

# Solar Cooling with the XCPC

A UC Merced demonstration project

**Solar Cooling** – Using energy from the sun to provide space cooling, refrigeration, A/C

- Well matched supply/load (high cooling demand on sunny days)
- Energy that would heat up a building is diverted for cooling

## Barriers

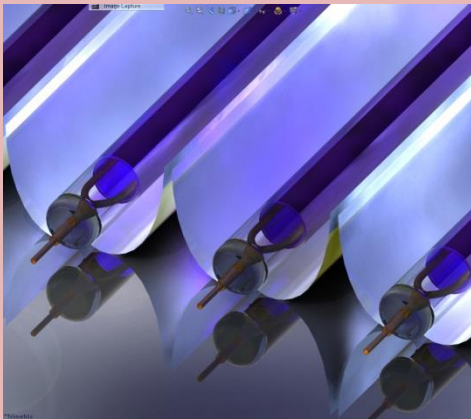
- Efficient cooling machines (2e absorption) require high temps  $\sim 180^\circ\text{C}$
- Tracking collectors are problematic for buildings
- Absorption chillers do not respond well to variability of solar insolation

## Solution

- Gas / Solar hybrid chillers
- Development of new high temperature, fixed solar collector at UC Merced

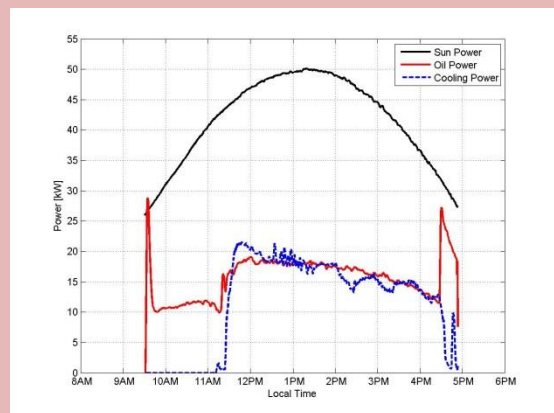
## XCPC – External Compound Parabolic Concentrator

- Designed with non-imaging optics
- Non-tracking
- Thermodynamically efficient
- Collects diffuse sunlight
- Installation flexibility



## Solar Cooling Demonstration

- 160 XCPC collectors ( $50\text{ m}^2$ )
- 23 kW LiBr-H<sub>2</sub>O 2e Absorption Chiller
- Run for two cooling seasons



## Highlights

- Daily Solar COP  $\sim 0.4$
- 2 hour warm up time (natural gas)
- 6 hours direct solar powered cooling
- Cooling extended with cold storage
- Provides thermal power to drive 2e absorption chiller w/o tracking