



# Solar Cogeneration

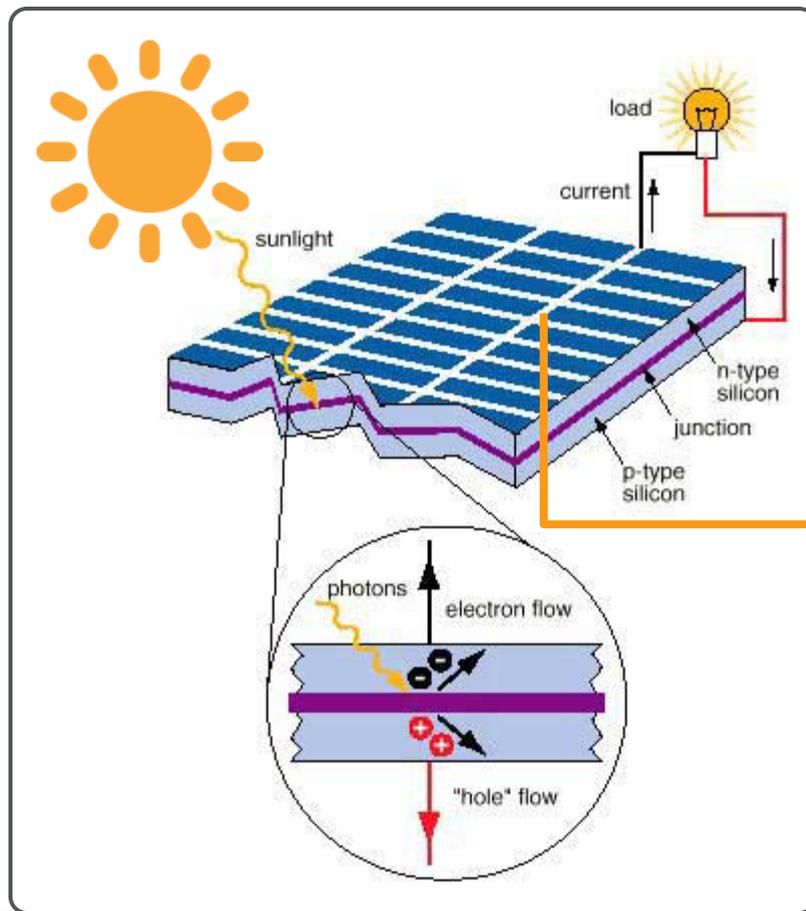
Accelerate Commercialization in California  
of Hybrid Concentrating Photovoltaic  
Thermal and Tri-Generation

Ratson Morad  
COO and VP R&D

10 February, 2011

**Cogenra Solar, Mountain View, CA 94043**

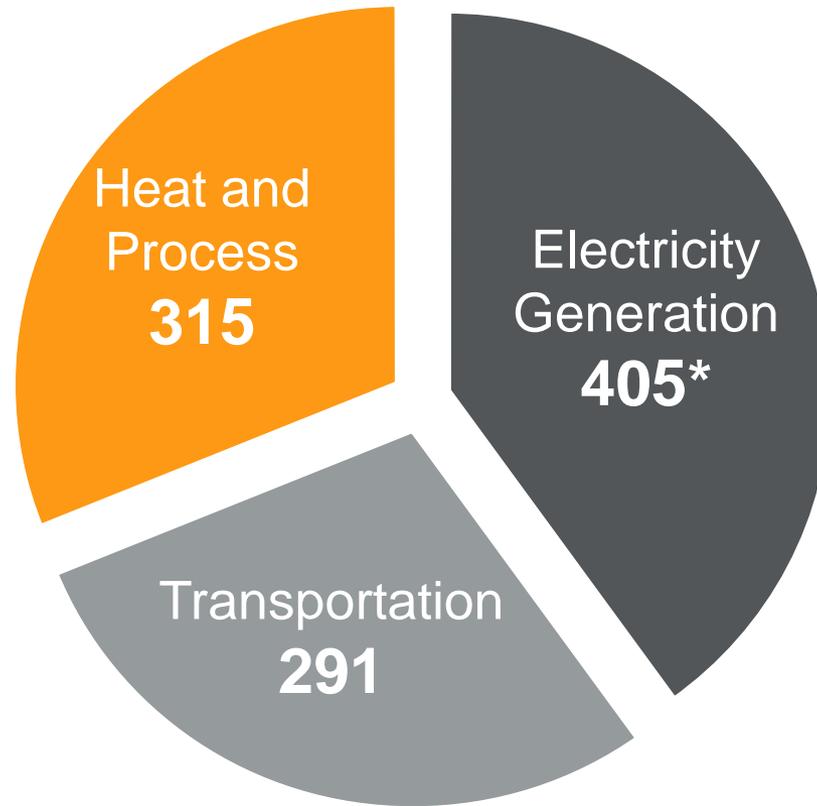
# PV Utilizes a Fraction of the Solar Potential



**~15%**  
Usable Electricity

**~85%**  
Wasted Energy  
(mostly *Heat*)

# Heat: The Untapped Opportunity



U.S. Energy Consumption (Billion Therms/Year)

\* Electricity Generation: 128 delivered, 277 losses

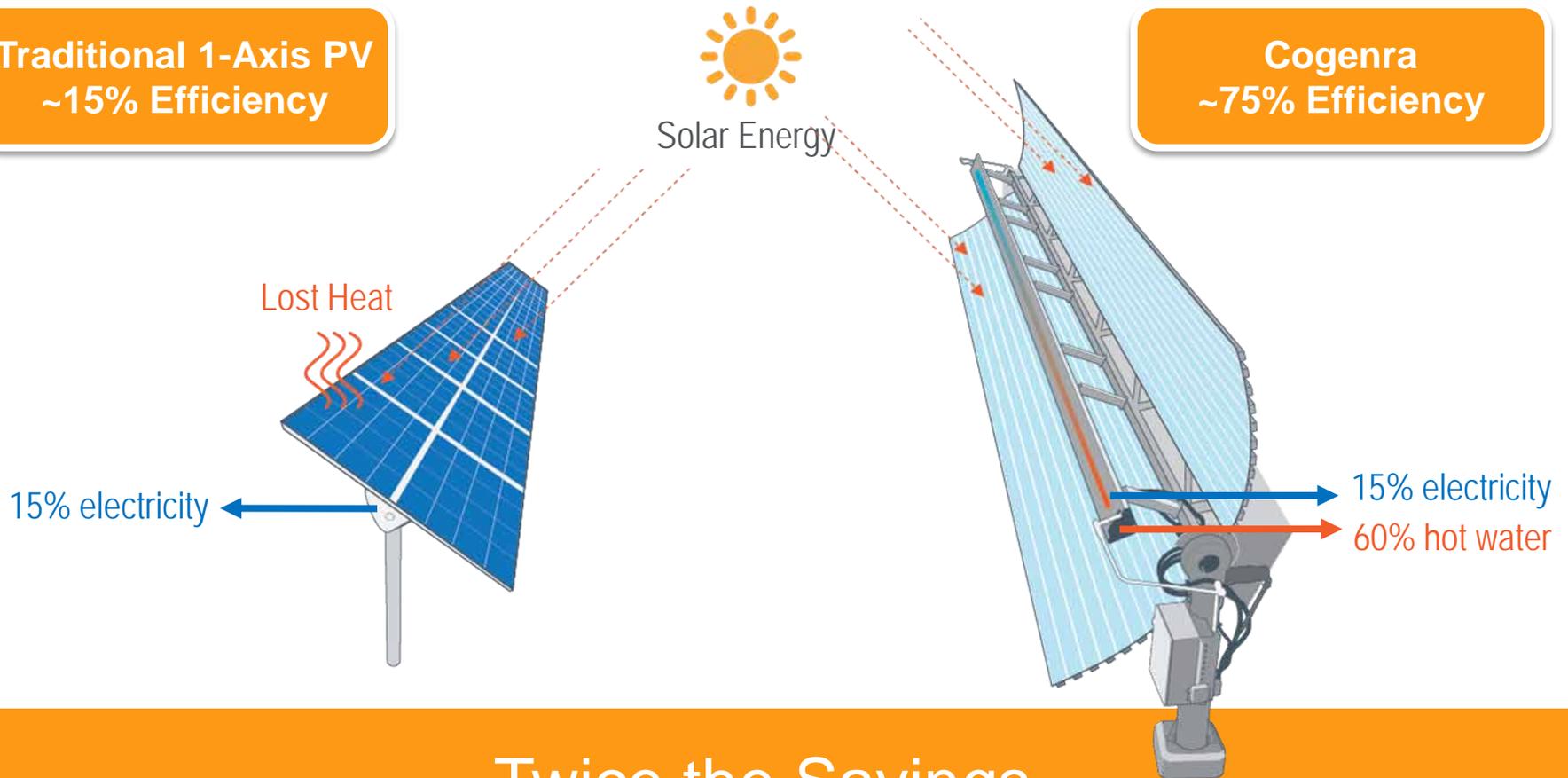
\* Source: US DOE, EIA, 2007,

# Solar Cogeneration

## Photovoltaic Electricity + Solar Hot Water

Traditional 1-Axis PV  
~15% Efficiency

Cogenra  
~75% Efficiency



Twice the Savings

# Key for Accelerating Commercialization

Design second generation system that that will reduce overall system cost by up to 20%

- Designed a system that reduced cost by sharing drive mechanism and controller between adjacent systems - Q2/2011
- Develop merge-at-customer planning system and site integration - Q4/2011
- Design 'BOS' for the hot water that can be easily connected at site - Q3/2011

Increase customer saving and enable incentive free renewable energy

- Design and deploy instrumentation - Completed
- Track and analyze system performance - Started
- Measure field performance and refine economic and financial models - Q3/2012
- Optimize control logic to maximize delivered energy value. - Q4/2011

Adapt system to enable advanced flexible energy delivery capabilities - Q3/2012

# Lower Total cost by designing a system that can be merged at customer



Source  
Globally

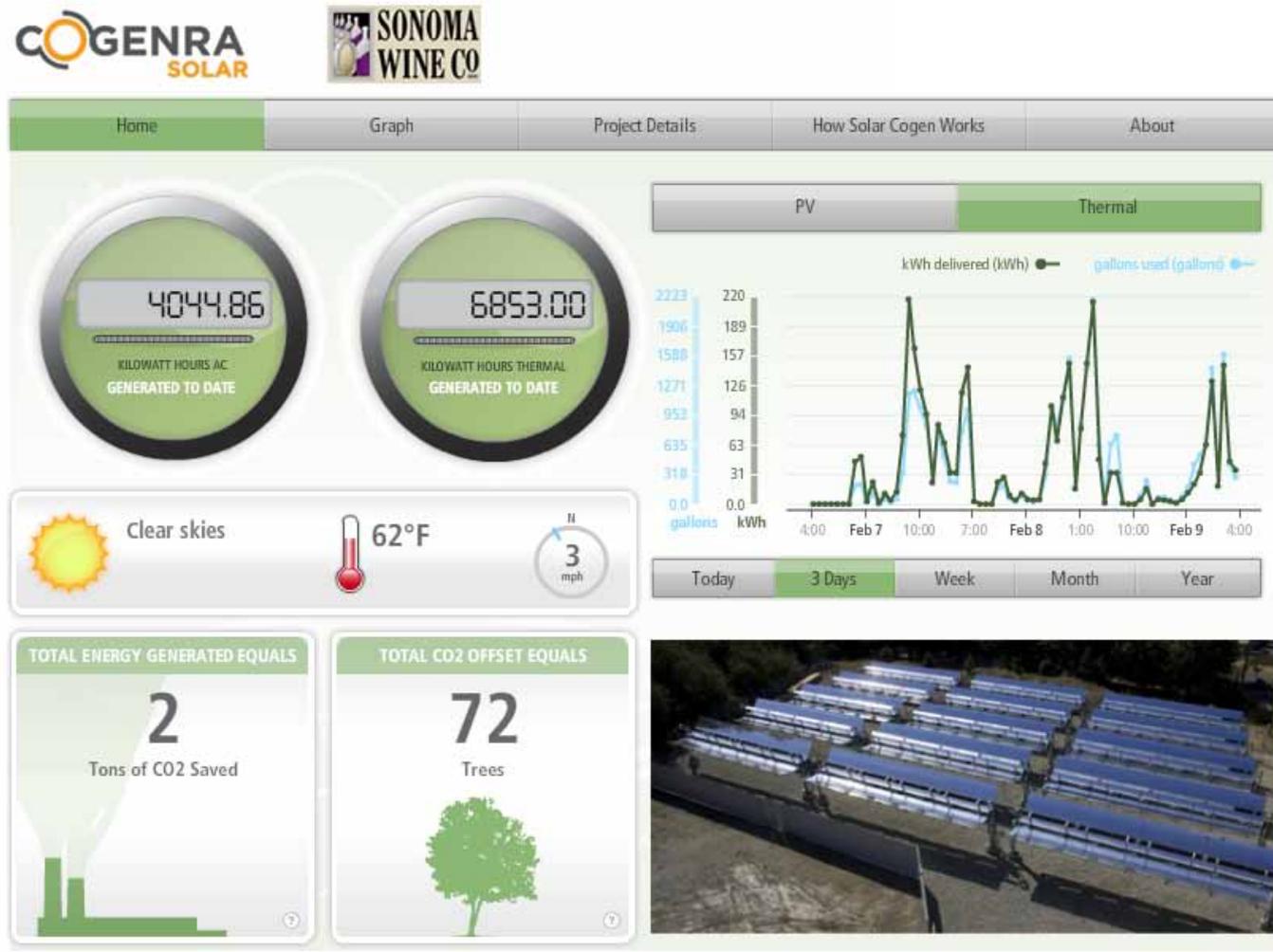
Ship Flat

Merge  
on Site

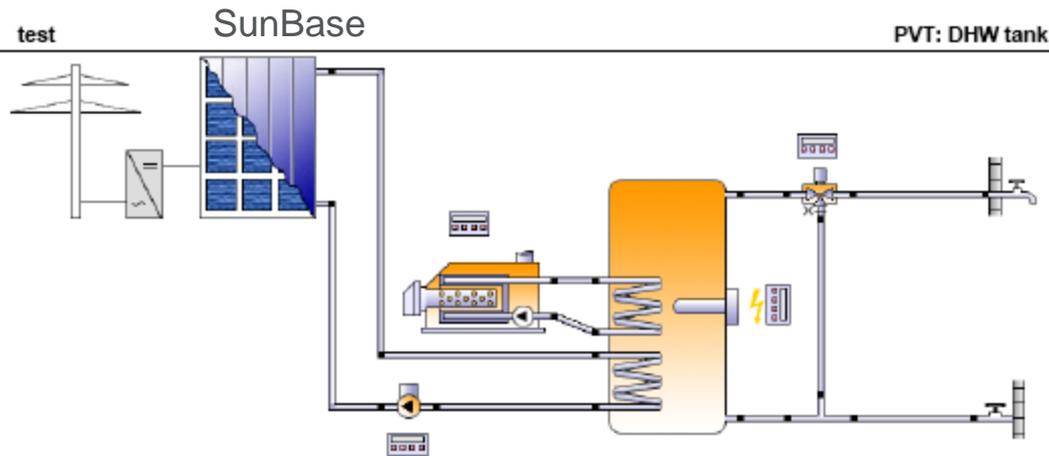
Scalable  
Production

Rapid  
Installation

# Deployed instrumentations and started to track performance at Sonoma Wine Company



# Analyzing performance and sizing installation

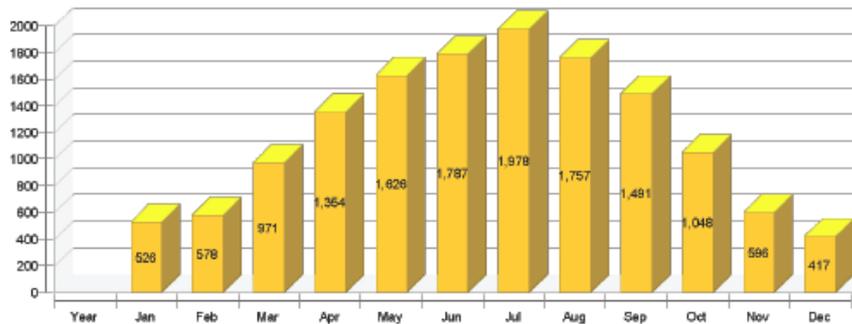


## Location of the system

USA  
 CA Mountain View  
 Longitude: -122.04°  
 Latitude: 37.39°  
 Elevation: 32 m

## Solar thermal energy to the system [Qsol]

kWh



- Cogenra developed simulation capabilities of PV-thermal hybrid concentrating-collector models and implemented in latest version of PolySun
- Enables modeling and detailed report of SunBase system output through a year including customer usage
- A good tool for array sizing, and for input to the financial model
- Cogenra will use this tool to analyze system performance and to optimize output based on customer's hot water usage

# SRCC Certification

- Cogenra SunBase System is the first to be certified under CG-600
- SunBase is qualified for CSI rebate for Hot Water
- This will enable faster adoption of Solar Cogeneration in California

<p style="text-align: center;">SOLAR COLLECTOR CERTIFICATION AND RATING</p>  <p style="text-align: center;">SRCC OG-100</p>	<p style="text-align: center;"><b>CERTIFIED SOLAR COLLECTOR</b></p> <p>SUPPLIER: <b>Cogenra Solar, Inc.</b> 365 E. Middlefield Rd. Mountain View, CA 94043</p> <p>MODEL: SunBase 1.0</p> <p>COLLECTOR TYPE: Concentrating</p> <p>CERTIFICATION#: 2010032A</p>
Original Certification Date: 10-JAN-11	

# Developing Heat & Power Purchase Agreement



## Provide Renewable Energy

- Turnkey facility & operations

## CUSTOMER / HOST

## Purchase Energy

- Predictable energy expense

## Benefits

- § Savings & hedge
- § Reduced emissions
- § Environmental statement

## Without Risk

- § No capital outlay
- § No debt
- § No performance risk
- § No maintenance

Enabling rapid commercialization via HPPA

# Solar Cogeneration Summary



- § Increase efficiency by delivering electricity and heat
- § Reduced emissions
- § Enable fast deployment through modular system which can be sourced locally
- § Enable fast adoption by developing Heat and Power Purchase Agreement

Getting the Most from the Sun

# Project Funding

Co-sponsored through California Public Utility Commission (CPUC) grant funding from California Solar Initiative (CSI) Research, Development, Demonstration, and Deployment (RD&D) Program with Itron, Inc. as the program manager.





**Thank You**

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