



Irfan Ali
President & CEO
iali@arcnuclear.com

Advanced Reactor Concepts (ARC)

11710 Plaza America Drive, Suite 2000

Reston, VA 20190

703-430-1743 (P)

703-430-1743 (F)

www.ARCnuclear.com



Company Background

- ARC Was Founded to Address the Challenge of Future, Global Energy Requirements
- ARC-100 Ideally Suited for Emerging Countries With Inadequate Transmission Grids
- ARC-100 Offers a New Level of Safety and Simplicity
 - True Passive Safety Features Eliminate the Possibility of Core Meltdown
 - 20-Year Fueling Cycle Provides Energy Security to Developing Markets Without a Robust Nuclear Infrastructure
 - Offered Solution Entails No Access to Fuel by the Customer
- The ARC Team Includes Leading Experts on Small Reactors and Advanced Nuclear Fuels



The ARC-100 Reactor

- Small, Modular Reactor With 20 Year Fueling Cycle
- 260 MWt/100 MWe
- “Fast-Neutron Spectrum” Reactor
- Sodium Cooled Using Metal Fuel
- Uranium-Fueled Nuclear Core Submerged in Liquid Sodium; Effectively Not Subject to a Meltdown
- Alternative Fuel: LWR Recycled “Waste”
- Target COE of \$0.05 - \$0.08 Per kWh
- Key Applications: Off-Grid Electrical Production, Water Desalination, Shale Oil Extraction, Co-Gen Applications



ARC-100: Key Features

- Technology Derived from the EBR-II and the IFR Experiences
 - Primary Objective 1: Provide Nuclear Energy in a Configuration Suited for Developing Markets
 - Primary Objective 2: Do So While Minimizing Proliferation Risk
- The ARC-100 Safety Case Includes Non-Traditional Elements Compared to LWR and Oxide Fueled LMFBR (FFTF, CRBR)
- The ARC-100 Safety Case Also Extends Beyond the Cases Made for Other IFR Inspired Commercial Programs; Cases Reviewed Historically by the NRC
- Passive Decay Heat Removal
- Traditional SCRAM System, But, With Passive, No Damage Response to ATWS Events
- Non-Nuclear Grade BOP Plus Passive Load Follow Based on Innate Reactivity Feedback
- Horizontal Seismic Isolation for the NSSS
- No LOCA Scenarios



ARC-100: Key Features

- Significantly Lower Severity of Accidents Expected
 - Low-Energy Dispersal of Fuel Due to Entrapped Fission Gas
 - In-Vessel Retention of Sub-Critical, “Coolable” Debris
 - Iodine and Cesium Chemically Trapped in Fuel and Primary Coolant
- Small Volume Containment
- Expected, Significantly Smaller EPZ
- No On-Site Spent Fuel and No On-Site Fuel Handling Equipment
- ARC-100 Core Operating Parameters are Well Within the Existing Database for Metallic Fuel
- Digital I & C



Licensing Issues for Consideration - NRC

- Licensing the NSSS Independent of the Non-Safety Grade BOP
- A Reduction in the Radius of the EPZ Based on No Energetics and In-Vessel Retention
- A Reduction in the Staffing Level of Guard force Based on Inaccessibility of fuel
 - No On-Site Storage, No On-Site Fuel Handling Equipment
- Defense-in-Depth Measures
 - Traditional Approach: Case-by-Case Basis, Structuralist, PRA as an Afterthought
 - Future: Smaller Systems, Lower Complexity, Extensive Use of Modeling and Simulation Throughout the Design Process, PRA an Integral Part of This Process
 - Entirely Technology Specific or Any Generic Assessment?



Policy Issues for Consideration - NRC

- Global Supply Chain
 - Widely Dispersed Fabrication With On-Site Assembly
- Global Process for Fuel Fabrication and Handling
 - ARC's Strong Preference is to Fabricate the Fuel Cartridge in the U.S.
- Interim Design Certification Similar to the Vendor Design Review (VDR) by the Canadian Nuclear Safety Commission (CNSC)
 - Early Feedback from the Regulator Would be Helpful in Further Technology Development
 - Could Serve as an Important Milestone for Private Investors
 - Positively Expose New Technology and Products to Potential Utility Customers



Technology Issues for Consideration - DOE

- Assist in Formal Compilation of Metal Fuel Database
 - Extensive Data from 50 Years of Metal Fuel Testing
 - Data Currently Reported Through Multiple Organizations and Repositories
 - Data Covers Normal and Accident Conditions; Also Fabrication Procedures
 - A Formal Repository, in Compliance With NRC QA Requirements, Would Benefit the Entire Industry
- Further Study on Release of Iodine and Cesium When Metal Fuel Pins Breach and Melt
- Continued Development of Supercritical Brayton Cycle
- Continued Development of Modeling and Simulation Tools to Facilitate Safety and Performance Analysis
- Continued Development of Digital I & C
- Test Facilities for Testing New Fuels
 - Simulated vs Actual



Thank You!