Westinghouse AP1000® PWR Fleet: Licensed, Proven and Under Construction

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TALKING POINTS

1. AP1000 Design: Safe, Simple, Standardized

2. Global construction progress of the AP1000 fleet

3. Education, Training & Skills Development

4. Skills coordination and build-up for nuclear industry

5. Conclusion
Westinghouse Electric Company

- Incorporated in 1886 by George Westinghouse
- Responsible for some of the world’s most important achievements:
  - AC technology
  - 1st commercial radio broadcast
  - USS Nautilus
  - 1st camera on the moon
  - Commercial nuclear power

Vision: to be the customers’ choice in supplying leading-edge nuclear technology to satisfy the world’s growing demand for energy
Westinghouse Locations

60+ Sites Worldwide!
Solely Focused on Commercial Nuclear Technology

Nearly 50 percent of the nuclear power plants in operation worldwide are based on Westinghouse technology.

- Our newest design – the AP1000® pressurized water reactor (PWR) – features innovative passive safety systems and proven technologies based on Westinghouse’s 50+ years of experience.
AP1000 Plant: Safe, Simple and Standardized

- Passive safety replaces mechanical and electrical systems – harnesses natural forces like gravity, convection and condensation to achieve safe shutdown

- Strong licensing pedigree based on reviews in multiple countries; first and only Generation III+ reactor to receive design certification from the U.S. NRC

- Simplified design and modular construction provide a plant that is easier and less expensive to build, operate and maintain
Major Safety Advancements of the AP1000 Plant

Passive Safety-Related Systems
- Use “passive” processes only, no active pumps, diesels, ....
- One-time alignment of valves
- No support systems required after actuation
- Greatly reduced dependency on operator actions

Active Defense-in-Depth-Related Systems
- Reliably support normal operation
- Redundant equipment powered by onsite diesels
- Minimize challenges to passive safety systems
- Not necessary to mitigate design basis accidents

Severe accident scenario effects are mitigated by in-vessel retention of the melted fuel
AP1000 Plant Global Project Delivery

- Eight AP1000 units under construction worldwide
  - Four units in China
  - Four units in the United States

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Progress of China Projects: Summary

- Major equipment delivered and installed at Sanmen Unit 1 and Haiyang Unit 1 includes:
  - Reactor Vessel
  - Steam Generators
  - Reactor Vessel Internals
  - Polar Crane
  - Integrated Head Package
- Shield Building Conical Roof set at Sanmen Unit 1 in November 2013 and Haiyang Unit 1 in December 2013
- Digital I&C turnover to Startup staff in progress
- Potential Sanmen operators have completed simulator training; Haiyang operators started simulator training in July 2013
- Technology transfer well advanced
Sanmen Site Progress: Time Lapse View

2009 to 2013
Progress of U.S. Projects: Summary

• Nuclear island basemat concrete pours completed for V.C. Summer Units 2&3; Vogtle Units 3&4
• Containment Vessel Bottom Head (CVBH) set in nuclear island for initial units at each site
• CV ring fabrication underway
• Component and module fabrication proceeding
• Reactor vessels delivered for initial units at each site; additional equipment and component deliveries continue to proceed
Major Steps Toward AP1000 Plants in Europe

• Exclusive talks now underway with Bulgarian Energy Holding EAD to construct an AP1000 plant for Kozloduy Unit 7

• Toshiba Corp. agrees to buy 60% share in NuGen, with plans to build three AP1000 units at Moorside site in West Cumbria, U.K.
Benefits of AP1000 Technology and Westinghouse Approach to New-Build Business

• **AP1000** plant combines proven technologies and innovative passive safety systems
  – 5,000 man-years of design work

• Eight units under construction worldwide; more are planned
  – First nuclear concrete placed for first eight

• Regulatory certainty
  – Almost 300 man-years of licensing review in U.S. and U.K. alone

• We Buy Where We Build™ approach provides rich opportunities for local suppliers

• Committed to developing the next generation of engineers and other technical professionals
Lessons Learned: Requirements for a Successful New-Build Program

• Strong reference plant
• Leverage “country of origin” licensing
• Utilize modern construction methods
• Defined approach to sustainable localization
• Avoid first-of-a-kind deployment issues
• Take advantage of Nth-of-a-kind experience
AP1000 Plant Value Proposition

Proven Technology with Passive Safety Systems

Simplified Design with Modular Construction

Reviewed in Multiple Countries by Independent, Technically Rigorous and Transparent Regulators – Using a Well-Defined Safety Standard
Westinghouse
Skills Development & Training
Westinghouse Maintains Standard Training Processes

• Systematic Approach to Training is Followed
  – ADDIE Model
    • Analysis, Design, Development, Implementation, Evaluation

• IACET Authorized Provider (International Association for Continuous Education and Training)
  – an accreditation process
  – involves a self-study, an application and a site visit that benchmarks your organization against the ANSI/IACET Standard.
A structured method to determine:
- Local workforce’s education and skill level
- Skill/performance gap
- Training solution
- Prioritization of actual training needs based on schedule, cost etc.
Training Design phase is key

Design Standards will include:
- Principles of adult learning
- Integration of Human Performance and safety strategies and tools
- Use of Operating Experience
- Building pre- and post-training assessment requirements into the training materials

Design must align with principles of standard operations
Broad Curriculum Choices

• Curriculum Examples
  • Nuclear Plant Operator Certifications
  • Technical Courses Directed to Appropriate Levels
  • New Plant Overview Courses
  • Nuclear Safety Culture
  • Human Performance
  • Start-Up Test Engineer Program
  • Train-the-Trainer Certification
    Options for Select Topics
  • Leadership Development
Roles and Expectations for Training

• Clear definitions for roles:
  • Instructors
  • On-the-Job Trainers (OJT)
  • Subject Matter Experts (SME)
  • Suitably Qualified and Experienced Persons (SQEP). “Qualified Operators for example”

• Defined standards
• Certification/assessment methods for all roles.
• Managers and senior training personnel will sponsor and monitor training standards
Nuclear Skills Transfer, Training & Development

Delivery Options for Curriculum

- Traditional Classroom
- Virtual Classroom
- Web-Based Training
- Webinars
- Video
- Blended-Learning
- Job-Aids
- On-the-Job Training
New Build Craft Skills Development & Timing

• Plan for synergies with Medupi & Kusile training programs:
  – Timing of skills needs vs build completion
  – Ramp-up of nuclear skills training, both new skills and upgraded existing skills
  – Unions need to be involved
  – Eliminate gap in skills usage between builds

• Importance of nuclear “GO” decision
  – First nuclear concrete date of 2018 planned
  – Later start dates will lead to costly loss of skills
US AP1000 Construction - Site Staffing

Southern- Vogtle: Project Staffing
First Nuclear Concrete 1 July 2011 & 1 July 2012

Commercial Operation Dates:
Unit 3 - January 2016
Unit 4 - January 2017
CONCLUSION

• Westinghouse has “a good story to tell” about localization
• Local industry can supply into AP1000 global supply chain
• The AP1000 Fleet is based on a standard design
• A Reference Plant will be available soon
• Westinghouse is READY and ABLE to provide our passively safe GenIII+ nuclear technology to South Africa
• The “GO” Decision for nuclear should not be delayed any further

Photo courtesy of SNPTC
THANK YOU .... ANY QUESTIONS?