Commission for Environmental Cooperation
Building the Renewable Energy Market in North America

October 28 – 29, 2004 - Montreal

Renewable Energy Potentials in Canada

Martin Tampier – Environmental Intelligence
On behalf of the Clean Air Renewable Energy Coalition
http://www.cleanairrenewableenergycoalition.com

CLEAN AIR RENEWABLE ENERGY COALITION

Clean Air Renewable Energy Coalition

Key Points

- Started in December 2000
- Founded by Suncor Energy Inc. and Pembina Institute
- Brings together a ‘Counter-Intuitive Group of Strange Bedfellows’ not the ‘Usual Suspects’
- Laser focussed on advancing Green Power (as defined by Eco Logo) in Canada
- Members forced to ‘check their biases at the door’ in working on Coalition matters

CLEAN AIR RENEWABLE ENERGY COALITION

Who we are

Members:

AIM PowerGen Corporation

Axor

BC Hydro

BP Canada Energy Company

Benign Energy Canada Inc.

Canadian Hydro Developers

Enmax

Federation of Canadian Municipalities

Friends of the Earth

International Institute for Sustainable Development

Ontario Power Generation Inc.

Pembina Institute

Pollution Probe

Shell Canada Limited

Suncor Energy

Toronto Atmospheric Fund

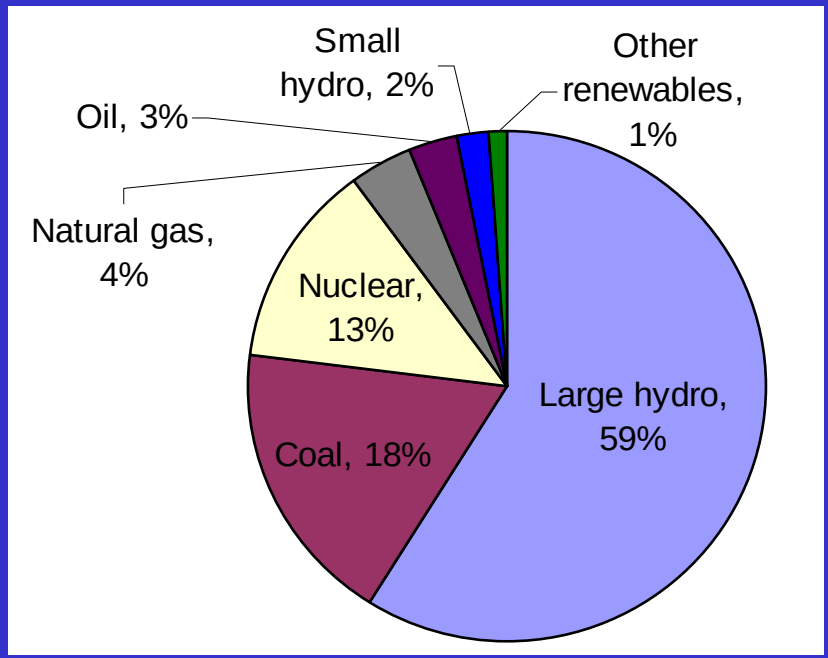
Toronto Environmental Alliance

Toronto Hydro

CLEAN AIR RENEWABLE ENERGY COALITION

Canada – Current Status (2004)

Technology	Installed Capacity (MW)
Onshore Wind	439
Offshore Wind	0
Small Hydro	1,800
Solar PV	10
Biomass	1,628
Landfill Gas	85
Geothermal	0
Wave Energy	0
Tidal Energy	20



CLEAN AIR RENEWABLE ENERGY COALITION

Green Power Potential – Who knows?

- Pollution Probe 2002 study "Promoting Green Power in Canada" was first attempt to bring numbers together
- Extended and refined during 2003/2004 Workshop series (Final Report at www.pollutionprobe.org)
- Clean Air Renewable Energy Coalition VISION document
- Marbek case study "Ecological Fiscal Reform" (NRTEE, 2004)
- NRCan – CETC Varennes (André Filion), 2004

CLEAN AIR RENEWABLE ENERGY COALITION

Wind Power Potential

Is a function of:

- Overall wind resource
- Location of sites
- Transmission capacity
- Intermittency and backup power
- NIMBY
- Overall wind resource estimated at 100,000 MW (CanWEA) (Germany today: 14,000 MW+)
- Today's grid can take about 40,000 MW of intermittent resources
- NRCan estimate for 2025: 25,000 MW
- Wind Atlas now available on the Internet

- Offshore wind: minimum of 2,500 MW (both coasts, plus Great Lakes)

CLEAN AIR RENEWABLE ENERGY COALITION

Small Hydro

- Mostly run-of-river hydro – no storage beyond 48 hours
- Small Hydro Atlas identifies 11,000 MW for Canada
- Marbek Assessment (NRTEE): max. of 10,000 MW by 2020
- Clean Air Renewable Energy Coalition: 57 TWh (13,000 MW)
- Pollution Probe: at least 9,000 MW
- NRCan: 6,500 MW by 2025

CLEAN AIR RENEWABLE ENERGY COALITION

Geothermal

- Only economical in British Columbia (Yukon has resources, but remote)
- Overall potential estimated to be 3,000 MW (industry estimate)
- First 100 MW plant scheduled for 2007

CLEAN AIR RENEWABLE ENERGY COALITION

Solar PV

- CanSIA estimate: 70,000 MW on buildings (optimal orientation only)
- Current amount: 10 MW
- NRCan estimate: 10,000 MW (overoptimistic)
- Mid-term contribution expected to be moderate
- Encouraged by net metering programs

CLEAN AIR RENEWABLE ENERGY COALITION

Biomass

- Very diverse resource
- 170 MW from landfills with capturing systems; 250 MW including others
- 780 MW from agricultural waste digesters (Alberta Research Council estimate)
- NRCan: 650 MW of biogas/flare gas/waste gas by 2025
- 1,600 MW already being used in pulp & paper sector
- Little additional forestry waste available, but bad data
- Marbek estimate: max. 6,000 MW by 2020
- Coalition estimate: min. 47 TWh or 6,700 MW

CLEAN AIR RENEWABLE ENERGY COALITION

Ocean Energy

- **Tidal power** potentials assessed in BC: up to 3,000 MW, southern BC coast only
- East coast estimate: up to 1,000 MW
- **Wave power:** BC Hydro assessment was 6,100 MW
- East coast estimate: 4,000 to 10,000 MW
- NRCan: 2,000 MW by 2025

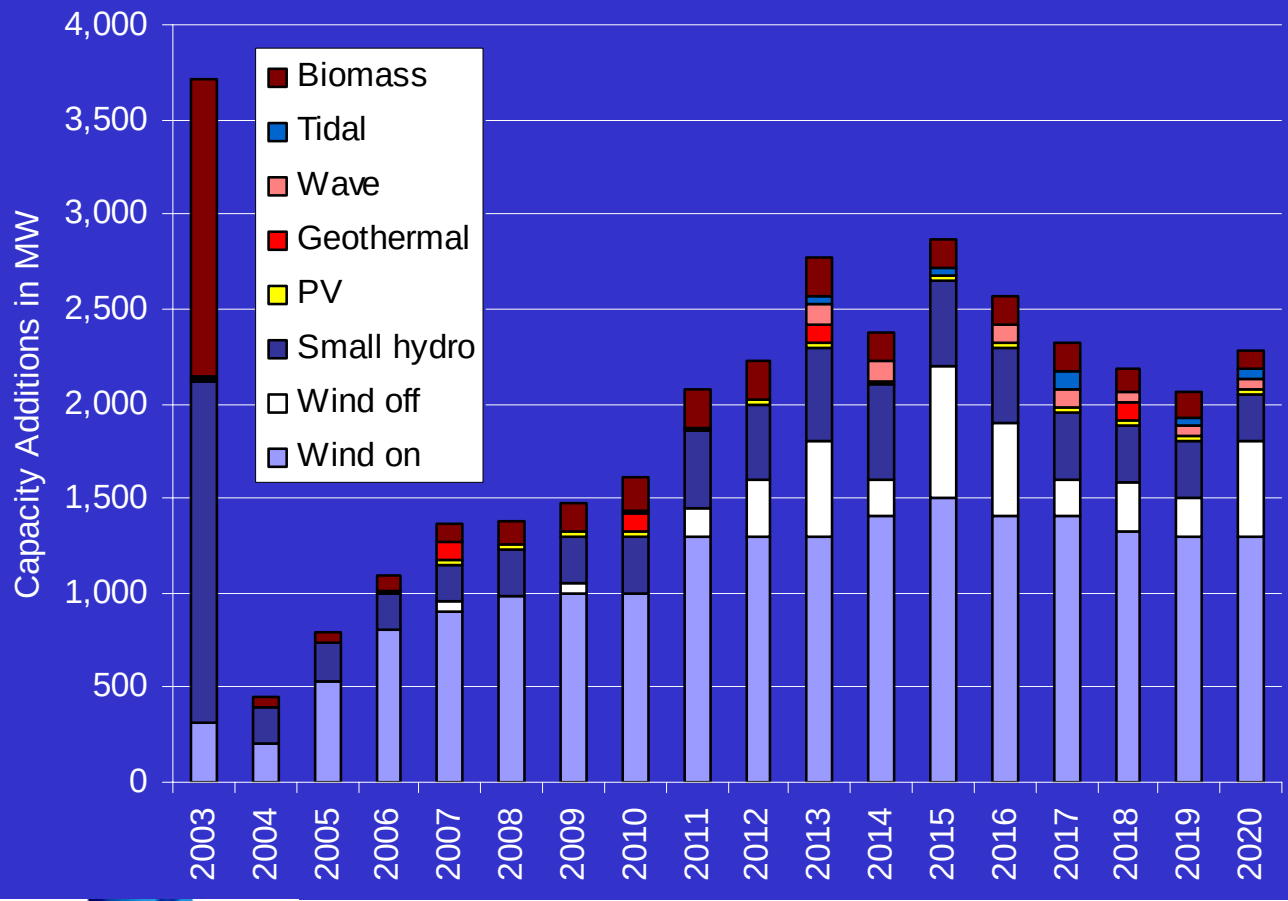
CLEAN AIR RENEWABLE ENERGY COALITION

Technical Potentials

Technology	Technical Potential (MW)	Capacity Factor (%)	Overall Generation Potential in Canada
Wind (onshore)	>40,000	30	>105,120 GWh
Wind (offshore)	>2,500	40	>8,760 GWh
Small hydro	>9,000	50	>39,420 GWh
Solar PV	>70,000	14	>86,000 GWh
Biomass	(7,000 or more)	80	49,000 GWh or more*
Geothermal	3,000	95	25,000 GWh
Tidal Energy	3,000 or more	30	7,884 GWh or more
Wave Power	10,100–16,100	30	26,543 GWh or more
Total	**>140,600**		**347.7 TWh or more**
Conventional (current annual generation in Canada)			603.2 TWh

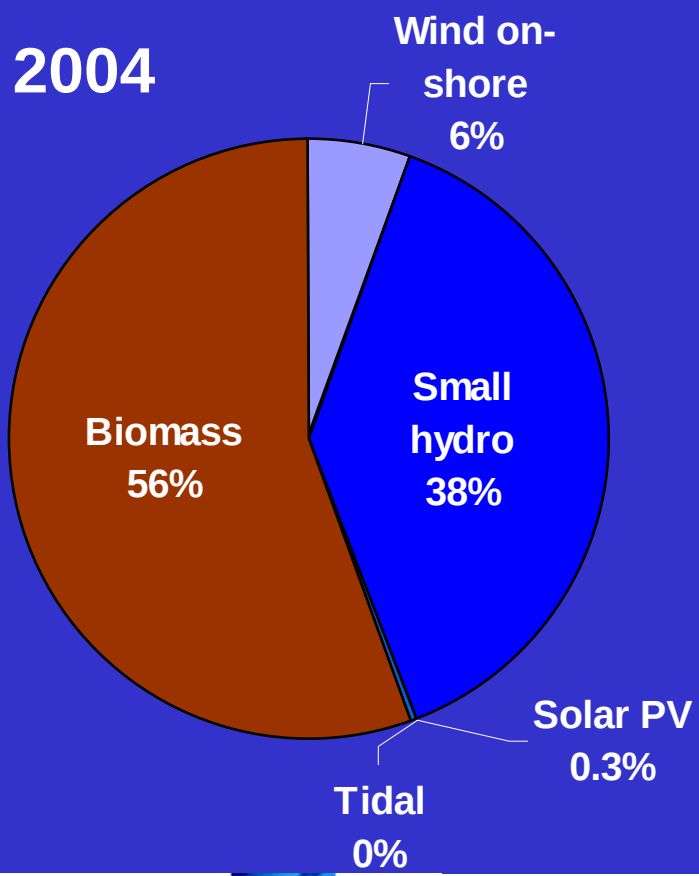
CLEAN AIR RENEWABLE ENERGY COALITION

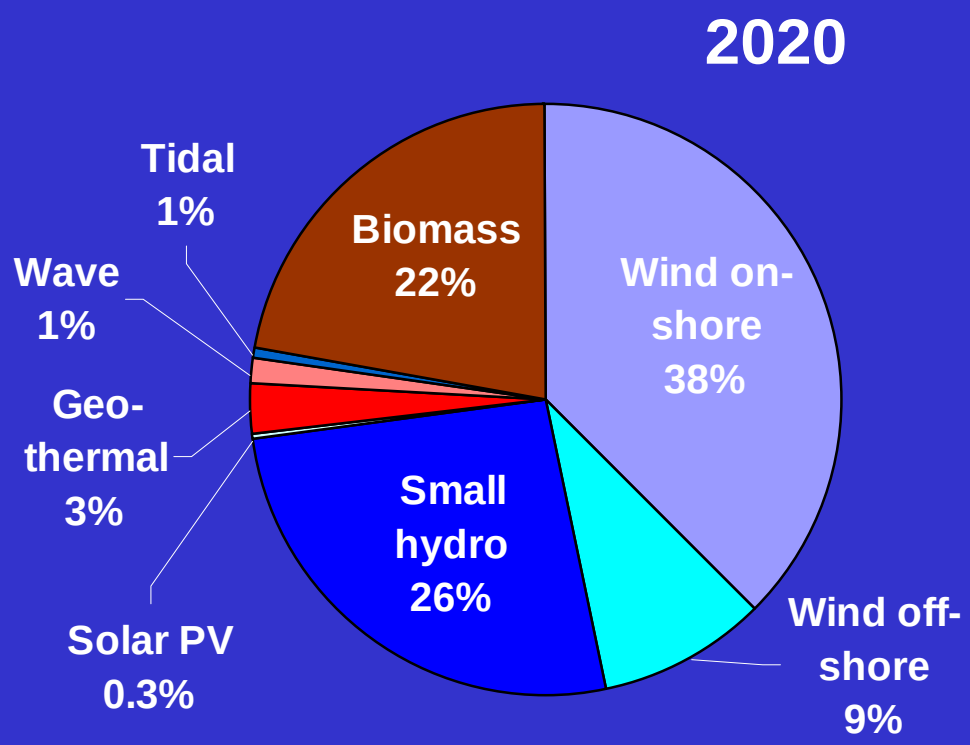
Capacity Additions to 2020 (15% Target)



CLEAN AIR RENEWABLE ENERGY COALITION

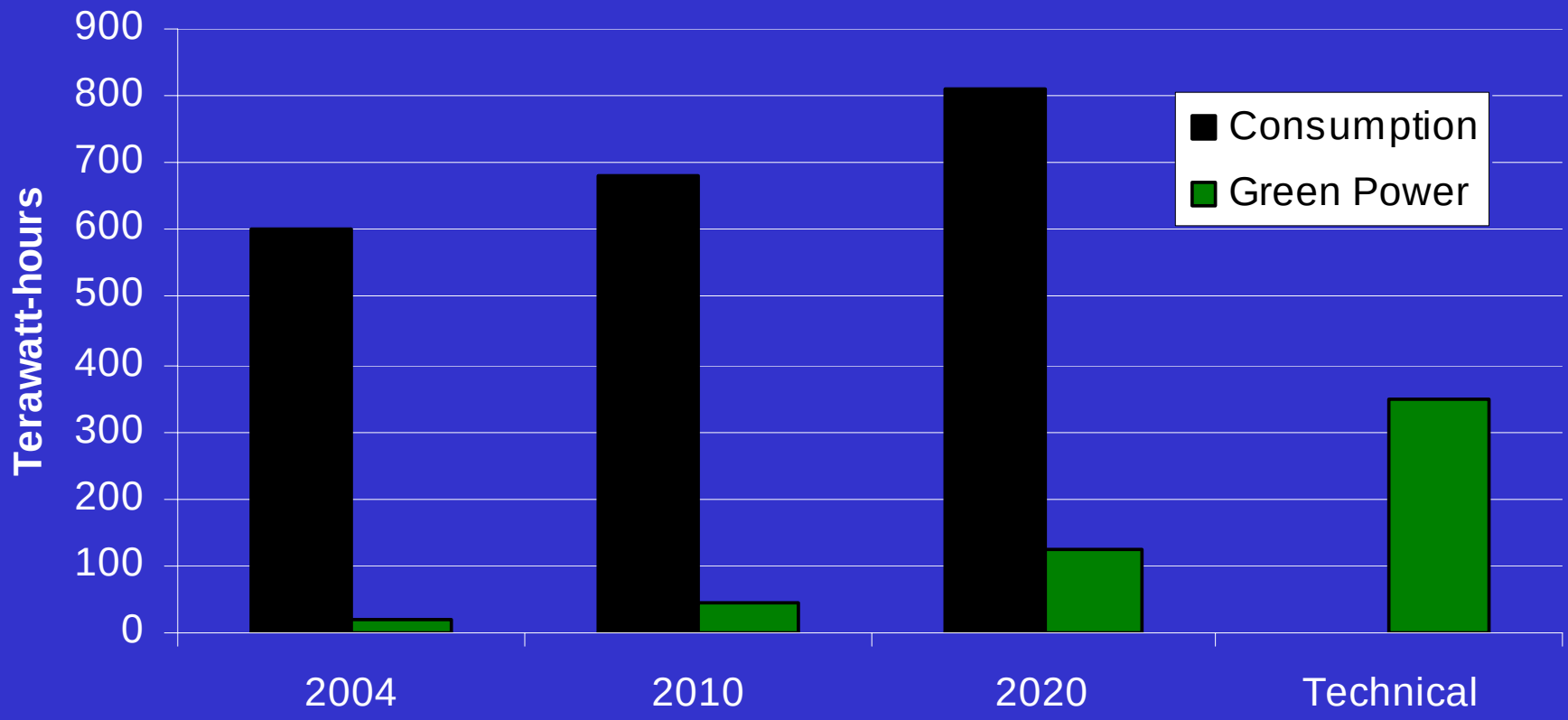
GP Comparison 2004 and 2020





CLEAN AIR RENEWABLE ENERGY COALITION

Shares of GP



CLEAN AIR
RENEWABLE ENERGY
COALITION

Policy Implications

- Clean Air Renewable Energy Coalition targets are 7% of green power by 2010 and 15% by 2020.
- Current provincial policies will lead to at least 7.6% of green power by 2010-2012.
- Considerable potentials in ocean energy, solar PV and onshore/offshore wind support the view that a 15 to 20% green power target for 2020 is realistic for Canada.
- In line with Pollution Probe's 120 TWh target by 2020.

CLEAN AIR RENEWABLE ENERGY COALITION

Thank you!

Contact Information

Coalition Coordinator: Mark Rudolph

mark@cleanairrenewableenergycoalition.com

www.cleanairrenewableenergycoalition.com

Environmental intelligence

martin.tampier@telus.net

CLEAN AIR RENEWABLE ENERGY COALITION