# A Solar, Geothermal, and Wind Powered Turbine

- We use heat to drive a unique steam turbine
- Required heat comes from combination of green sources:
  - Solar (trough concentrated): Main driver because of economics
  - Wind: Replace expensive generator with cheap dynamometer pump to make heat
  - Geothermal: Use only shallow wells to control costs
- Advantages:
  - At least some heat is always available, thereby greatly reducing battery storage requirements
  - Resource maps show that the system can be used throughout continental United States
- Conventional turbine problems:
  - Conventional steam turbines cannot operate on the low temperatures and pressures produced by most green power sources in most parts of the US over an entire day
  - The main problem is damage to the high speed blades when they encounter condensation droplets
- Our solution: A bladeless (thrust) steam turbine:
  - First engine built: Ancient philosopher Hero of Alexandria
  - Problem: Inefficient – Currently used only in rotary lawn sprinklers
  - We have patented a means to make it efficient
- Advantages:
  - No blades, therefore no blade damage due to condensation at lower temperatures
  - Always has at least some motion, therefore long life because of no stop/start bearing damage
  - Can operate at all scales, from residential to large utility