Team 16: The Nuclear Family

EN-FISSIONING A SUSTAINABLE FUTURE
Outline

- Project Overview
- Current Status
  - Reactor System
  - Power Cycle
- Validation
- Questions

Team Members

Thane Symens
Mechanical

Meredy Brichford
Chemical

Joel Smith
Mechanical

Christina Headley
Chemical

Project Overview

Status: Reactor

Status: Power

Validation
Project Overview

- Problem: Energy Crisis
- Customers: Power Companies
- Design Norms
  - Stewardship
  - Caring
  - Trust
Design Process

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**Project Overview**

- Status: Reactor
- Status: Power
- Validation
Molten Salt Reactor (MSR)

- Small
- Modular
- Molten Salt
- Breeder

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Sorensen, Kirk. “Thorium, an Alternative Nuclear Fuel.” TEDxYYC.

Core Design: SCALE 6.1 from ORNL

Cycle 2 Down - Sample Problem 1

Status: Reactor
Status: Power
Validation

Project Overview
Moving Forward

- Dynamic modeling
- Spent-fuel reprocessing
- Salt/material compatibility
- Thorium Energy Alliance Conference

Thorium Energy Alliance
7th Annual Future of Energy Conference
Palo Alto • June 3rd 4th • 2015

http://www.thoriumenergyalliance.com/
Power Cycle

- CO₂ recompression cycle
- Calculations done for basic design
- Current turbine operating conditions
- Preliminary cost estimate
  - $34.7 million

Moving Forward

- Corrosion of equipment
- Startup and shutdown
- Optimization of power cycle
- Control systems

Project Overview | Status: Reactor | Status: Power | Validation
Validation

Power Cycle
- Economics
- Thermodynamics

Reactor Design & Economics
- Oak Ridge Experiments (1950s)
- Industry (current)

Project Overview | Status: Reactor | Status: Power | Validation
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Regulations and Licensing

Two-Step Licensing Process

Construction Permit
1. Preliminary Safety Analysis
2. Environmental Review

Operating License
1. Final Safety Analysis Report
2. Updated Environmental Report
Questions?