Infrastructure Needed for Success

An OEM/NSP Designer’s Perspective

Frank Yee
Chief Nuclear Engineer
Candu Energy

Pacific Basin Nuclear Conference, Vancouver, Canada
August 24 – 28, 2014
Candu Energy: A Total Nuclear Solution Company

Nuclear New Build
• Develop, design, build CANDU® nuclear power reactors

Life Extension Projects
• Refurbish and upgrade reactors in Canada and around the world

Support services to nuclear power plants (CANDU® & non-CANDU®)
• Operations & Maintenance support, plant life management programs, waste management
Existing and Emerging CANDU® Markets

- Ontario, Canada: 18 units
- New Brunswick, Canada: 1 unit
- Argentina: 1 unit, undergoing life extension
- Romania: 2 units; 2 units under development
- China: 2 units
- South Korea: 4 units

New build opportunities in existing markets in Argentina, Canada, China and Romania and new markets in Poland, UK and Malaysia.
Context – We are Part of a Larger Team

The following key external entities are needed to ensure a vibrant nuclear industry:

- Healthy Supply Chain
- Strong Media and Public Support
- Engaged Universities
- Practical Set of Codes and Standards
- Effective Regulator
- Productive Engineering Tools and Analysis Codes
- Proactive Government & External Relations
- Capable Trades and Construction Work Force
- Strong R&D Facilities and Researchers
- Profitable Utilities and Strong Owners Group
Infrastructure Comes in Many Forms

- Strong R&D Facilities & Researchers
- Profitable Utilities & Strong Owners Group
- Healthy Supply Chain (Parts & Services)
- Strong Media & Public Support
- Engaged Universities
- Practical Set of Codes & Standards
- Effective Regulator
- Productive Engineering Tools & Analysis Codes
- Proactive Gov. & Ext. Relations
- Capable Trades / Construction Work Force

OEM/NSP Designer
Healthy Supply Chain

OEM Inputs:
- Outreach & Engagement
- Clear Specifications
- Updates on Prospective Markets and Technology Direction, Recognizing Capability Maintenance is a Challenge without New Build

Desired Outcome:
- Competitive and Reliable Products
- Reliable Sources of CANDU® Components (Calandria, Steam Generators, PHT Pumps, Fuel Channels, Fuelling Machine)
- Technical Support and Strategies for Obsolescence
**Strong Media and Public Support**

**Desired Outcome:**
- Positive, Balanced Reporting
- Supportive Public
- Elected Representatives who Reflect Public Opinion
- Engaged Communities
- Proactive Industry, Supportive of CANDU® Technology

**OEM Inputs:**
- Inform the Public on the Benefits of Nuclear
- Community Engagements
- Leverage the Benefits to the Environment
Engaged Universities

OEM Inputs:
- Provide Support to Research Chairs
- Input to Development of Curriculum
- Identification of Relevant Areas of Research
- Advice on Resourcing Demand
- Develop and Share our Vision of the Future

Desired Outcome:
- Partner in R&D
- Highly Trained Individuals
- Advice to Government Decision
- Innovation
Practical Set of Codes and Standards

OEM Inputs:
- Participation in Technical Working Groups
- Input to Identification of Industry Needs
- Provide Technical Advice on Reactor Technology

Desired Outcome:
- Safe and Reliable Design Based on Fully Developed Codes and Standards
- Stable Framework for Industry
- Reflect Industry Best Practices
Effective Regulator

OEM Inputs:

- Development of Step by Step Regulatory Structure that Reduces both Regulatory and Investment Risk
- Technical Support to Licensees
- Proponent of CANDU® Specific Design Features with the Regulator
- Support to Develop Safety Standards at the IAEA

Desired Outcome:

- Establishment of a Risk Management Based Regulatory Regime
- Clearly Understood Regulatory Documents
- Regulatory Certainty in Approving Construction and Operating Licenses
- Harmonized International Regulatory Approach
Productive Engineering Tools and Analysis Codes

OEM Inputs:
- Definition of Requirements and Methodologies for Third Party Developers
- Exchange of Experience in Use of Tools and Codes
- Needs to Advance State of the Art for Tools and Codes
- Supply Technical Capabilities to Maintain Computer Codes on Behalf of Industry

Desired Outcome:
- State of the Art Software
- Accurate and Efficient Tools
- Innovation to Improve Productivity
- Buy vs Invent Strategy Clearly Defined
Proactive Government & External Relations

OEM Inputs:
- Briefings to Elected Members and Government Officials
- Input into Science & Technology Decisions
- Engagement on Policy & International Issues

Desired Outcome:
- Enabling Bi-Lateral Agreements
- State to State Influence
- Long Term Strategy for Nuclear
- Enabling Science & Technology Programs
- Influence at International Fora
**Capable Trades and Construction Work Force**

**OEM Inputs:**
- Information and Definition of Requirements
- Leadership and Specialty Training
- Identification of Specialty Skills

**Desired Outcome:**
- Development of Technology Specific Skills
- Available Work Force when Project Mobilizes
- Commitment to Delivery
**Strong R&D Facilities and Researchers**

**OEM Inputs:**
- Identification of Areas Requiring Research for New Build and Operating Station
- Identification of R&D Skills to Respond to Emerging Operating Plant Issues

**Desired Outcome:**
- Innovation and Discovery
- Assessments Leading to Shorter Outage, Enhanced Safety, Reduced Maintenance Cost, Ease of Licensing
Profitable Utilities and Strong Owners Group

OEM Inputs:
• Designs that Meet Customer Needs Throughout Station Life
• Innovative and Reliable Products to Maintain High Capacity Factors
• Minimize or Eliminate Single Point Vulnerabilities as Much as Possible to Avoid Forced/Planned Outages

Desired Outcome:
• Partners in Identifying Needs (Shared Mutual Benefit)
• Two Way Communication/OPEX on Performance and Issues
• Development of OEM/Utility Long Term Relationship
• Optimized Stations’ Continuous, Reliable and Safe Operation with the OEM Feeling Sense of Contribution to the Success of the Station
Conclusion – Olympic Theme for Team Success – taken from Tim Hortons’ Commercial

“...there is no such thing as an unassisted goal...”

Together we can succeed!
Thank You