

Excellence through Collaboration

Nuclear Power Generation for the Next Decade: Challenges and Solutions for 2015-2025

A CANDU Owners Group Perspective

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CANDU Owners Group (COG)

COG Today

COG is a federally-incorporated not-for-profit organization whose sole interest is to add value to its members through improved safety, reliability and human performance achieved through collaboration in research and development, projects and services and shared operating experience.

Our members:

COG MEMBER	OPERATING UNITS	INSTALLED CANDU CAPACITY (MW(E))	COG MEMBER	OPERATING UNITS	INSTALLED CANDU CAPACITY (MW(E))
BRUCE POWER	8	6348	SOCIETATEA NATIONALA NUCLEARELECTRICA	2	1411
NEW BRUNSWICK POWER	1	680	CHINA NATIONAL NUCLEAR OPERATION CO.	2	1400
ONTARIO POWER GENERATION	10	6618	NUCLEOELECTRICA ARGENTINA SA	1	648
CANADIAN NUCLEAR LABORATORIES	1	RESEARCH	PAKISTAN ATOMIC ENERGY COMMISSION	1	137
NUCLEAR POWER CORPORATION OF INDIA LTD.	18	4460			
KOREA HYDRO AND NUCLEAR POWER	4	2867			

TOTAL UNITS: 47 NPP / MW(E): 24569

And supplier participants make us stronger working together...

Amec Foster Wheeler

AREVA NP Canada

BWXT (formerly B&W)

Cameco

Canadian Power Utility Services

GE Hitachi Canada

Hatch

Kinectrics

RCM Technologies

SNC-Lavalin (Candu Energy)

Stern Labs

Worley Parsons



Key Challenges for the Next Decade

- Major Projects / Refurbishment
- Ageing Management
- Human, Organizational and Infrastructure Aspects
- Supply Chain
- Waste

Refurbishment: Challenges

- Large, technically & organizationally complex, expensive
- Resource constrained
- Past experience:
 - Cost and Schedule Overruns
 - Plant reliability post refurbishment
- Stakeholder confidence essential
 - Shareholders
 - Investors
 - Public



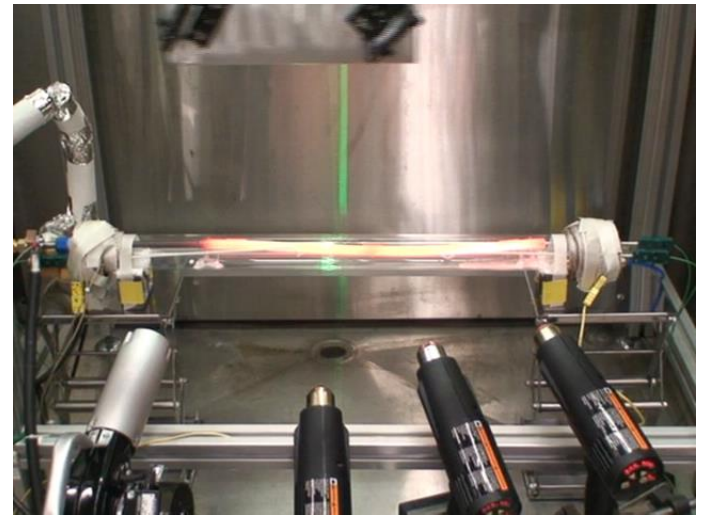
Refurbishment: Approaches

- Innovation
 - R&D to support life extension of life limiting components
- Collaboration
 - Industry Peer Group established
 - Coordination of project schedules between utilities
 - COG Supplier-Participant program to improve supplier performance
- Aggregation of knowledge
 - “Excellence in Refurbishment” document
 - Knowledge beyond nuclear industry
 - Database for sharing Lessons Learned



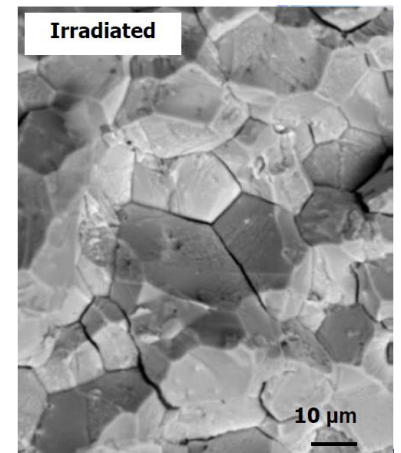
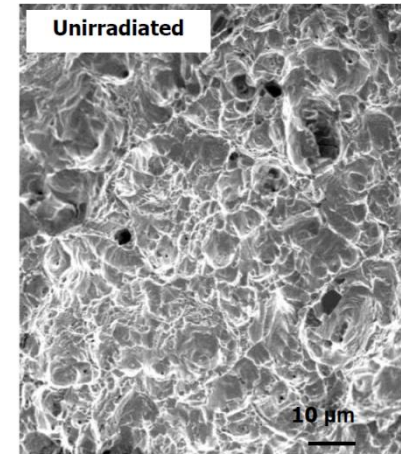
Ageing Management: Challenges

- Refurbished reactors will operate 60 years, or more
 - Only a small portion of the plant is refurbished
- Ageing Management activities (e.g., R&D and I&M) are costly
- Investor confidence
 - Reliable, predictable operation
 - Regulatory certainty
 - Public acceptance



Ageing Management: Approaches

- Risk Informed Prioritization
- Innovation
 - Understand ageing mechanisms
 - Reduce scope / cost of inspection and maintenance activities
- Collaboration
 - Minimize duplication of effort
 - Reduce cost
 - Ensure alignment
 - Expand the Community of Practice
- Aggregation of knowledge
 - Trending of ageing related Operating Experience
 - Ageing management Peer Group



Human, Organizational & Infrastructure Aspects: Challenges

- Sustaining the knowledge base
 - Additional challenges posed by technology divergence
- Technology Convergence
 - International fleet approach broadens Community of Practice for CANDU-6 Technology
- Collaboration
 - INPO / WANO
 - Human Performance Peer Group
 - Safety Culture Self Assessment: sharing of approaches / results
- Innovation
 - R&D to adapt resilience approaches from other industries



Summary

- Significant opportunities lie ahead
 - New build in 4 of the 7; refurb in 5 of 7 CANDU / PHWR countries
- Common Challenges
 - Stakeholder confidence
 - Public acceptance
 - Economics
 - Regulatory certainty
 - Human aspects
- Common Approaches
 - Innovation
 - Collaboration
 - Aggregation of knowledge
 - Risk Informed prioritization
 - Technology convergence
- Operational focus remains fundamental
 - Safe, reliable, economic and predictable performance essential to sustainability



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Thank you!

