



WORCESTER
S T A T E
UNIVERSITY

MAPC-MASSCEC Clean Heating And Cooling Workshop For Municipalities

Bob Daniels – Associate Director, Facilities

April 4, 2017



Worcester State – Wellness Center

- Opened Fall of 2016
- New construction, 100,000 Sq. Ft,
- Cost of \$50 Million
- WSU's 4th LEED Gold Building
- Sustainable Features:
 - High efficiency HVAC
 - LED lighting
 - Rain Water Harvesting – Irrigation
 - Fitness Equipment generates electricity
- Solar Thermal Hot Water



Solar Thermal Process- Funding Opportunities

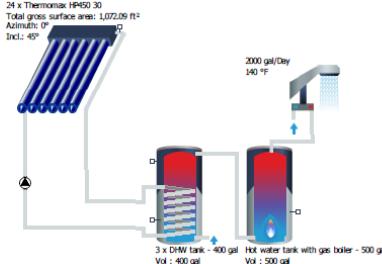
- WSU - Public Entity – No tax breaks
- Potential Funds:
 - Clean Energy Center
 - DOER – Lead By Example Program
- Clean Energy Center
 - Funds for feasibility study
 - Rebates for construction
- DOER – LBE
 - Check for grant opportunity
- Talk to agencies BEFORE you start



Solar Thermal Process- Design

- WSU – New construction
- Feasibility Study – T*SOL
- Engineering Support
 - Find someone with experience
- Design was incorporated into the new building which made it easy.
- Identify additional costs:
 - You need more than just the solar panels
 - Structural support – steel
 - Hot water tanks, piping, electric
- Controls and integration to Building Management System

Technical Specification
Kingspan Solar
KS3714 Worcester State University - Wellness
24x HP450-30 Collector



Results of annual simulation

Installed collector power:	237.88 kBtu/hr	
Installed solar surface area (gross):	1072.09 ft ²	
Irradiation on to collector surface (active):	414.95 MMBtu	501.97 kBtu/ft ²
Energy delivered by collectors:	260.35 MMBtu	314.96 kBtu/ft ²
Energy delivered by collector loop:	246.10 MMBtu	297.71 kBtu/ft ²
DHW heating energy supply:	562.58 MMBtu	
Solar contribution to DHW:	244.76 MMBtu	
Energy from auxiliary heating:	325.6 MMBtu	
Natural gas (H₂) savings:	4,895.1 therm	
CO ₂ emissions avoided:	64,189.05 lbs	
DHW solar fraction:	42.9 %	
Fractional energy savings (DIN CEN/TS 12977-2):	43.2 %	
System efficiency:	59.0 %	

Solar Thermal Process- Construction

- CEC online application
 - PowerClerk is easy to use
 - All information is entered online or uploaded
- Equipment lead times
- Inspect the “system” as it’s constructed
- Don’t forget to include code compliance people early on
 - Building, Plumbing, Electrical inspectors
- Remember to include your controls vendor if applicable
- Commissioning – A MUST!

MASSACHUSETTS CLEAN ENERGY CENTER

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Applications My Settings Print

Commonwealth Solar Hot Water Commercial-Scale Program Application Form

Program Administrator	Massachusetts Clean Energy Center
Application Number	CSHWC-00307
Current Date	04/03/17

HOST CUSTOMER

Company Name	Worcester State University
Contact Person Name	Robert Daniels
Contact Person Title	Associate Director of Facilities
Mailing Address	486 Chandler Street
City, State, Zip	Worcester, MA 01602
Business Phone	(508) 929-8099

SYSTEM OWNER: Same as Host Customer

PAYEE

Company Name	Division of Capital Asset Management & Maintenance (DCAMM) Project # WOR0001 DC1
Contact Person Name	James Freely
Contact Person Title	Project Manager - Project # WOR0001 DC1
Mailing Address	1 Ashburton Place
City, State, Zip	Boston, MA 02108
Business Phone	(617) 727-4050 x31239
Business Phone	(617) 204-1239

It is the sole responsibility of the PAYEE to take any necessary actions concerning tax implications of receipt of the rebate payment.

APPLICANT/PRIMARY INSTALLER/INTEGRATOR

Company Name	Worcester State University
Contact Person Name	Robert Daniels
Contact Person Title	Associate Director of Facilities
Mailing Address	486 Chandler Street
City, State, Zip	Worcester, MA 01602
Business Phone	(508) 929-8099

PROJECT SITE INFORMATION

Host Customer Sector	Government/Public/Non-Profit
Project Site	
Site Address	486 Chandler Street
City, State, Zip	Worcester, MA 01602
County	Worcester
Electric Utility Service	
Utility Company	National Grid

Solar Thermal Process- Construction

- There are quite a few components to the system
- Coordination of various trades
- Clash detection



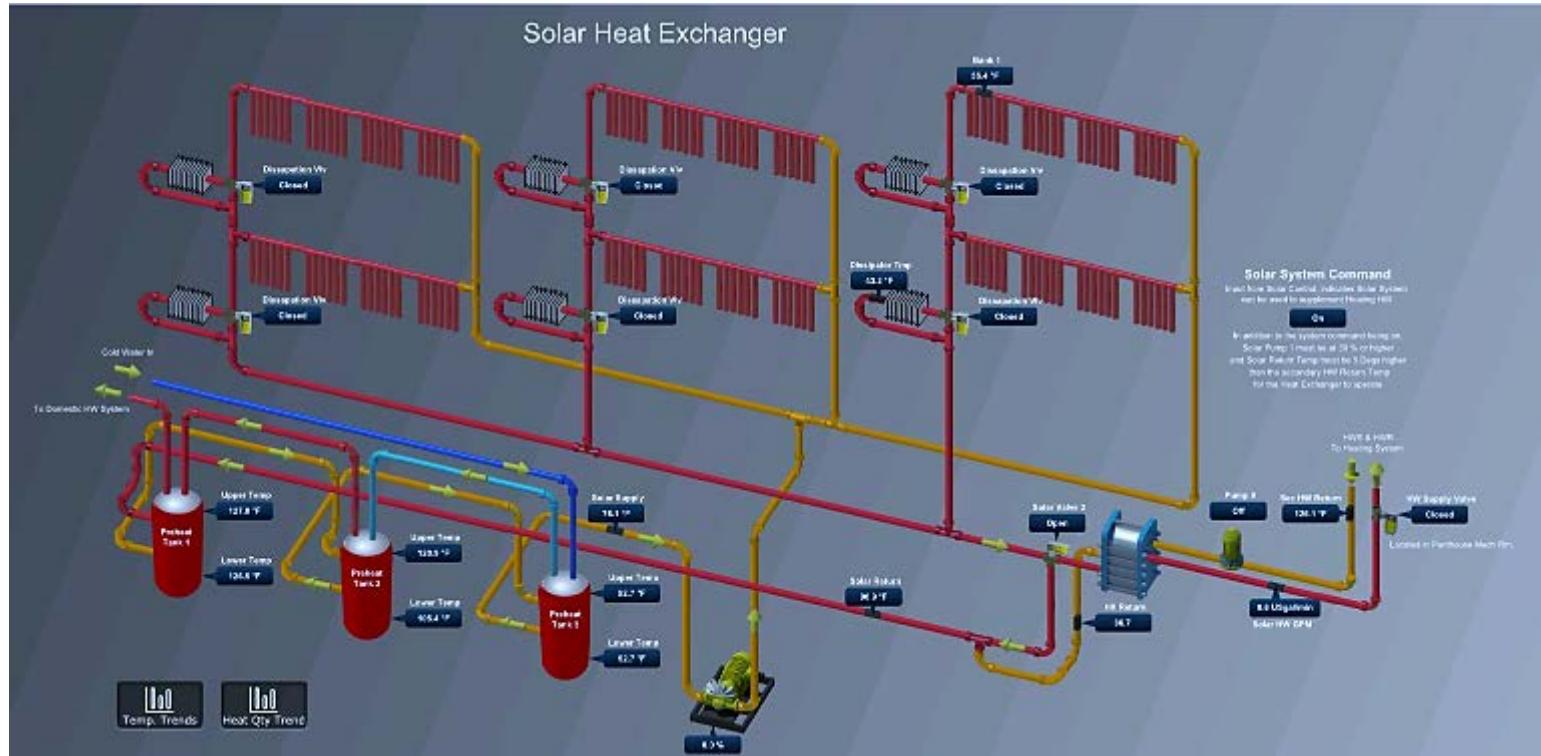
Solar Thermal Process- Construction

- Hot water holding tanks
- Heat dissipation valve and heat dump fin-tube



Solar Thermal Process- Controls and Commissioning

- Monitor the operation
- Require a third party commissioning agent!



Thank You!

Bob Daniels

Associate Director of Facilities

Environmental Health and Safety Officer

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