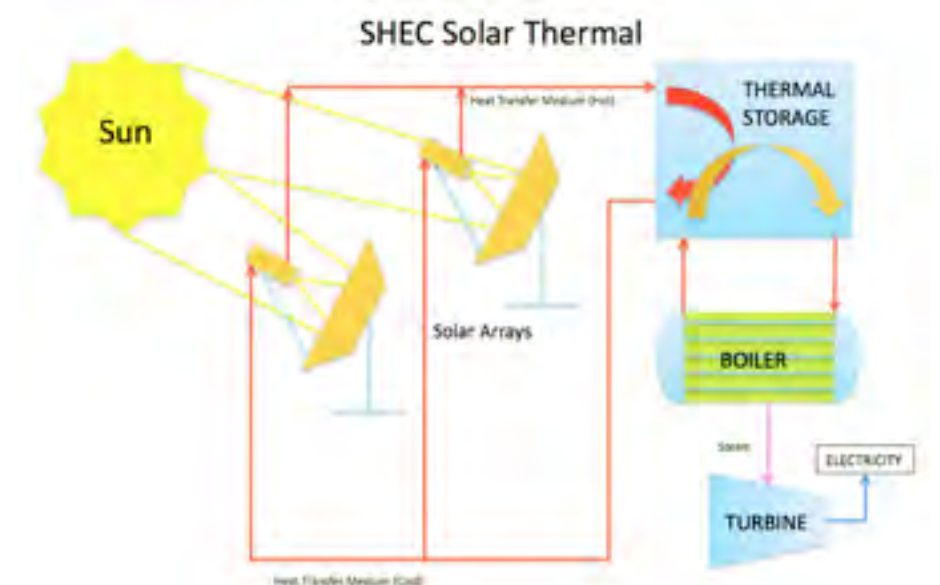


Energy Storage & Generation - A disruptive game changer



SHEC mastered hydrogen production with solar energy. Now using the technology to transform solar thermal energy production

- 1996 Started as a Solar Hydrogen Company with the mandate:
- Develop renewably produced hydrogen using solar energy
 - Do so cost competitively with fossil fuels
- 2004-06 Proved commercial viability of solar collection technology – tested Tempe Arizona and Saskatoon
- 2008 Began adaptation of technology to Solar Thermal Energy and Advanced Industrial Applications:
- To create **small scale 10KW electric power systems** for remote applications.
 - To create **base load** power, cost competitive with fossil fuels.
 - To use **800°C system** to power high temperature/efficiency steam turbines, and **can replace Peakers** as part of a fast ramp storage solution.
 - To accomplish the above by creating a **suite of patented and proprietary technologies** covering heat collection, transfer, storage that work effectively together.
 - To adapt the new technology to provide **24 hour thermal heat up to 1,000 C directly to industrial processes** like refining, chemical processing and others.
- 2008-11 Proved viability of high heat storage and high heat transport technology - tested in Saskatoon

3 Advantages

- Can scale to **small community electric power systems** (10KW-250KW) by linking SHEC receiver to Stirling engines
- Serve **advanced industrial applications** using high temperature heat (up to 1000°C which can be stored for 24/7 production) for enhancing chemical and refining processes (250KW – 25MW)
- SHEC stored energy system **will be lower cost** than any other renewable energy plus **base load** (24 hour) storage system (PV, geo or solar thermal or battery **for utility scale systems** (10MW – 1GW).

Unique Technology Offerings work together to provide the best high temperature solution to solar energy



Super Solar Concentration Heliostats



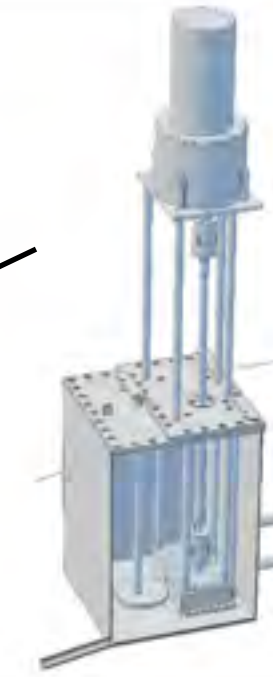
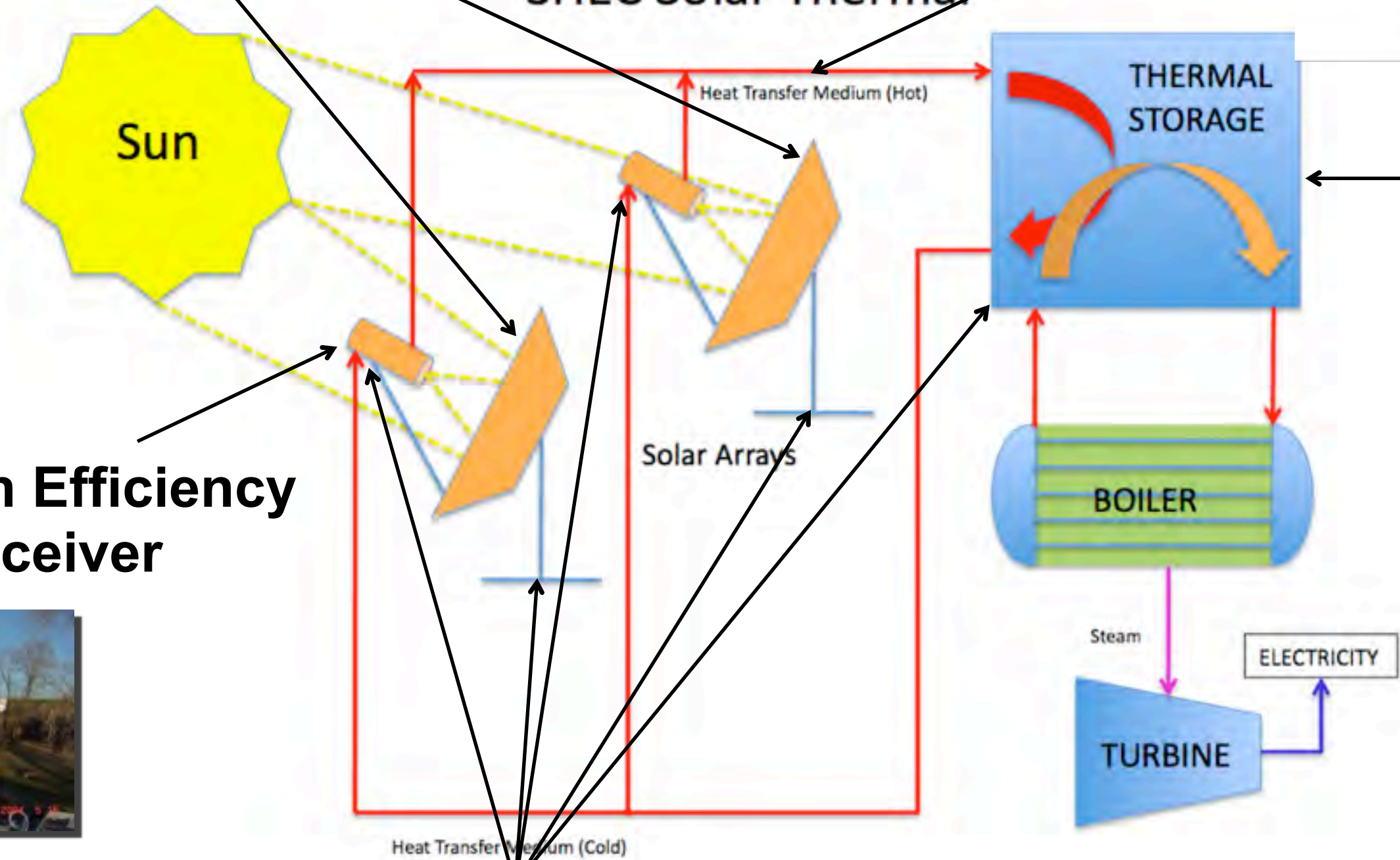
Ultra High Efficiency Solar Receiver



Internally Developed Hardware Controls



SHEC Solar Thermal



High Temperature Heat Transport Technology



Low Cost High Temperature Thermal Storage Technology



Internally Developed Hardware Controls



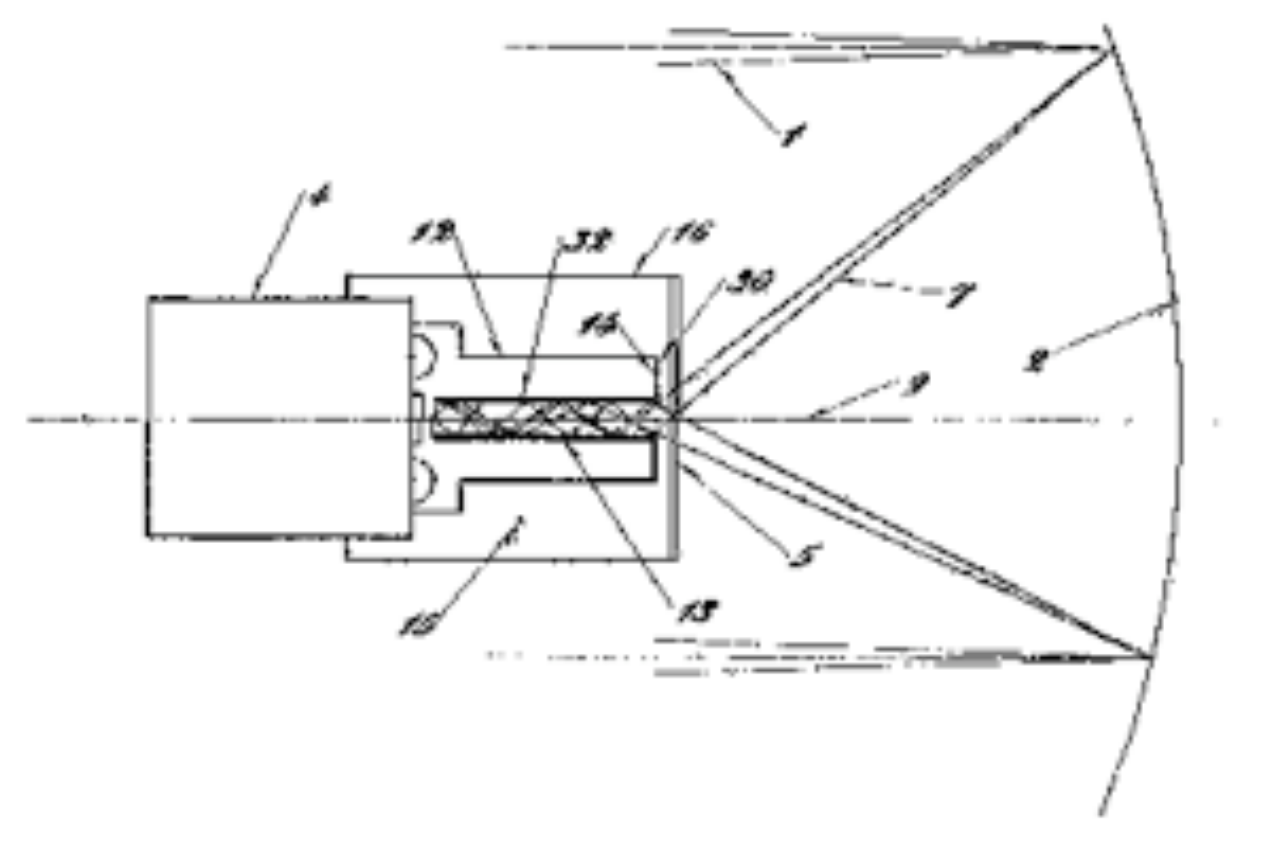
Internally Developed Advanced Software Controls

www.SHECenergy.com

Patented Solar Receiver captures 850°C Energy

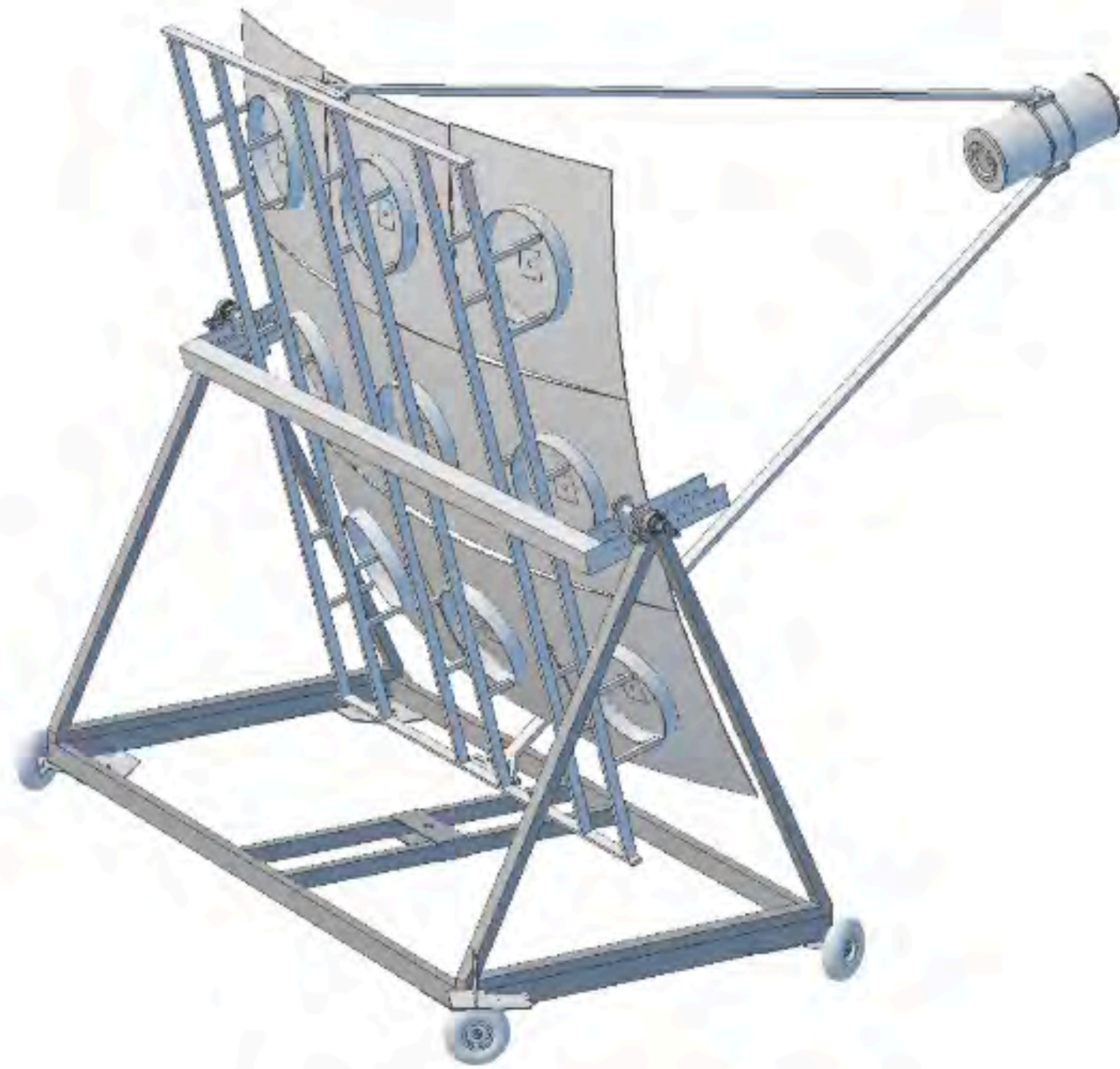
Greatly increases overall system efficiency by about two times over competing technologies

- 1. Small hot target** to collect solar energy with minimal energy loss.
- 2. Patented optical receiver**
 - harness super intense solar beam w/o destruction & extremely low energy loss.
- 3. Optical cavity receiver** distributes beam over large internal area with multiple internal reflections – partial absorptions of energy prevents target destruction
- 4. Very small entry aperture** minimizes energy loss.
- 5. Greatly increases overall system efficiency by about two times over competing technologies.**



Proprietary Utility Scale Heliostat System delivers focused energy to SHEC Receiver Aperture

Special Heliostat mounting and drive system to stabilize and control frame even in significant winds



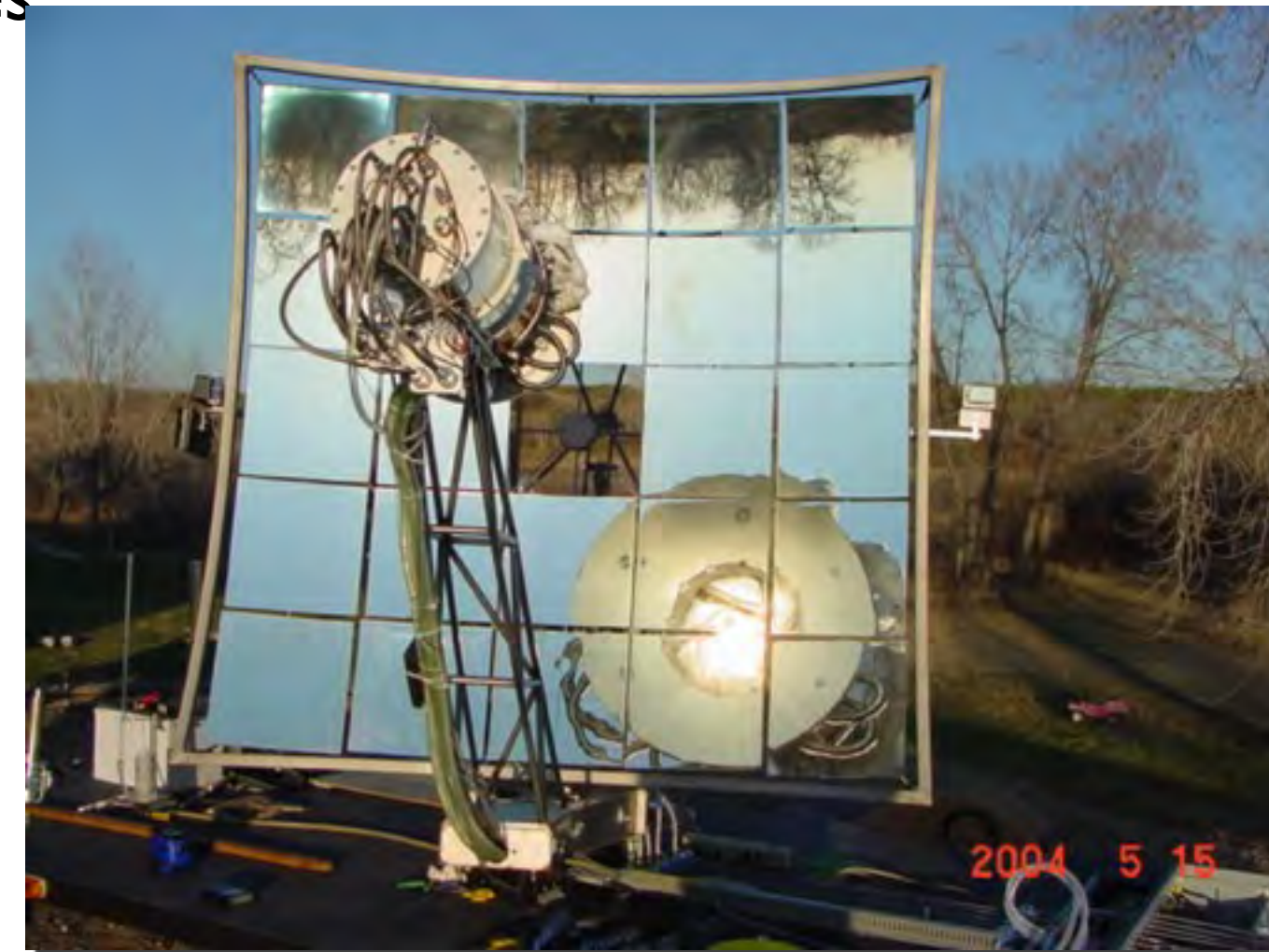
For Smaller Light Industrial Scale Systems

SHEC offers foundation-less and foundation class solar arrays that can be deployed depending on soil conditions. The cost to install foundation-less systems is extremely low.

Proprietary Rapid Mirror Production for Smaller Scale Systems (10KW to 40 KW)

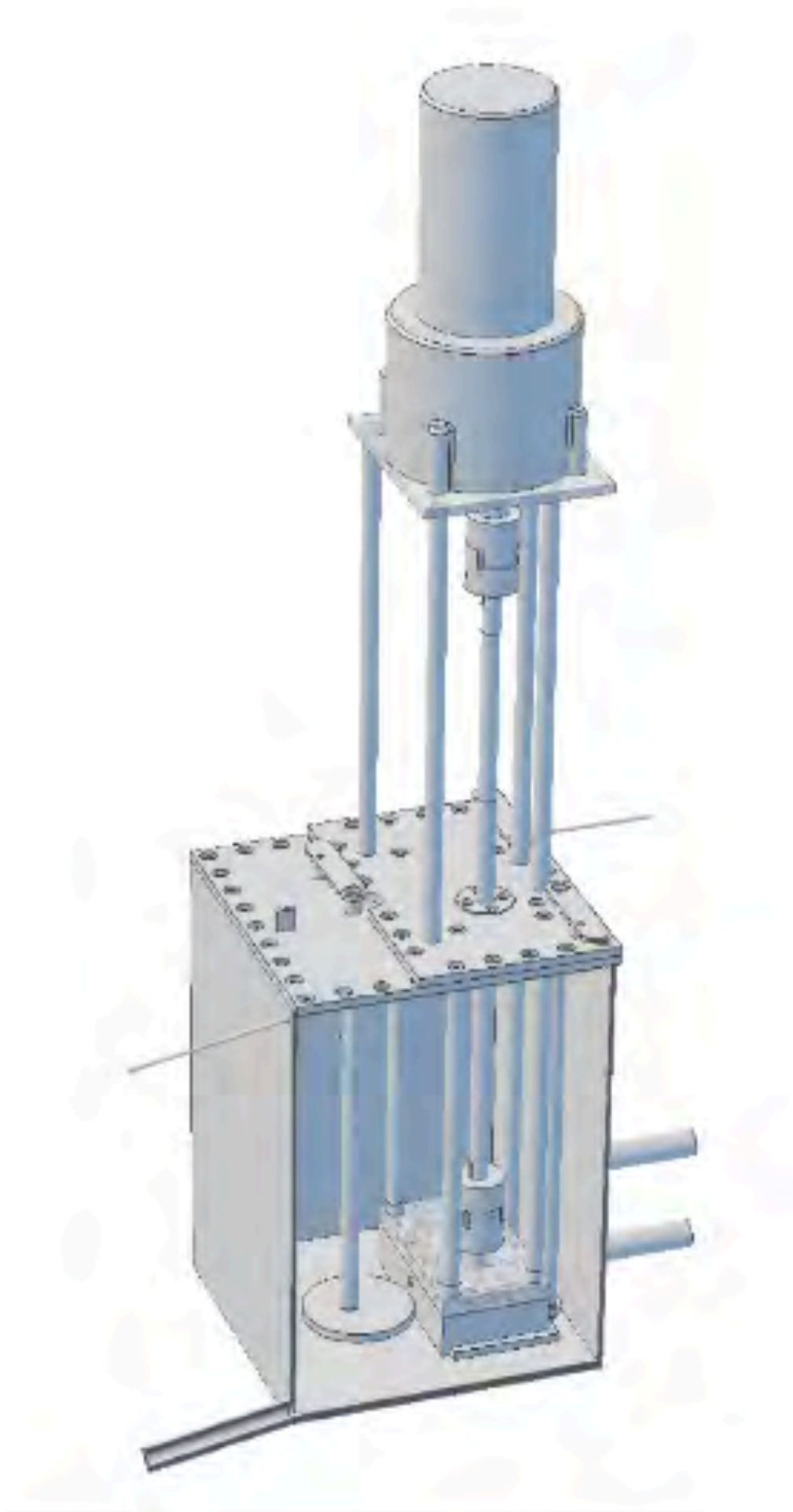
Technique was developed for very high speed production of curved glass solving the thermal shock problem normally associated with rapid glass forming.

1. Manufacturers required 24 hours to produce a SHEC size solar mirror in one processing oven.
2. New system increases the production rate by 30 times



High Heat Transport Technology enables 800°C Transport

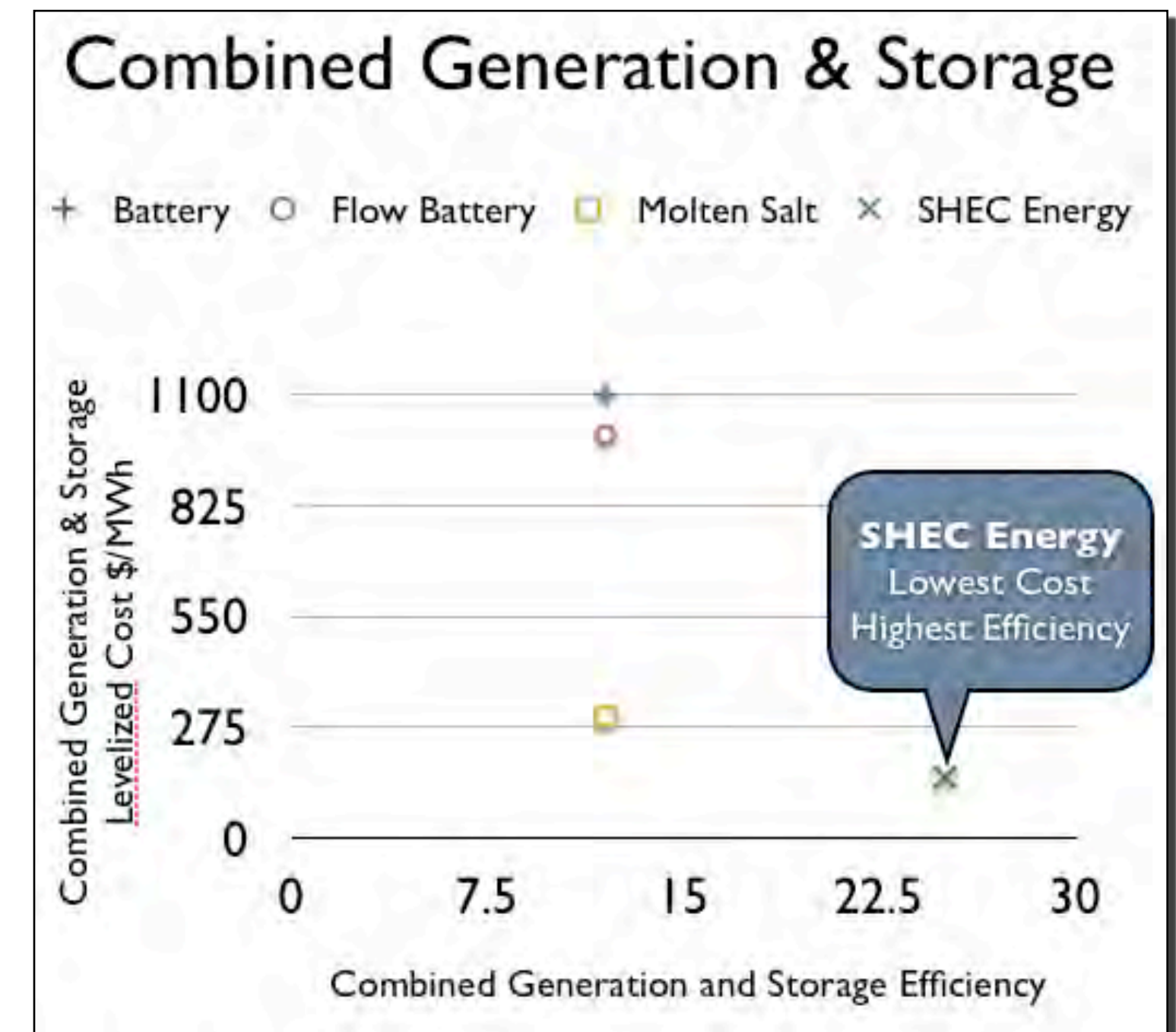
- Proprietary thermal transfer technology, pumps, and joints
- Commodity stainless steel piping



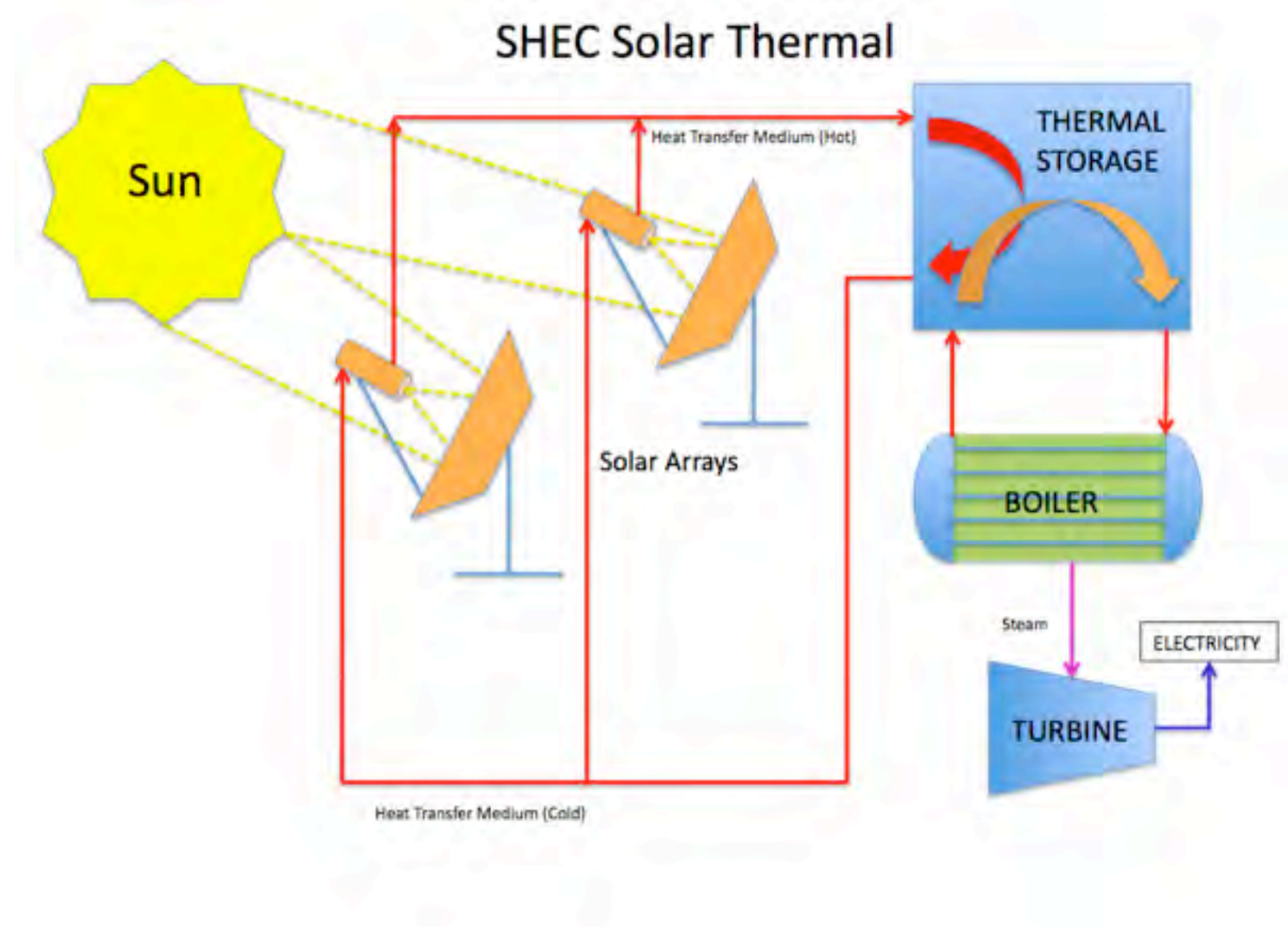
High Heat enables 24 hour Storage

SHEC is half the cost of Molten Salt at under 13 cents/kwh

- **High efficiency solar collection advantage**
Higher % capture per Heliostat
Lower emissivity at receiver
- **High temperature energy storage advantage**
Very low cost vs Salt or Battery
Maintains high turbine level heat for 24 hours
- **High temperature turbine advantage**
Potentially double the power output of lower temperature molten salt systems



High Temperature Storage can drive high temperature high efficiency turbines

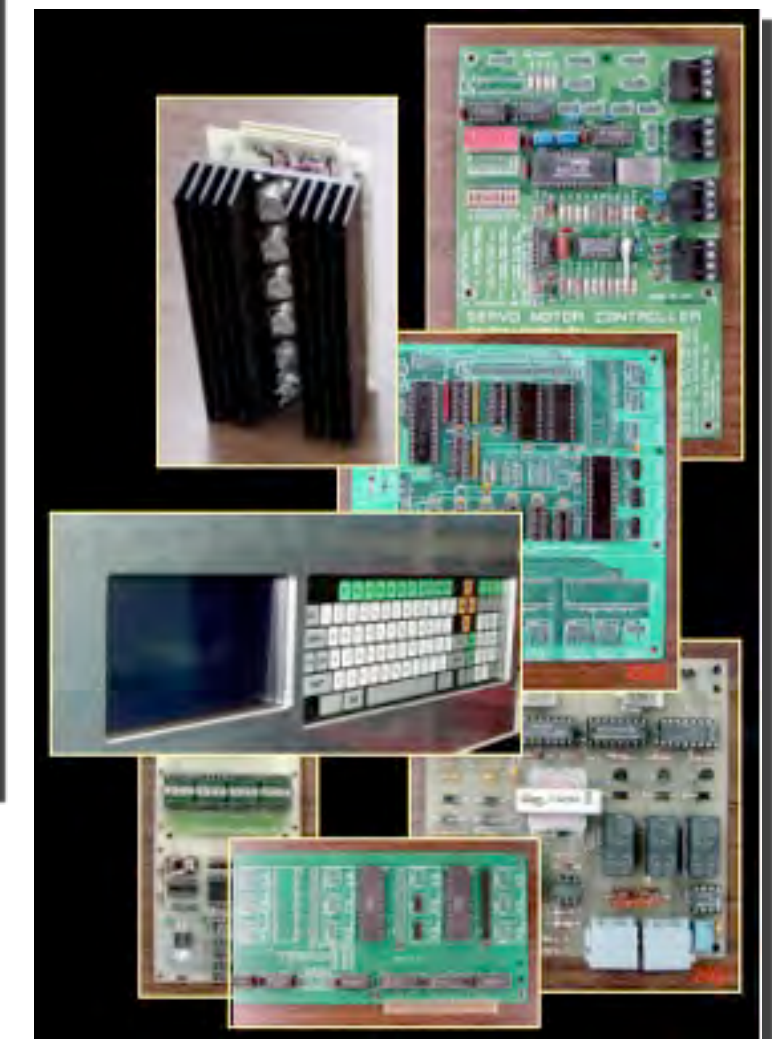


- Solves Molten Salt temperature limitations
- Allows for 200 degree drop over 24 hrs and still be effective
- Can retrofit solar system into existing fossil fuel plants or tie into geothermal plants

Internally Developed Hardware Controls Enables cost effective management of fully arrayed field.

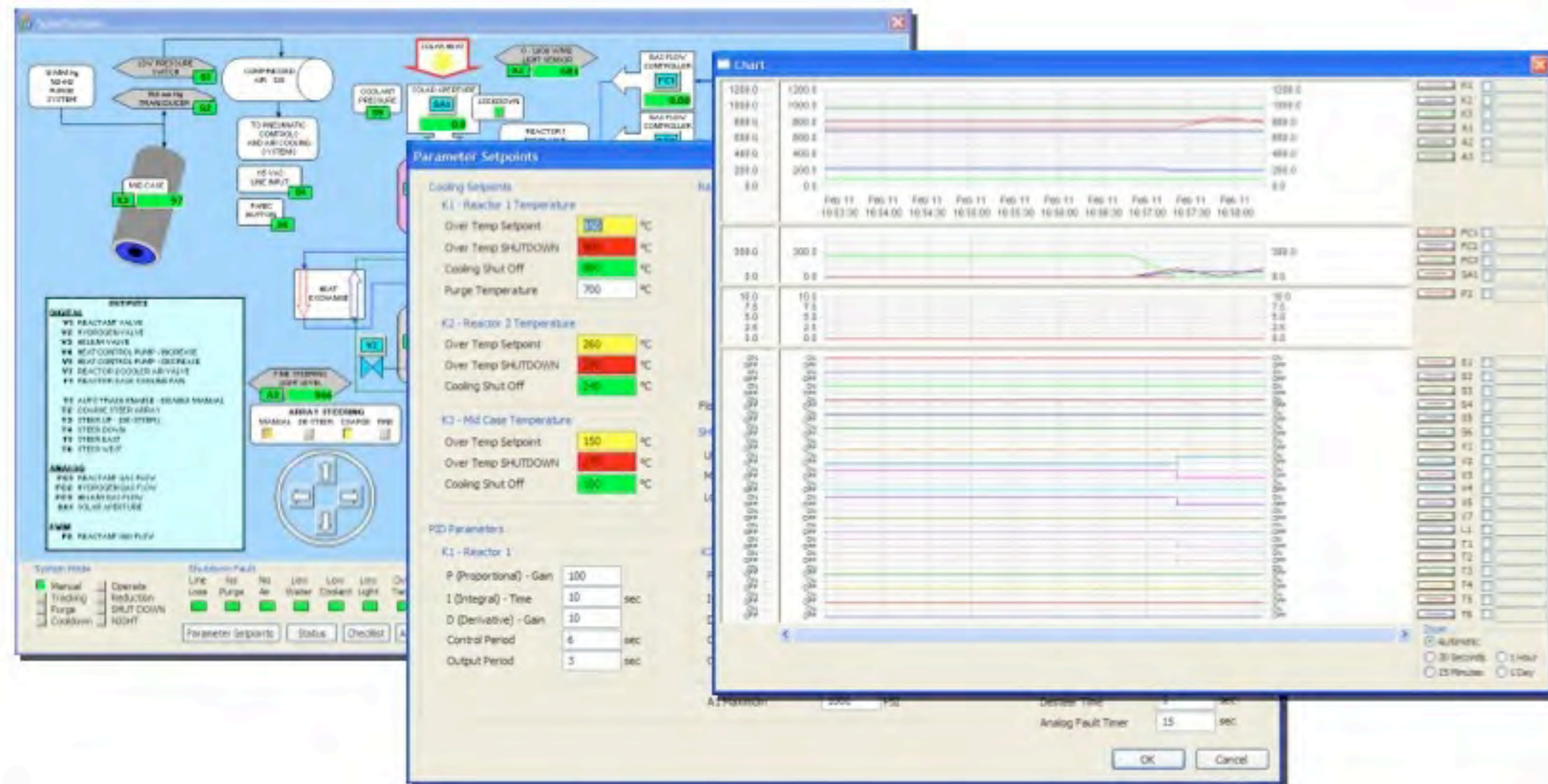
Specialized sensors, and controls both for mechanical and electronic application including:

- purge regulators,
- ultra precision - wide range flow sensors,
- motion controls,
- electronic motor drives,
- optical tracking systems,
- industrial microcomputers,
- digital and analog real world interfaces



Internally Developed Software Controls Enables cost effective management of fully arrayed field.

- Single source of all technology needs internally, enables tight integration of the system
- Increases reliability
- Lowers cost



Patented and Proprietary Technology Matrix

Patented



1. Super Solar Concentration Heliostats

- Ultra rigid super structure
- Proprietary very low cost drive system
- Proprietary low cost glass mirror manufacturing process

Patented

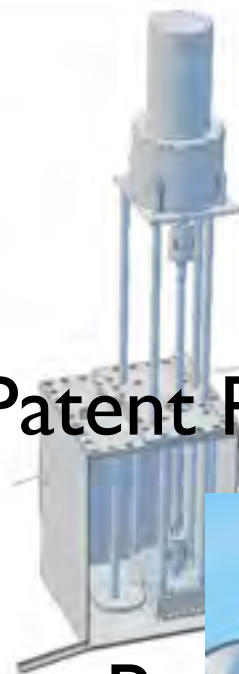


2. Ultra High Efficiency Solar Receiver

- Stirling engine receiver
- Steam turbine receiver
- Solar aperture



Patent Pending



3. High Temperature Heat Transport Technology

- Various formulations of heat carrier capable of operating in excess of 850 C
- High temperature heat carrier pump capable of operating at 850 C
- High temperature heat carrier joints capable of operating at 850 C

Patent Pending



4. High Temperature Thermal Storage Technology

- Proprietary insulation system
- Proprietary anti corrosion system
- Ultra low cost storage medium
- Proprietary heat transfer mechanism



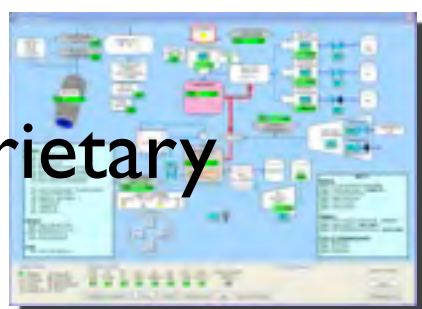
Proprietary



5. Hardware controls

- Motor drive electronics
- Precision optical tracking system
- Time of Flight proximal tracking system
- Specialized transducers and sensors
- Micro processor controls (Specialized very low cost PLCs)

Proprietary

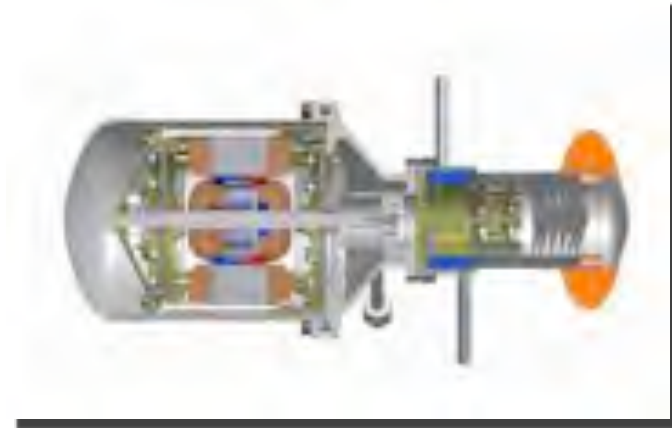


6. Advanced Software Controls

- Solar receiver control
- Tracking control
- Safety monitoring and auto safe shutdown sequence
- Plant histogram and fault tracking



SHEC Solar Applications – Village to GW Scale



- **3 Applications**

- Solar systems for smaller scale individual Stirling engine power plants or multi engine solar parks utilizing thermal energy storage. May be shipped with SHEC concentrators in the future as customer has expressed interest in this.
- 10 MW to 1 GW utility scale from solar heat and thermal storage systems for steam turbine power plants.
- 250 kW to 25 MW industrial scale use of high temperature fluids for industrial applications.



- **Can integrate (Retrofit) into existing fossil fuel power plants**

- Without duplicating infrastructure, can continue conventional power when solar is not generating.
- Significantly reduce CapEx - not require build-out of the power block (steam turbine, generator, building, etc).
- Accelerates development process as existing plant has already gone through the permitting and has infrastructure. The addition of a solar field to an existing plant is much quicker.



SHEC Receiver and Stirling Engines combine for efficient smaller scale power production



First Customer

1. Pre production sample testing November 2011
 - Expect 2 months for evaluation
 - Contingency budgeting of rework, but don't expect it
2. Order MOU (Definitive after testing)
 - Year 1 – 10,000 units at \$7k each (estimated 50% margin)
 - Year 2 – 40,000 units
3. Company Breakeven is 4,000 units a year

SHEC Utility Scale Customer Pipeline

SHEC is completing a number of PPAs for full-scale solar thermal power plants implementing energy storage.

- 3 African municipalities are seeking PPAs totaling about 400 MW. These are expected to be received over the next 6 months.
- An Asian country seeks the base load SHEC system to power multiple small scale rural irrigation and food storage systems.
- Major US home builder is seeking a SHEC power and home heating system for new green community developments (estimated at 7 MW).

Because of the California law, AB25-14 mandating utility grade energy storage, there is expected to be significant interest in the SHEC energy storage system.

SHEC is exploring outsourced contract manufacturing to supplement production

- Successfully completed field trials
- Ramping for Stirling Receiver production start in 2012
- Planning to ship first Utility Scale system by 2013



Successfully completed field trials.

