

# Power Partners, Inc. Adsorption Chillers



# Power Partners, Inc. – Athens, GA

- Facility:
  - Square footage: 677,400
- Products:
  - Distribution Transformers
  - Solar Water Heaters
  - Adsorption Chillers
- Milestones:
  - 52 Years in Operation
  - 7 Years as Power Partners, Inc.
  - WBENC Certified



# Green Initiatives

- Launched new product, solar water heaters, 2007
- Chartered PPI Green Team in 2008
- Green Supplier Network audit, 2008
- Green Supplier Network Partner, 2009
- EPA CHP Partner, 2009
- ISO 14001 certification, 2009
- PPI Board of Advisors member Catherine Greener, Greener Solutions, Inc., is a subject matter expert on sustainability
- Launched adsorption chiller product line, 2009





# ECO-MAX

adsorption chillers  
...for global cooling



# Manufacturing Area

- New 30 ton overhead crane
- Wash and paint booths
- Testing equipment
- Material handling & workstations



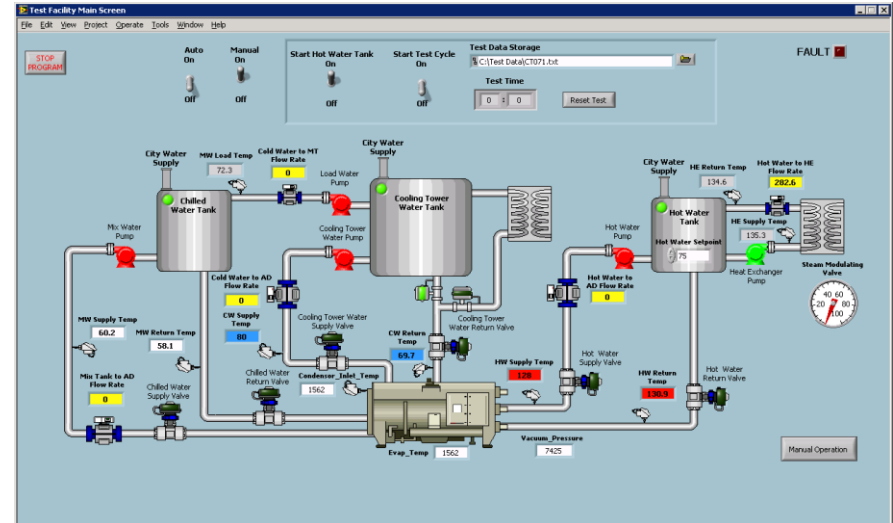
Before



After

# Test Facility

- World Class test facility
- Meters calibrated to NIST standard
- 10M Btu capacity
- Flow rates from 5 gpm to 2000 gpm
- Full diagnostic testing capability



# Adsorption Chillers – Advantages

- Long Life (> 20 years)
- Minimal maintenance
- Use waste heat (or solar thermal)
- Ultra-low electricity consumption
- Low carbon footprint
- “Green” refrigerant (water) & desiccant (silica gel)
- Wide hot water temperature range, 200F → 125F
- Negligible noise, vibration
- Continuous operation
- No replacement of adsorbent



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\* Electricity consumption, 150TR chiller:

mechanical ~ 100.0 kW

adsorption < 0.4 kW



# “Hot Rod” Silica Gel

Silica gel is a [granular](#), [porous](#) form of [silica](#) made synthetically from [sodium silicate](#). Despite the name, silica gel is a [solid](#).

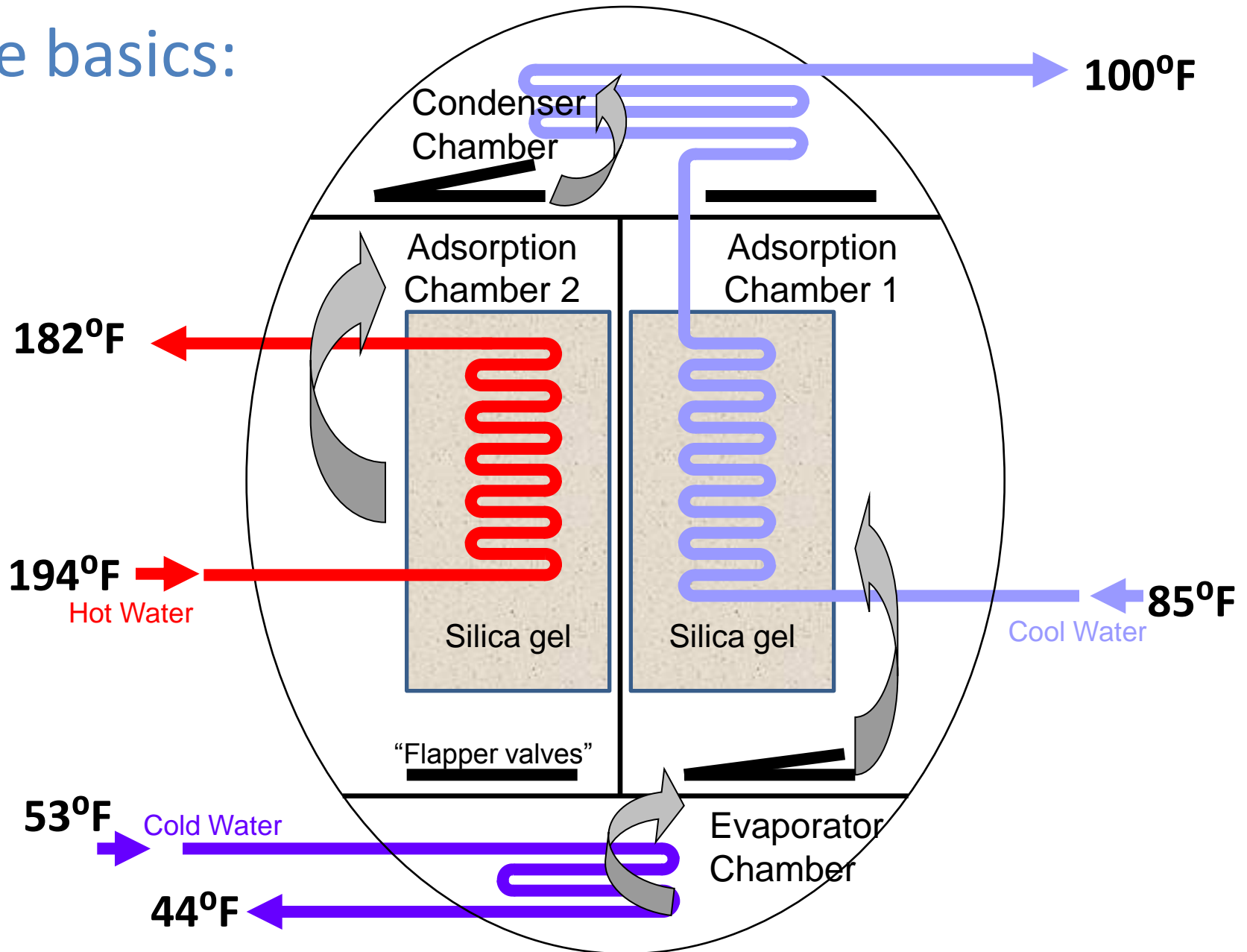
Silica gel is most commonly encountered in everyday life as beads packed in a [semi-permeable](#) plastic. In this form, it is used as a [desiccant](#) to control local [humidity](#) in order to avoid [spoilage](#) of some goods.

Silica gel's high [surface area](#) (around  $800 \text{ m}^2/\text{g}$ ) allows it to adsorb water readily, making it useful as a desiccant (drying agent).



Source: Wikipedia

# The basics:



# U.S. Embassy

- U.S. Dept. of State, OBO (Overseas Building Operations)
- 150TR @ 52°F chilled water
- CHP (Tri-generation) application
- Shipped 1<sup>st</sup> Qtr, 2010



# Sustainable Technologies Center Community College in New Mexico

- 30TR @ 45°F chilled water
- Solar application
- Shipped June, 2010
- LEED Gold!



# Military Base – Southeastern U.S.

- 80TR @ 45°F chilled water
- Solar application, driven w/ 160° F hot water
- Accepted July, 2010



# Architect Firm in Georgia

- 40TR @ 45°F chilled water
- CHP (Tri-generation) with 2 microturbines
- Shipped September, 2010
- LEED Platinum!



# Retailer in the Pacific

- 90TR @ 45°F chilled water
- CHP (Tri-generation) application
- Shipped October, 2010



# Power Partners Teams with DOE's Pacific Northwest National Laboratory

7/15/2010

...on a **\$2.54 million research program** to test new sorbents and refrigerants in a type of air conditioning unit that runs on waste heat or heat from solar thermal collectors.

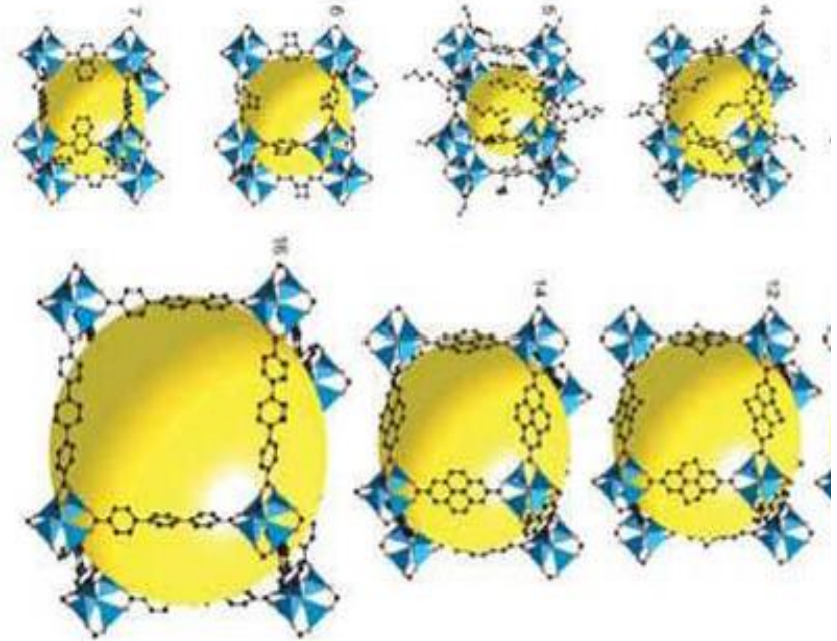
During the three-year program, the team will design, assemble and test an adsorption chiller that takes advantage of PNNL's **metal-organic heat carrier** technology. The goal is to utilize PNNL's advanced materials and develop adsorption chillers that are **smaller, more efficient and affordable** enough to be used more frequently in commercial buildings.

**Power Partners will lead engineering and testing** efforts as the project advances from a bench-scale prototype to a 5-ton cooling capacity demonstration unit, utilizing its state-of-the-art test facility.



# What are Metal Organic Heat Carriers?

- Framework structures forming 3D porous network with tunable binding energy for gases and liquids
- Synthesis conditions support thin film deposition, nanophase crystals, or bulk powders
- Suitable for high temperature applications
- Applications in geothermal power, waste heat recovery, cooling and refrigeration, cryo-separations, etc.



*Thank You!*  
*[www.eco-maxchillers.com](http://www.eco-maxchillers.com)*

