

Micro-Reactor R&D Needs

Presentation to

**GAIN-EPRI-NEI-US NIC
Micro-Reactor
Workshop**

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Economics of Micro-Reactors for Remote Sites

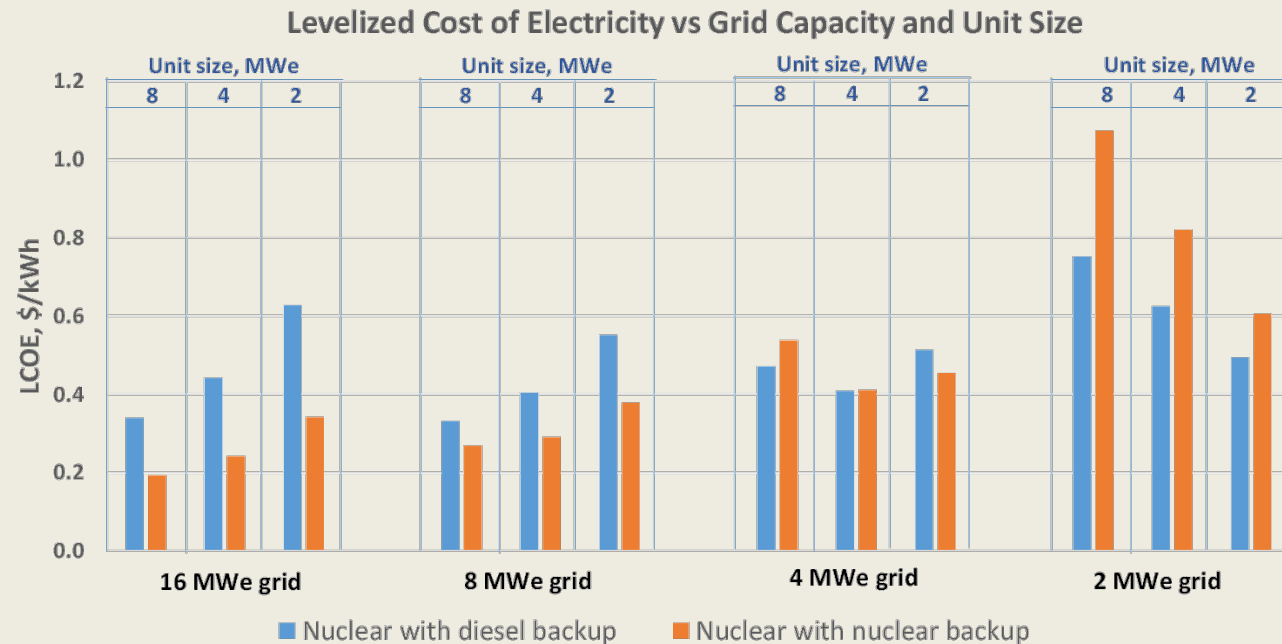
Uncertainties Are Significant

Questions

1. What is distribution of desired unit sizes?
2. What are typical capacity factors and load profiles?
3. What provisions will be made for spent fuel and waste?
4. What are minimum staffing levels for routine checkout, maintenance, security remote operations/monitoring, data collection and management

Generalized Analysis

- 75% capacity factor
- 6% cost of money
- 20 year economic life
- No licensing cost



Licensing Autonomous and Remote Operations Uncertainties Are Significant

- Technology for secure, remote operation and communication via satellite uplink or internet is very mature.
- Military remotely piloted aircraft (RPA) log many more hours than piloted aircraft
- Regulatory approval for remote, semi-autonomous operation with munitions was a serious challenge
- Very close coordination between vendor, customer and regulator made it happen



General Atomics
satellite, MQ-9 and
ground control

- Establish a body of regulation for remotely operated and autonomous nuclear plant control
- NRC must establish safety review process
- First time license could be expensive

Non-Nuclear Isolated Grid Testing

Purpose: Test power conversion and automated control systems for simulated isolated grid load profiles

Requirements:

- Controlled, electrically-driven heaters to simulate reactor heat (6-10 MWe)
- Variable, controllable load bank and switchgear to simulate grid
- Facility for power conversion system set-up and operation

User to supply:

- Interface ducting to heater section
- Control system interface for heaters
- Power conversion system and installation