Promoting a Healthy Nuclear Industry

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Ontario's Nuclear Industry - the way forward

Ron Oberth
President

Organization of Canadian Nuclear Industries

2013 CRAC Annual Conference
May 31, 2013

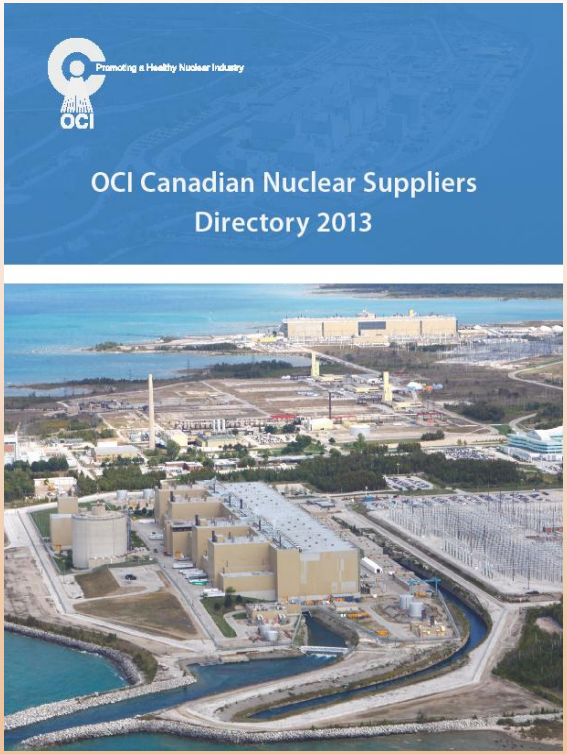
OCI Overview

Promoting a Healthy Nuclear Industry

- OCI is an industry association representing 180 private sector suppliers of products and services to the Canadian and offshore nuclear industries.

- OCI member companies, located in communities across Ontario, employ more than 10,000 highly qualified nuclear specialists – out of 30,000 total direct jobs in Canada's nuclear industry

- Skilled and well-paid jobs in OCI companies are vital to the economic health of these communities



Construction of CANDU units at Qinshan in China 1997-2003

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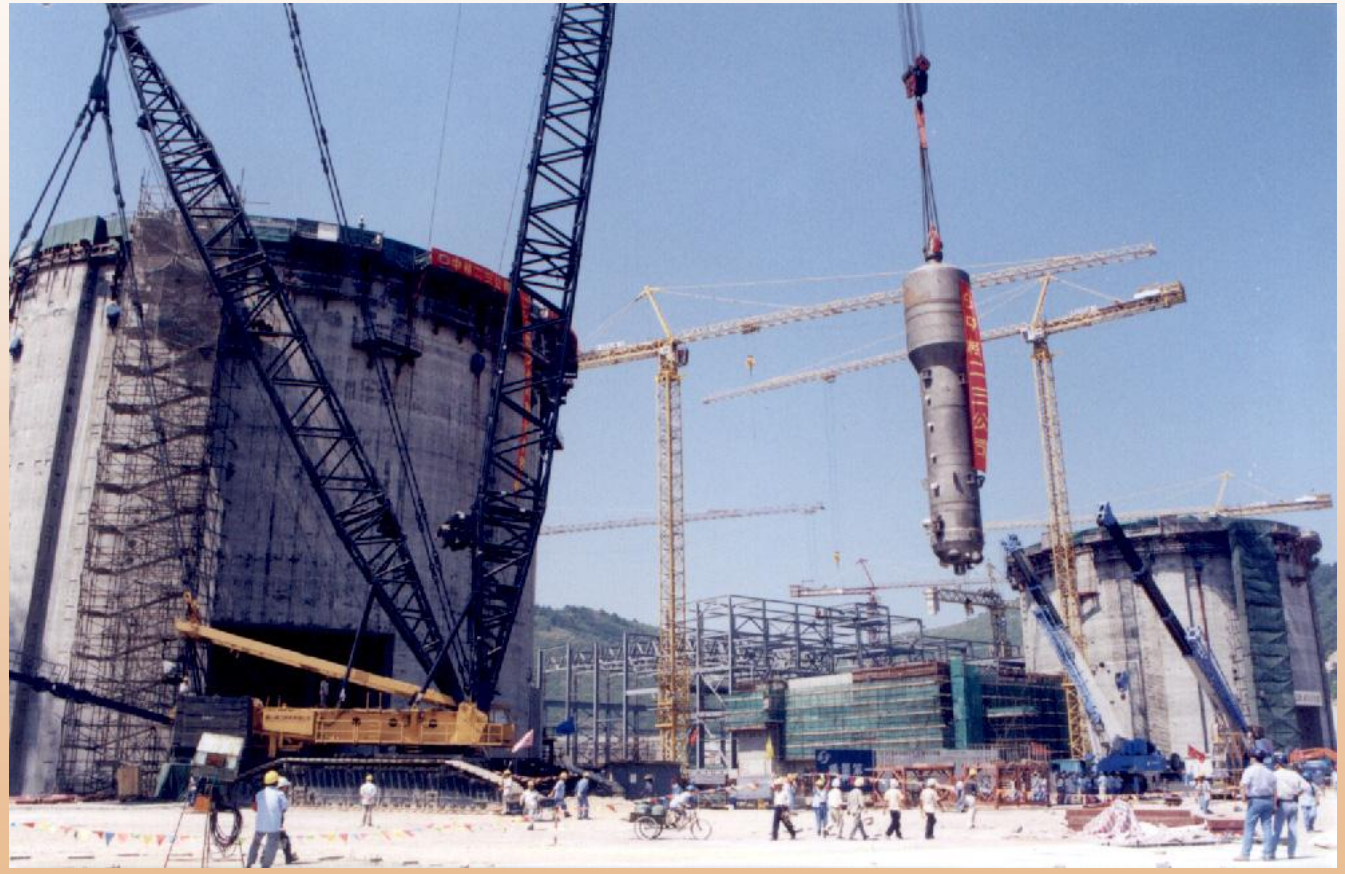

Construction of CANDU units at Qinshan in China 1997-2003

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Darlington Energy Complex 2012

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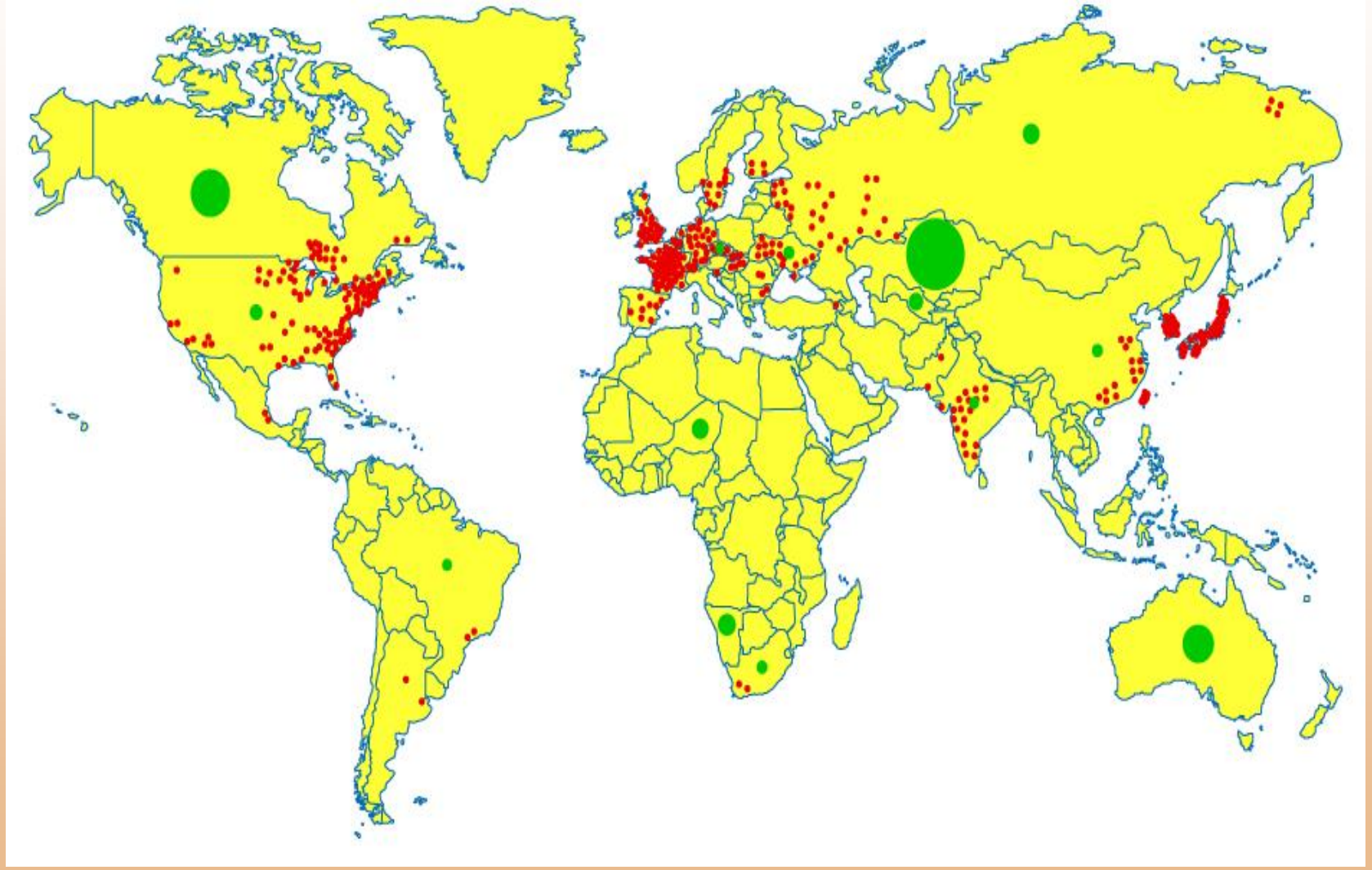
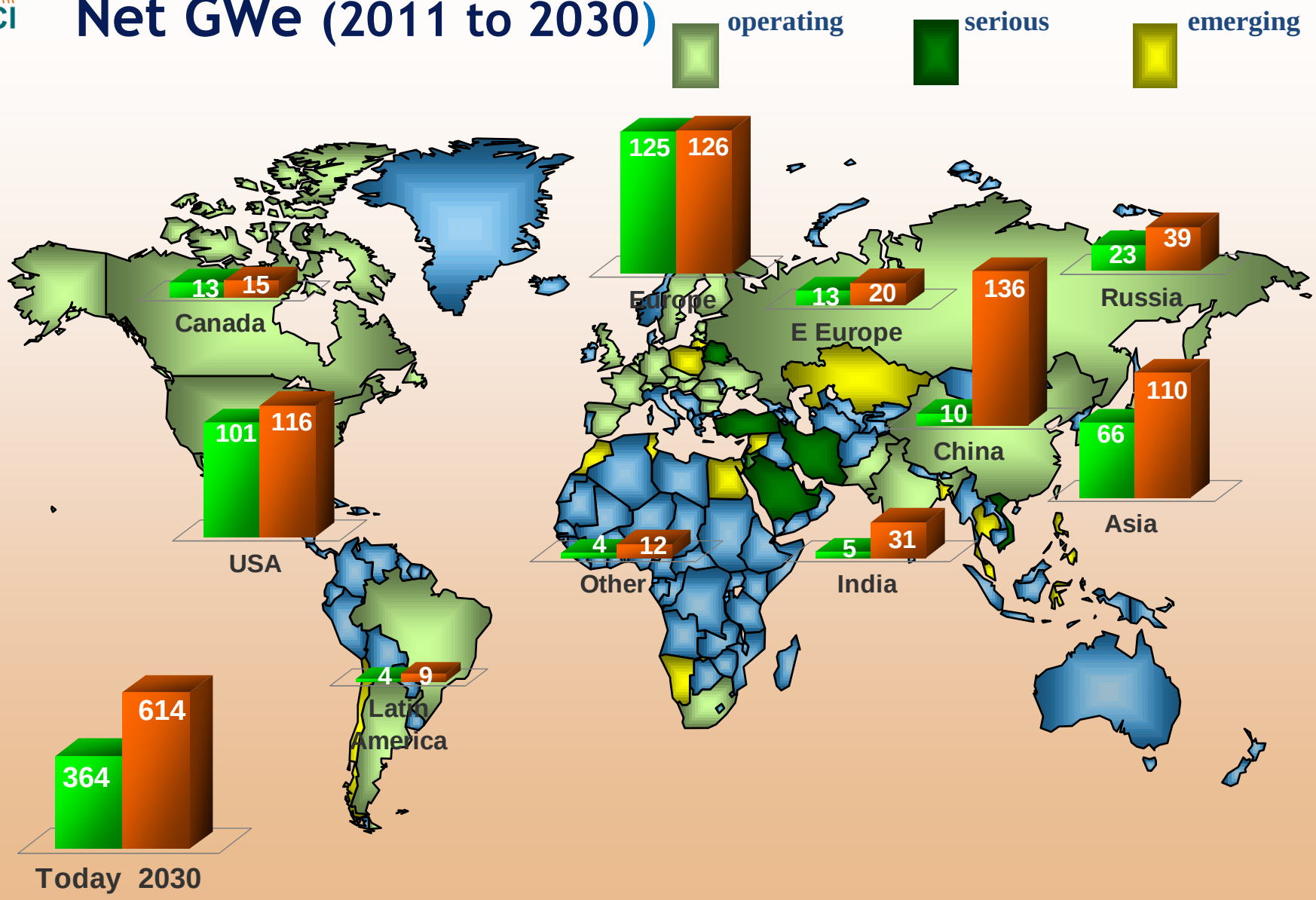
World Nuclear Power Reactors - with Uranium Sources



Reference case generating capacity

Net GWe (2011 to 2030)



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Canadian Nuclear Industry

- *Canada was a successful nuclear pioneer*
  - *60 years of nuclear technology development*
  - *Developer of CANDU nuclear technology*

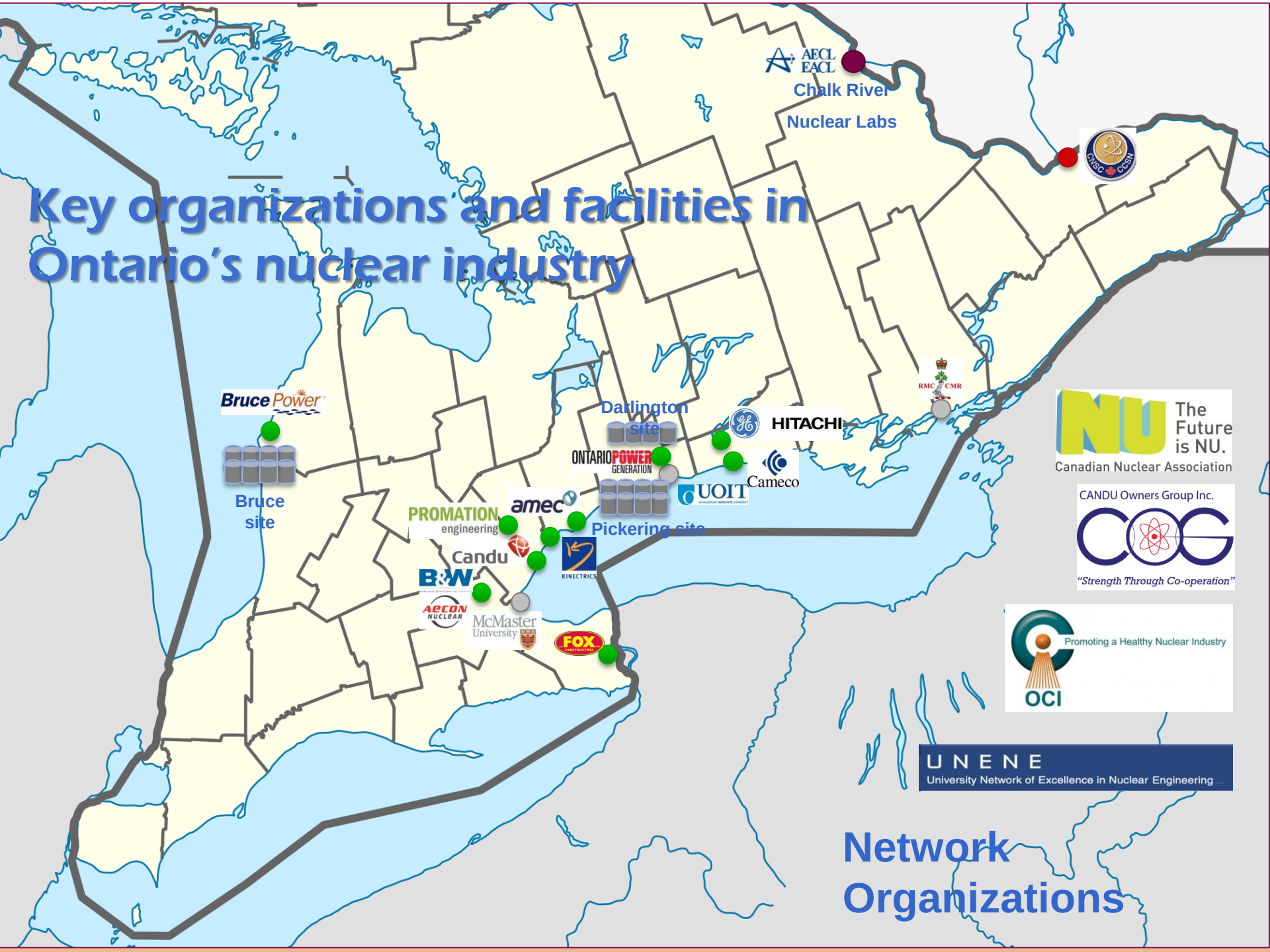
- *Nuclear energy is a $7 B/year industry*
  - *30,000 direct jobs (plant operations, services /equipment supply, uranium mining, regulation and R&D)*
  - *More than $1 B/year in exports*
  - *World's second largest exporter of uranium*

ONTARIO POWER GENERATION

Cameco

Bruce Power

Candu


Key organizations and facilities in Ontario's nuclear industry
AECL EACL
Chalk River Nuclear Labs
CNSC CCSN
Bruce Power
Bruce site
Darlington site
ONTARIO POWER GENERATION
HITACHI
Cameco
UOIT
RMC CMR
PROMATION engineering
amec
Pickering site
Candu
KINECTRICS
B&W
AECON NUCLEAR
McMaster University
FOX
The Future is NU.
Canadian Nuclear Association
CANDU Owners Group Inc.
COG
"Strength Through Co-operation"
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UNENE
University Network of Excellence in Nuclear Engineering
Network Organizations

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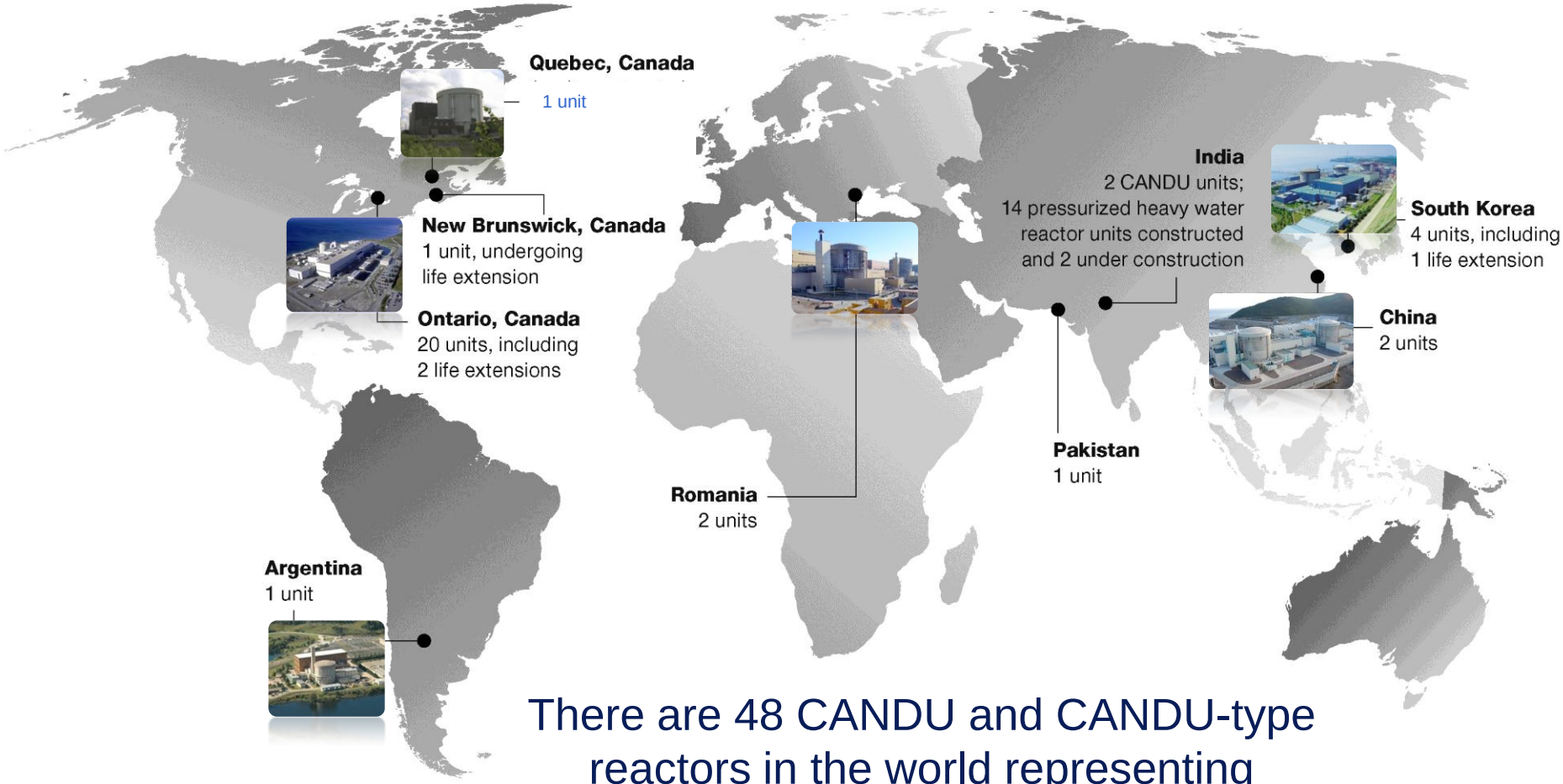
CANDU: A Global Success



There are 48 CANDU and CANDU-type reactors in the world representing approximately 10% of the global fleet of 442 reactors

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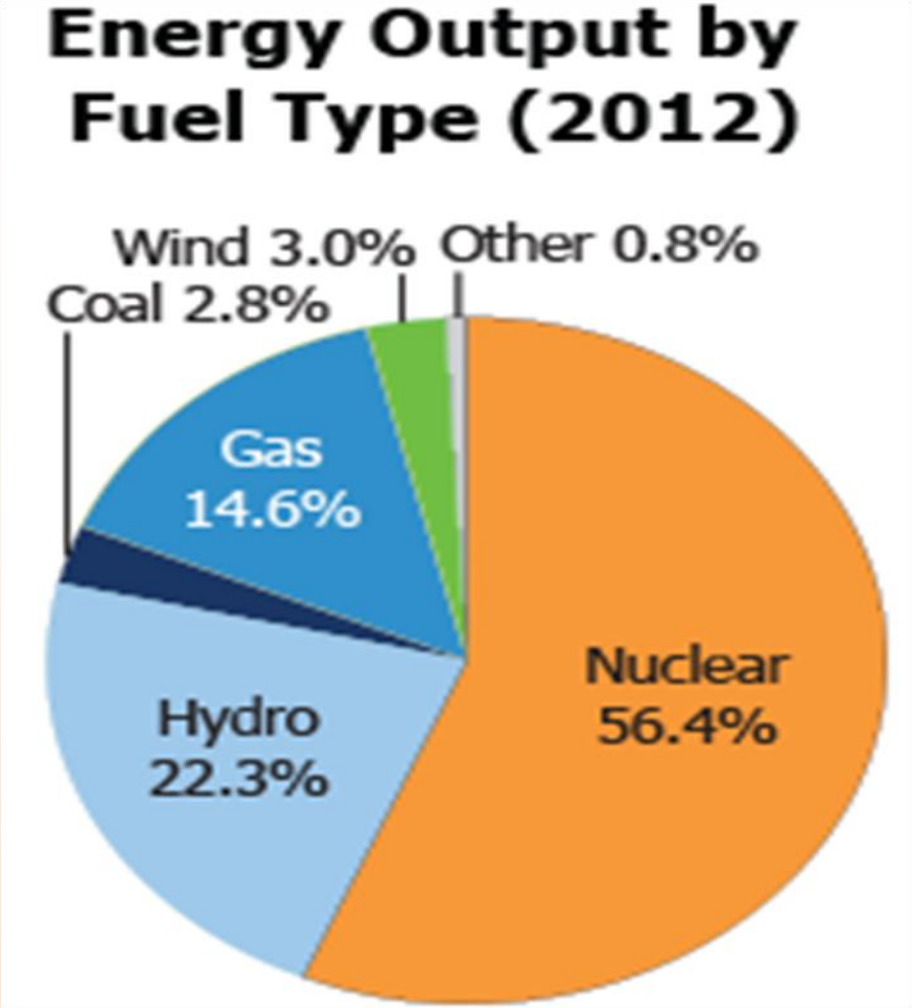
Electricity Sources in Ontario (2012)



Source: Independent Electricity System Operator (IESO), 2012

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Nuclear Power In Ontario

Pickering Nuclear Power Station

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Nuclear Power In Ontario

Darlington Nuclear Power Station

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Nuclear Power In Ontario

Bruce Nuclear Power Site

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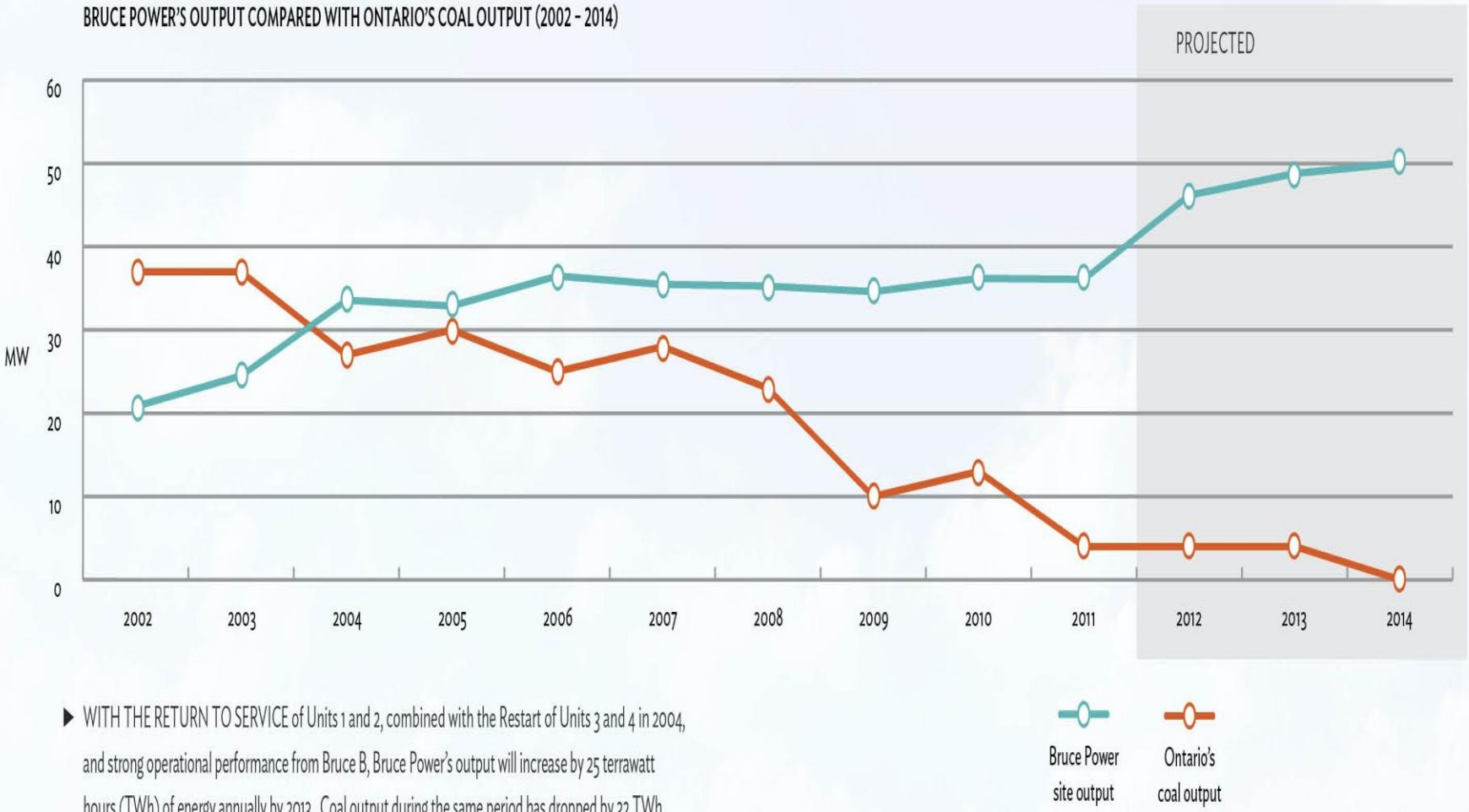
Nuclear Up / Coal Down

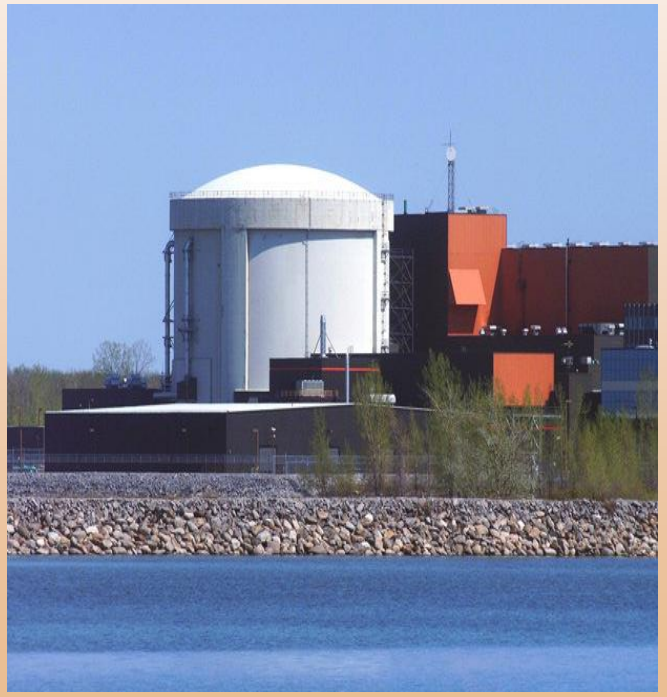
(Bruce Power website)



Nuclear Power in other Provinces

- The CANDU plant in New Brunswick supplies 40% of the provinces electrical energy.
- The CANDU plant in Quebec is scheduled for decommissioning.

Point Lepreau Nuclear Generating Station, New Brunswick



Gentilly Nuclear Generating Station, Bécancour, Quebec

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Managing Used Nuclear Fuel

- One 20 Kg CANDU fuel bundle produces the same amount of electricity as 400 Tonnes (4 rail cars) of coal
  - *power 100 homes for 1 year*

- All used nuclear fuel is now stored at reactor sites in pools or concrete containers
- All of Canada's used nuclear fuel could be stored on a football field to a height of 2 m

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Canada's Plan for the Long-Term Management of Used Nuclear Fuel

- The Government of Canada has approved a plan for the long-term management of used nuclear fuel
- The "Adaptive Phased Management Program" involves interim storage at reactor sites followed by above ground centralized storage and finally deep geologic disposal in a stable and tested rock formation.
- 15 communities in two provinces have expressed interest in hosting the facility.

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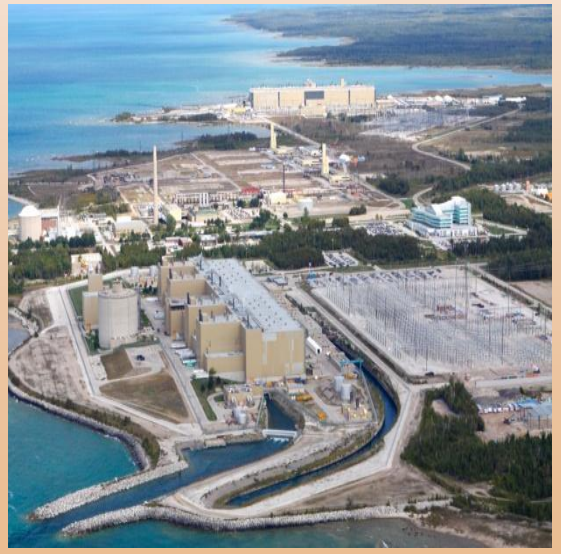
Ontario's Long Term Energy Plan

- Ontario's Long Term Energy Plan (2010) calls for the refurbishment of Darlington and Bruce units as well as the construction of new nuclear units at the Darlington Site to maintain a balanced and reliable electricity supply portfolio.
- Ontario Govt is starting a review of the 2010 Supply Plan to reconsider supply mix (nuclear, hydro, wind/solar, gas)



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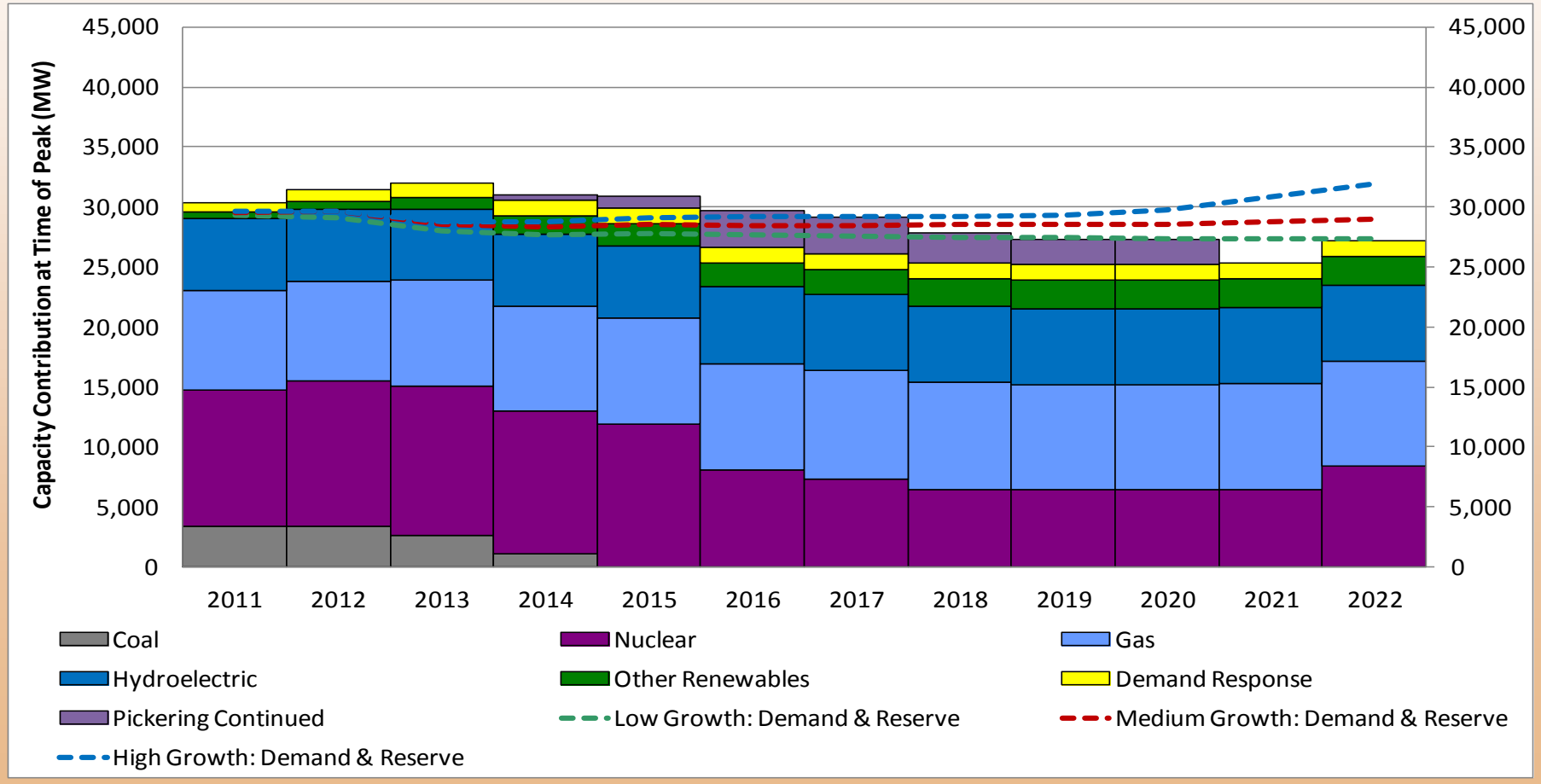
Ontario needs robust and diversified power system to sustain and attract industry

- **OPA Supply-Demand Forecast shows surplus supply in near term, adequate supply mid term and <u>need</u> for new supply in 2022 (March/12)**



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Public Support for Nuclear – Ontario

2012 Public Opinion Research

National Nuclear Attitude Survey

Ontario Results

	2011	2012
In favor		
Refurbishment	**68%**	**63%**
New Build	**50%**	**48%**

(CNA 2012)

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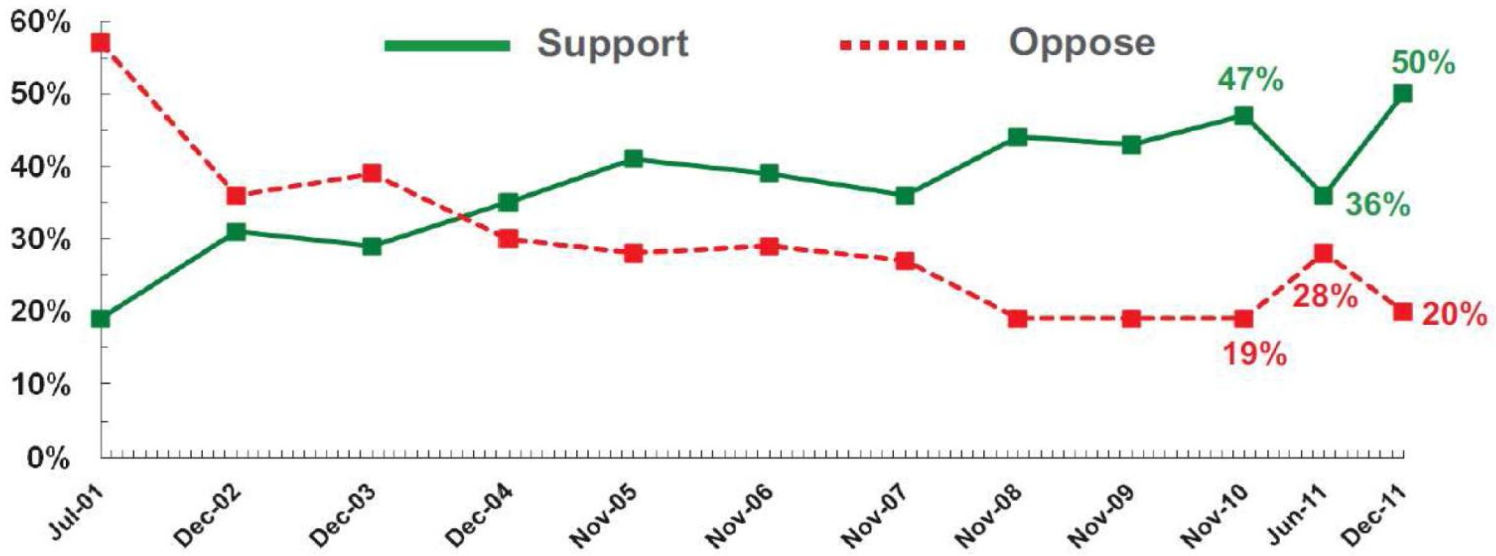
Public Support for Nuclear – UK

Support for replacement new build reaches a new high point of 50%



Base: Ipsos MORI poll. Base: All adults aged 16+ (1,000 – 2,000).
Fieldwork December 2011

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Germany's Phase-out of Nuclear

Shares in net electricity production in 2012

Graph: B. Burger, Fraunhofer ISE; data: EEX Transparency Platform, Statistisches Bundesamt (DESTATIS)

Fraunhofer ISE

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A Tale of Two States

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California's Coming Green-Outs

Wall Street Journal March 30, 2013

"The wind and solar mandate means future power shortages."

"The state's renewable energy standard will soon cause a surge in electricity prices and could even lead to rolling blackouts when the weather heats up."

"In 2006, the state passed a law requiring utilities to derive 20% of their power from renewables by 2010. The mandate has since been increased to 33% by 2020."

"California residents and businesses already pay rates that are 25% to 60% higher than the national average. Excessive energy costs have helped to obliterate the state's manufacturing base"

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Nuclear Plants to Expand Charlotte Region's Energy Portfolio

(charlotte Business Journal, April 20, 2012)

- Four new advanced-design AP1000 nuclear plants are under construction at the Vogtle Site in N Georgia and at V.C. Summer Site in S.C. near Charlotte.

"The facility bolsters economic-development prospects for us all in the region. Industry moves to locations with stable, ample and affordable electricity. Companies including Google and Facebook recently chose the Carolinas for facilities, in part, for the ample and carbonless power that's available with nuclear energy. These are terrific New Economy companies building for the first time in our region."

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Electricity Cost Comparison - Ontario

- **The average cost of electricity from nuclear units (high capital cost and low fueling cost)*:***
  - ***Darlington & Bruce B units ~ 5.2-5.5 cents/kWh***
  - ***Refurbished Bruce units ~ 6.8 cents/kWh***
  - ***New Units ~ 8 -10 cents/kWh***
- **Ontario's revised Feed In Tariffs *(not including back-up gas)*:**
  - ***Wind - $11.5 cents/kWh and up***
  - ***Solar -35 cents/kWh and up***
- **Combined cycle gas plants (with gas at $4/MMBTU) are currently the low cost option (without a carbon tax)**
  - ***Long term price risks if price of gas in NA moves to world levels and carbon tax is higher than projected***

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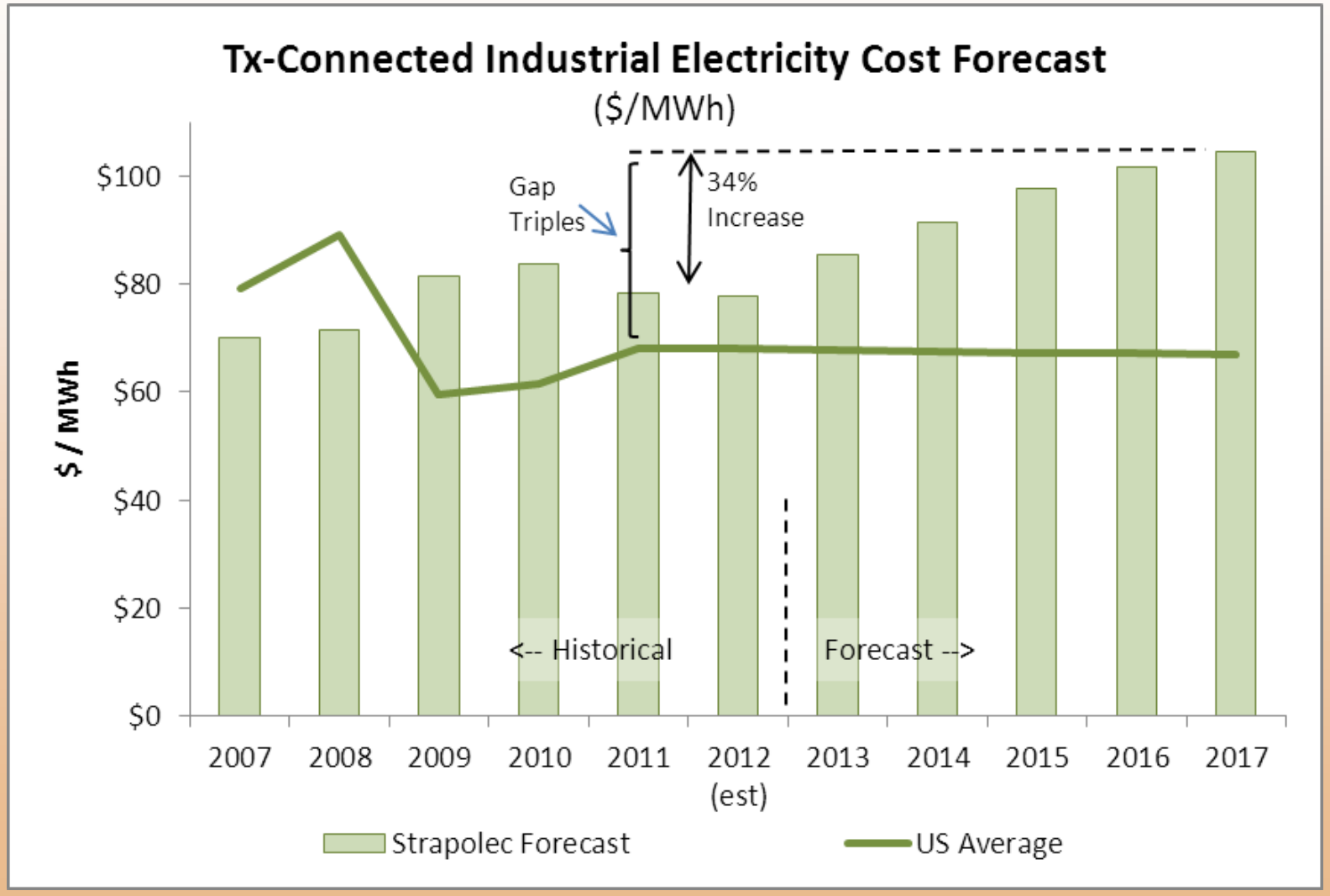
Strapolec Phase 1 Study Results (Feb 2013)



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Economic (Jobs) Impact of Refurbishments

- **Annual Economic Benefit of Refurbishment and Operations (10 Refurbishments plus Operations during the Refurbishment Program Period (2016 - 2024)**

	Refurbishment	Operations	Total Impact
• Employment	10,600	16,600	27,200
• Labour Income	$1.2 B	$2.1 B	$3.3 B
• Fuel Cost	-	$0.5 B	$0.5 B
• Equipment	$1.9 B	$1.2 B	$3.1 B
• TOTAL	$3.1 B	$3.8 B	$6.9 B

Canadian Manufacturers and Exporters (Sept. 2012)

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Conclusions

- **Nuclear should continue to be the main base-load supplier of low cost and low carbon electricity in Ontario (50% of supply mix)**
- **Decisions on Ontario's future electricity supply mix must consider**
  - ***electricity deliver price***
  - ***economic impacts – direct and indirect jobs***
  - ***GHG emissions***
- **A fact-based and consistent communication program is critical to maintaining public support and political support for nuclear power**
  - ***Nuclear refurbishments/construction = direct nuclear jobs***
  - ***Nuclear base load = lower cost electricity = manufacturing jobs***
  - ***Nuclear = lower GHG emissions than higher wind/solar/gas supply***

The nuclear industry welcomes the support of host communities and industry associations such as the CME and the CRAC

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www.oci-aic.org