Concentrated Solar Air Conditioning for Buildings Project

"GLOBAL COLLABORATION IN ENVIRONMENTAL AND ALTERNATIVE ENERGY STRATEGIES"

International Workshop on Environment and Alternative Energy

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Presenter: Mr. Al Sorkin, Senior Principal Engineer, ITB

Believe It Or Not!

- ***Solar heating for staying cool in buildings!?***
- ***NASA is doing a project with the Navy at an Air Force Base!?***
- ***A Hawaiian company is installing a Chinese chiller in Arizona!?***

Believe It! It's true!

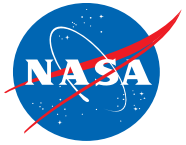
- ***NASA organized a collaborative technology demonstration project with the DOD ESTCP Program to get performance data on concentrated solar collectors supplying the energy for absorption chillers to air condition building***

- ***Project team developed proposal; went through ESTCP project selection and funding process***

- ***Demonstration site was selected from list of potential sites based on feasibility of facility and eagerness of base energy managers***

Partners in the Project

- ***ESTCP***
- ***Naval Facilities Engineering Service Center***
- ***NASA TEERM***
- ***ITB***
- ***Sopogy***
- ***TESS***
- ***Enovity***
- ***Davis-Monthan AFB***



Roles of Partners in the Project

- ***ESTCP – Major funding source***
- ***Naval Facilities Engineering Service Center – Principal Investigator***
- ***NASA TEERM/ITB – Co-principal investigator***
- ***Other NASA Centers (JSC, DFRC) – Peer review***
- ***Sopogy – Technology provider***
- ***TESS – Modeling & Simulation***
- ***Enovity – Measurement & Verification***
- ***Davis-Monthan AFB – Demonstration Site***

Federal facilities energy use reduction mandates

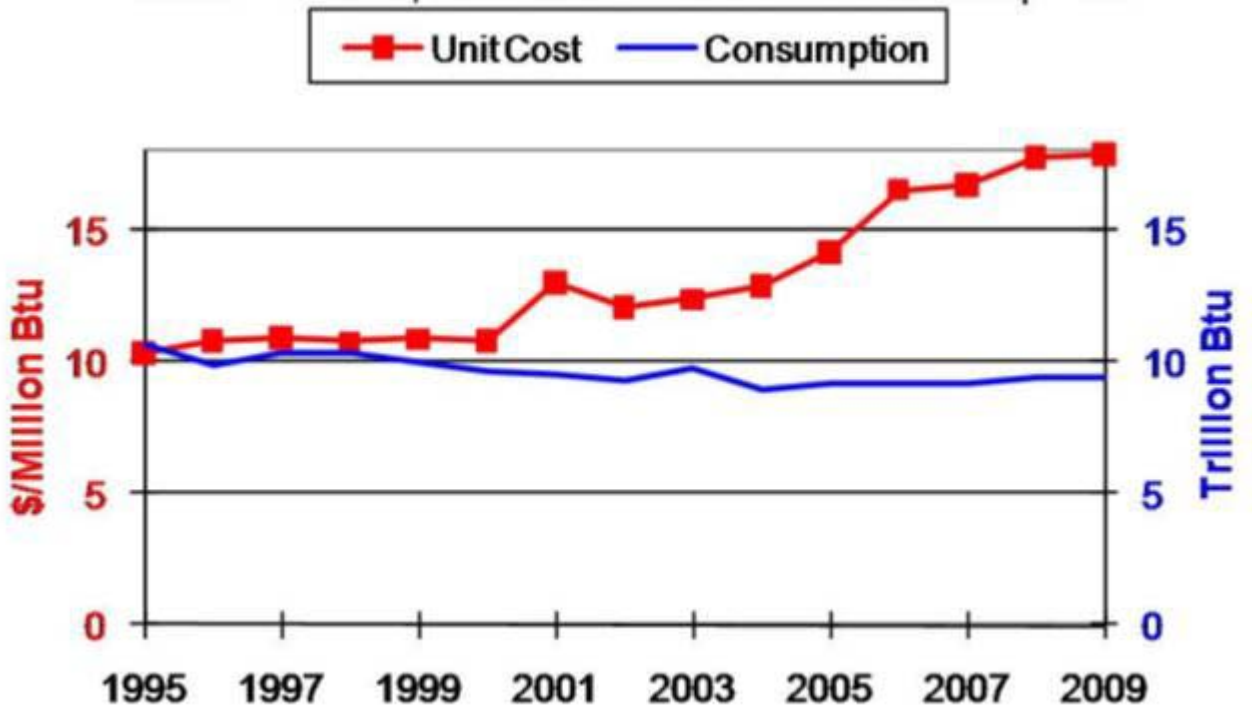
Topic	Requirement
Energy Intensity	Reduce Btu/gsf 3% annually from FY 2003 baseline for FY 2006-2015 (30%)
Water Intensity	Reduce gal/gsf 2% annually from FY 2007 baseline for FY 2008-2020 (26%)
Renewable Energy	Increase percentage of total electricity from renewable sources 3% FY 2007-2009 5% FY 2010-2012 7.5% FY 2013+

Risk to Mission

– ***Rising energy unit costs eroding mission funding***

– Trend: Buying less yet spending more

- Since FY 1995, use down 12% and unit costs up 73%



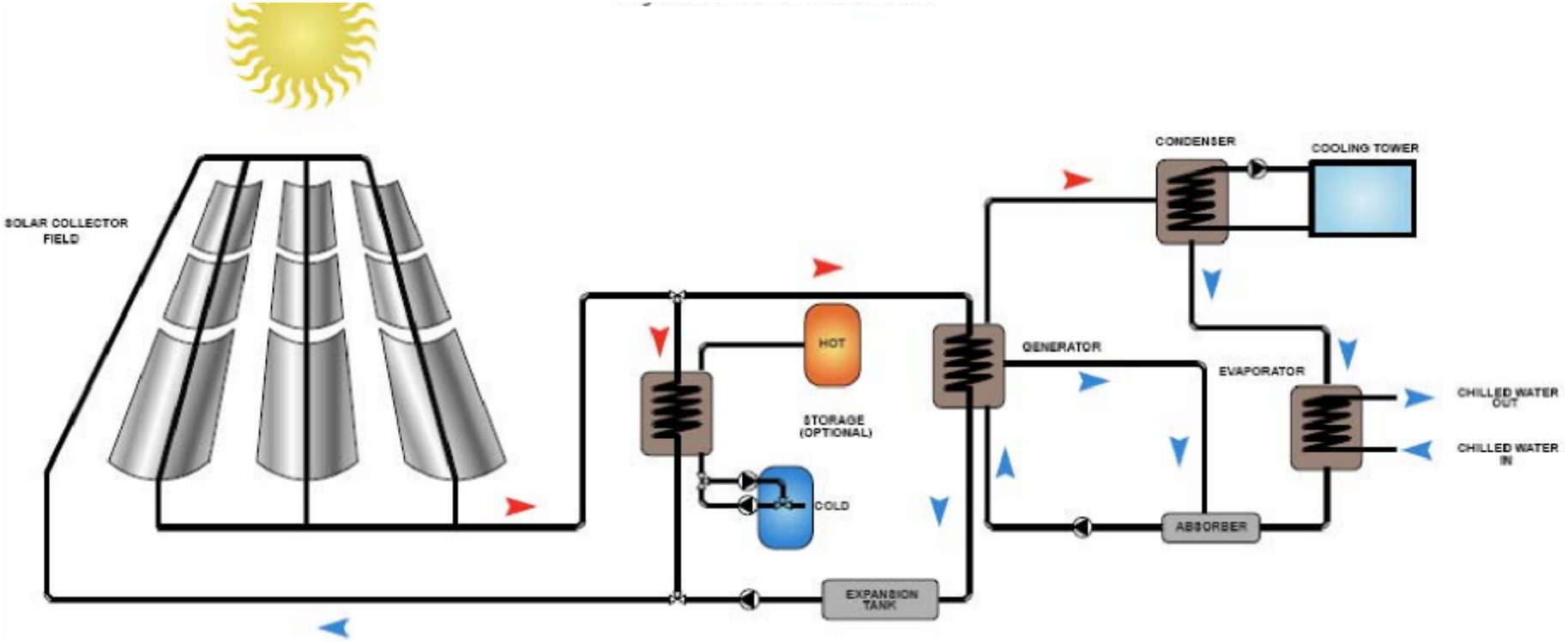
Significance of air conditioning

- ***DOD studies have concluded that air conditioning accounts for 30-60% of total energy expenditures***
  - ***Gas-Fueled Cooling Technologies at DOD Fixed Facilities***
    - http://oai.dtic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=ADA309231

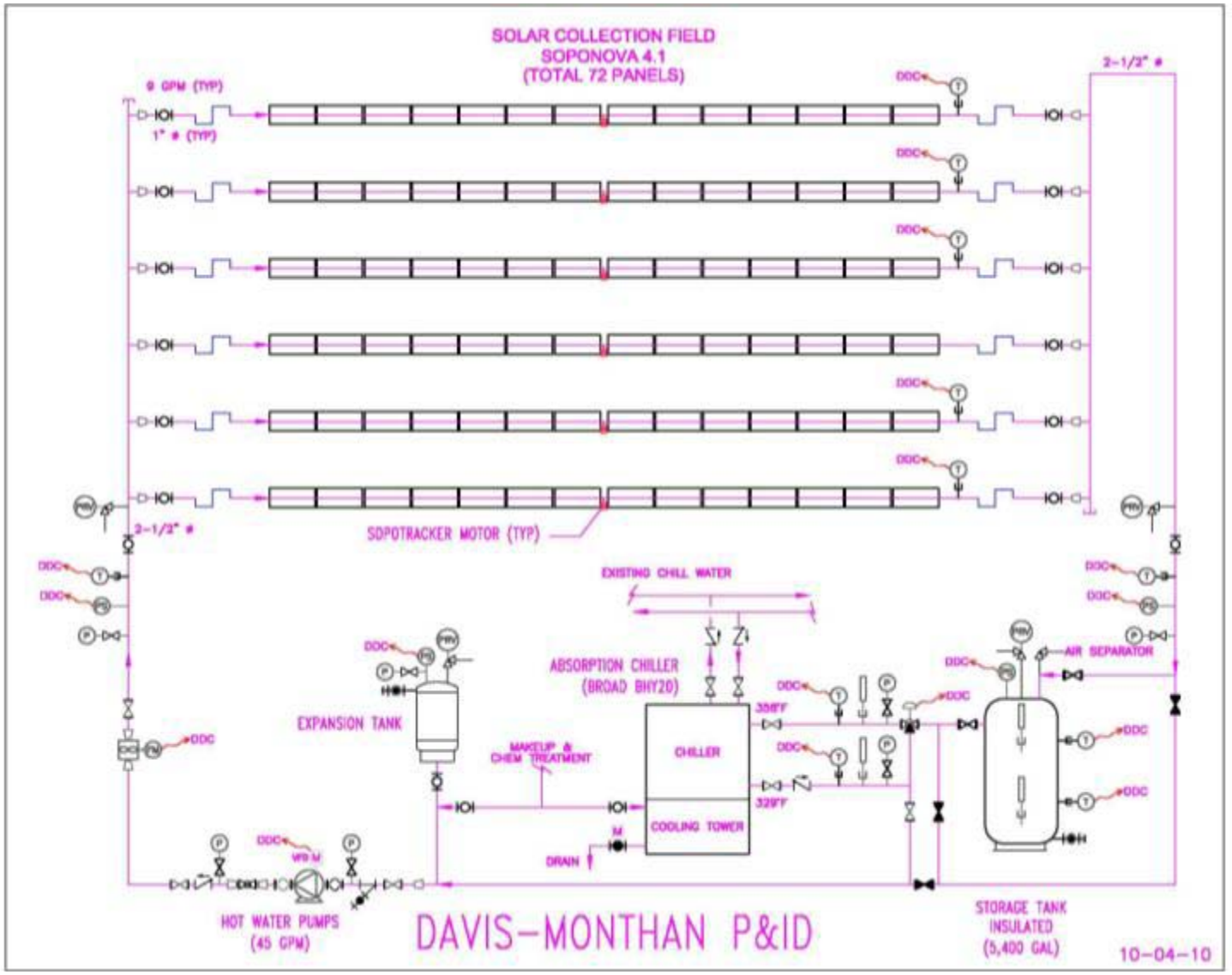
- ***Why use solar thermal energy? To offset energy provided from the grid***
  - ***Concentrating Solar Power Outlook***
    - http://www.greenpeace.org/international/en/publications/reports/concentrating-solar-power-2009/
  - ***Particularly in the southwest***
    - http://www.nrel.gov/csp/maps.html

Environmental Security Technology Certification Program

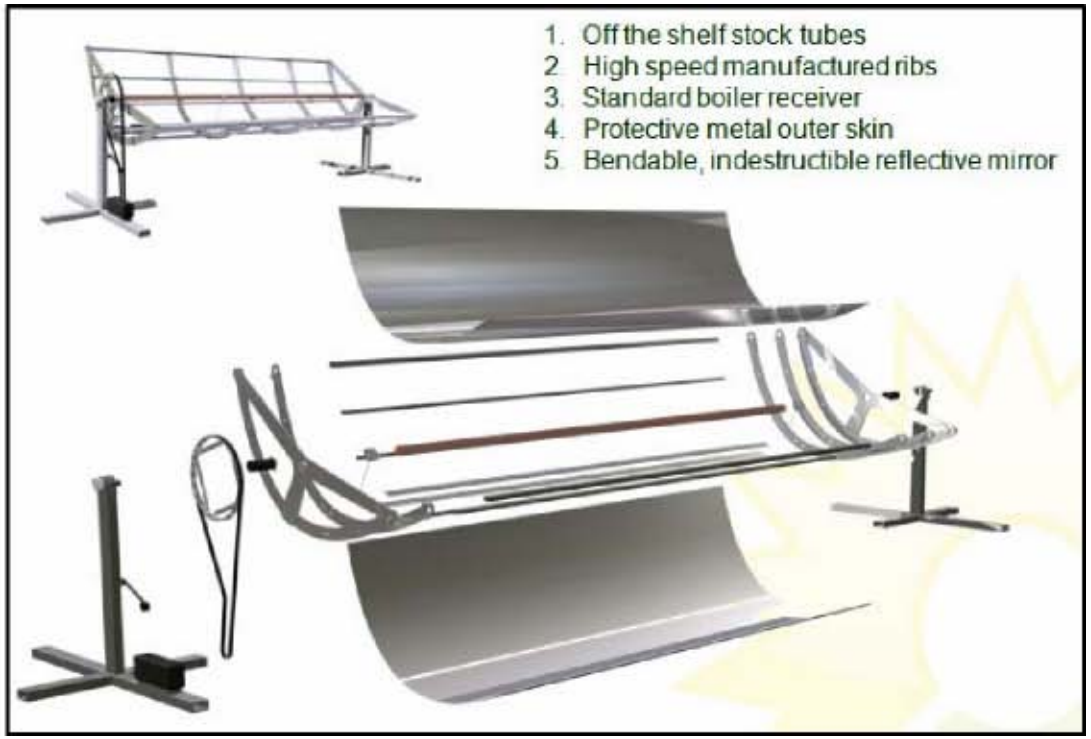
Overall conceptual schematic of technology



Plumbing and Instrumentation Diagram



Solar Collectors

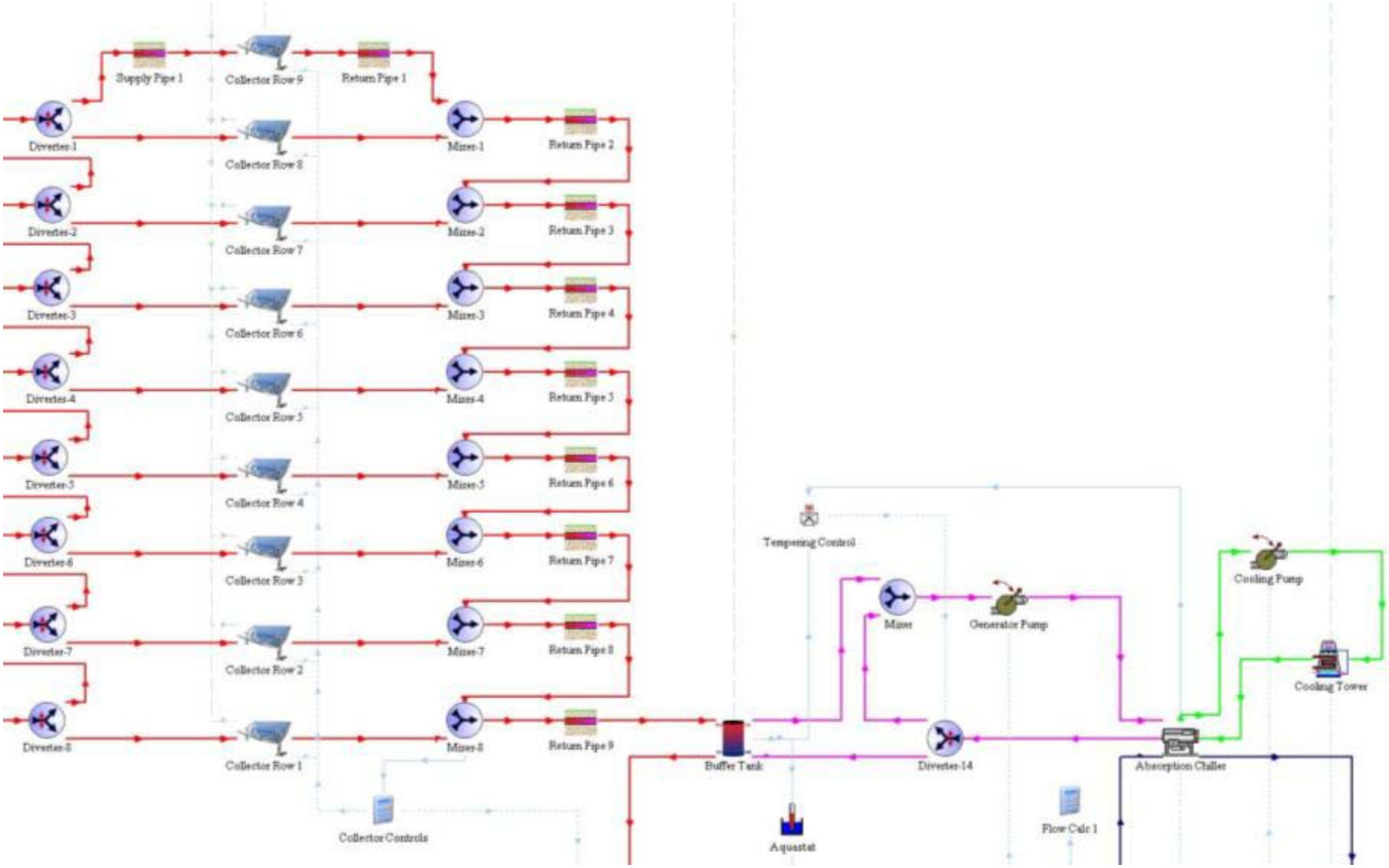


- ***Sopogy SopoNova MicroCSP Data Sheet***
  - http://sopogy.com/pdf/contentmgmt/Data_Sheet_SopoNova_Web.pdf

Photo of Youth Center

Photo of collector field

TESS modeling in TRNSYS



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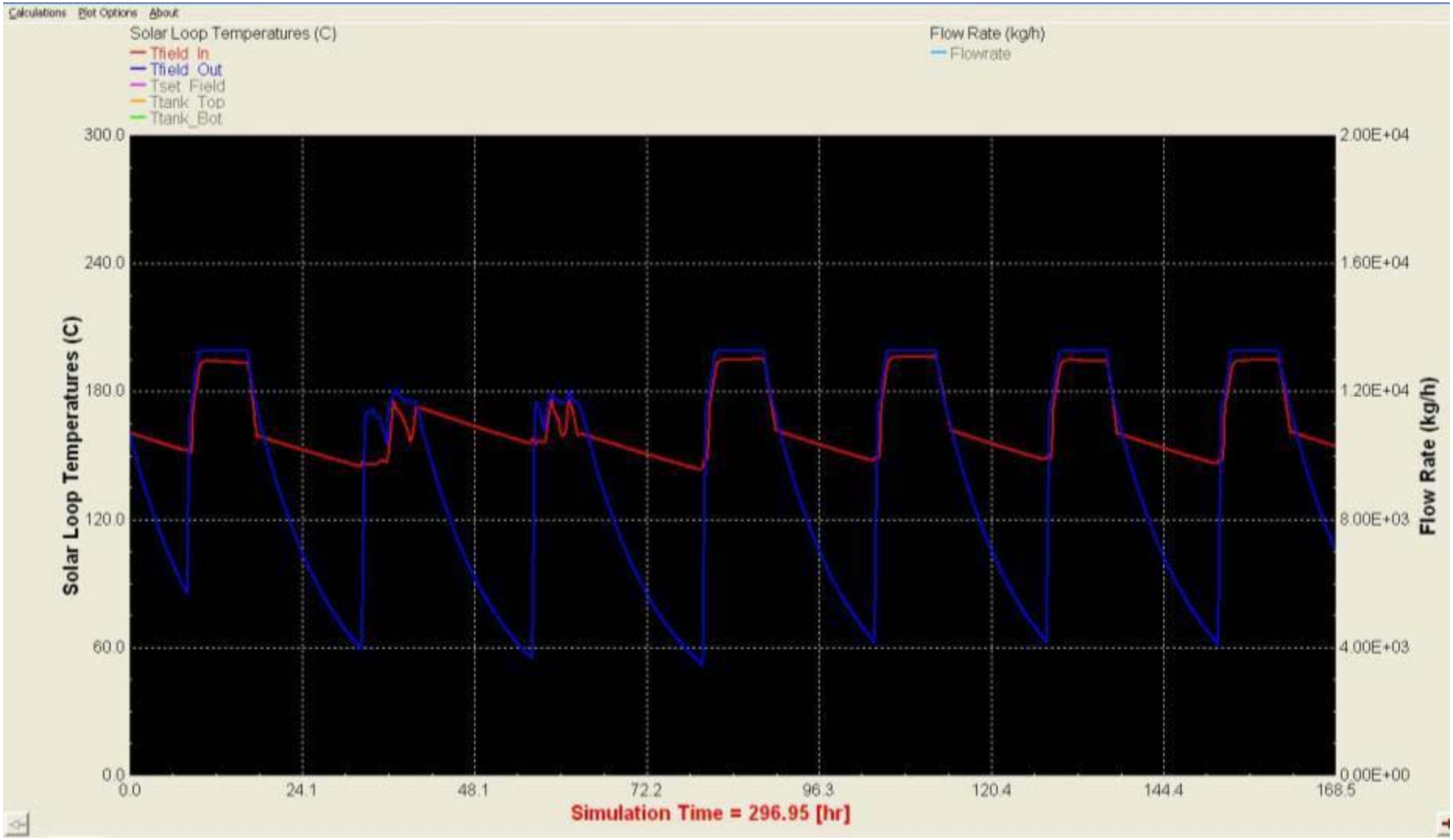

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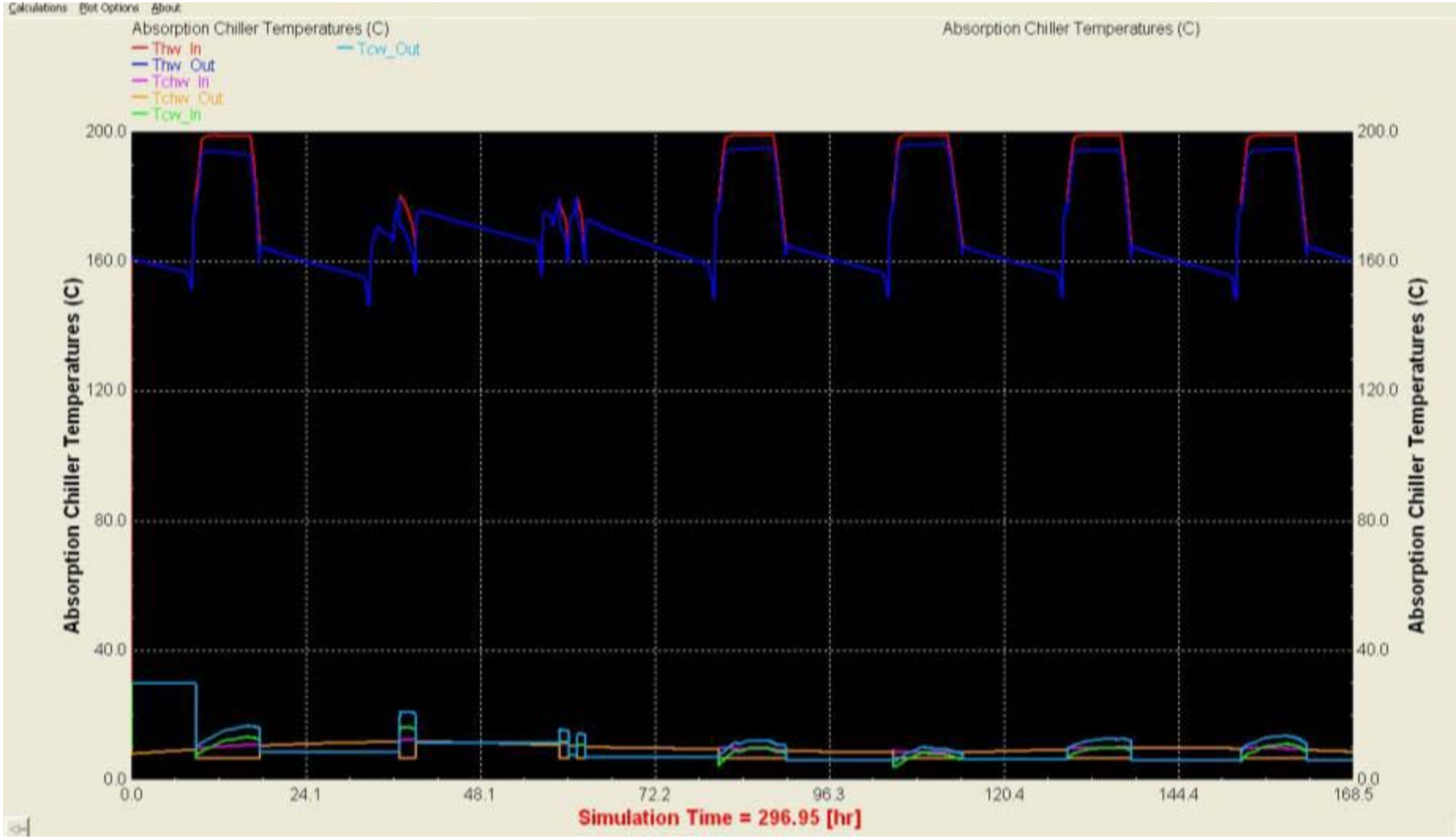

Concentrated Solar Air Conditioning for Buildings

Description:

- Reliable access to affordable, stable energy supplies at facilities/installations. Small-footprint, easily installed solar thermal energy system utilizing proven technology to drive industrial-sized absorption air conditioning systems.
- Increase energy efficiency, and percentage renewable consumption. (Summer AC loads account for 30-60% of total energy expenditures at DoD facilities.) Helps agency meet regulatory requirements (e.g., EO 13423, EPA 2005, EISA 2007, EO 13514).
- Demonstrate that solar collectors can be integrated with absorption chillers to provide a renewable energy based source of air conditioning.

Stakeholders:

- Work Partners: Navy [Principal Investigator], Sopogy [Turnkey], TESS/Enovity [subcontractors]; Davis-Monthan AFB (demo site in AZ)
- Other: NASA (JSC & DFRC), HQ EMD

Project Approach:

- Collect baseline operational data
- Install MicroCSP™ and absorption chiller
- Collect at least 12 months of operational data
- Determine offset electrical grid energy quantities and savings
- Prove cost-effective alternative to fossil fuel based energy

MicroCSP™ Solar Collector “SopoNova 4.0™”
(Illustration courtesy of Sopogy)

Alternatives:

- Parabolic solar collectors coupled with absorption chiller

Progress: Planning for testing

Period of Performance: May 2010 to February 2013

Contact:

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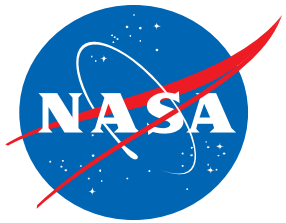
- TEERM Program Manager: Chuck Griffin, NASA, 321-867-6225, chuck.griffin@nasa.gov

Project Schedule

	FY10				FY11				FY12				FY13			
Project Initiation			■													
Project Planning			■	■												
Requirements Definition			■	■	■											
Materials Preparation				■	■	■	■	■								
Testing					■	■	■	■	■	■	■	■	■			
Analysis and Reporting													■	■		
Follow-up / Closeout														■		

– ***Questions?***


NASA