PBMR Program Summary- Progress, Key Issues and Research

Edward G. Wallace
Senior General Manager – US Programs
PBMR Pty Ltd.

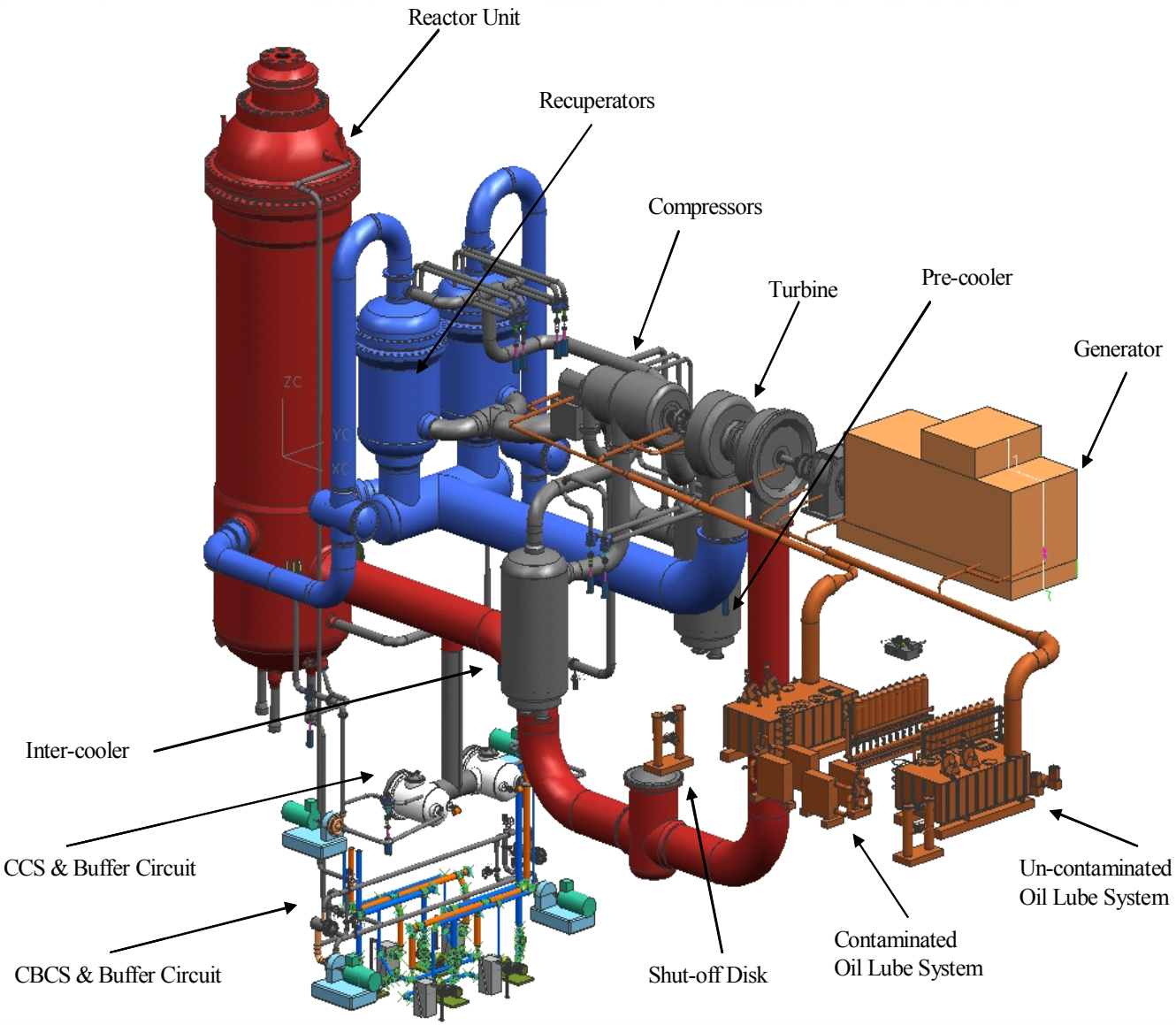
March 8, 2006
US Nuclear Regulatory Commission
Regulatory Information Conference 2006
Session W4BC: Advanced Reactors – GEN IV
Rockville, MD

Demonstration Power Plant

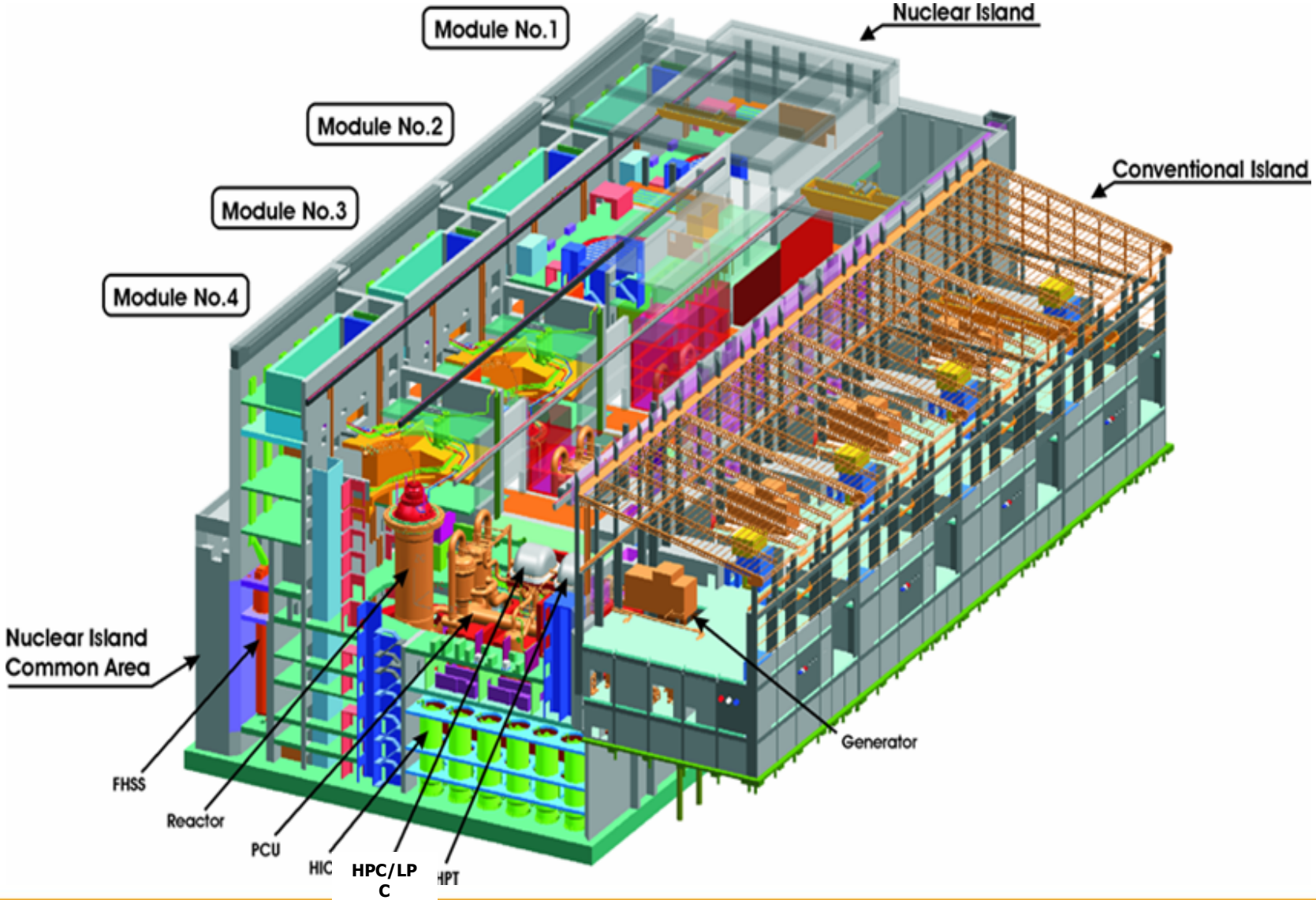
Project Has Already Been Launched

- Basic technology well-founded over 25 years of German reactor and equipment design, testing and operating experience
- Currently over 700 equivalent full-time staff working on project at PBMR and at strategic suppliers
- Basic design being completed and detailed design started. Over 4.3 million hours of engineering to date
- Revised Environmental Impact Assessment (EIA) submitted and updated Safety Analysis Report (SAR) nearing completion
- Laboratory-scale fuel fabrication transitioning to pilot commercial scale equipment
- Helium Test Facility and High Temperature Test Facilities under construction
- Construction Manager mobilizing
- Contracts with key suppliers for critical components being placed now
- Construction schedule established at Koeberg-South Africa
  - Site Access 1Qtr 2007
  - Construction Excavation Starts 3Qtr 2007
  - Fuel Load 4Qtr 2010
  - Plant Turnover to Client 4Qtr 2011

PBMR Main Power Systems



4 Pack Multi-Module Plant



Key Issues in the US

- PBMR has completed its planning with the NRC for PBMR Design Certification Pre-Application work
- Seven key issues have been defined:
  - LBE selection methodology and analysis assumptions
  - SSC Classification/Defense-in-Depth
  - Fuel Design and Qualification
  - Applicable Codes and Standards & Materials Selection
  - Analytical Codes Verification & Validation
  - Single Module vs. Multi-module Certification
  - Physical Security Considerations in Design
- Several of these key issues are underpinned with a supporting R&D program

PBMR R&D Program Elements

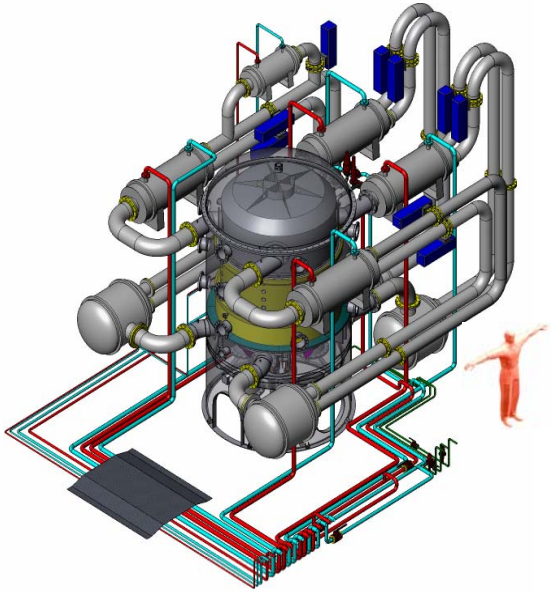
A. Basic Research and Development

B. Component Development Testing

C. Validation Testin

F

Micro-Model



High Temperature Test Facility

Helium Test Facility

C. Validation Testing Programs

- Part scale test programs to validate design assumptions and safety codes
  - PBMR Micro-Model validation of Flownex T-H code (Completed)
  - ASTRA Critical Facility Reactivity Control Tests (Completed)
  - Helium Test Facility validation of Flownex T-H code, validation of full scale component performance at full temperature, pressure, height and duty cycle conditions (2006+, South Africa)
  - NACOK testing of natural circulation flows and graphite corrosion (oxidation) under air ingress conditions (2004+, Germany)
  - Heat Transfer Test Facility validation of heat transfer coefficients in pebble bed reactors(2006+, South Africa)
  - Fuel Irradiation Testing Programs of PBMR-manufactured fuel under PBMR reactor conditions (2006-9, South Africa, Russia and others TBD)
  - Graphite Irradiation Program – Extended graphite, CFRC lifetime performance data for PBMR conditions and above (2006+, TBD)
  - Plate-out Test Facility- Examine dust and other coolant contaminant behaviors in simulated plant conditions. (2006+, South Africa)

In Closing….

- The PBMR program is progressing rapidly towards construction of the first Generation IV reactor
- The key US issues are important to generic NRC initiatives in regulatory reform and non-LWR licensing requirements
- PBMR design and licensing lay the groundwork for the NGNP regulatory program required by the Energy Policy Act of 2005
- Cooperative research and development can broaden, leverage and accelerate the development of high temperature gas reactors as well as lead to more efficient and effective regulatory processes