Nuclear Industry Localization Conference

Partnering with Westinghouse for a successful nuclear programme

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Our Standard: Global Technology with Local, Operationally Excellent, Cost-effective Implementation

Westinghouse

Full-scope, vertically integrated capability

Toshiba

Broad-based products and services implemented globally with 17,000 people in 18 countries

world-class products, services and resources integrated with Toshiba
Westinghouse Electric Product Lines

Nuclear Services
Focused on operating plant success through reliable operation, better (shorter, more predictable) outages and maximized power output.

Nuclear Fuel
A single-source fuel provider for PWR, BWR, VVER, AGR and Magnox reactors worldwide.

Nuclear Automation
Instrumentation and control solutions to enhance the reliability of nuclear plant control and safety systems.

Nuclear Power Plants
Specializing in the technology of new nuclear power plants and component manufacturing.
Evolutionary PWRs

- Updates of current 3 & 4-loop designs
- Extensive, safety-grade support systems
- Off-site ac for safety action and safety diesel or turbine-driven generators as backup
- Greater reliance on operator action
- Ultimate heat sink: heat exchangers/water systems

Why AP1000 passive designs?

- Less concrete & steel/MWe
- Simpler, less equipment, less safety-grade equipment, no safety-grade pumps
- Fewer Seismic 1 structures
- Shorter construction schedules
- Less maintenance, maintenance-free canned reactor coolant pumps, simpler Tech Specs
- Much less reliance on operator action to mitigate accidents (72 hours)
- Independent of off-site ac power to operate safety systems
- Ultimate heat sink: ambient air

*The preferred technology in the US and China*
Unique Benefits of AP1000™

- Incorporates lessons learned from the past
  - Simpler (less equipment, easier to operate, etc.)
  - Standardized (design, processes, construction, procedures)
  - Compact (very small footprint)
  - Safer: pre-licensed (certified by US NRC, being licensed in UK, Czech Republic, Canada, China)
  - Constructible via modularization
  - Localizable
AP1000 Passive Safety System Design Improves Economics and Construction Schedule

- 50% Fewer Safety-grade Valves
- 35% Fewer Pumps
- 80% Less Safety-grade Pipe
- 45% Less Seismic Building Volume
- 70% Less Cable

- No safety related pumps
- No safety related AC power
- Eliminates safety related support systems: HVAC, cooling, pneumatics.
Westinghouse-AP 1000
Advanced Passive Safety Features
Passive Containment Cooling System

AP1000
Ultimate
Heat Sink is the
Atmosphere
Innovative Approach to Project Risk Reduction and Schedule Optimization
AP1000 utilizing Modular Construction
AP1000 Project Schedule

Technology Selection and Early Works
- COD-8 years Initial Commercial Agreement
- COD-6.5 years Full Notice to Proceed / Final Investment Decision
- COD-4.5 years 1st Nuclear Concrete

Project Preparation Phase

Site Preparation
- Regulatory Construction License Approval

48 Months Construction
- Regulatory Operating License Approval

Start up & Testing

Supply Chain Activities
- Address Long Lead Requirements
- Develop Module Plan & Local Vendors
- Logistics Plan

Simulator Available and Operator Training
AP1000™ Contracts in China: On Time, On Budget

AP1000 selected as the Generation 3+ technology for Standard Plant deployment in China.

Four units under construction:
- Two units at Haiyang
- Two units at Sanmen

- Groundbreaking in Feb. 2008
- First Concrete Placement in Mar. 2009
- Currently in construction phase
- First plant in operation in 2013
- Fourth plant in operation in 2015
Localization
AP1000 Design Features and Modularization Facilitating Localization

- Passive safety features design equivalent in safety to other designs, while using very little safety grade equipment
  - Local suppliers can participate without upgrading qualifications
  - 80%+ of design is non-safety
- Modules and containment vessel (CV) localized
- > 50% of equipment to be localized
- Most of the Construction to be localized
Typical AP1000™ Cost Allocation by Type

- Equipment: 43%
- Transportation: 4%
- Site Construction: 41%
- Construction Mgmt: 6%
- Proj Mgmt/Engineering: 6%
- Transportation: 4%
Typical AP1000™ Equipment Breakdown

- Mechanical: 36%
- Piping/Valves: 8%
- Electrical: 5%
- I&C: 10%
- Other: 9%
- Heavy Components (TG, RV, SG): 32%
## Equipment Opportunities for South Africa

Equipment represents more than half of plant cost

- Containment vessel assembly
- Non-ASME III pumps and compressors
- Tanks
- Electrical transformers
- Material for and assembly of service water cooling towers
- Heat exchangers
- Module construction
- Switchgear, MCCs, panels
- Material-handling equipment
- Electrical panels and load centers
- Civil & MEI construction
- Cable and electrical raceway
- Electrical fittings
- Concrete
- Rebar
- Formwork
- Structural steel
- BOP piping
- HVAC ductwork and supports

South African suppliers can become part of the global Westinghouse supply chain.
Supply Chain Vision - Localization

Localized Supply Base as a partner with Westinghouse in the AP1000™ Integrated Global Supply Chain Network.

1. Localization & horizontal integration – We Buy where we Build™
2. Progression of Localization

- **Minimum Development/Investment:** Construction labor and construction commodities
- **Medium:** Localization of equipment by qualified local industries. Mainly Commercial off the shelf, build-to-spec, non-safety, but need to be commercially competitive
- **Maximum:** Qualified safety-related, Tech Transfer. TT develops local industries, licensed technology. Usually viable only for national fleet program aspirations
South African suppliers will become part of the global Westinghouse supply chain.
Construction Site for Modular Construction
Localized Module Factory

Local suppliers’ content
Module Installation on Site
Summary (1)

- The AP1000 utilizes a passive safety system design
- AP1000 is simpler, more compact, and easier to construct
- The design offers greater opportunity for localization
  - So far, 200+ modules can be built in RSA
  - Valves, tanks, heat exchangers, piping can all be sources in RSA
  - Possible to localize more with local ASME qualified partners
- AP1000 features and construction methods reduce project risk
- Construction is scheduled for 48 months for 1st reactor, targeting 36 months as local learning curve builds
- Shorter construction period significantly reduces the cost of financing the project
Summary (2)

- Licensing and Human Capital development form a large part of the project preparation phase.
- Westinghouse has been present permanently in South Africa since 2002/2003 in Cape Town, then to Pretoria, and has now a total of 100 Westinghouse South African employees.
- Since the beginning, Westinghouse is applying a sustainable BEE program in his local company.

The Future Nuclear Program is a unique chance:
- to build locally the technical and management skills of a mature industry,
- step by step, to improve the qualification of the already existing local industry network.
Thank you for your attention

AP1000
Haiyang – Jan 2011