

# Solar Water Heat Case Studies

## Building Solar Workshop

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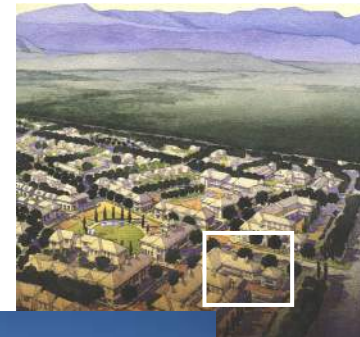


*Mechanical/Electrical Design  
Energy Management Consulting  
Sustainable Solutions™*

Case Study Presentation  
**Solar Village**

# Solar Village - Prospect

- **Mixed use zoning**
- **3 story structure**
- **1st floor commercial**
- **16 residential units above**
- **Courtyard to foster community**



# Owner Philosophy

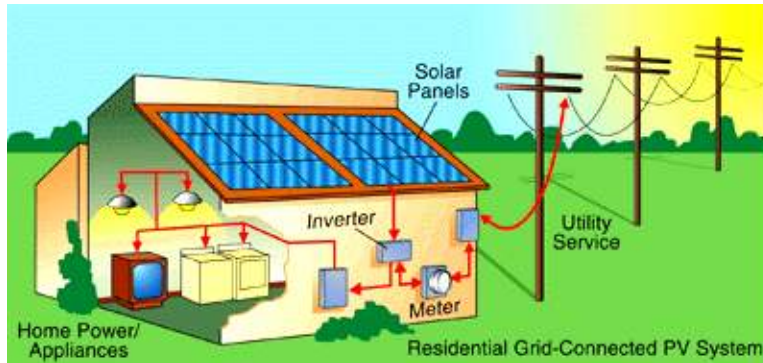
- **Progressive communities, quality and low maintenance, and the lowest monthly costs of anything on the market**
- **Establish a brand that will become known nationwide for mainstream sustainable homes and workplaces**
- **Prove the business case to the industry**



# Marketing

- **Sell the unique “everyday” benefits:**
  - **Higher quality**
  - **Increased comfort levels**
  - **Lower monthly costs**
  - **Lower maintenance**
  - **Healthier**
  - **True community**

# Systems: Solar - PV or Hot Water



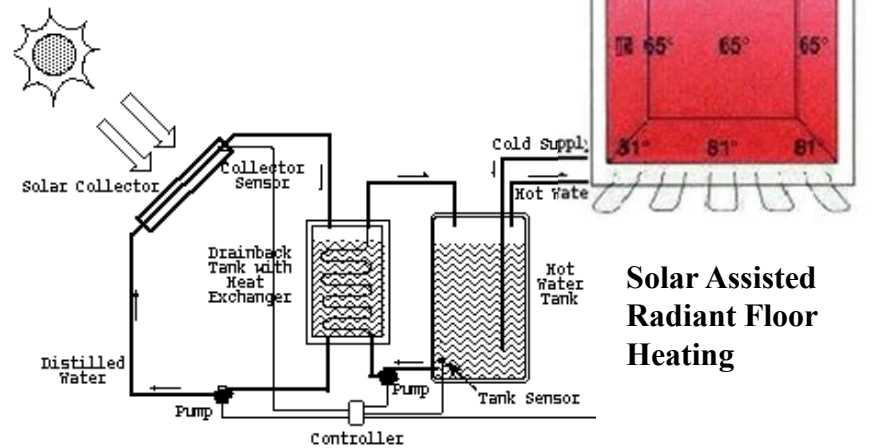
No Batteries  
Required

Based on Net Meter Rate  
Schedule

Wind Energy will  
cover all loads not  
covered by Solar

## Manage Loads

- Efficient Appliances & Lighting
- Efficient Windows & Coverings
- Extra Insulation



40-50% lower Heating and Cooling Costs

# Systems: Solar

## Solar Systems Integrated into the architecture



# Systems Analysis - Heating

- **Space Heating Hot Water**
  - **Solar Thermal**
  - **Geoexchange**
  - **Central Hot Water**
  - **High Efficiency Furnaces**
  - **Combined Space / Domestic Hot Water**
- **Domestic Hot Water**
  - **Stand Alone DHW**
  - **Central DHW**



# **Systems Analysis - Cooling/Ventilation**

- **Geoexchange**
- **Small, Central Chilled Water Systems (w/ Cooling tower fountain / Water feature)**
- **High Efficiency Direct-Expansion**
- **Indirect Evaporative**
- **Natural Ventilation / Free Cooling**

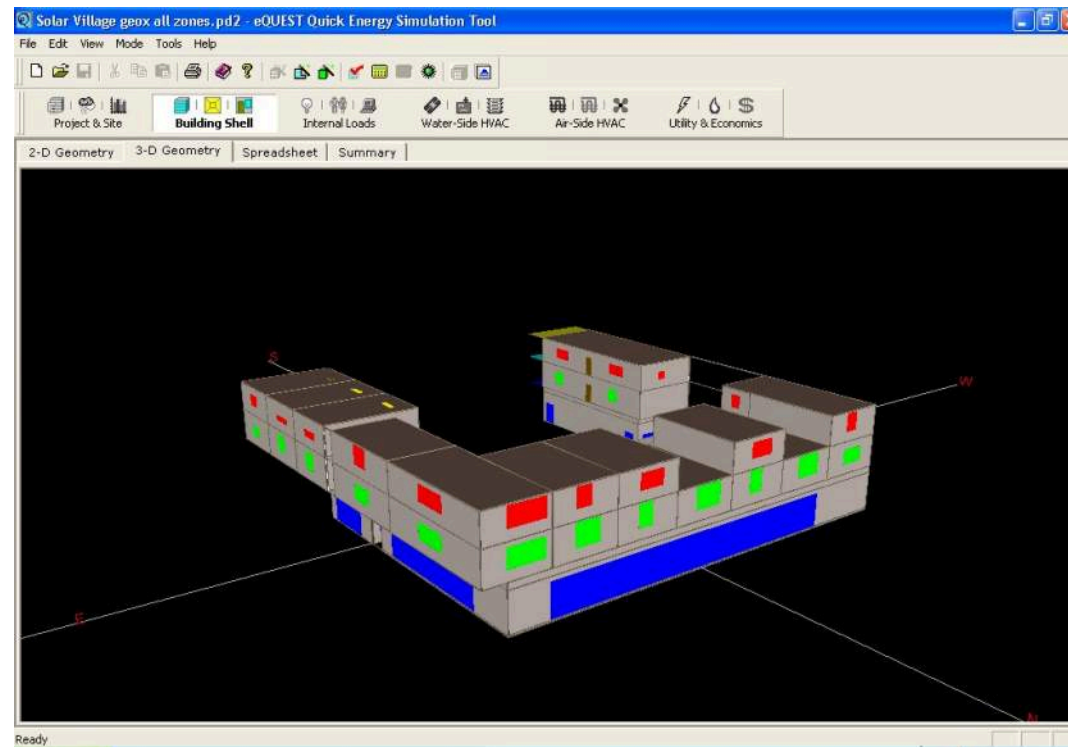
# HVAC Systems Selected

- **Cooling**
  - 13+ SEER DX Cooling, R410a
- **Domestic Water Heating**
  - Solar, Central DHW
- **Space Heating**
  - *Commercial* - Condensing (92%+ AFUE), Variable Speed Furnaces
  - *Residential* - Solar-assisted, Central Hot Water Heating Serving Radiant Floor



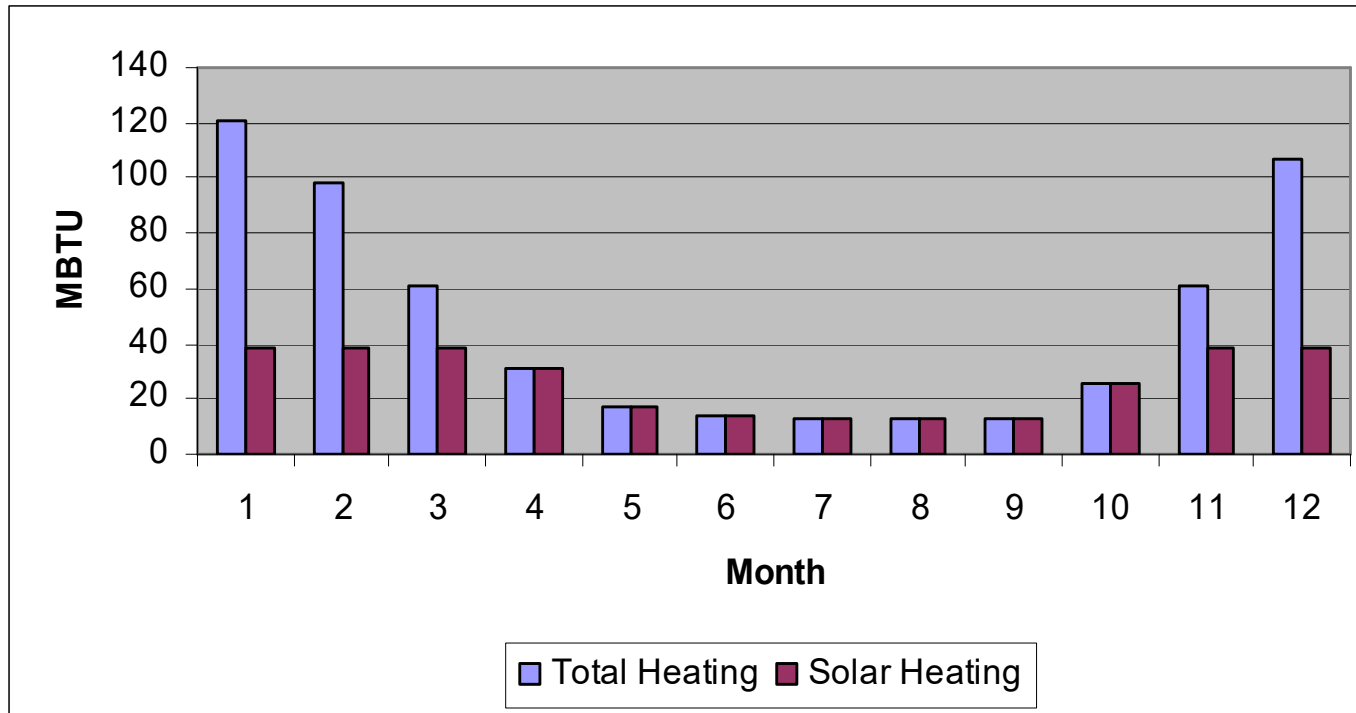
# Systems - Modeling

- **eQUEST model performed**



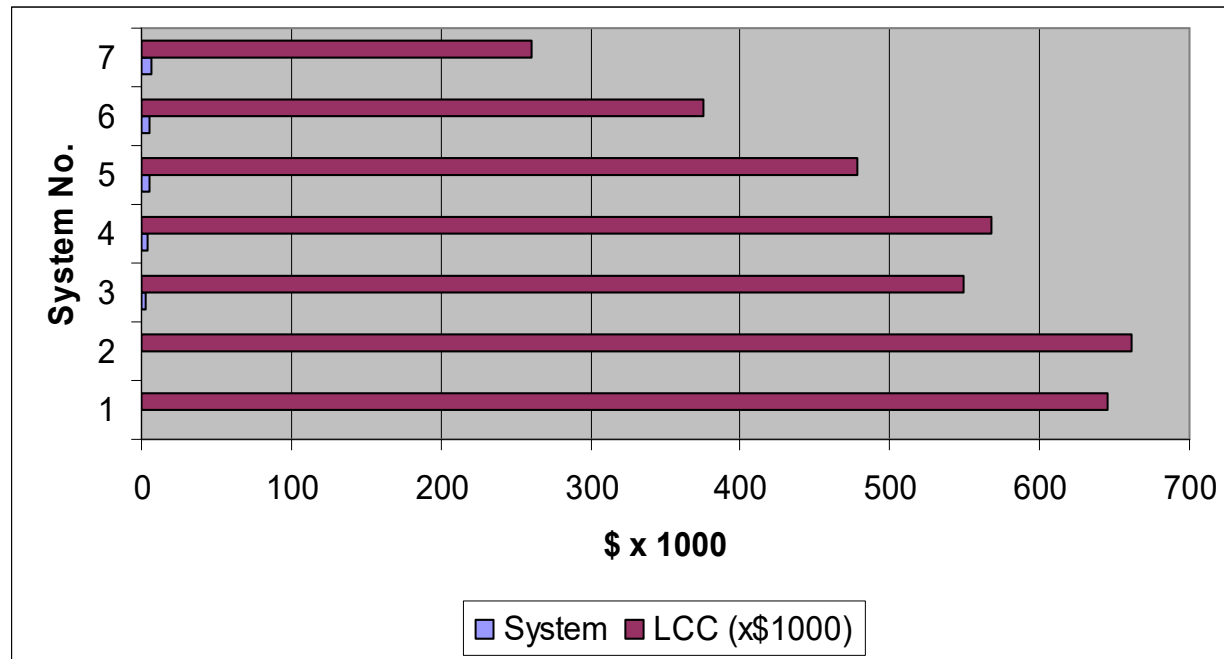
# Systems - Modeling

- **Optimized solar thermal system using F-chart**
  - Optimal slope =  $38^\circ$  ( $45^\circ$  actual)



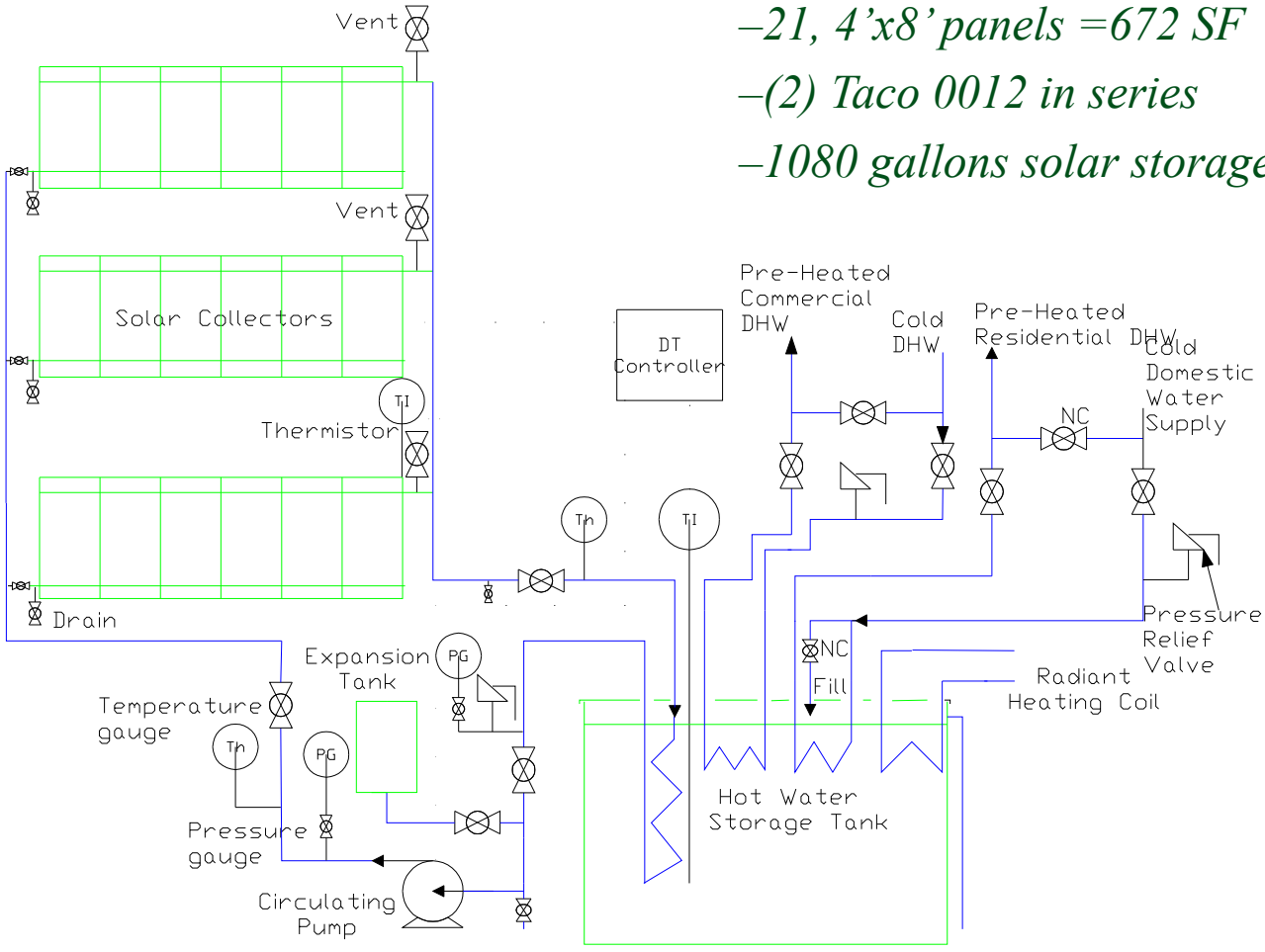
# Systems - Economics

- Life cycle cost analysis performed
- Estimated > 60% better than IECC

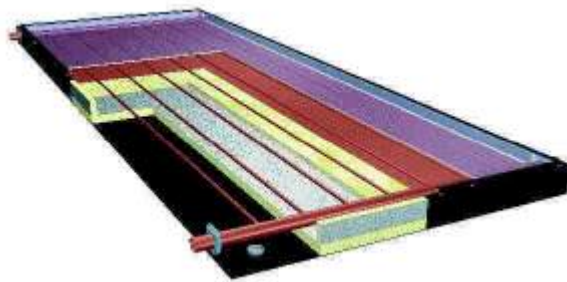


# System

- 21, 4'x8' panels = 672 SF
- (2) Taco 0012 in series
- 1080 gallons solar storage



# System Components



## **The Bottom Line**

- **80% of Solar Village Prospect has been pre-sold before ground breaking**
- **Tremendous interest from the area and the press**
- **A strong future for more Solar Villages and hopefully competitors**
- **Resolution 37 is setting the stage for the future of renewable power in Colorado**



Case Study Presentation  
Jianken

# Jianken

- **Mixed use zoning**
- **3 story structure**
- **1st floor commercial**
- **4 New York lofts**
- **Roof-top terrace**

# Owner Philosophy

- **Affordability**
- **Efficiency**

# Systems Analysis - Heating

- **Space Heating**
  - **Central Hot Water**
- **Domestic Hot Water**
  - **Central DHW**

# **Systems Analysis - Cooling/Ventilation**

- **High Efficiency Direct-Expansion**
- **Indirect Evaporative**
- **Direct Evaporative & “Free” Cooling**

# HVAC Systems Selected

- **Cooling**
  - *Commercial* – Evaporative & DX
  - *Residential* - Evaporative
- **Space Heating**
  - *Commercial* – Packaged gas/electric RTUs, some radiant
  - *Residential* - Central Hot Water Heating Serving Radiant Floor
- **Domestic Water Heating**
  - Solar DHW

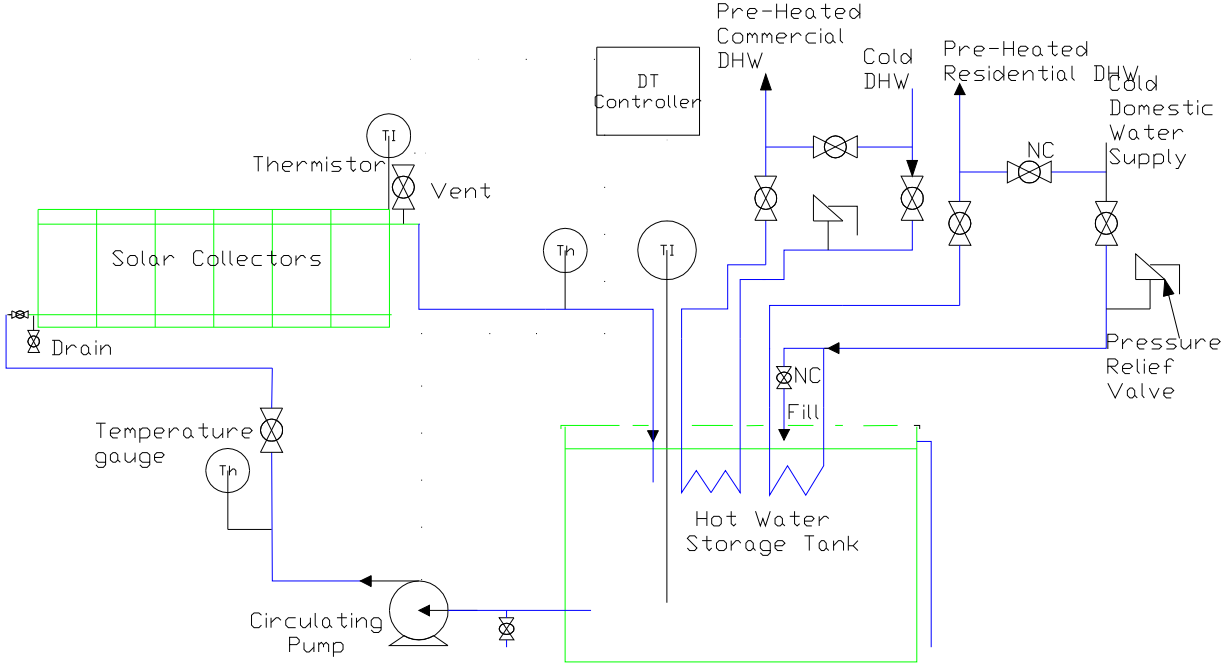


# Solar System

-7, 4'x10' panels = 280 SF

-(2) Taco 0011 in series

-450 gallons solar storage



# Success

- **Promote qualifications-based team selection**
- **Work with experienced professionals**
- **Front-load the design process**
- **Establish goals and work to meet them**
- **Consider life cycle costing**
- **Commission the system**
- **Track results**



## Final Thoughts

- **Code (ASHRAE 90.1) is the worst you can design/build to by law.**



- **LEED compliance is no guarantee of an energy efficient building.**



- **An Energy Star building is no indication of a sustainable building.**



- **Use LEED, Energy Star as guides for building better buildings.**



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