

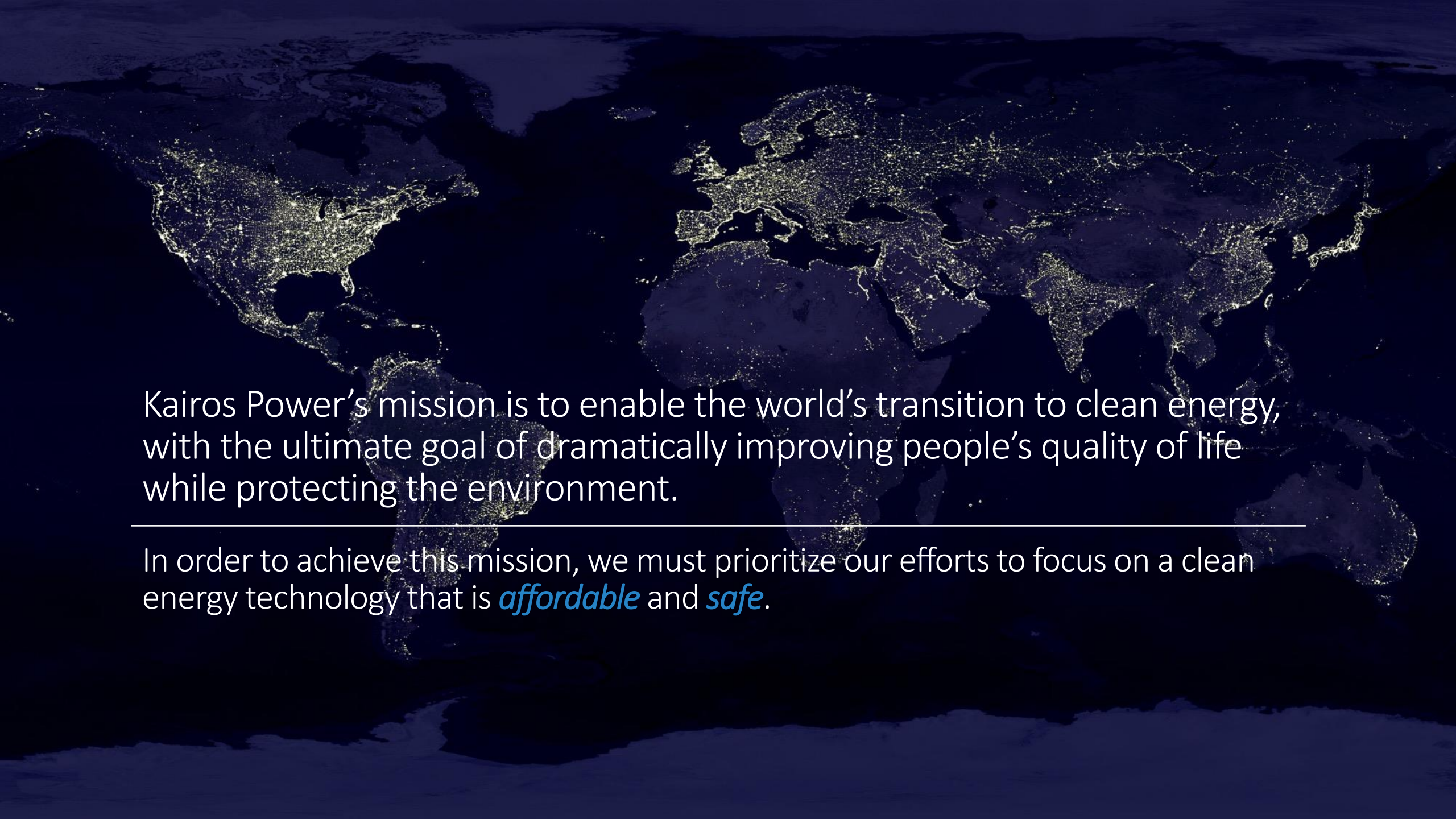


Kairos Power

MSR WORKSHOP 2024

CHAIR'S PANEL: EXPERIMENTAL PRACTICES

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Kairos Power's mission is to enable the world's transition to clean energy, with the ultimate goal of dramatically improving people's quality of life while protecting the environment.

In order to achieve this mission, we must prioritize our efforts to focus on a clean energy technology that is *affordable* and *safe*.

Molten Salt System Best Practices

Safety Culture

- **Chemical hazards:**
 - Hydrogen fluoride
 - Detection via sensors – cross-sensitivity
 - Organic vapor and acid gas cartridges in respiratory protection
- **Complete dermal coverage with replaceable layers**
- **High temperature hazards:**
 - Protect cables and instrumentation
 - Touch safe surfaces near operators
- **Industrial Hazards:**
 - High voltage equipment
 - Potential for arcing or arc-flash – graphite dust
 - Slips, trips, and falls
 - Rigging

Utilizable Controls

JHA, HAZOP, peer reviewed procedures prior to commissioning

Stop work

See something say something

Redundancy

Exclusion zones

GFCI protection on heater circuits

Lockout/Tagout



Molten Salt System Best Practices

Compatible Materials

- **Galling**
 - Temperature
 - Time
 - Contact stress
 - Surface chemistry
 - Consider cost/benefit of reusing fasteners
- **Corrosion**
 - Include corrosion allowance in wall thickness
- **Strength at operating temperature**
- **Differential thermal expansion of material pairs**
 - Fit tolerancing
- **Galvanic corrosion**

- **What materials *can* you use?**

- Stainless steel
- Graphite
- Alumina – gas space
- PTFE – cold locations



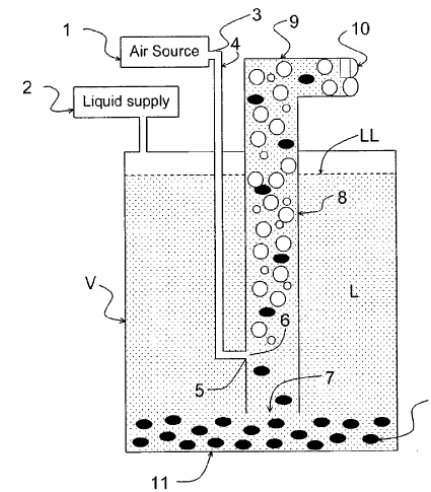
Molten Salt System Best Practices

Stumbling Block Design Features

- **Pumps**
 - Centrifugal
 - Gas lift
- **Valves**
 - Freeze
 - Mechanical
- **Heaters**
 - Heat zones above and below free surface of tanks
 - Size to keep duty cycle between 30-50%
- **Dip tubes** – include a spare or a nozzle that can become a spare
- **Scrubbers**
 - Vacuum protection
 - Back pressure

- **Vapor traps**
 - Cold spots
 - Condensation
 - Oversize gas nozzles to prevent occlusion with snow

- **Flanges – designing for a leak**
 - Drip trays
 - Leak detection methods



668 MOLTEN-SALT REACTOR HEAT-TRANSFER EQUIPMENT [CHAP. 15]

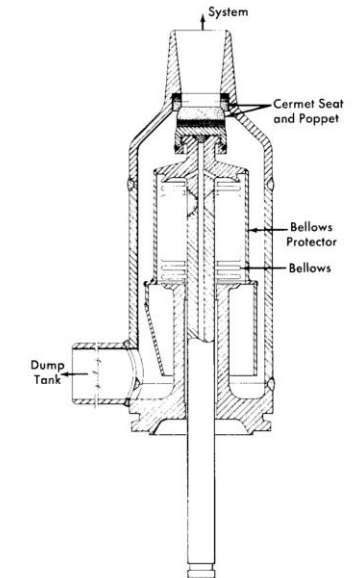


FIG. 15-4. Bellows-sealed, mechanically operated poppet valve for molten-salt service.