HIGH DENSITY THERMAL STORAGE WORKSHOP

BREAKOUT REPORT

HIGH TEMPERATURE SYSTEMS

www.arpa-e.energy.gov
HIGHEST VALUE USES AND IMPACT

- Solar thermal
- Combined Heat and Power (CHP)
- Peaking for traditional and nuclear power
- Chemicals industry
  - Fuel and chemicals processing
- Building heating
- Absorption chillers
LARGEST TECHNOLOGY CHALLENGES

- Operating range in 0-1300 degrees Celsius for solar thermal
- Infinitely stable
- High specific heat & thermal conductivity
- Materials
  - Lower viscosity, corrosivity, melting point, density
  - Higher durability
- Heat transfer coefficient
- Ensuring that practical installation and implementation issues are taken into consideration
- Reliability of heat recovery in refineries
- Reliability of power grids
- Supply and demand mismatch
INNOVATIVE WAYS TO MINIMIZE HIGH TEMP EFFECTS

- Depends on degradation mechanism
- Good thermal transport with chemical isolation
- Combination of two materials to stabilize the system
- Dynamic monitoring of the system
ENERGY DENSITY REDUCTION

- 30-50% energy density reduction from the system
  - Should dictate what the material looks like
- Very application dependant
Cost should not necessarily be broken down

Must specify several parameters

- Discharge rate/time of discharge
- Temperature
- Ultimately application specific
  - Have to define what the application will be
IS LONG TERM TES V VIABLE?

- Seasonal is not viable
  - Just go for a fuel or geothermal
WHAT WILL A HIGH IMPACT PROGRAM LOOK LIKE?

- Collection and transport up to a half a mile
- New chemicals and materials/microstructures
WHAT WILL A HIGH IMPACT TEAM LOOK LIKE?

- Reactor engineers, designers
- Heat transfer specialists
- Chemists, materials scientists
- Early stage research scientists
- Industrial partners
  - Installation/implementation perspective