Grand challenge
- Reduce O&M cost of AR’s to $2/MWh

Generic operating cost of estimates for commercial LWR’s

<table>
<thead>
<tr>
<th>Costs</th>
<th>$/MWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>O&amp;M</td>
<td>23</td>
</tr>
<tr>
<td>Fuel</td>
<td>7</td>
</tr>
<tr>
<td>Financing during operation</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>31</strong></td>
</tr>
</tbody>
</table>

Need to reduce for NE cost competitiveness

Aim to reduce O&M costs through developing advanced sensing capabilities for AR’s
MARS

*Major research threads*

- **Fluid Chemistry and Composition**
  - Multi-electrode array sensors

- **Fluid Thermophysical Properties**
  - Distributed temperature and strain

- **Sensor Development**
  - X-ray / optical probes

- **Techno-economic analysis**
  - Multi-modal thermal property probe
MARS

Team

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Chem

I&C = Instrumentation and Controls  
TH = Thermal Hydraulics  
Chem = Salt Chemistry  
TEA = Techno Economic Analysis
MARS

Project Accomplishments and/or Future Plans

- Technology development plan

<table>
<thead>
<tr>
<th>Fluid Chemistry and Composition</th>
<th>Fluid Thermophysical Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-electrode Array Sensor</td>
<td>Printed Circuit Heat Exchanger</td>
</tr>
<tr>
<td>X-ray / optical probes</td>
<td>Shell &amp; Tube Heat Exchanger</td>
</tr>
<tr>
<td>Sensor Development</td>
<td>Distributed Temperature and Strain Instrumentation</td>
</tr>
<tr>
<td>Data Generation</td>
<td>Thermal Property Probe</td>
</tr>
<tr>
<td>X-ray / optical probes</td>
<td>Optical Fiber Heater</td>
</tr>
<tr>
<td>X-ray / optical probes</td>
<td>Distributed Velocity and Phase Measurements</td>
</tr>
</tbody>
</table>

Test Sensors in Prototypic Conditions
- UW Salt
- ANL Sodium
- UW Sodium

KP-FHR
Technical accomplishments

- Developing capabilities for virtual sensing and automation
- Plan to transfer technology to KP-ITU

Thermal mixing Tee flow loop at ANL

KP-ETUDE
Publications


T2M activities

- Developing CRADA between Kairos Power, Argonne, and University of Wisconsin
Completed Q1 of the project
  • Submitted Q1 report and draft impact sheet
  • Currently working on Q2 milestones

Would like to learn how other performers address T2M