**Introduction & Background**

Significant technology developments are required to meet the SunShot Initiative cost goal for Concentrating Solar Power of 6c/kWh. The SunShot Initiative targets for Thermal Energy Storage (TES) are:

- TES Cost ≤ $15/kWh
- TES Efficiency (2nd Law) ≥ 95%
- TES Charge Time ≤ 8 hrs.
- TES Operating Temperature ≥ 650°C

There are several technologies that may be able to achieve the high temperature operation required. Of these technologies, sensible energy storage in high temperature molten salt systems is very promising.

Sensible molten salt is the TES technology of choice in current and near-term CSP plants. Sandia has a long history of research seeking to fully understand and quantify the material interactions between molten nitrate salt and containment materials.

**Obectives**

The Objectives of this research are:

1. Perform preliminary analysis of needs and system sizing
2. Solicit input from potential users in the CSP community on testing needs
3. Design system to be compatible with several candidate HTF's as is practical
4. Plan construction and obtain equipment estimates.

**HTF Properties**

The table below shows the known properties of 6 potential high temperature heat transfer fluids (typically at 600°C[1,2]). The flow loop should be capable of operation with as many of these fluids as possible.

<table>
<thead>
<tr>
<th>Salt</th>
<th>KCl/LiCl</th>
<th>KCl/LiCl-NaCl</th>
<th>KCl/LiCl-Li2CO3</th>
<th>KCl/LiCl-Na2CO3</th>
<th>KCl/LiCl-Mg2CO3</th>
<th>KCl/LiCl-MgCl2</th>
<th>KCl/LiCl-CaCl2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melt Point</td>
<td>348°C</td>
<td>346°C</td>
<td>393°C</td>
<td>396°C</td>
<td>429°C</td>
<td>338°C</td>
<td></td>
</tr>
<tr>
<td>Eclectic (%)</td>
<td>40-60</td>
<td>24-43-33</td>
<td>25-43.5-31.5</td>
<td>20-60-20</td>
<td>78-22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dens (kg/m³)</td>
<td>1.560</td>
<td>1.561</td>
<td>1.569</td>
<td>1.569</td>
<td>1.569</td>
<td>1.569</td>
<td></td>
</tr>
<tr>
<td>K/μm²/s</td>
<td>0.822</td>
<td>0.822</td>
<td>0.822</td>
<td>0.822</td>
<td>0.822</td>
<td>0.822</td>
<td></td>
</tr>
<tr>
<td>Visc (m³/s)</td>
<td>4.3</td>
<td>4.3</td>
<td>4.3</td>
<td>4.3</td>
<td>4.3</td>
<td>4.3</td>
<td></td>
</tr>
</tbody>
</table>

**Results and Next Steps**

The table below shows the known properties of 6 potential high temperature heat transfer fluids (typically at 600°C[1,2]). The flow loop should be capable of operation with as many of these fluids as possible.

**References**


**www.solar.energy.gov/sunshot/csp.html**