

# PURSUING BEST COST SOLAR THERMAL CONCENTRATION



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## Problem

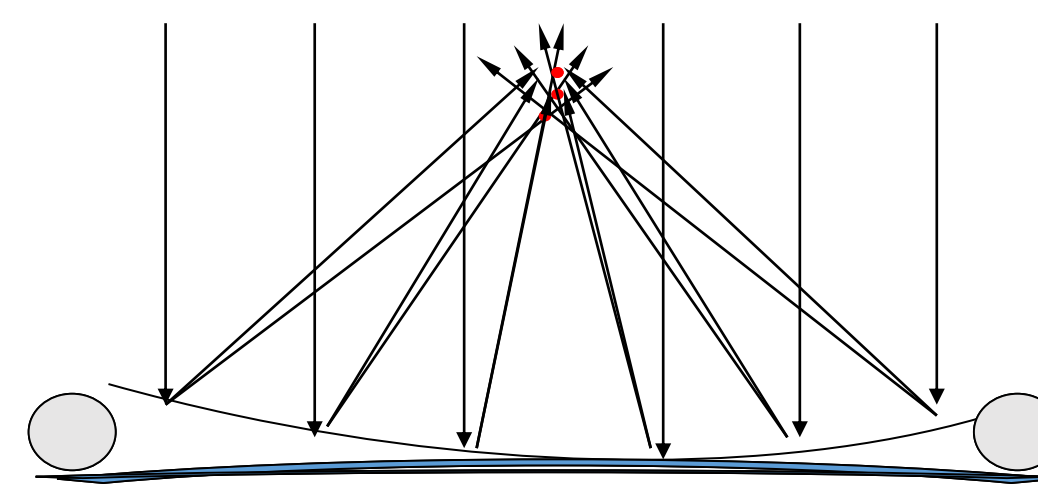
Solar thermal generation remains uncompetitive to traditional combustion-based thermal generation

## Goal

Improve competitiveness of Solar thermal generation.  
Develop a Best Cost Point-Focus Dish/Thermal system

## Design

- Reinventing point focus dishes utilizing *mirror film* instead of glass mirrors
- vacuum deformed to focus sunlight.
- offers much lower cost than glass mirrors
- provides sufficient concentration
- light weight dishes enable lightweight tracking structures
- Infinitely variable focal lengths between 10 and 30 feet
- rapid defocusing for safety.

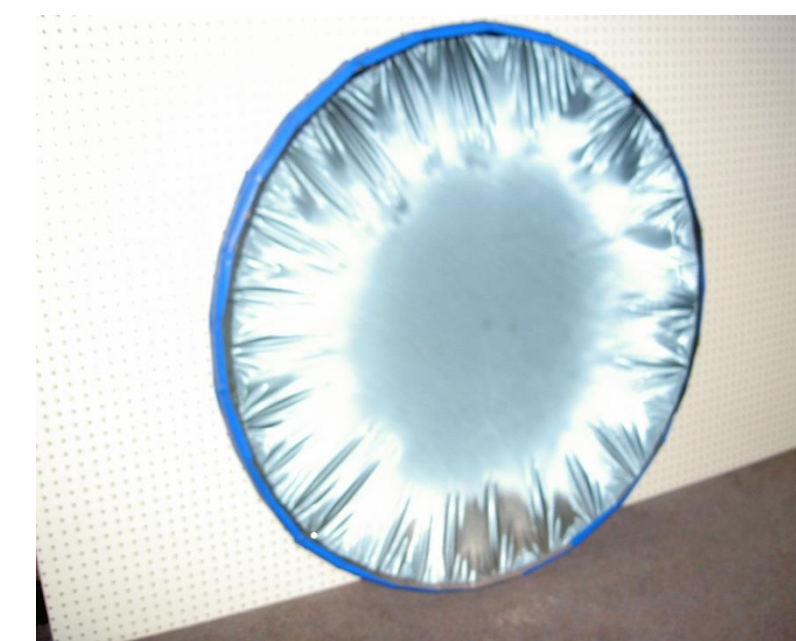


## Learning from the past-previous “stretched membrane” systems have had a checkered history

- **Problem-** Poor film durability
- **Solution-** New films provide similar performance and service life to glass mirrors - Reflectech Solar, 3M
- **Problem-** Film wrinkling- past systems utilized stainless steel or other heavy underlayments to inhibit wrinkling
- **Solution-** Annular floating batten with thermal tensioning
- **Problem-** Weatherability- high winds and abrasive particulate
- **Solution-** Weathervaning tracker, rotates away from oncoming wind.  
Dishes flip up to reduce incident dish area. Prototype has survived outdoors for 9 years .



Failed Lajet/Cummings Project



Wrinkling Typical when reflective film is stretched across a round hollow dish, with vacuum applied inside.



Wrinkling inhibited via internal “floating battens”  
US pat. # 7,374,301 B1



Haboob approaching Phoenix



Prototype 4-dish tracker in weathervane mode at 50 mph... US pat. 8,210,162 B2



Prototype carrying a snow load

## Implementation

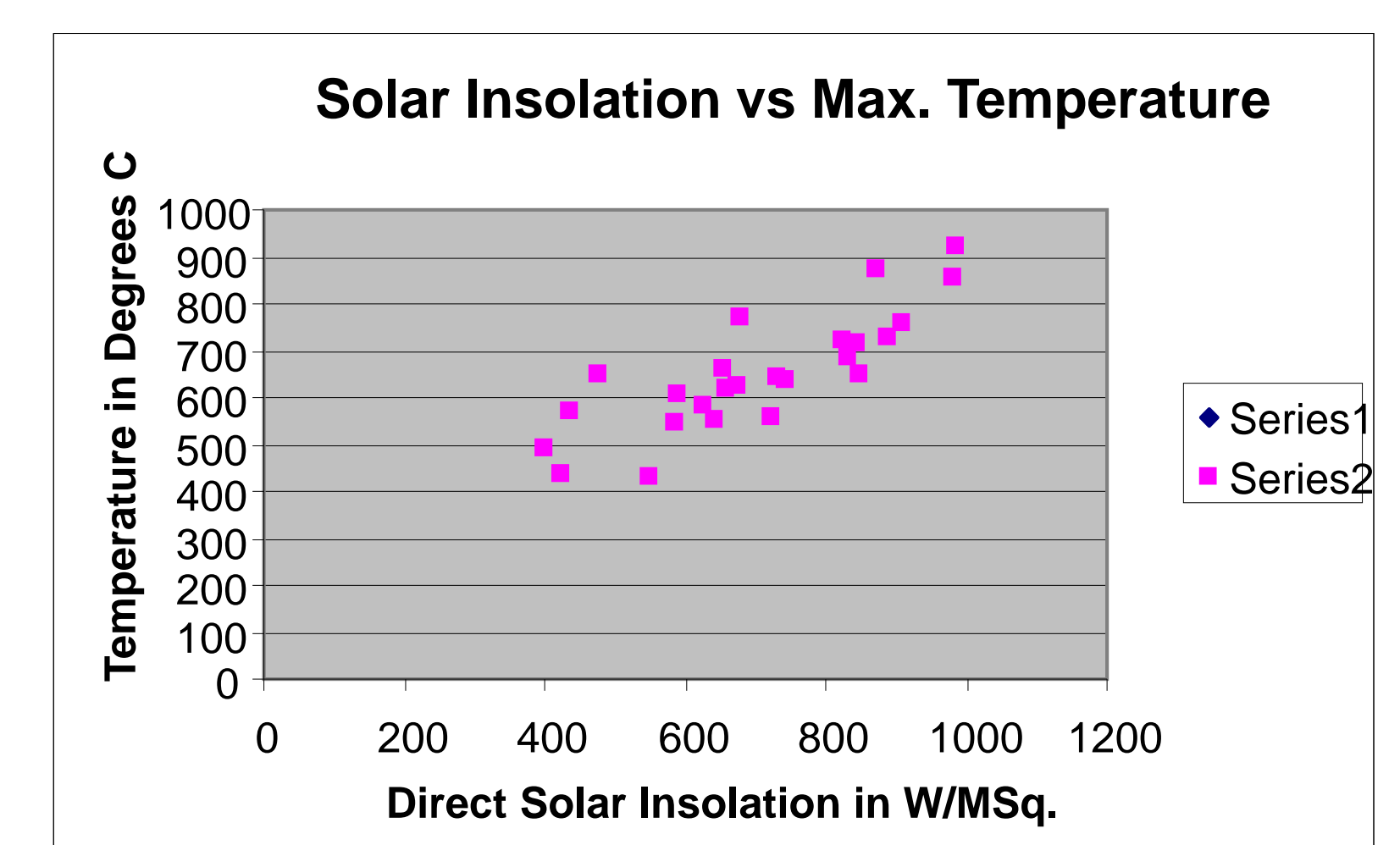
- ✓ Solar Cooking- Available today



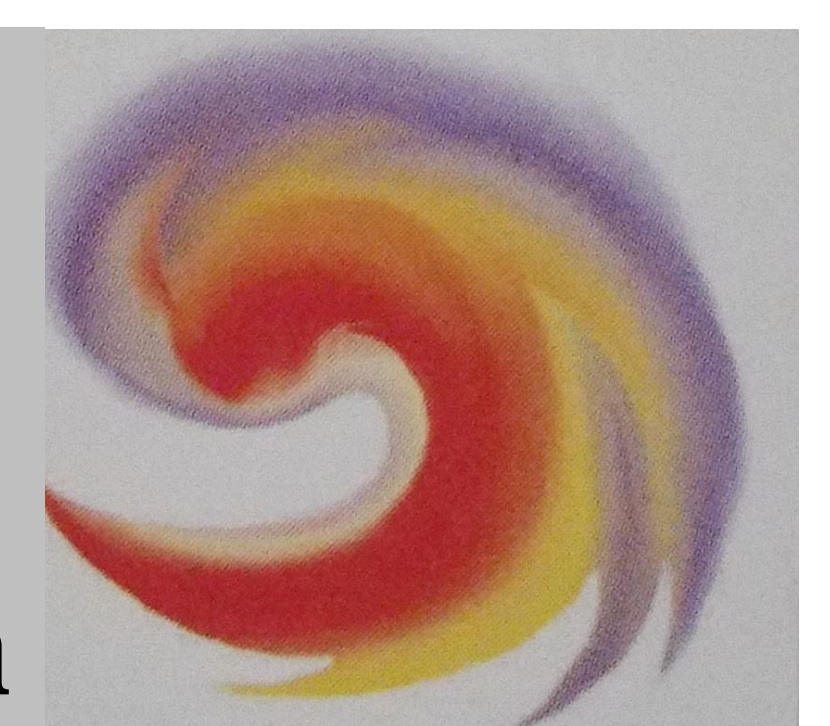
- ✓ Power Applications– Scaling to 8’ diameter dishes



- ✓ Solar Tracking/ Steam receiver  
Operational summer 2017



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## -Packaged Fire Tube Boiler

- 300-500 HP (223-373 kw)
- High power density
- 24/7 availability
- 80-85% efficiency
- Low maintenance



## Prototype Dish/Thermal tracker-

- Low power density
- High space requirements
- Variable availability based on sun



- **Future-** 3D Fresnel Array- multiple trackers focusing on one or more stationary towers with high efficiency cavity receivers.
- **Looking for partners in SW US with steam or hot water requirements**