



Jose Etcheverry PhD

VARI HALL
Sustainability Ambassador York University

Associate Professor Faculty of Environmental Studies

Co-Chair Sustainable Energy Initiative

May 12 2015





Personal Story

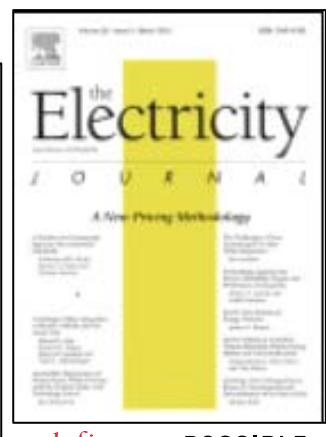
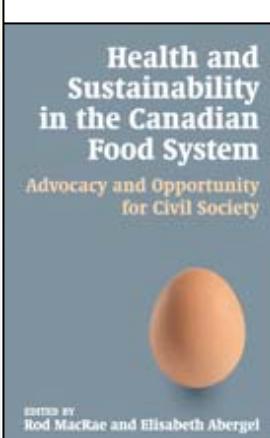
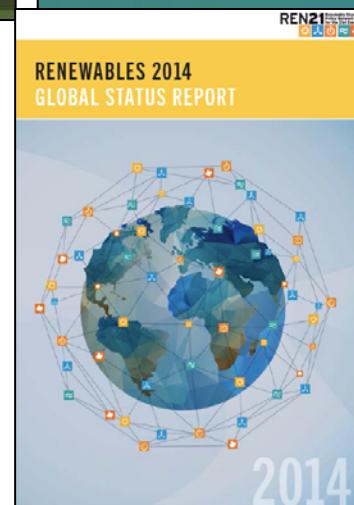
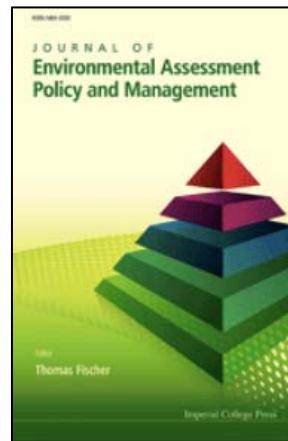
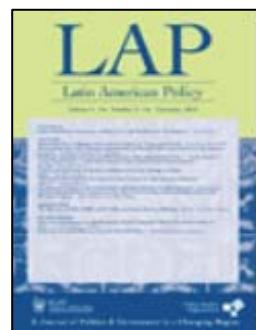
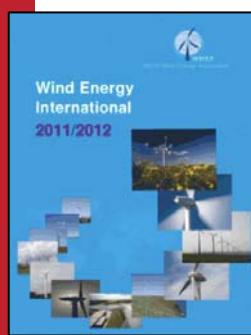
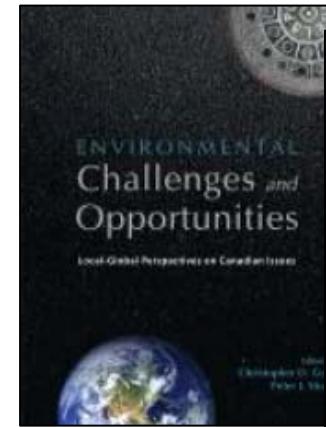
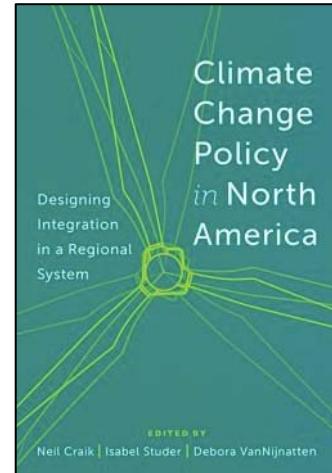
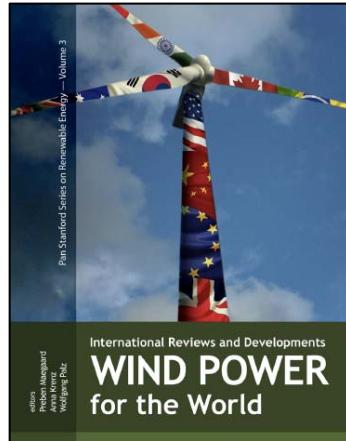
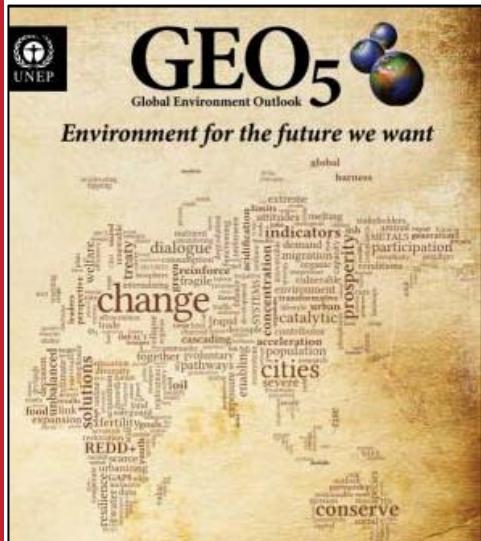


PhD (November 2008) U of T

YORK 
UNIVERSITÉ
UNIVERSITY
redefine THE POSSIBLE.



Research @ York U (research: chapters, articles, reports)



SEI Initiatives



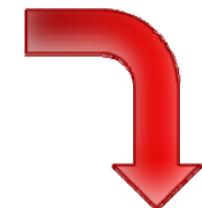
Sustainable
Energy Initiative



faculty of
environmental
studies



SEI International Work



Innovation and Knowledge Mobilization Work

faculty of environmental studies

Energy Technology Forum: International Overview of Energy Storage



SUSTAINABLE ENERGY INITIATIVE SEMINAR SERIES
Presentation and Q&A session

Thursday, March 14th, 2013, 8:30 - 11AM

MaRS Discovery District, Auditorium B
101 College Street Toronto, ON, Canada, M5G 1L7
DR. DIRK-UWE SAUER, Institute for Power Electronics and Electrical Drives (ISEA), Germany



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Sustainable Energy Initiative

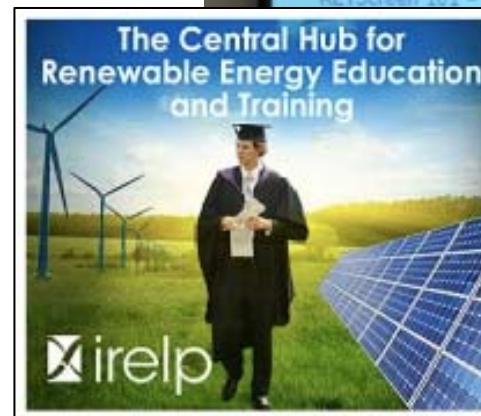


faculty of environmental studies



RETScreen Training Institute
RETScreen 101 – Introduction to Clean Energy Project Analysis

The Central Hub for Renewable Energy Education and Training



IRENA
Renewable Energy Learning Partnership



Paper One: Ontario's Road Map To Prosperity

Top



Ontario's Road Map to Prosperity: Developing Renewable Energy to its Full Potential
by Jose Etcheverry with MES students Lynda O'Malley and Jennifer Taylor

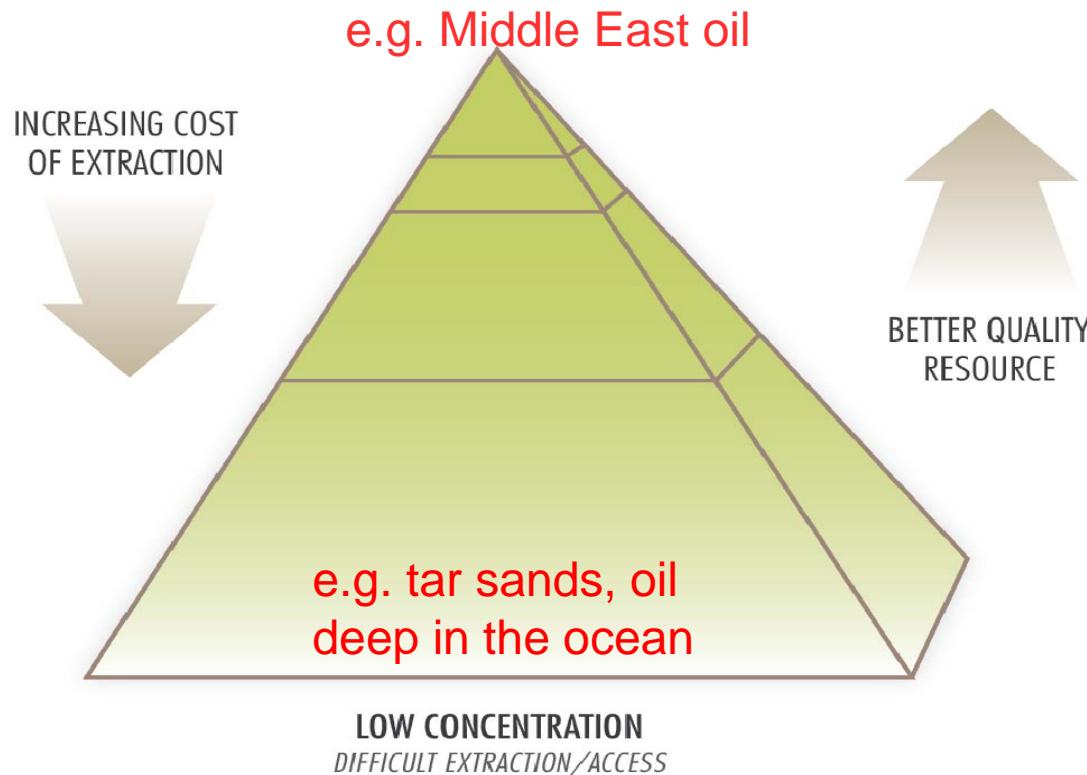
The report summarizes a viable strategy, a roadmap, to achieve prosperity, energy security and ecological protection in Ontario. It highlights specific collaborative areas in which agencies such as the Toronto Region Conservation Authority (TRCA) can lead the province's adoption of renewable energy.

Key Presentation Points:

- 1. Why is 100% RE imperative?**
- 2. How far has renewable energy already come?**
- 3. Where is work still needed?**

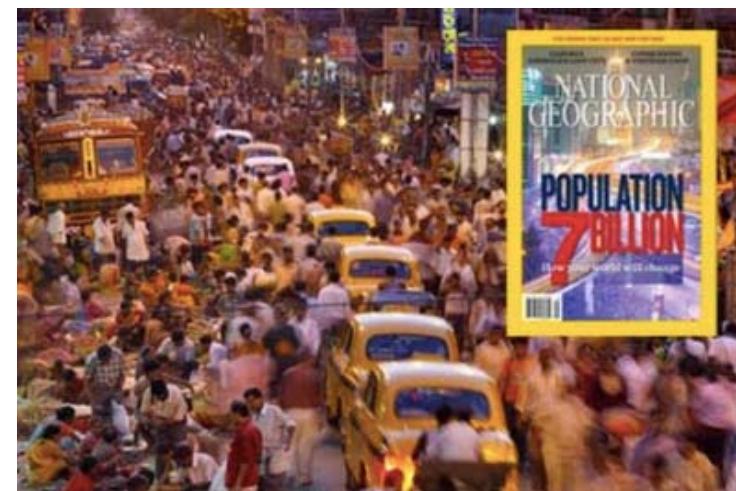
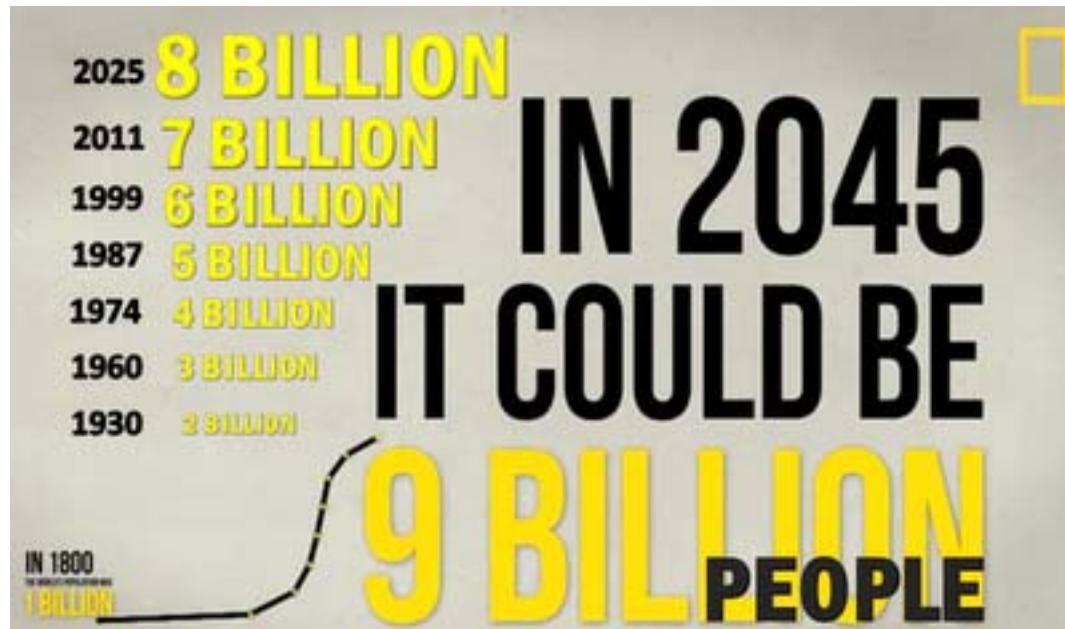
THE RESOURCE TRAP

ALL RESOURCES ARE NOT EQUAL:
As Cost \$ Increase so do Risks



SOURCE: MICHAEL LARDELLI, "EARTH AS A MAGIC PUDDING," OCTOBER 20, 2008,
<HTTP://WWW.ENERGYBULLETIN.NET/NODE/46956>, MODIFIED FROM THOMAS AHLBRANDT AND
PETER J. MCCABE, "GLOBAL PETROLEUM
RESOURCES: A VIEW TO THE FUTURE,"
GEOTIMES, NOVEMBER 2002,
HTTP://WWW.GEOTIMES.ORG/NOV02/FEATURE_OIL.HTML

Today = 7 000 000 000
9 000 000 000 in 2045?



JOEL PETT
USA TODAY



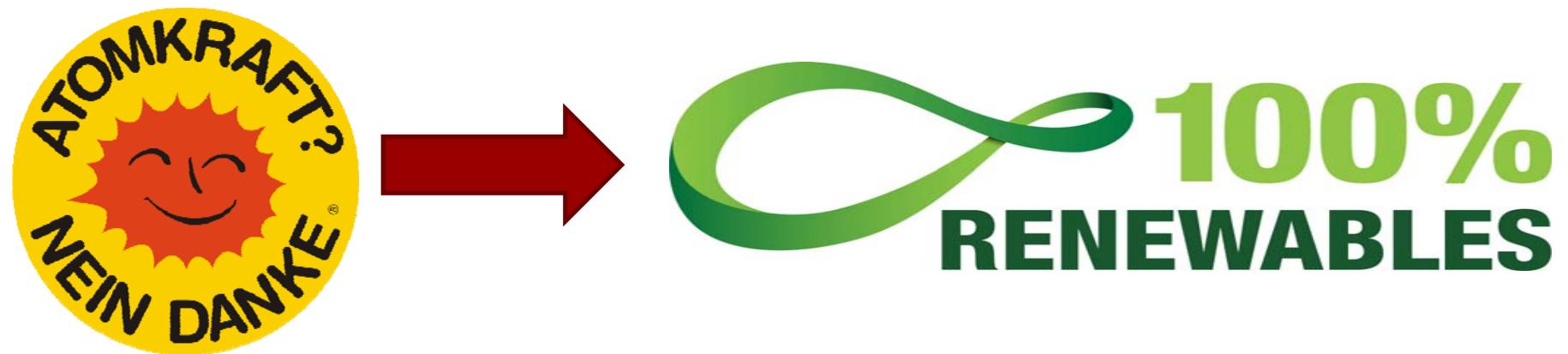
Cartoonists International: www.nyjourn.com/cartoonists



“People are the only ones capable
of transforming society.”

- Rigoberta Menchu

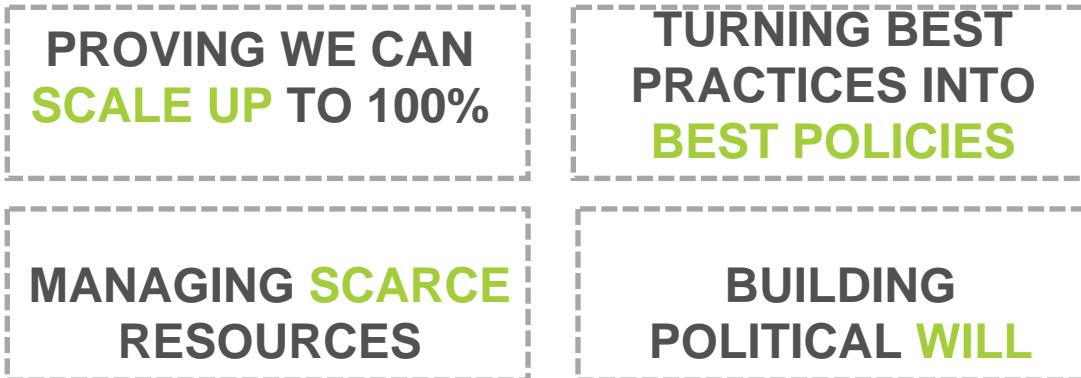
BRANDING 100% RE AS THE NEW NORMAL



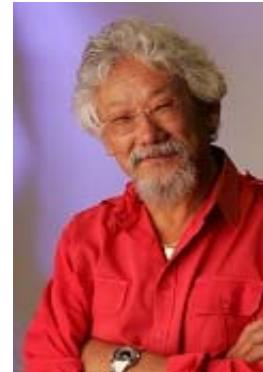
Goal → 100% Renewable Energy ASAP



Road Map to Achieve 100% RE



100% RE Ambassadors



we need more...Particularly
Women Leaders



FOR MORE INFORMATION



www.go100re.net



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www.facebook.com/global100re

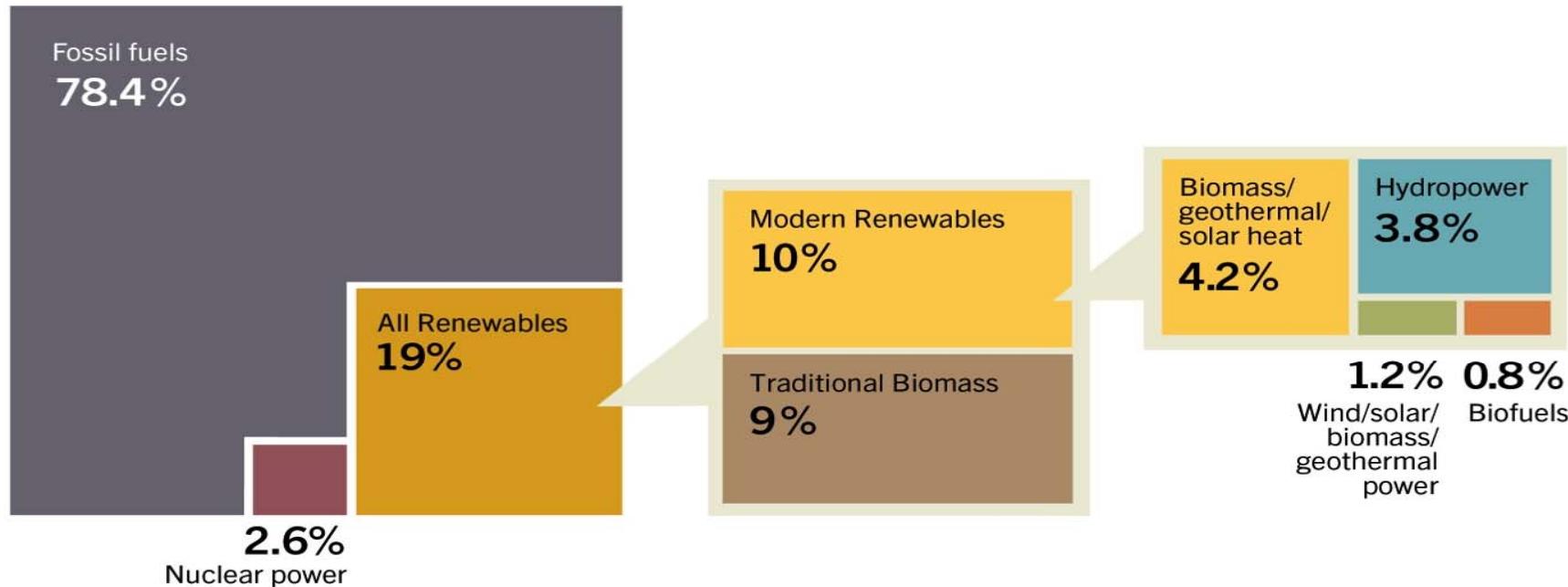


info@go100re.net

Key Presentation Points:

- 1. Why is 100% RE imperative?**
2. How far has renewable energy already come?
3. Where is work still needed...

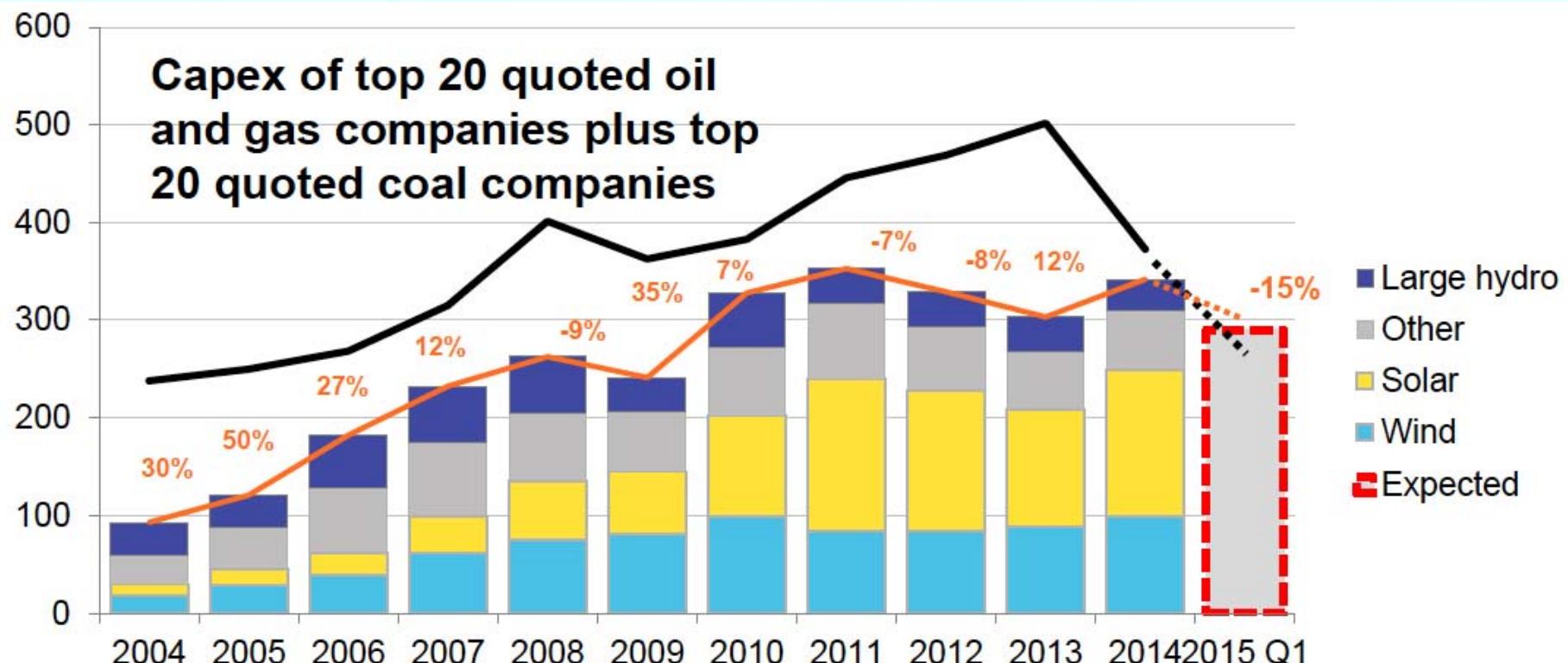
Estimated Renewable Energy Share of Global Final Energy Consumption, 2012



REN21. 2014. *Renewables 2014 Global Status Report* (Paris: REN21 Secretariat).

CLEAN VS FOSSIL ENERGY INVESTMENT (\$BN)

Bloomberg
NEW ENERGY FINANCE



Note: Nominal values. Renewable energy includes large hydro, investment made at financial close. Fossil fuel is gross investment on coal, gas and oil capacity. We assume capacity retirement of 3.3%/yr for coal, 4%/yr for gas and 2.5%/yr for oil in all countries where fossil capacity is net positive. We assume retiring capacity is replaced in countries where fossil fuel capacity additions are net positive and not where additions are zero or negative. We count fossil fuel investment in the year when capacity was commissioned (owing to a lower visibility of data). Q1 2015 figures do not include corporate & government R&D, or EST asset finance estimates which are compiled on an annual basis only.

Source: Bloomberg New Energy Finance

SELECTED COMMERCIAL BUILDERS OR BUYERS OF RENEWABLE ENERGY

Bloomberg
NEW ENERGY FINANCE



Images: Various; Bloomberg New Energy Finance

Key Points to Remember:

1. Solar = decreasing prices
2. Wind = size growth
3. Tesla Aesthetics plus Free Patents



Bibliothèque Nationale de France

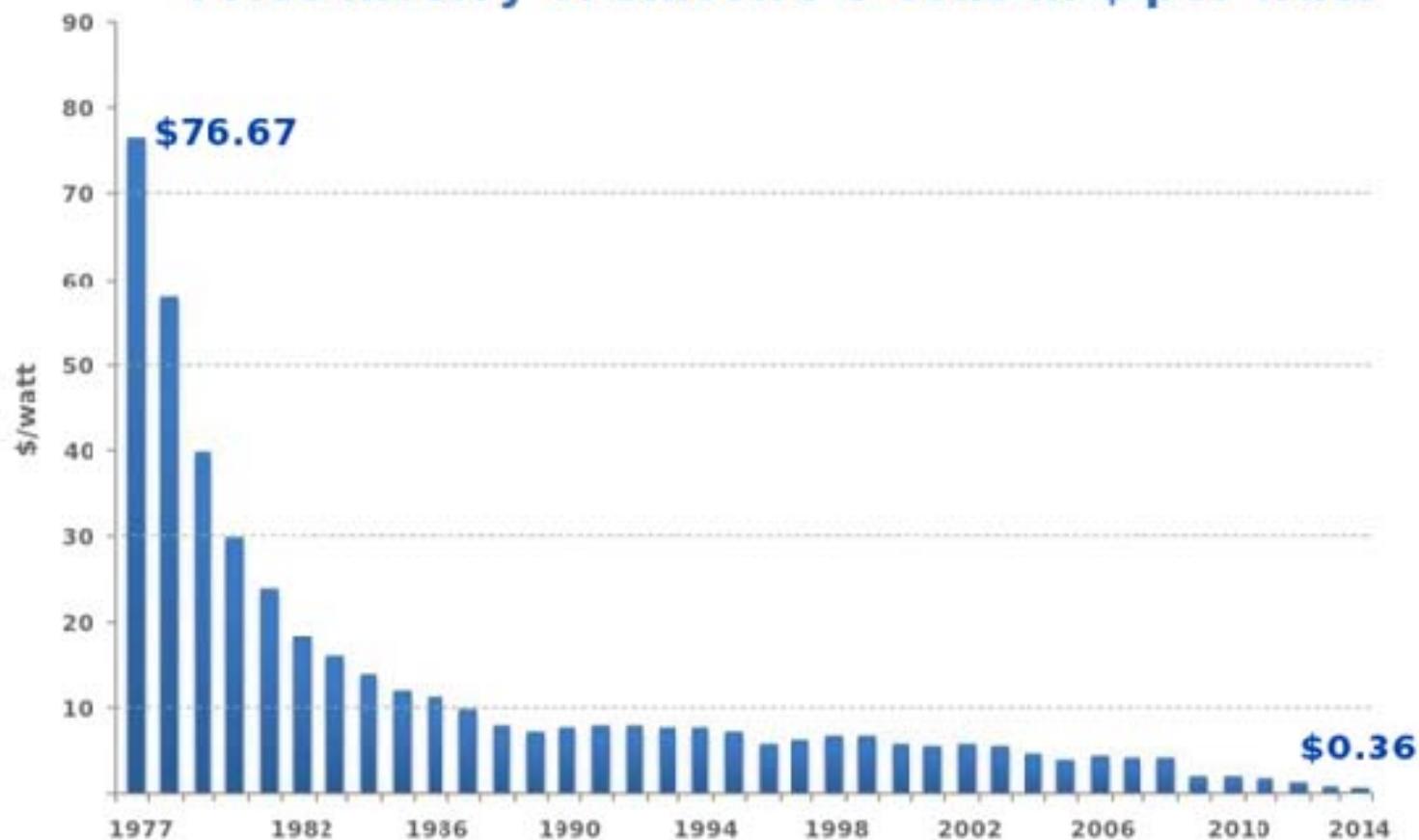


Popperfoto/Getty Images

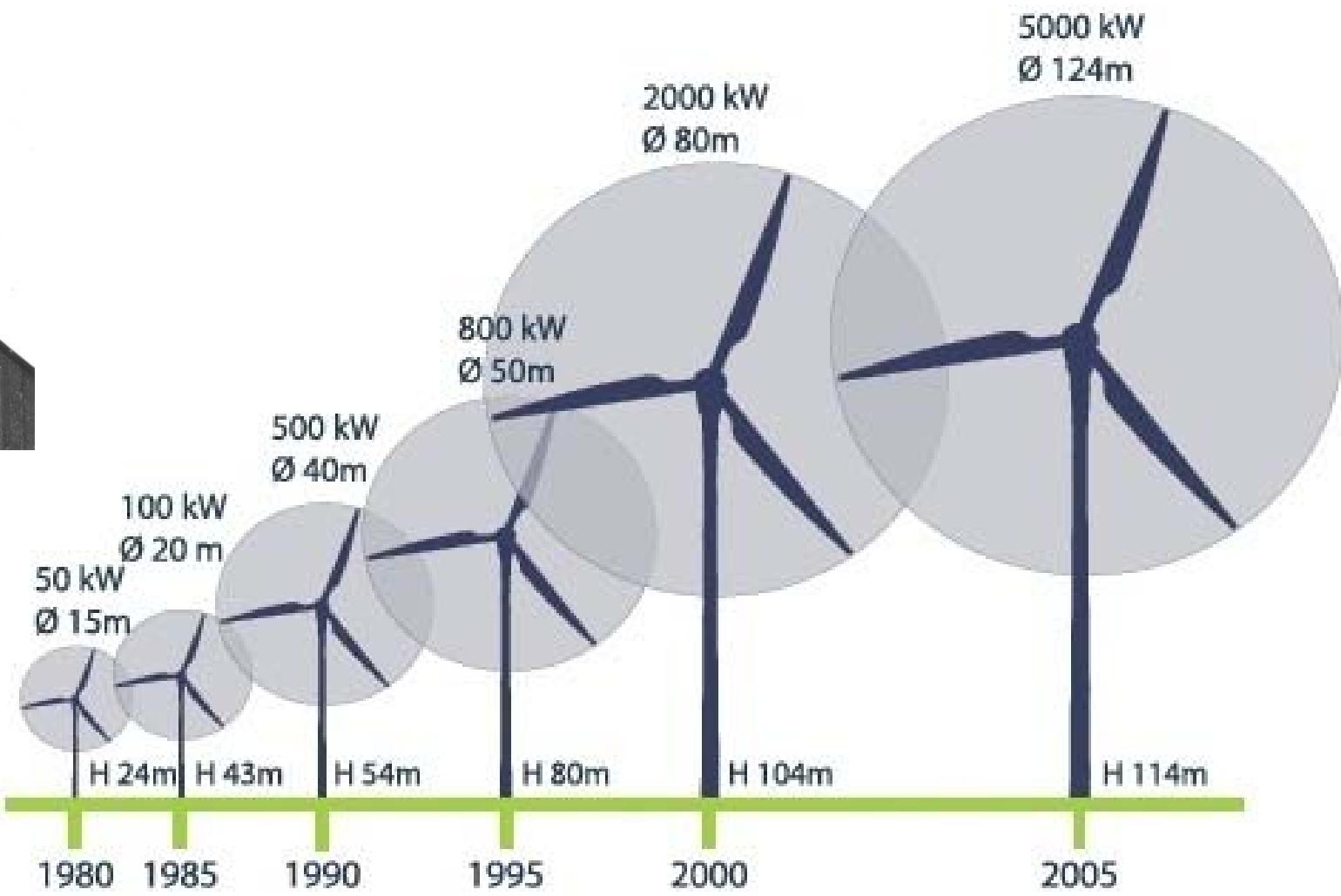


Ecofoty Group Limited

Price history of silicon PV cells in \$ per watt



Source: Bloomberg, New Energy Finance & pv.energytrend.com



TESLA GIGAFACTORY

50 GWh in annual battery production by 2020
Enough for 500,000 Tesla cars
Powered by renewable energy
Net zero energy factory



Key Presentation Points:

- 1. Why is 100% RE imperative?**
- 2. How far has renewable energy already come?**
- 3. Where is work still needed...**

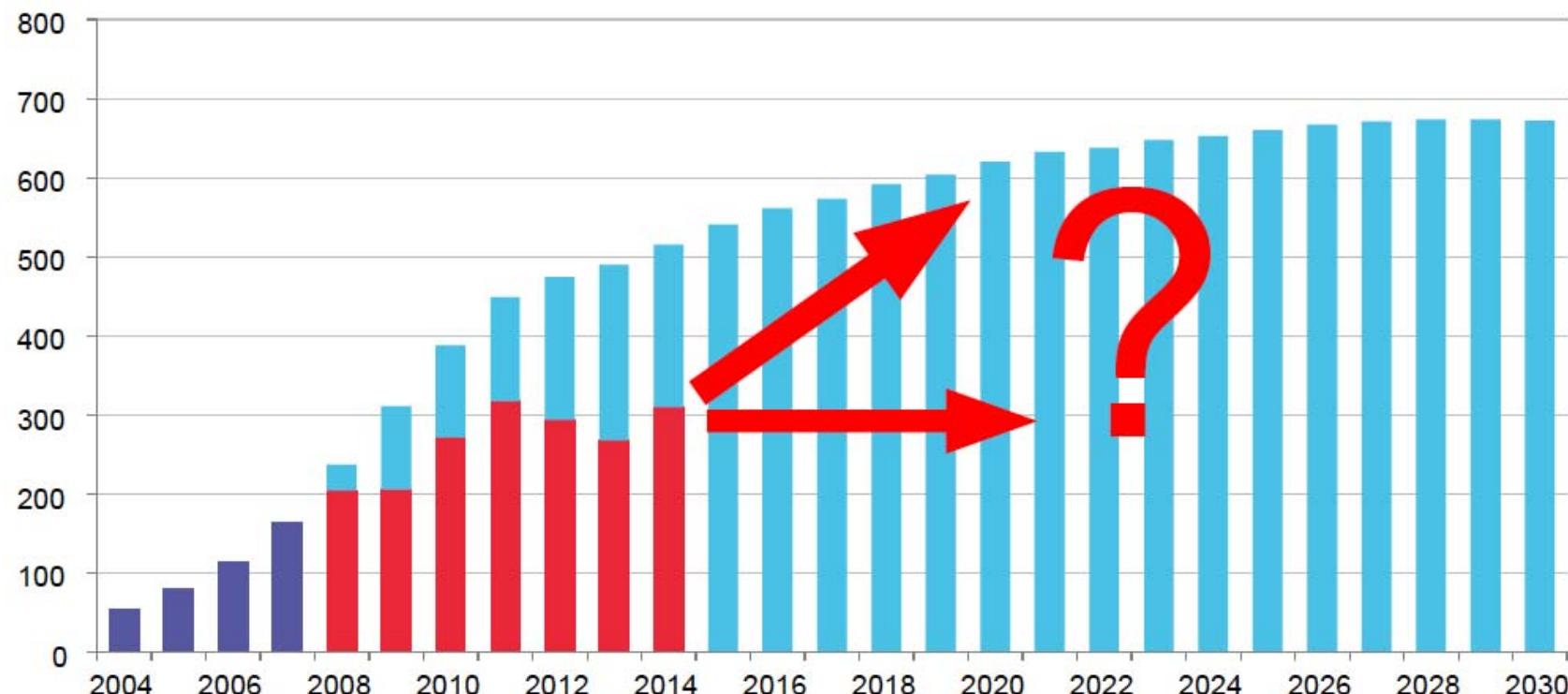
Where is work still needed...

- > Policy + political support
- > Community ownership
- > Aesthetics/style

CLEAN ENERGY CAPITAL REQUIREMENT TO 2030

(\$BN)

Bloomberg
NEW ENERGY FINANCE



Source: New Energy Finance Global Futures 2008, Bloomberg New Energy Finance



SOURCE: THE ECONOMIST

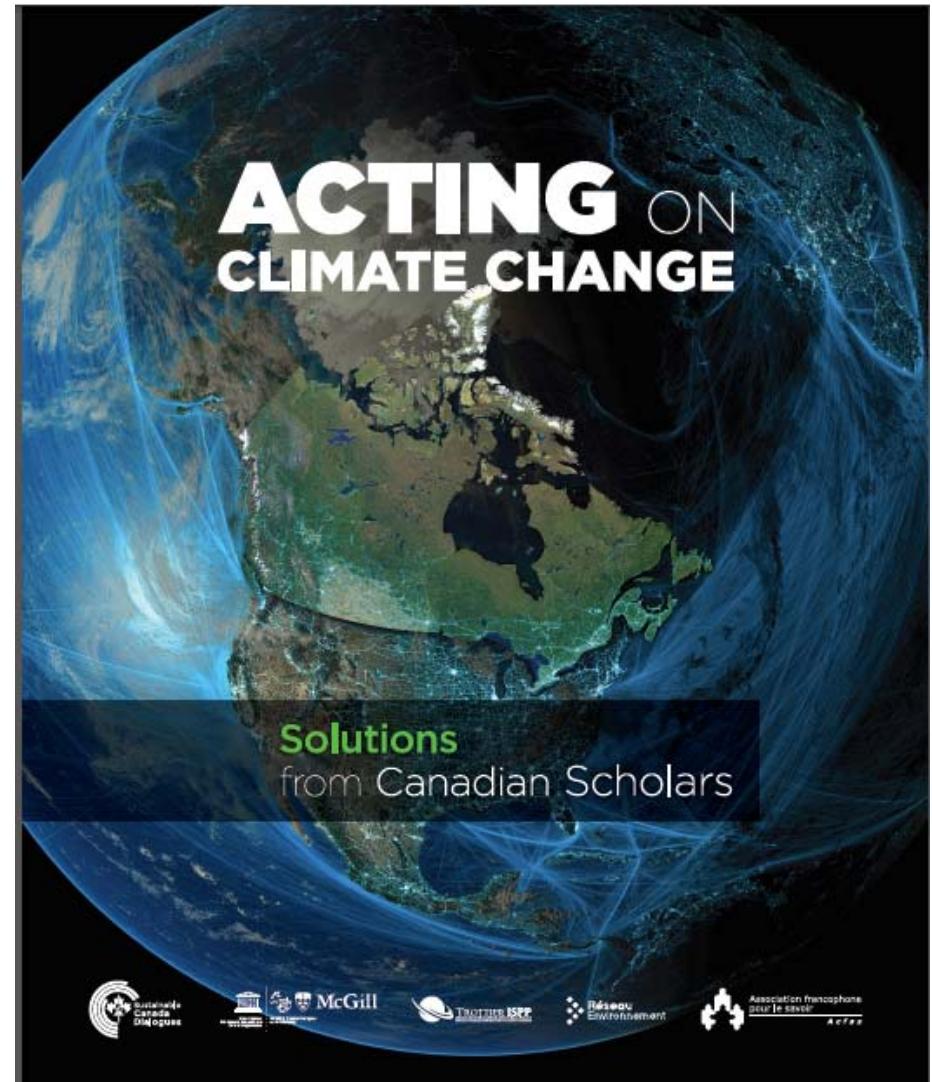
Potential Drivers for RE Solutions in North America

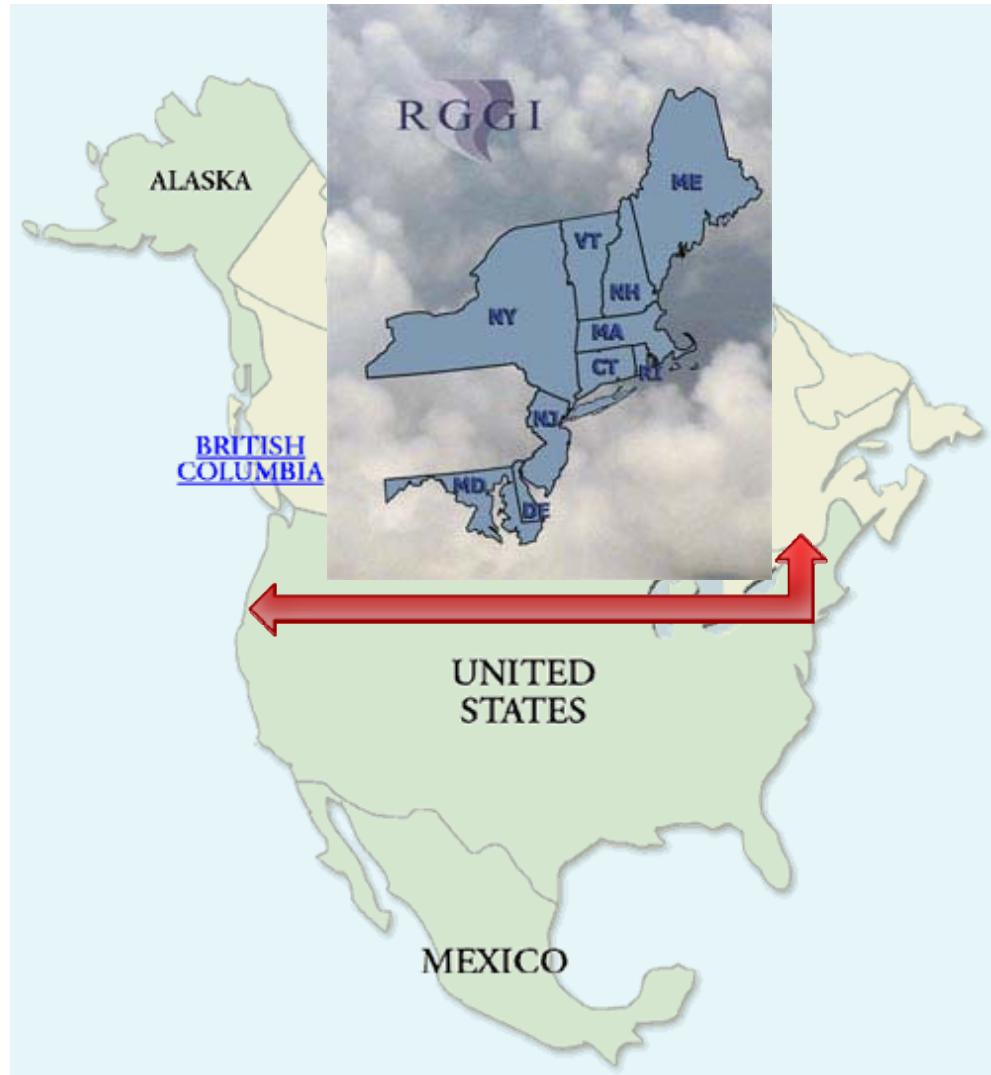




Avoid this style of North American Climate Change Policy

North American Climate Change Policy





Carbon Taxation:
British Columbia
Cap and Trade:
California, Quebec
And now Ontario
RGGI
Coal Phase-Out

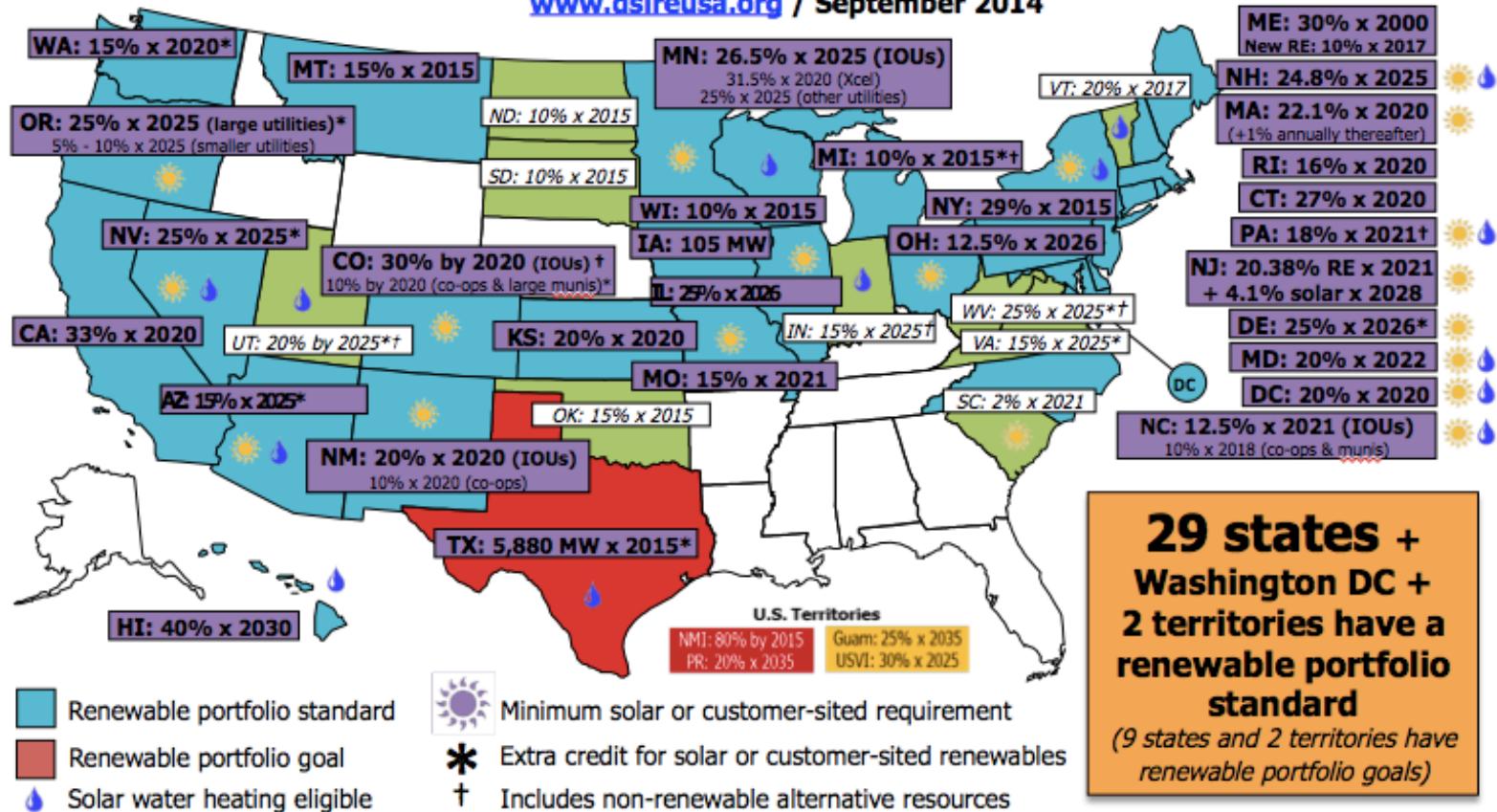
North American Climate
Change Policy

Renewable Energy Support Mechanisms (Electricity)

- Renewable Energy Portfolio Standards (RPS)
- Net Metering
- Feed in Tariffs

Renewable Portfolio Standard Policies

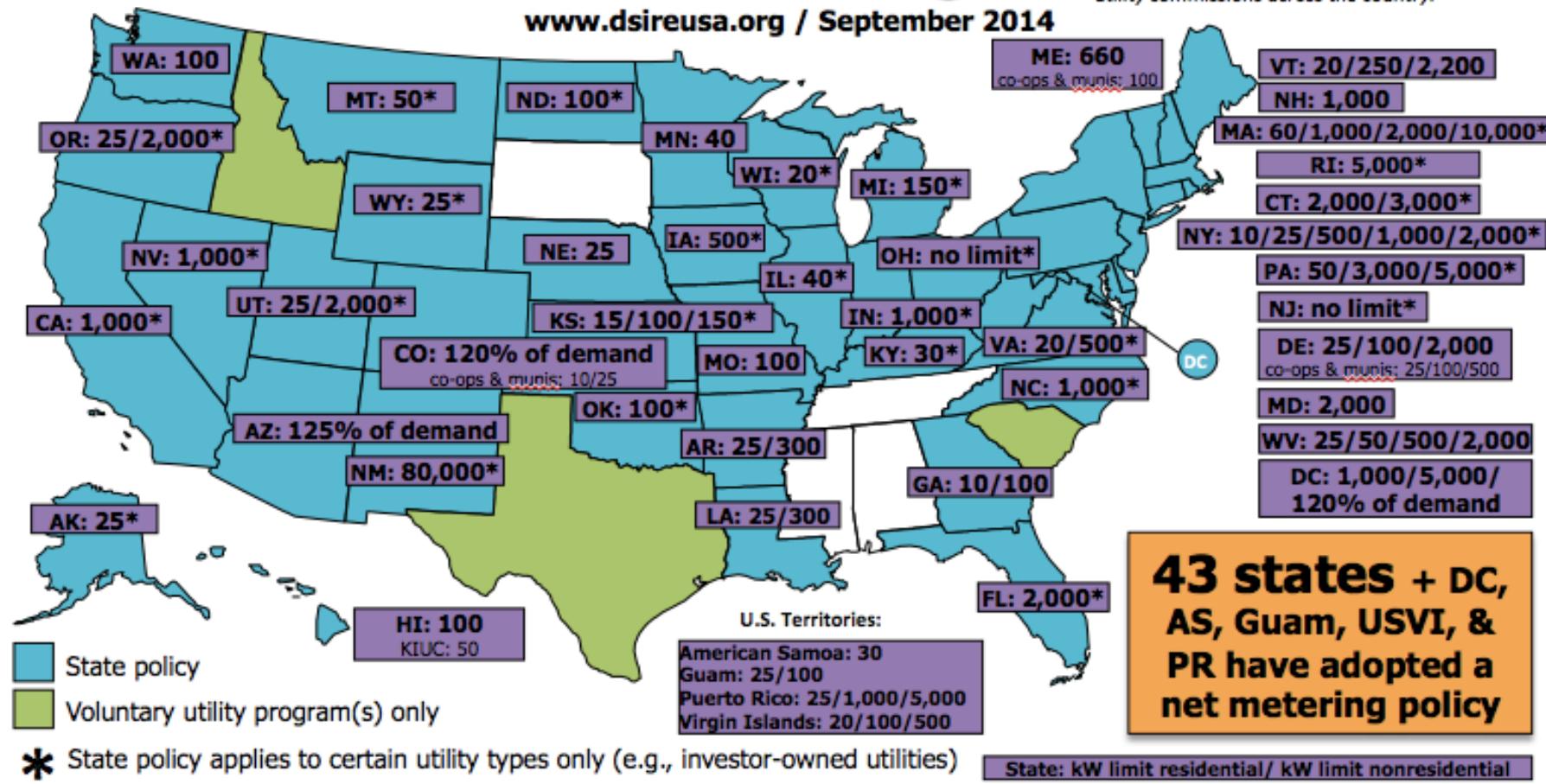
www.dsireusa.org / September 2014



Net Metering

www.dsireusa.org / September 2014

Note: Net Metering rules are being actively discussed in over a dozen state public service & utility commissions across the country.



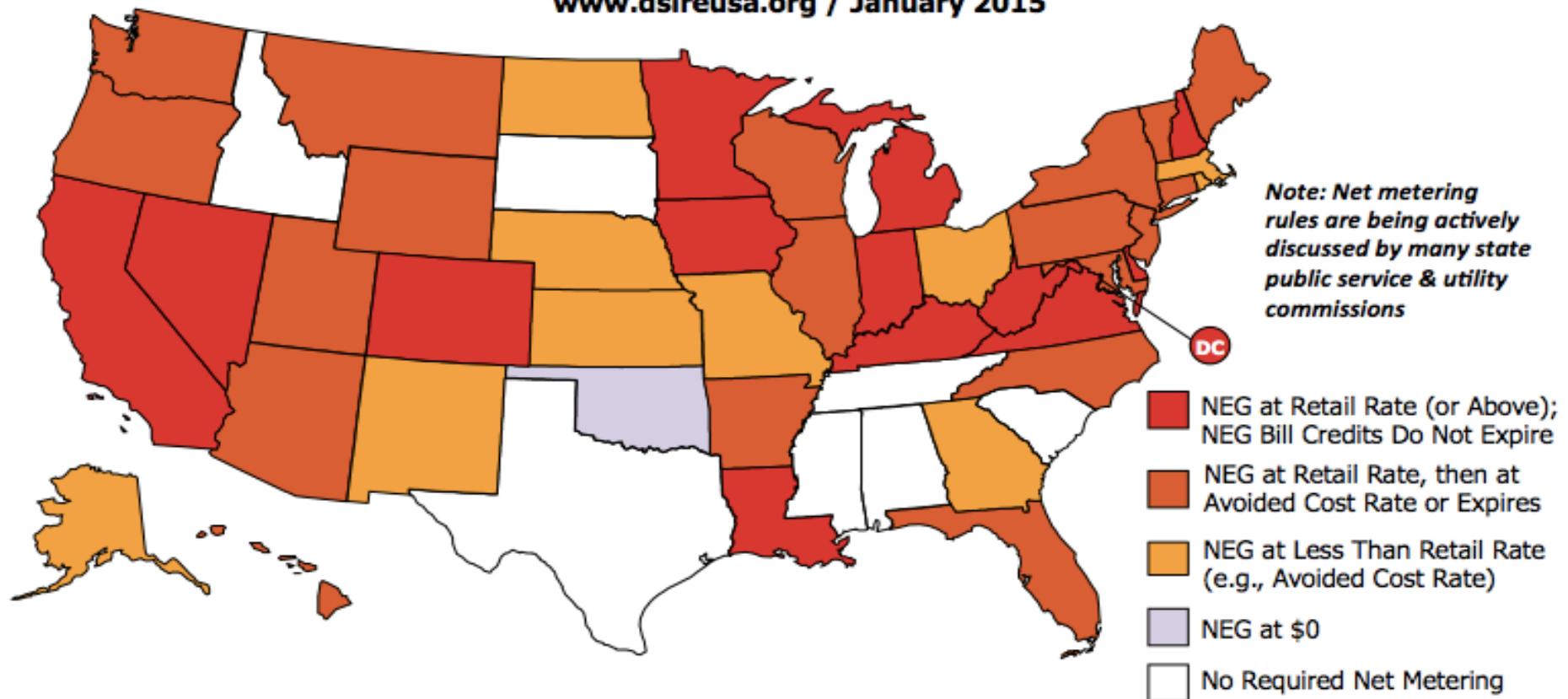
**43 states + DC,
AS, Guam, USVI, &
PR have adopted a
net metering policy**

Note: Numbers indicate individual system capacity limit in kW. Some limits vary by customer type, technology and/or application. Other limits might also apply.

This map generally does not address statutory changes until administrative rules have been adopted to implement such changes.

Payment/Credit to Customer-Generator for Monthly Net Excess Generation (NEG) Under Net Metering

www.dsireusa.org / January 2015



A Snapshot of Renewable Energy Goals and Investments

Last year, investors poured \$207 billion into clean energy deployment around the world. They're following the opportunities unlocked by governments that seek to meaningfully address climate disruption, retain competitiveness, and create opportunities. Here, a tour of clean-energy investment hot spots.



WHICH NATION IS MORE ATTRACTIVE TO INVESTORS INTERESTED IN RENEWABLE ENERGY?*

Rank from 1 to 40, with one being the "most attractive"



WHICH NATION'S GOVERNMENTS AND COMPANIES ARE DRIVING MORE INNOVATION???



From Tendering (RFP) to SOP to FIT...



41

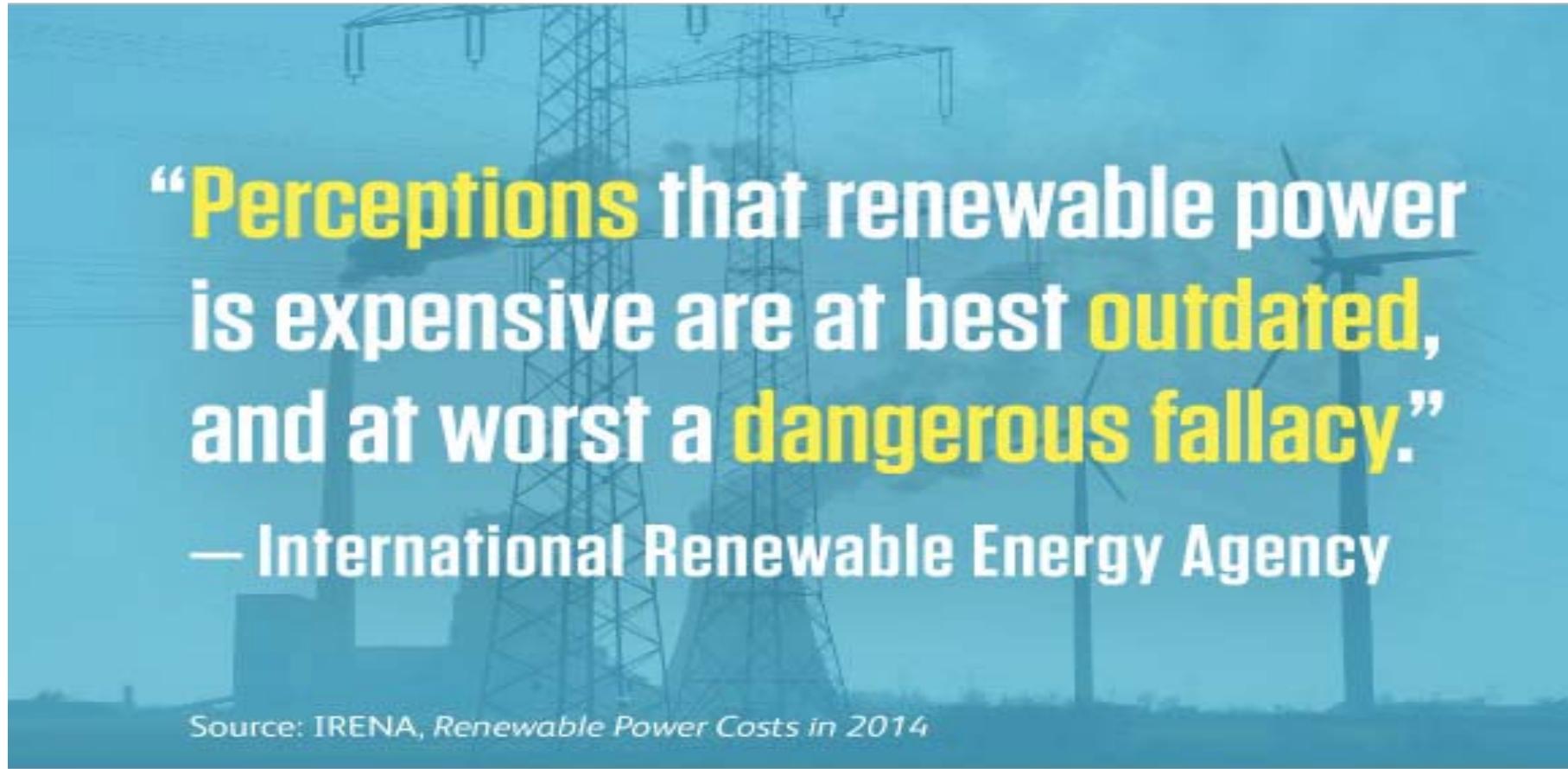


Drivers for effective policy

Good Jobs, Resilient Communities and Healthy Environments



**Over \$27 billion
invested in Ontario**



“Perceptions that renewable power is expensive are at best outdated, and at worst a dangerous fallacy.”

— International Renewable Energy Agency

Source: IRENA, *Renewable Power Costs in 2014*

RENEWABLE ENERGY COSTS PLUNGE TO HISTORIC LEVELS

The Ontario Nuclear File



- Nuclear is **too expensive** and if allowed to continue it will stop renewable energy
- All nuclear plants built in Canada have failed and demand massive \$ repairs
- All nuclear plant repairs have ended costing much more than anticipated
- Always...original original budget x more
- Who pays?
- → we all do every month



Pickering Nuclear



- Pickering original repair budget =
\$1,300 million
- Pickering actual repair cost =
\$ 2,600 million

Bruce Nuclear



- Bruce original repair budget =
\$ 2,750 million
- Bruce actual repair cost =
\$ 4,800 million

Darlington Nuclear



- Darlington original repair estimate =
\$6,000 million - \$10,000 million
- Darlington actual repair cost = ? Estimate x (?)
- Should we allow this to happen?

Friday, March 22, 2013
10:50 PM EDT



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Business

Nuclear watchdog okays Darlington nuclear overhaul

Canada's nuclear safety regulator has approved plans to overhaul the reactors at the Darlington nuclear station

...Ontario Power Generation, which owns Darlington, plans to start shutting the four reactors down for a major, mid-life overhaul in 2016.

But the commission's decision isn't likely to end the debate over the project, which the energy ministry estimated in 2010 could cost anywhere between \$6 and \$10 billion...

But while selling part of the transmission business would generate a one-time cash haul for the government, it would dilute its share of Hydro One's profits in the future. To justify that tradeoff, any proceeds from the sale should be reinvested in Ontario's electricity sector. The needs are gaping. For starters, Ontario Power Generation faces a \$10-billion tab (before interest, inflation and inevitable cost overruns) to refurbish its Darlington nuclear station, beginning next year.

The Globe and Mail

Published Monday, Mar. 16 2015, 3:00 AM EDT

Last updated Monday, Mar. 16 2015, 3:00 AM EDT

THE GLOBE AND MAIL 

Friday, March 22, 2013

11:17 PM EDT



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Business

Darlington nuclear refit will have two outside overseers

Two advisers are being hired to make sure the multi-billion-dollar refit of the Darlington nuclear station stays on budget.

Text size: + - Reset



Report an Error

+ save to mystar

By: John Spears Business Reporter, Published on Sun Jan 20 2013

...the province's overseer will be Calm Consulting Inc., headed by Mike White, who worked at the former Ontario Hydro for 14 years before heading out on his own in 1990.

Bentley said he'll be paid \$200 an hour. The cost is estimated at \$650,000 over two years, but will depend on actual hours worked.

OPG hasn't yet selected its oversight adviser, Bentley said.

Nuclear refits have a history of running vastly over budget, in Ontario and elsewhere.

In the late 1990s, OPG estimated it would cost \$1.3 billion to refurbish the four reactors at the Pickering A nuclear station.

OPG awards \$350 million Darlington contract

By: John Spears Business reporter, Published on Thu Apr 04 2013

Ontario Power Generation has awarded a \$350 million contract for refurbishing the Darlington nuclear station to Alstom Power & Transport Canada.

It's the second major refurbishment contract awarded, bringing the total value to nearly \$1 billion, even though no final decision on the overhaul will be made until 2015.

SNC-Lavalin and Aecon Industrial had previously been awarded a \$600 million contract for work on the nuclear reactors at Darlington.

Alstom's contract is for work on the turbine generators at the station. A nuclear station works by creating heat through a nuclear reaction, then using that heat to make steam that spins turbine generators.

OPG spokesman Neal Kelly said that both contracts have a combination of detailed planning work, and execution work.

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Radio One

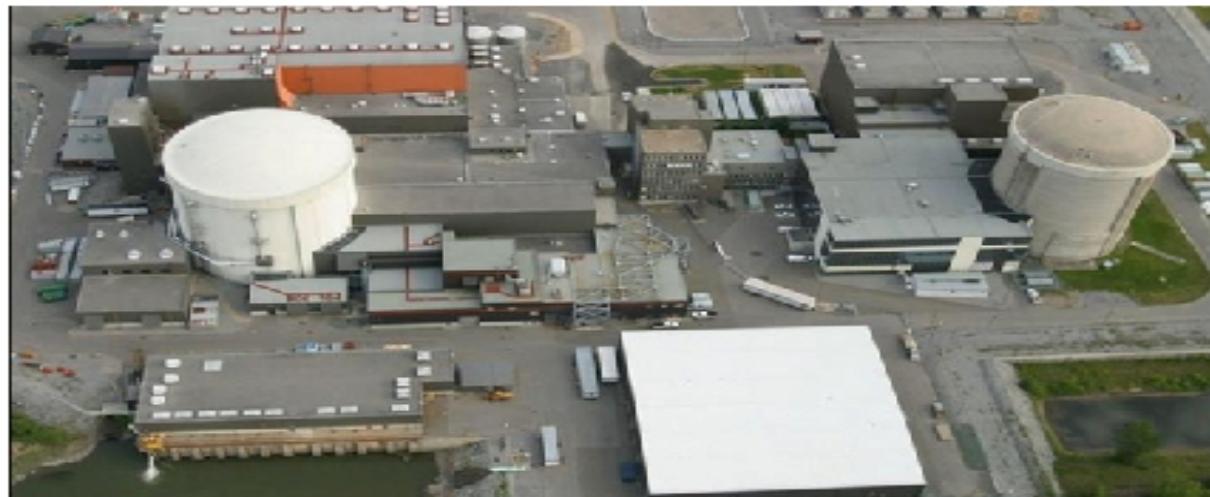
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Quebec's Gentilly-2 nuclear plant shuts down after 29 years

Chamber of commerce says it will keep fighting the closure

CBC News Posted: Dec 28, 2012 3:06 PM ET | Last Updated: Dec 28, 2012 5:13 PM ET □ 44



According to Hydro-Québec, it would have cost nearly \$4.5 billion to refurbish the Gentilly-2 nuclear power plant, which will shut down Friday. (Jacques Boissinot/Canadian Press)

Quebec's sole nuclear power plant will cease production at 10:30 p.m. today after 29 years of generating electricity.

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Fukushima, 11 March 2011 – 2015

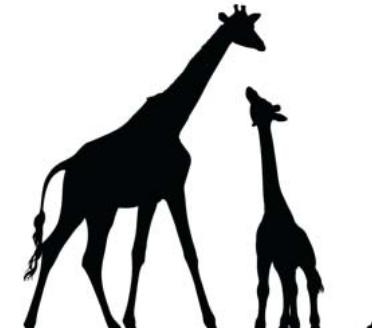
We commemorate all the victims of the use of nuclear power.
We call for an immediate halt to the construction and operation of
nuclear power plants worldwide.

Environmental Laureates attending the International Convention
Freiburg, 12 March 2015



Where is work still needed...

- > Policy + political support
- > Community ownership
- > Aesthetics/style



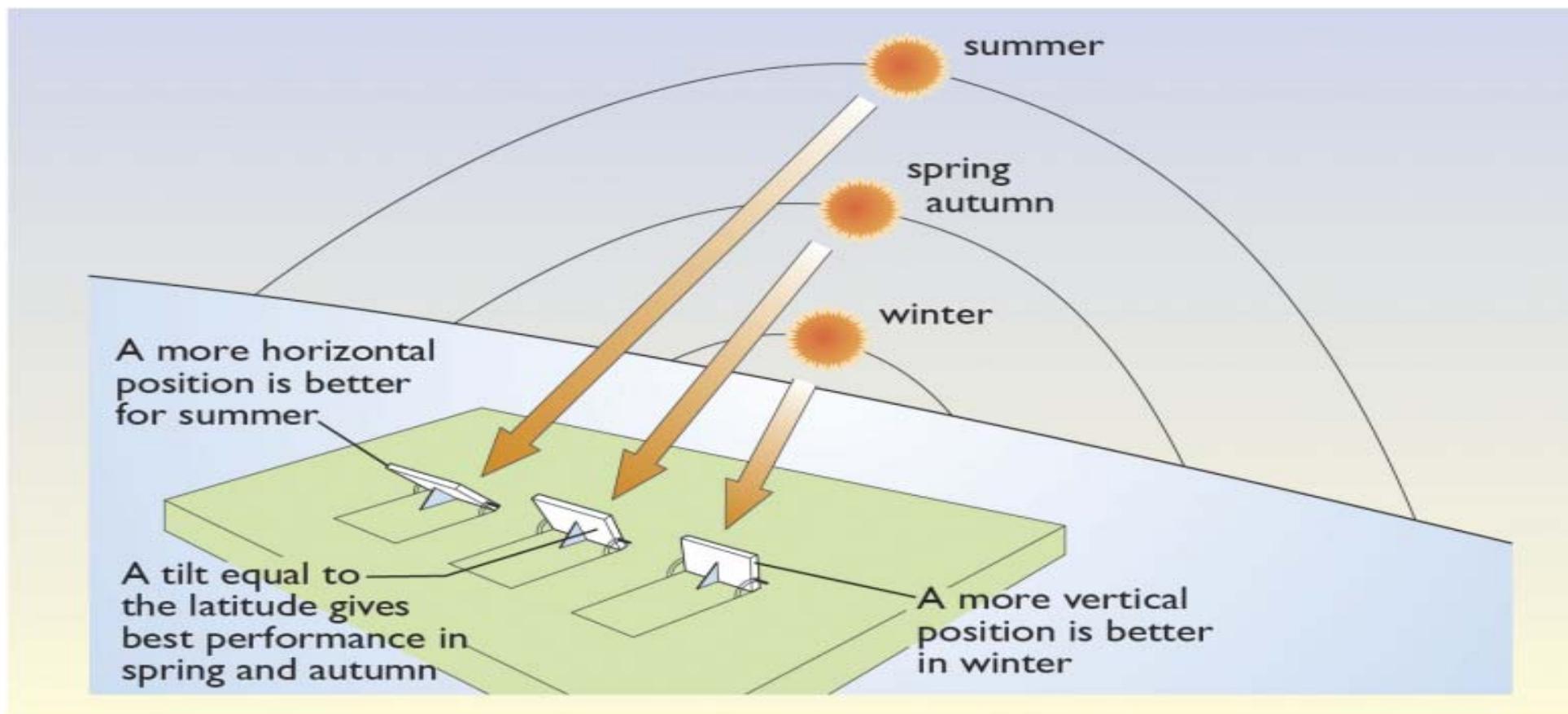
invest in north america's 1st zoo-biogas plant.

Community ownership of RE is Crucial



Where is work still needed...

- > New Policies + Higher political support
- > Community ownership
- > Aesthetics/style



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We need to advance RE Aesthetics





Barcelona 100% RE





Barcelona 100% RE



Solar Oasis

redefine THE POSSIBLE.



Barcelona 100% RE

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Barcelona 100% RE



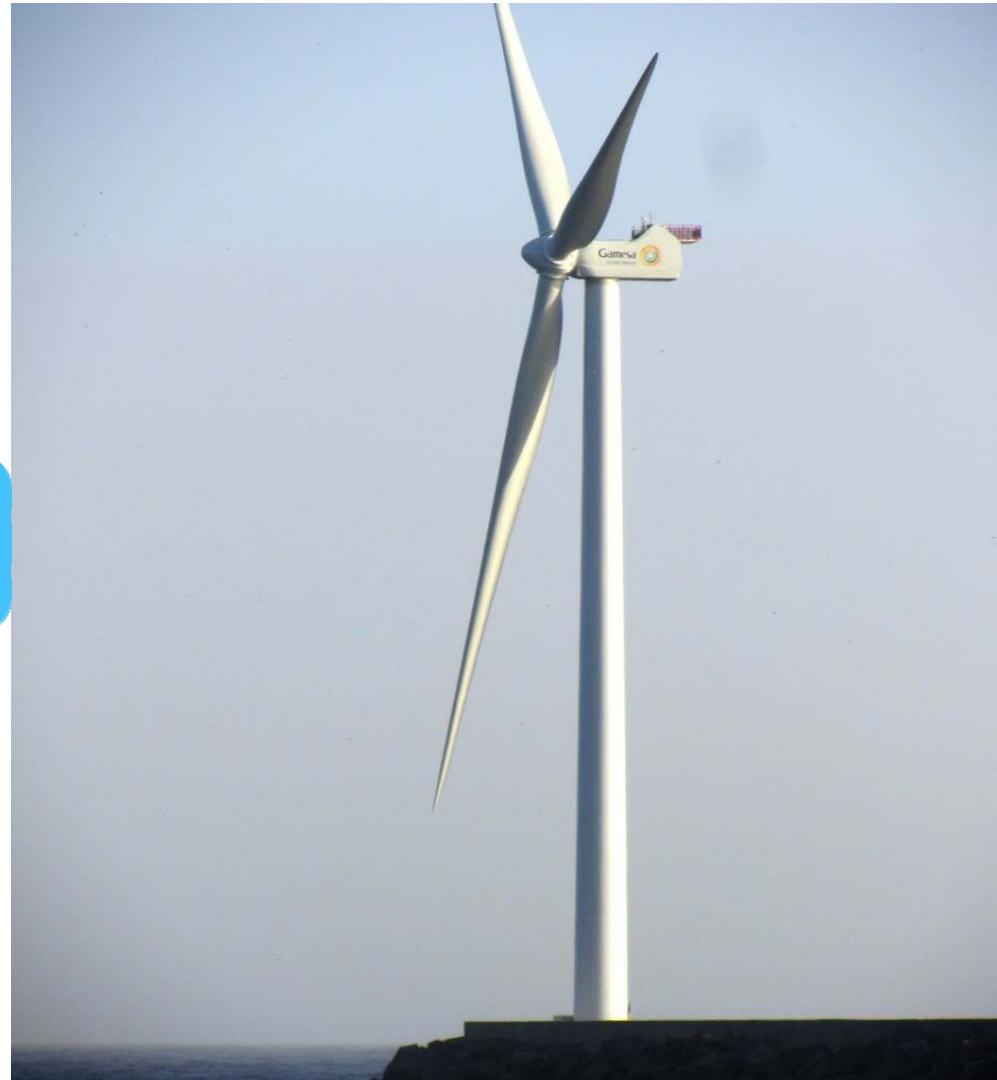
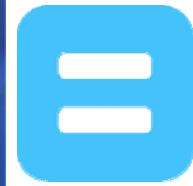
Solar Oasis

redefine THE POSSIBLE.









Bigger can sometimes be better...
We need policies for REpowering

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100% renewable energy and energy efficiency

www.renewablecities.ca

www.yorku.ca/sei



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Vancouver, Canada
13 - 15 May, 2015



Hosted by:



14th World Wind Energy Conference & Exhibition

Innovation for 100% Renewable Energy
In Harmony with the Environment

26-28 October, 2015 – Jerusalem, Israel



www.yorku.ca/sei

Q&A + Let's talk collaboration



Thank you/ Merci Beacup/ Muchas Gracias



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Faculty of Environmental Studies

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www.yorku.ca/sei



Sustainable
Energy Initiative



faculty of
environmental
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