






CANDU: Vital Foundation of Ontario's Power System

Robert Van Adel
President & CEO, AECL
OEA, June 17, 2004



Blackout in Ontario Focused People's Attention on the Potential Energy Crisis

Toronto



Blackout put nuclear energy back on the agenda

"Nuclear generation is an integral part of a responsible, progressive plan to generate electricity in the 21st century" (Premier Dalton McGuinty, 2003)

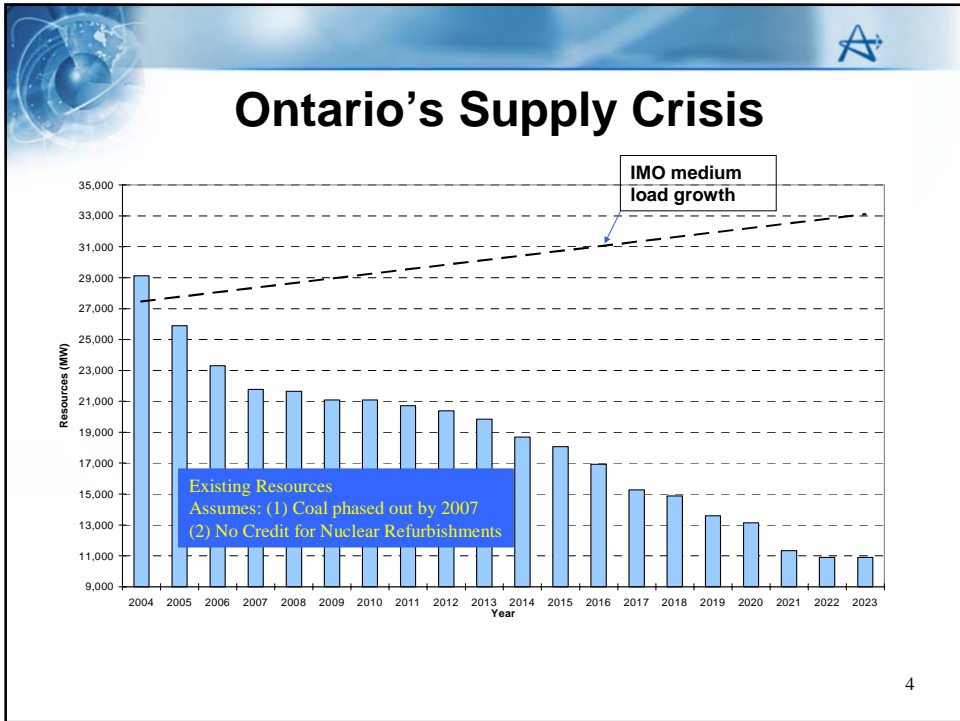
2





Ontario's Electricity Supply Crisis

- **“Ontario is facing an electricity supply crisis”**
 - *Hon. Dwight Duncan, Minister of Energy*
- **80% of system (25,000 MW) needs refurbishing, rebuilding or replacing by 2020 to meet demand, replace coal**
 - Massive initiative will cost \$25 to \$40 B, per Minister
- **Decisions & commitments must be made NOW to ensure reliable, adequate and economic supplies of power from a secure, diverse and clean mix of supply options**

3







What is Being Done About It?

- Conservation
- RFPs for new capacity:
 - Renewables (300MW)
 - New Electricity Generation or Demand Side Management (2500MW)
- Electricity Restructuring Act
- Revitalization of nuclear energy in Ontario:
 - 3 CANDUs brought back on line in past year (2,000 MW)
 - Pickering/ Bruce refurbishment decisions soon (3,000 MW)
 - Feasibility study for new-build Advanced CANDU at Bruce
 - Improved CANDU performance by private-sector Bruce Power equivalent to new 600 MW plant

5

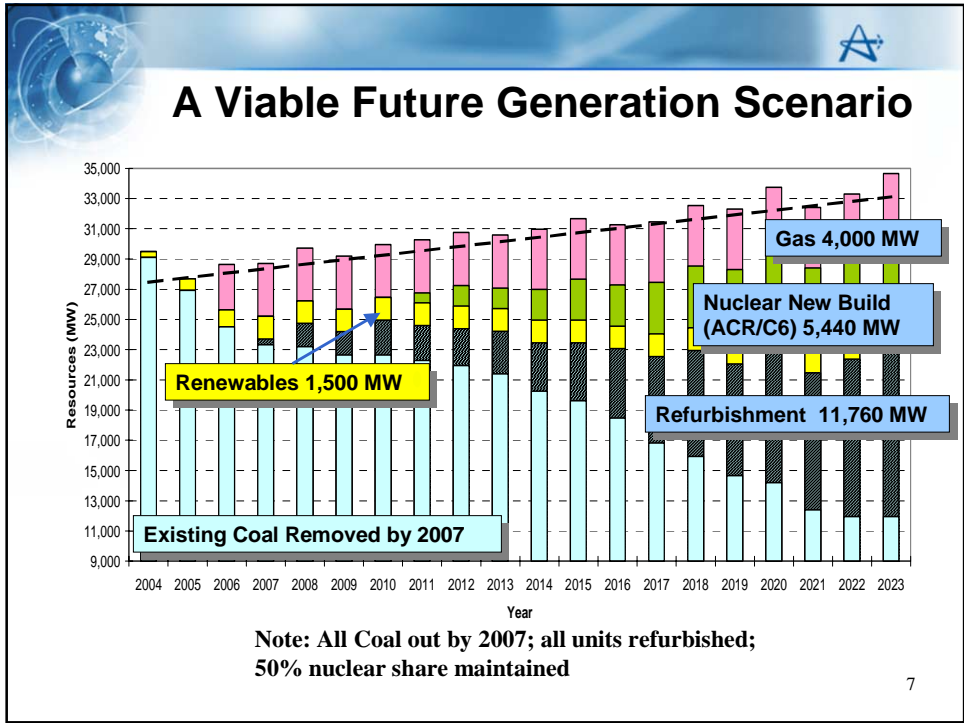


Options to Fill Gap

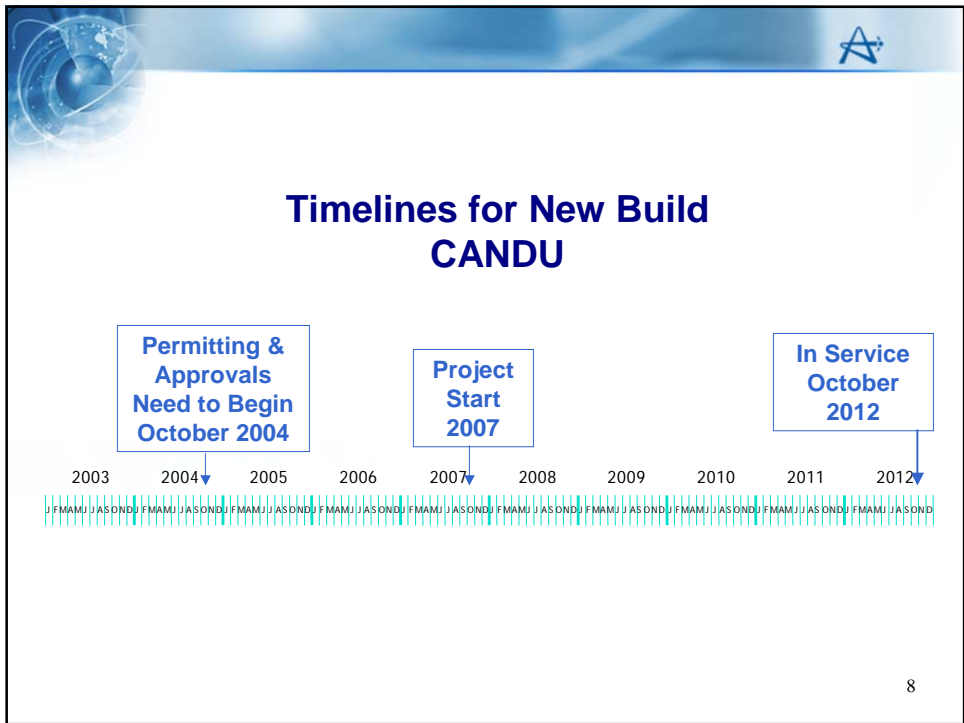
- If remove coal by 2007, Ontario is left with following options:
 - Gas
 - Renewables
 - Nuclear
- Ontario needs all viable sources of electricity to meet supply gap; gas and renewables have both advantages and disadvantages

Each electricity source has its own merit – nuclear not competing with gas or renewables – all have their place

6



7



8

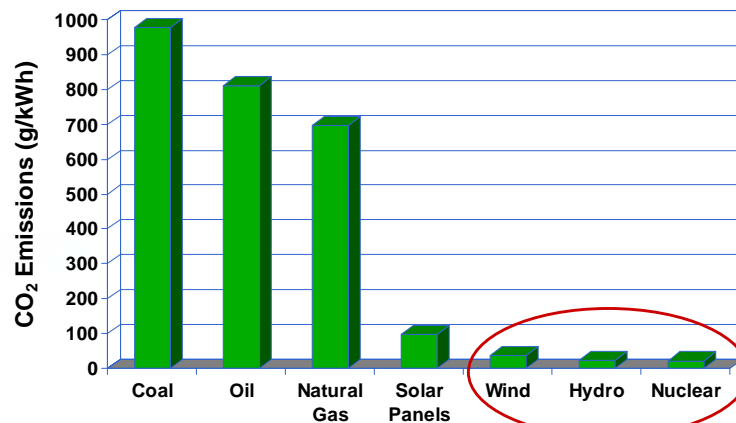
Why Now? Public Opinion supports Nuclear Energy

2004 Ipsos-Reid Poll showed that:

- **49 % of Canadians support nuclear energy**
- **64 % in Ontario support nuclear energy; 67% support refurbishment**
- **A majority of Ontarians agree:**
 - existing nuclear power plant licenses should be renewed
 - there should be new builds on existing sites
- **34 % of Ontarians are concerned about the cost of energy in general**
- **Support for nuclear increases when linkage is made between nuclear energy and clean air**

9



Full Cycle CO₂ Emission Studies



Source: IAEA Spadero et al. 2000


Electric Energy Technology

10

Why CANDU in Ontario?

- **CANDU is the baseload WORKHORSE of Ontario's power system (20 reactors, ~15,000 MW)**
- **CANDU is cost competitive**
- **CANDU is clean, low-cost, 24/7 baseload power, as is large hydro**




11






Why CANDU for Ontario?

- **CANDU is made-in-Canada technology, proven in Ontario for over 40 years**
- **Nuclear utilities in Canada all use CANDU**
- **Ontario benefits most from the CANDU program:**
 - **e.g. China project = \$2B Ontario content and 26,000 jobs**





12

Excellent CANDU 6 Performance


<u>Name of Unit</u>	<u>In-Service Date</u>	<u>Lifetime Capacity Factor</u>
Pt. Lepreau (New Brunswick)	Feb. 1, 1983	83%
Gentilly 2 (Quebec)	Oct. 1, 1983	80%
Wolsong 1 (Korea)	April 22, 1983	86%
Wolsong 2 (Korea)	July 1, 1997	92%
Wolsong 3 (Korea)	July 1, 1998	93%
Wolsong 4 (Korea)	Oct. 1, 1999	96%
Embalse (Argentina)	Jan. 20, 1984	85%
Cernavoda 1 (Romania)	Dec. 2, 1996	86%
Qinshan 1 (China)	Dec. 31, 2002	90%

13

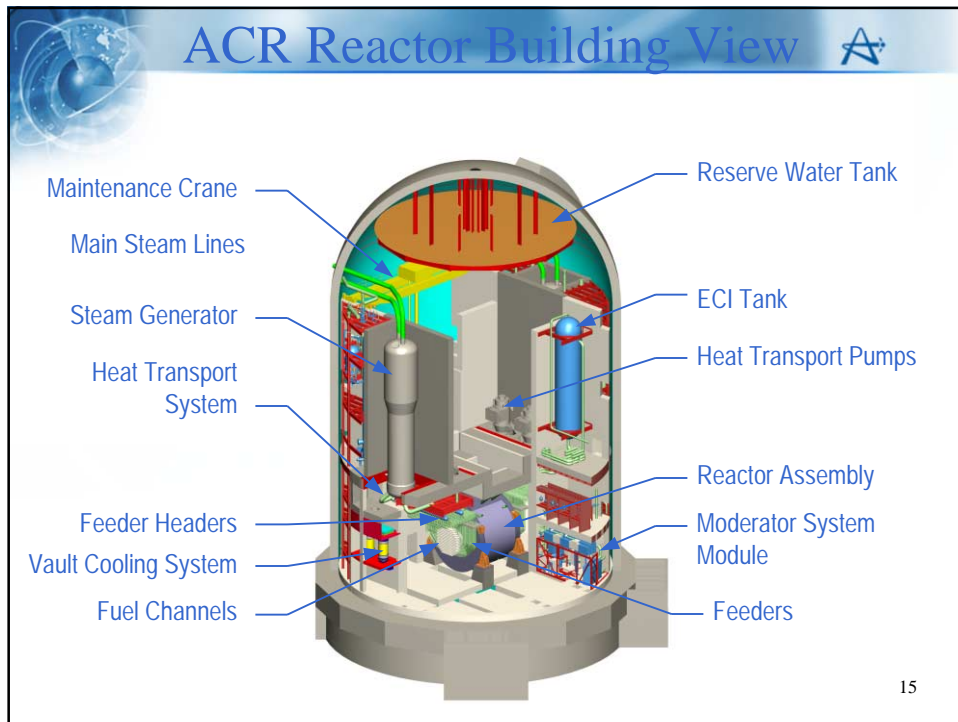



Why CANDU? World-beating Advanced CANDU Reactor (ACR)

- Developed by AECL in Ontario; based on proven CANDU 6 design
- Superior economics = keen market interest in Canada and US
- Lower capital cost, shorter schedule, competitive with gas, pre-licensed
- Market Studies: Winning product; leads competition, pre-fab modular design
- **ACR to be project-ready by 2006/07 for in-service early next decade**



14



Why AECL?

- **AECL has new management:**
 - aggressive, customer-focused commercial approach
- **AECL is the CANDU Design Authority:**
 - engineer, R&D expert and proven CANDU project manager – *worldwide*
- **AECL has capacity to take risk**
- **AECL can catalyze resources to deliver**

16



Why AECL? Strong CANDU Partners

- Working with Partners allows us to leverage experience and expertise to ensure our products meet our customers' high expectations
- Our Project Partners include:








AECL and its partners can bring this success to Ontario

17




Why AECL? Proven Project Delivery

- Through its “A” Team, AECL is delivering breakthrough advances in nuclear projects:
 - On time, on budget delivery of projects internationally, with globally-recognized partners – We are bringing this expertise to Ontario
 - Quality: CANDU technology
 - Service: we support our technology
 - Innovation: in construction methods, project management, and risk mitigation



Qinshan Phase III site –
Twin CANDU 6 Units

18

 **Why AECL? Risk Sharing Model**

- **Province - Provides stable policy environment and institutional framework via price support (PPA)**
- **CANDU Utility – Takes plant operating risk**
- **AECL – Takes project delivery risk: on-time, fixed price**
- **Federal Government – Supports and backstops AECL and CANDU/ ACR**

19


 **Why AECL? Proven Waste Solutions**

- **Dry fuel storage technology - MACSTOR®**
 - In use in Canada, Korea, Romania
- **Waste disposal concept in place**
- **NWMO will recommend solution by end of 2005**



The total waste generated from CANDU would fill one soccer field to a depth of one metre – waste is securely, responsibly managed.


20



Conclusions

- ✓ Refurbished CANDU, the CANDU 6 and the ACR
 - Will provide safe, reliable, clean-air baseload power at a competitive price for decades in Ontario
- ✓ We must replace CANDU with CANDU and add more baseload CANDU to be self-sufficient long term
- ✓ AECL & Partners can deliver CANDU solutions for Ontario
- ✓ Decisions need to be made NOW

21



"If we can do it (build CANDU on time & on budget) in China, surely to goodness we can do it in Ontario"

Hon. J. Manley

22

