olver Climate Stewardship Act
      - Cap 2010 emissions at year 2000 levels from electricity generation, transportation, industry and commercial economic sectors and allow trading.
      - Failed by 43-55 Senate vote in October 2003.

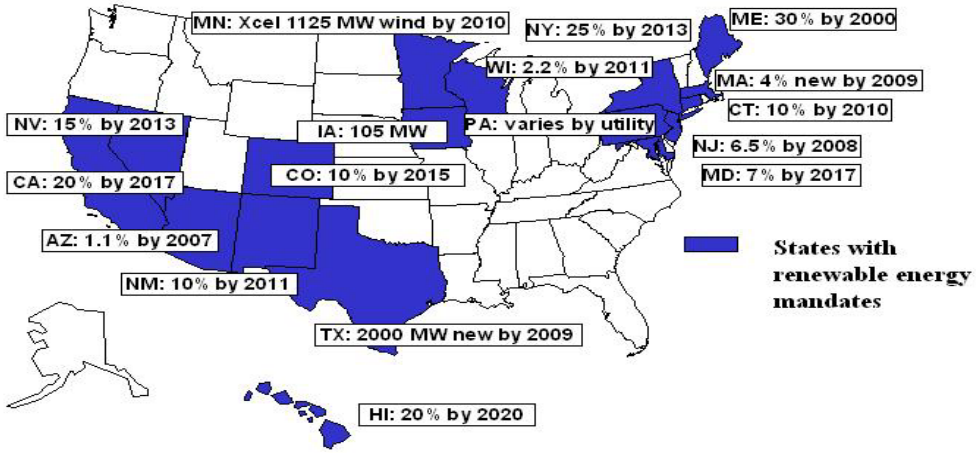
Climate Change Programs - US

- State level: 1000 flowers blooming
  - Regional Programs –
    - Regional Greenhouse Gas Initiative (RGGI)
      - Cap and trade system for reducing GHG emissions
      - Focused initially on power plant emissions
    - New England Governors/Eastern Canadian Premiers Climate Change Action Plan
      - 1990 levels by 2010
      - 10% below 1990 levels by 2020
    - Western Regional Governors Association
      - 30,000 MW of clean energy by 2015
      - 20% improvement in energy efficiency by 2020

Source: Pew Center for Climate Change

Climate Change Programs - US

- 1000 Flowers Continued
  - Carbon Cap or Offset requirements for power plants
  - Renewable energy mandates



Source: Pew Center for Climate Change

Climate Change Programs - US

- Chicago Climate Exchange
  - Voluntary GHG emissions reduction exchange
  - Members agree to reduce emissions every year for four years
  - Reductions can occur from offset projects outside US and be traded
- Shareholder actions
  - CERES agreements with Southern, TXU and Reliant to report emissions
- Litigation
  - Suit in public nuisance by CT, CA, IA, NY, RI, VT, WI, and NYC
  - Against AEP, Southern, TVA, Xcel and Cinergy

Climate Change Programs - Mexico

- Preparing to host CDM projects
  - Designated National Authority (DNA)
    - Still finding its way, not yet proven its efficiency
  - Agreements with Netherlands and Japanese Bank for International Cooperation for support on CDM projects in Mexico
- Good direct foreign investment climate
- Large potential for CDM projects
  - Some small scale projects validated, including hydroelectric projects
  - Few mature larger projects
- Could be significant demand for CDM credits
  - Europe, Japan, Canada
  - Europe alone could demand 100 million tons CO_2 equivalent/year from 2008-2012 of JI and CDM credits
  - Credit prices are hard to predict but could range from € 10-20/ton CO_2

Renewable Power Sector - Mexico

- Mexico has considerable, renewable resources
  - 52,000 MW hydro potential, of which 9,000 MW operating
  - 5,000 MW wind potential, 2,000 MW in the Isthmus of Tehuantepec
- Regulatory structure
  - A model “Interconnection Agreement for Renewable Sources of Energy” published by the CRE regulates the connection and swaps of energy between “self-supply” companies developing solar, wind and small hydro projects and the two public utilities (CFE, Luz y Fuerza).

Renewable Power Sector - Mexico

- The Interconnection Agreement addresses intermittency issues through an “Energy Banking” mechanism:
  - Sources deliver energy to the grid whenever they can generate and their customers take energy from grid whenever they need it.
  - Excess energy delivered to the grid during each hourly period (peak, semi-peak, intermediate, base) may be applied to offset deficits in any hourly period and month over a 12-month cycle.
  - If there is no surplus to offset a monthly deficit, the utilities invoice the “shortfall energy” under “normal supply agreements”.
  - If the self-supply company ends the 12-month cycle with a surplus, it must sell it to the utility at 85% of the “total short-term cost”
- CRE has also published model transmission agreements and rules to set wheeling charges for renewable sources.

Effect of Climate Change Programs on Renewables Market - Mexico

- CDM credit (CER) sales could be an additional stream of hard currency revenue for renewable power projects
- Projects must address additionality
  - CDM projects must show would not have happened but for ability to sell credits
    - Identify otherwise insurmountable barriers to proposed project
      - Financial
      - Institutional
    - Demonstrate that the proposed project will overcome barriers because of its status as a CDM project
      - Financial benefits
      - Institutional benefits of collaberation
      - Capacity building benefits

Effect of Climate Change Programs on Renewables Market - Mexico

- Additionality continued...
  - Analyze other activities similar to proposed project
    - Similar if same country, similar technology, similar scale
    - Catch 22 - the more successfully implemented projects like yours, the more difficult it is to show barriers and additionality

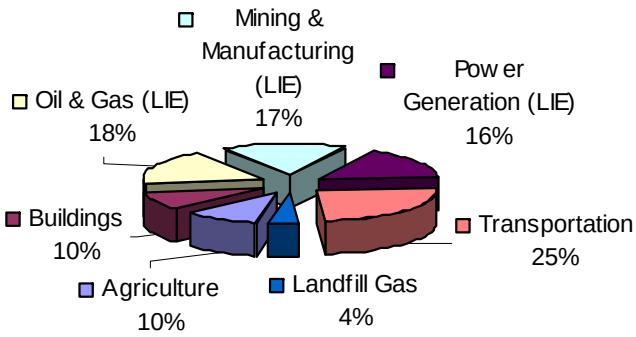
- Institutional Barriers
  - Multiple parties and agencies involved (public utilities, municipalities, states) - - but support by CRE and SENER
  - Wheeling arrangements still unclear -- but IPP projects may be tendered (no wheeling needed)

- Renewable projects are happening
  - El Gallo Hydro plant
  - Others planned but still a trickle, not a flood

Climate Change Programs in Canada

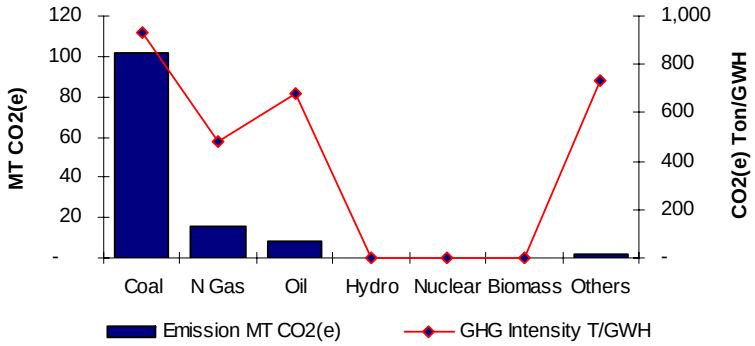
- Climate Change Plan for Canada
- 240 MT reduction target – in three phases
  - Stage I: 80 MT reduction – actions underway
  - Stage II: 100 MT reduction – new programs
  - Stage III: 60 MT "gap"
- Large Industrial Emitters ("LIE")
  - Industrial, power, oil & gas, mining, manufacturing
  - 55 MT reduction target
  - Covenant with backup + emissions trading
  - Emission intensity is the key – no fixed cap
  - Gov guaranteed price ceiling?
- Process/Issues:
  - Provincial jurisdiction
  - Regional distribution of emission vs. reduction burden
  - Energy export

Canada: Emission by Sector in 2010



Source: Climate Change Plan for Canada

2002 Emission Intensity in Electric Generation



Source: Environment Canada

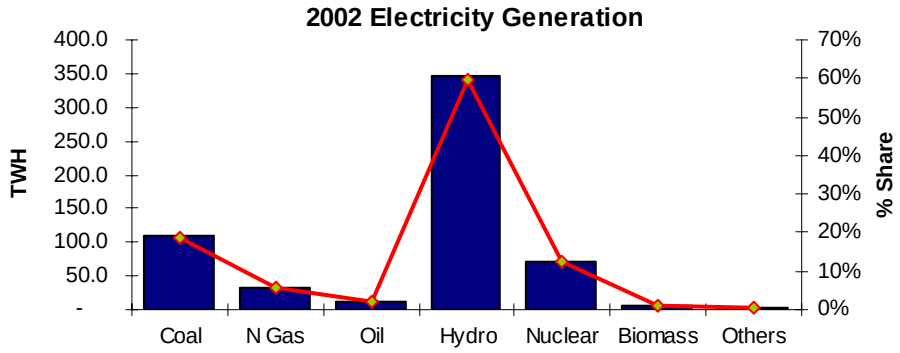
Renewable Energy Sector in Canada

- Hydro vs. “emerging renewables”
- Wind power – early stages, but strong growth
- Supporting policies emerging
  - Mostly driven by provinces
  - Significant Federal initiatives
- Deal structures are competitive
  - Better credit support
  - Access to competitive financing markets
- Strong sponsors emerging

Canadian Wind Power Capacity

Province	Installed	Proposed
BC		2,585
Alberta	269	985
Saskatchewan	11	167
Manitoba		125
Ontario	15	4,601
Quebec	113	1,150
Newfoundland		288
PEI	14	60
Nova Scotia	5	652
New Brunswick		193
Yukon	1	
NWT		
Nunavut		
Total	**427**	**10,807**

Source: Alyra and CanWEA



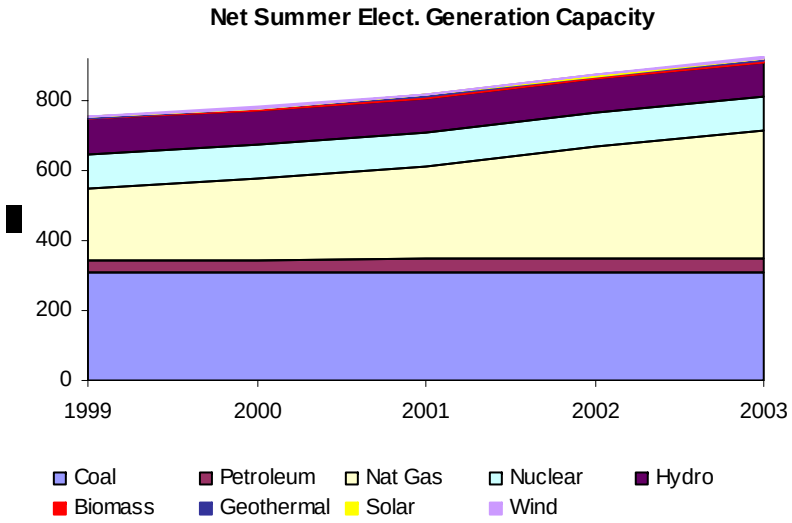
Source: Environment Canada

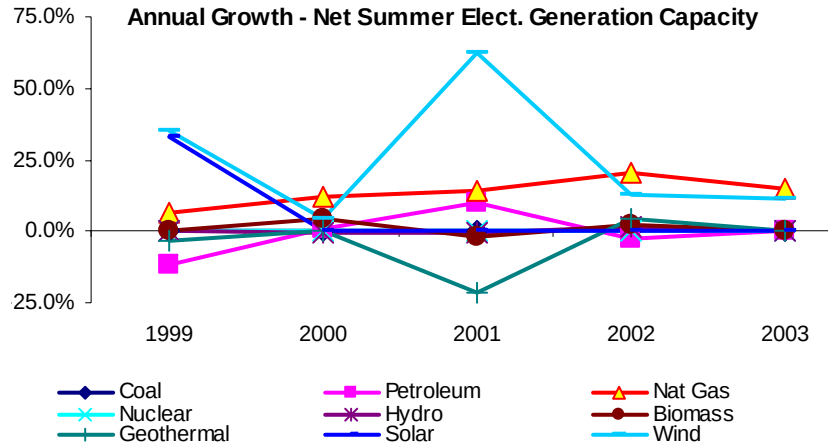
Effect of Climate Change Programs on Renewable Energy in Canada

- Emission reduction target from renewable energy is modest
  - 6.9 MT reduction through Federal incentives and Provincial programs
  - 10% renewable target for new generation
  - 20% of Federal power from renewables
- LIE system does not include renewable energy
- Not clear if renewables will be provided emission credits
  - Leakage
  - Displacement verification, emission intensity
  - Double counting
- Displacement of fossil units by renewables?
  - Coal marginal cost still cheaper (given emission intensity and price cap discussions)
  - Efficient CC gas units will be more competitive with wind power
  - Regulated markets – provincial policy key

Renewable Energy Sector in the U.S.

- Very small part of a large pie
- Wind vs. other renewables
  - Growth
  - Economics
  - Transmission
  - Resource
- Drivers for strong wind power growth
  - State RPS
  - Economics + gas price
  - PTC: a blessing and a curse?
- Renewables outlook
  - Long term outlook is strong
  - 10 GW incremental capacity by 2010?





Source: EIA

Effect of Climate Change Programs on Renewable Energy in the U.S.

- Renewable and Climate programs mix, indirectly...
  - RECs that allow investments out of district address climate issue
  - No federal climate program, so states using available policy mechanisms, like RECs
- State policies are strongest driver for US renewable energy investments
- Fuel diversity, environmental impact and economic development issues have been the discussion points.

Conclusion

- Vast potential for renewable energy growth in North America. The ingredients are there: resource, emerging policy environment and investment appetite.
- Climate change programs will play a role in renewables, albeit an indirect role.
  - Mexico: Lots of potential, and there are signs of progress, but no substantial investments expected until the interconnection issues and investment structure issues are fully clarified.
  - Canada: Climate change programs may induce renewables, depending on structure. Regardless, Provincial policies will continue to drive renewable growth.
  - US: Climate change issues do not have direct impact. State programs and energy dependency issues are the key factors.

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