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# A River of Energy Solutions

## Achieving the Solar Thermal Advantage with Solar Thermal Purchase Agreements

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# FLS Energy - Background

## Turn-Key Capability

- Design
- Engineering
- Installation
- Operation
- Maintenance
- Financing
- RECs and Utility Negotiation



**Solar Hot Water (Thermal)**

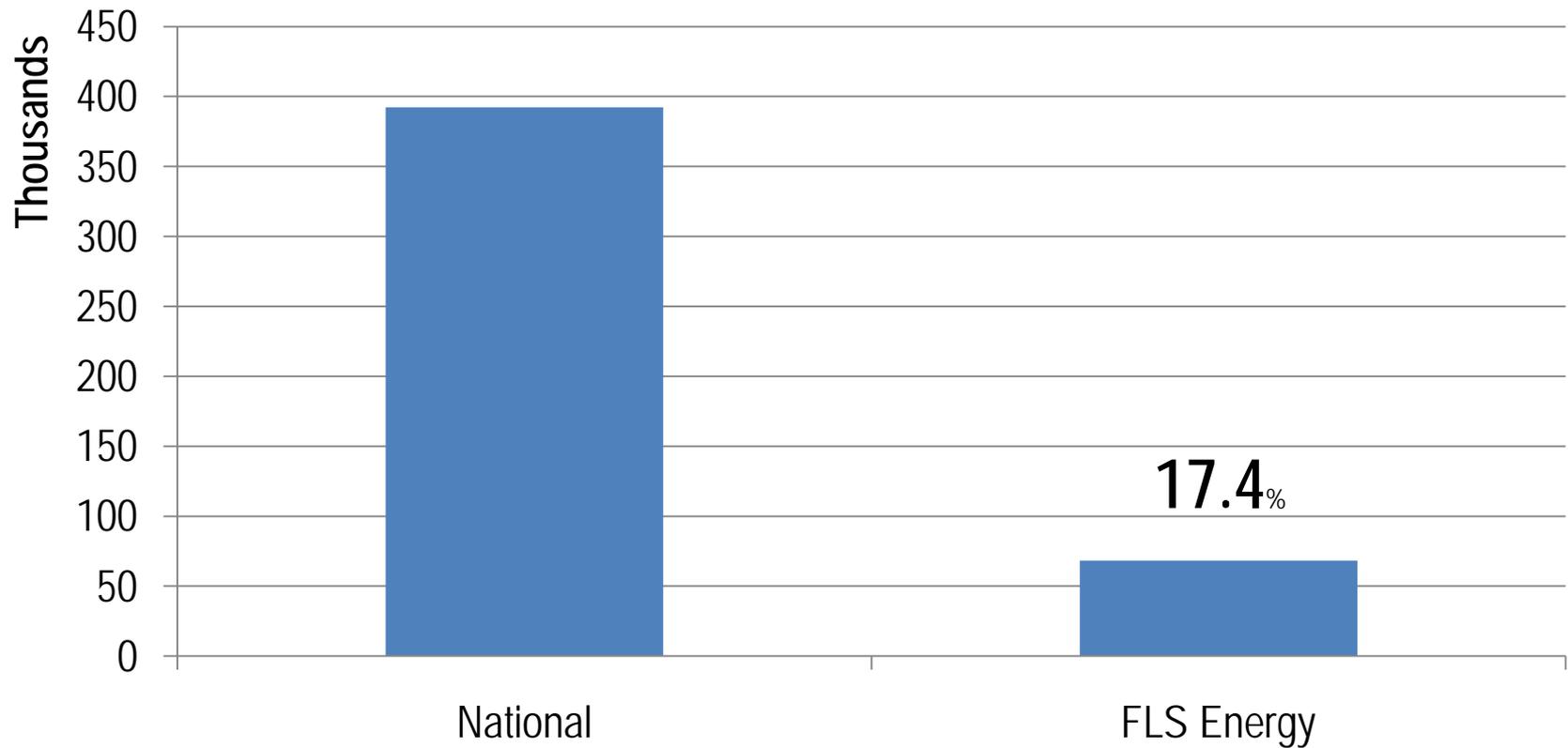


**Solar Electricity (PV)**

**Specialize in Large  
Scale Projects**

# National Leader in Solar Hot Water

Commercial-scale ("non-residential"), 2010

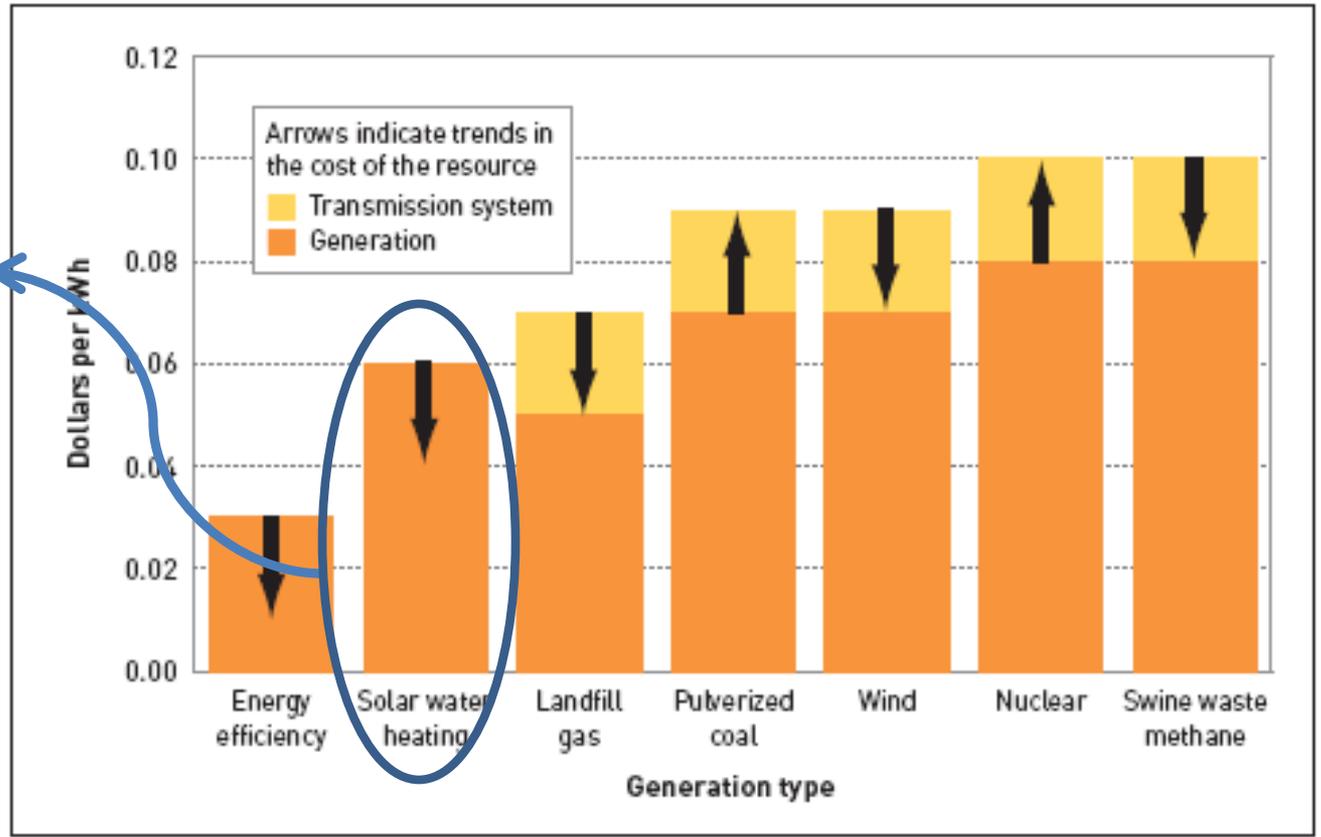


# Solar Thermal Opportunity

## Applications

- Housing (up to 25%)
- Lodging (up to 42%)
- Barracks/Dorms
- Hospitals
- Dining Facilities
- Laundries
- Fitness Centers

Cost comparison of electricity technologies



# Energy Mandates

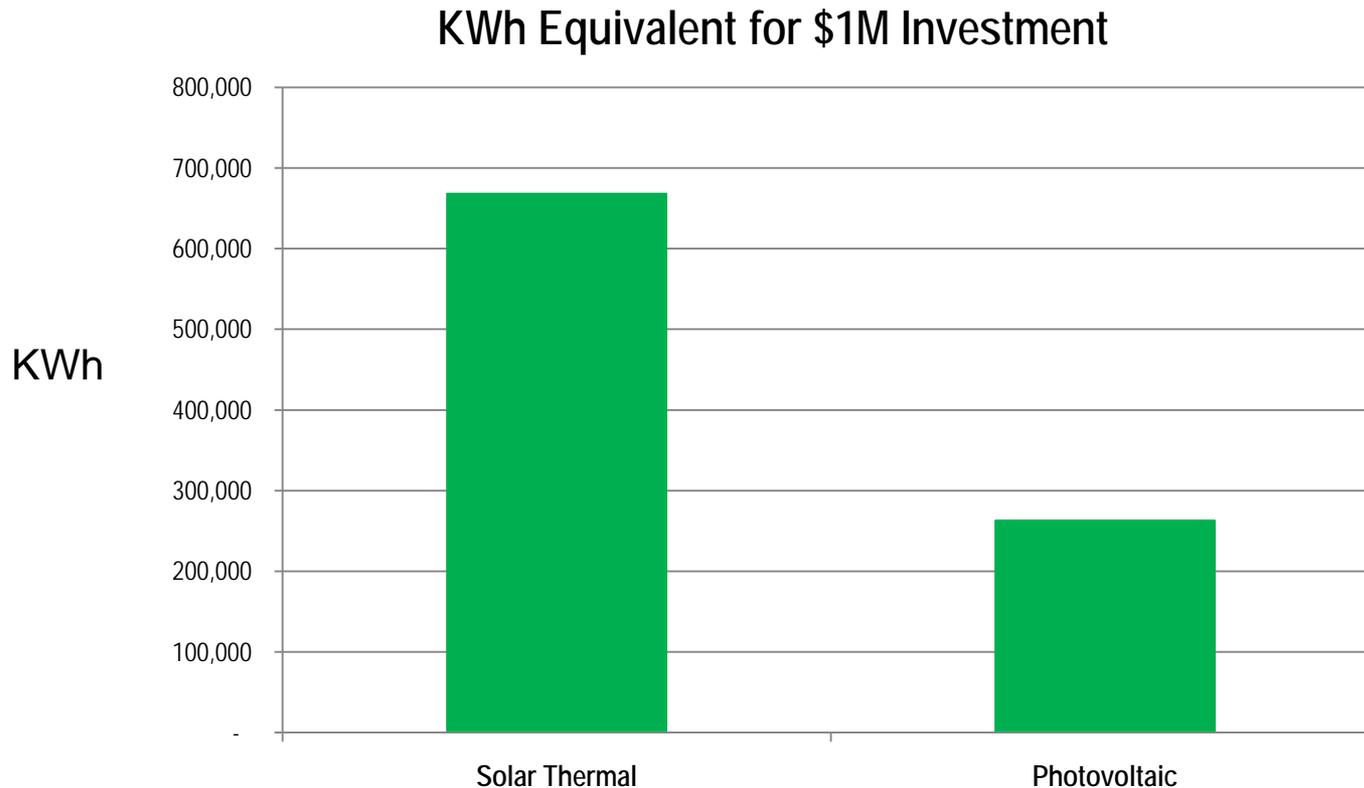
Drivers	EPACT 2005	Executive Orders 13514, 13423	EISA 2007	Agency specific goals
Facility Energy Efficiency	Beg in 2006, Reduce energy intensity(MMBTU/sqft) by 2%/yr on 2003 baseline	Beg in 2006, Reduce energy intensity (MMBTU/Sqft) by 3%/yr on 2003 baseline (30% by 2015)	Repeat E.O. 13423 goal of reduced energy intensity by 3%/yr, 30% by 2015	AF – 3%/yr
Renewable Energy	Set annual goals for electricity generated with renewables: 3% FY07-FY09 5% FY10-FY12 7.5% FY 13- 25% by 2025 (10USC2911)	50% of statutorily required renewable energy must be from sources placed into service after Jan 1, 1999		AF – 5% by FY10, 7.5% by FY13, 25% by FY25 VA – doubled all % SECNAV – 50% by 2020
Building performance/ sustainability	30% below ASHRAE 90.1 if life cycle cost effective	All MILCON,renovations, and repair comply with Guiding principles 2006 MOU	Section 436 Federal high Performance Green Building	AF – FY09 - LEED Silver on all MILCON
Solar Hot Water			New/renovated facility with hot water requirement must be 30% solar generated ( <i>where life cycle cost effective</i> )	
Reduce fossil fuel usage in new facilities		Beg 2020, all new Fed facilities must achieve net zero energy by 2030	<ul style="list-style-type: none"> <li>•55% by 2010</li> <li>•65% by 2015</li> <li>•80% by 2020</li> <li>•90% by 2025</li> <li>•100% by 2030</li> </ul>	SECNAV – 50% net zero by 2020 GSA – Net Zero by 2020

Utility Metering and reporting goals exist as well

# Achieving Federal Mandates

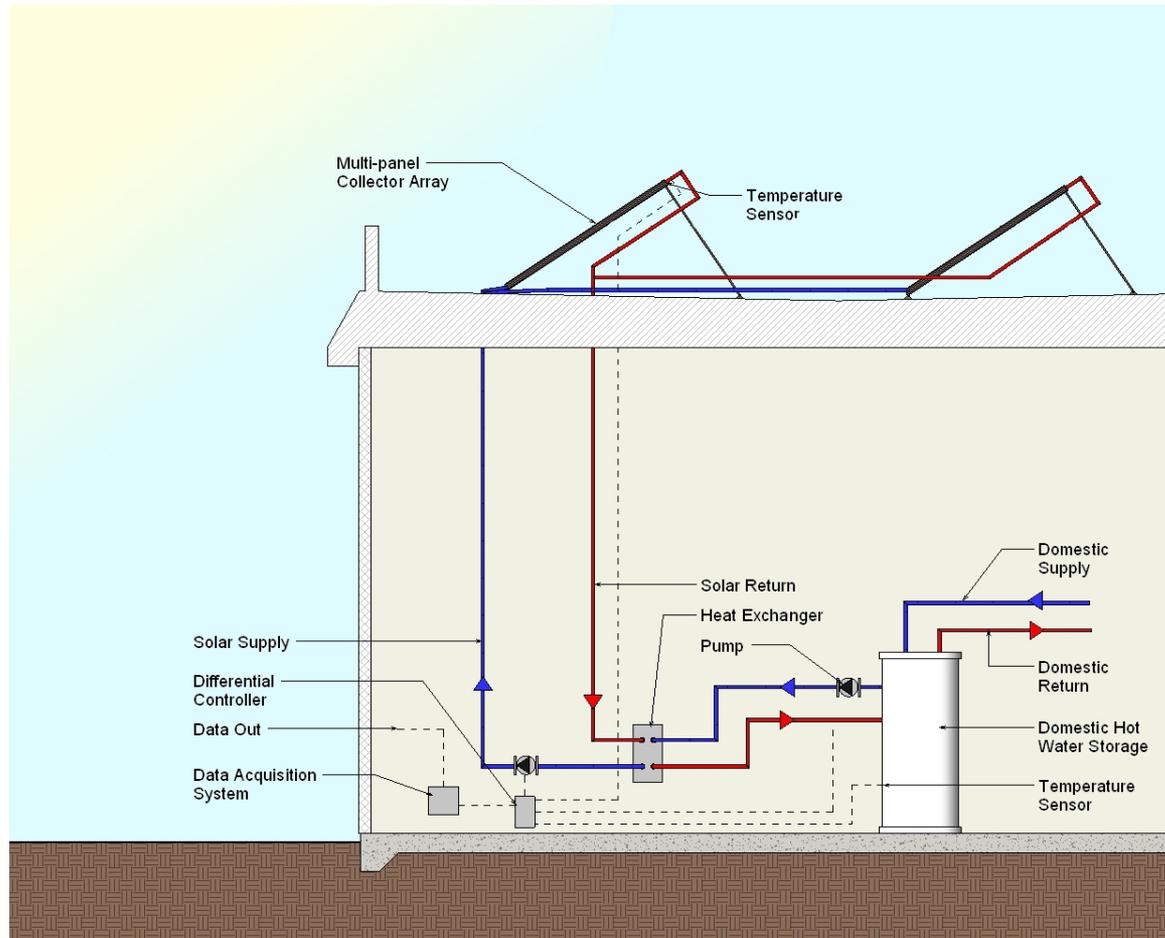
## The Case for Solar Thermal

- Solar Thermal has a 3:1 advantage over PV - per invested dollar



**Solar Hot Water: a great way to invest in renewable energy**

# Solar Thermal Overview



# Lodging Applications

- Sizing for Lodging
  - 15- 25 Gallons/  
room/day
  - Adjust for  
Occupancy
  - Design for 70%
- Example Project:  
Proximity Hotel
  - 100 Panels
  - 5000 Gal/day
  - 2.9MBTU/Day



**First LEED Platinum Hotel in America**

# Barracks/BEQs/Dorms

- Sizing for BEQs
  - 8-13 Gallons/person/day
  - Design for 30% to 70%
- Example Project: Solar Hot Water on 11 BEQs
  - 192 Panels
  - 9,250 Gallons/Day
- Output
  - 1.9 Billion BTUs/Yr
  - 575,100 KWH equivalents/Yr



**11 BEQs at Camp Lejeune**

# Housing

- Project: Solar Hot Water for 2200 Homes – Camp Lejeune, Cherry Point, New River
  - Provides 75% of Hot Water
  - 106,000 Gallons/day
  - 22.5 Billion BTUs/YR
- Partner: Actus Lend Lease
- Solar Energy Purchase Agreement
  - Reduced Water Heating Costs by 20% Day 1



**Largest residential Solar Thermal project in the Continental US**

# Fitness Centers

- Sizing:
  - 5-7 gallons/shower x expected # of showers
  - Pool: 1 Sq ft of panel per sq ft of pool\* -50-70%
- Example Project: YWCA Indoor Pool, Showers
  - 30 Panels, 1480 Gallons/Day
  - 306 MBTUs/Yr
  - 89,859 KWH equivalent/yr



# Considerations: Aesthetics



# Considerations:

- Building Orientation and Shading
- Available square footage

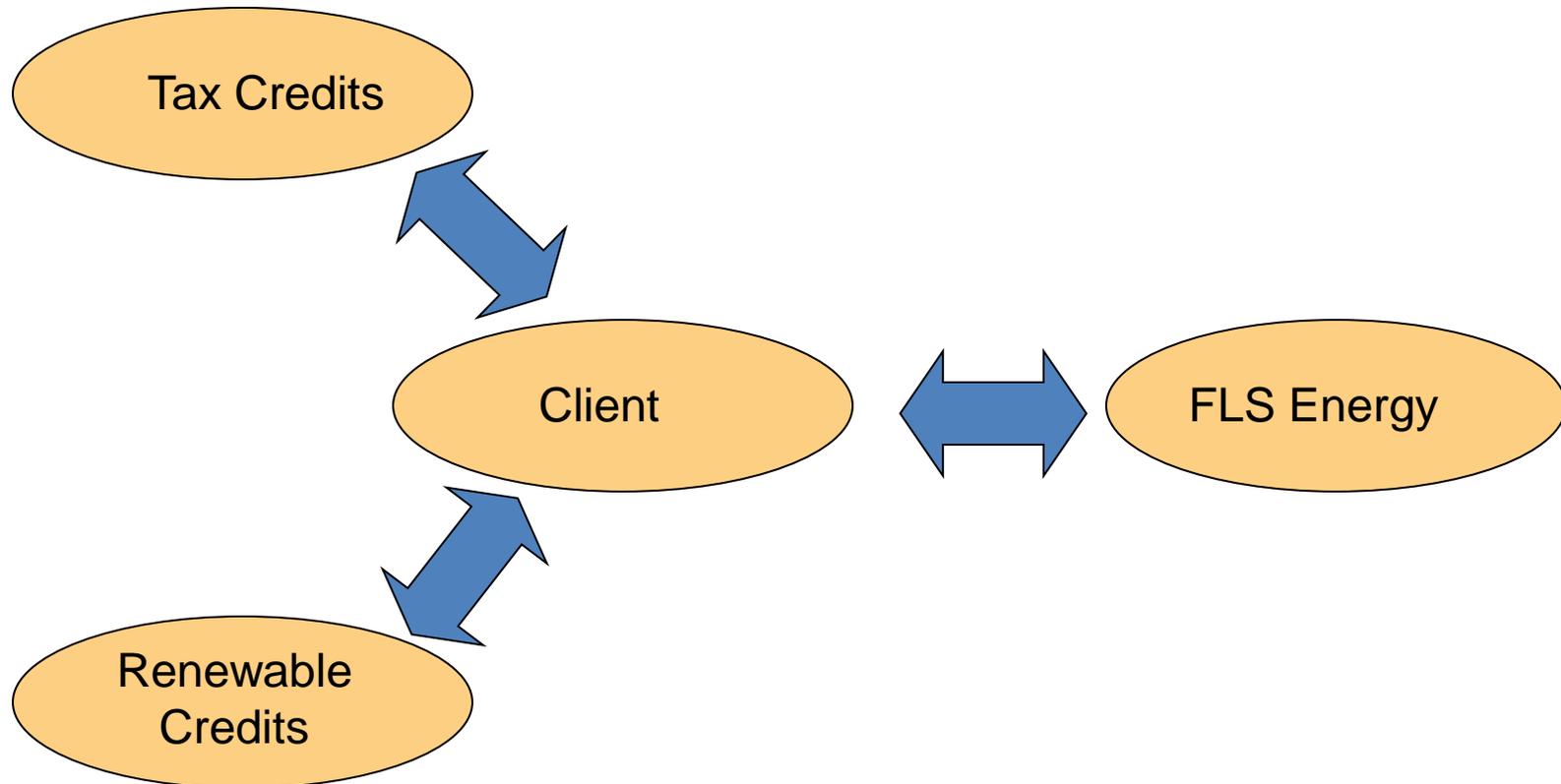
Good candidates



Too shaded



# Consideration: Financials - Traditional Equipment Purchase Model



Incentives Not Available to Government

# The Financial Case – Purchase Example

## Example Barracks: Assumptions

100 rooms, single = 100 occupants. @13 gal/person/day = 1300 gallons/day.  $1300 \times 70\% = 910$  gal/day

20 washing machines @30 lbs/load = 30 gallons of hot water per load. 25% usage = 150 gal/day

3 commercial washing machines – 60 lbs/load = 60 gallons of hot water per load. 50% usage = 90 gal/day

Total Domestic Hot Water = 1150 gallons/day

Budgetary Price: \$103,500 (\$4500/panel, provides 50 gallons of hot water per day per panel)

System Life: 30 years

No Incentives

## Natural Gas: 1.1/therm (1.375)

### Outputs

#### Annual Production:

Systems size	23 solar panels
BTU generation	235,060,000 BTU per year
kWh-equivalents	68,892 kWh per year

#### Financial

Return on Investment (based on 6 years)	3.0% per year
Simple Payback	34.0 years

#### Annual Non Monetary Benefits

CO2 avoided per year	14 tons
trees planted equivalent	43 trees
cars off the road	4 cars
homes electricity need	5 homes

Roof Space Required 1,380 square feet

## Natural Gas: 1.1/therm (1.375)+REC

### Outputs

#### Annual Production:

Systems size	23 solar panels
BTU generation	235,060,000 BTU per year
kWh-equivalents	68,892 kWh per year

#### Financial

Return on Investment (based on 6 years)	4.6% per year
Simple Payback	21.0 years

#### Annual Non Monetary Benefits

CO2 avoided per year	14 tons
trees planted equivalent	43 trees
cars off the road	4 cars
homes electricity need	5 homes

Roof Space Required 1,380 square feet

# The Financial Case - Alternative Fuel Scenarios

- Propane and Electricity for Heating Water – a Better Business Case

## Propane: 1.80/Gal (2.32/therm)

### Outputs

#### Annual Production:

Systems size	23 solar panels
BTU generation	235,060,000 BTU per year
kWh-equivalents	68,892 kWh per year

#### Financial

Return on Investment (based on 6 years)	5.1% per year
Simple Payback	19.0 years

#### Annual Non Monetary Benefits

CO2 avoided per year	32,673 pounds
trees planted equivalent	49 trees
cars off the road	8 cars
homes electricity need	5 homes

#### Roof Space Required

1,380 square feet

## Electricity: \$0.07/KWh (2.05/therm)

### Outputs

#### Annual Production:

Systems size	23 solar panels
BTU generation	235,060,000 BTU per year
kWh-equivalents	68,892 kWh per year

#### Financial

Return on Investment (based on 6 years)	4.5% per year
Simple Payback	20.0 years

#### Annual Non Monetary Benefits

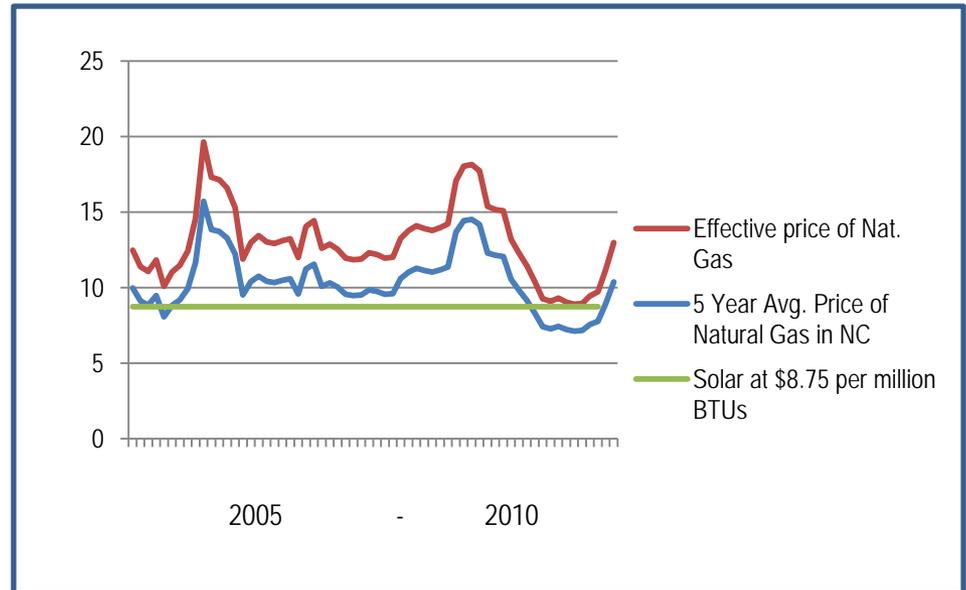
CO2 avoided per year	49,363 pounds
trees planted equivalent	74 trees
cars off the road	12 cars
homes electricity need	5 homes

#### Roof Space Required

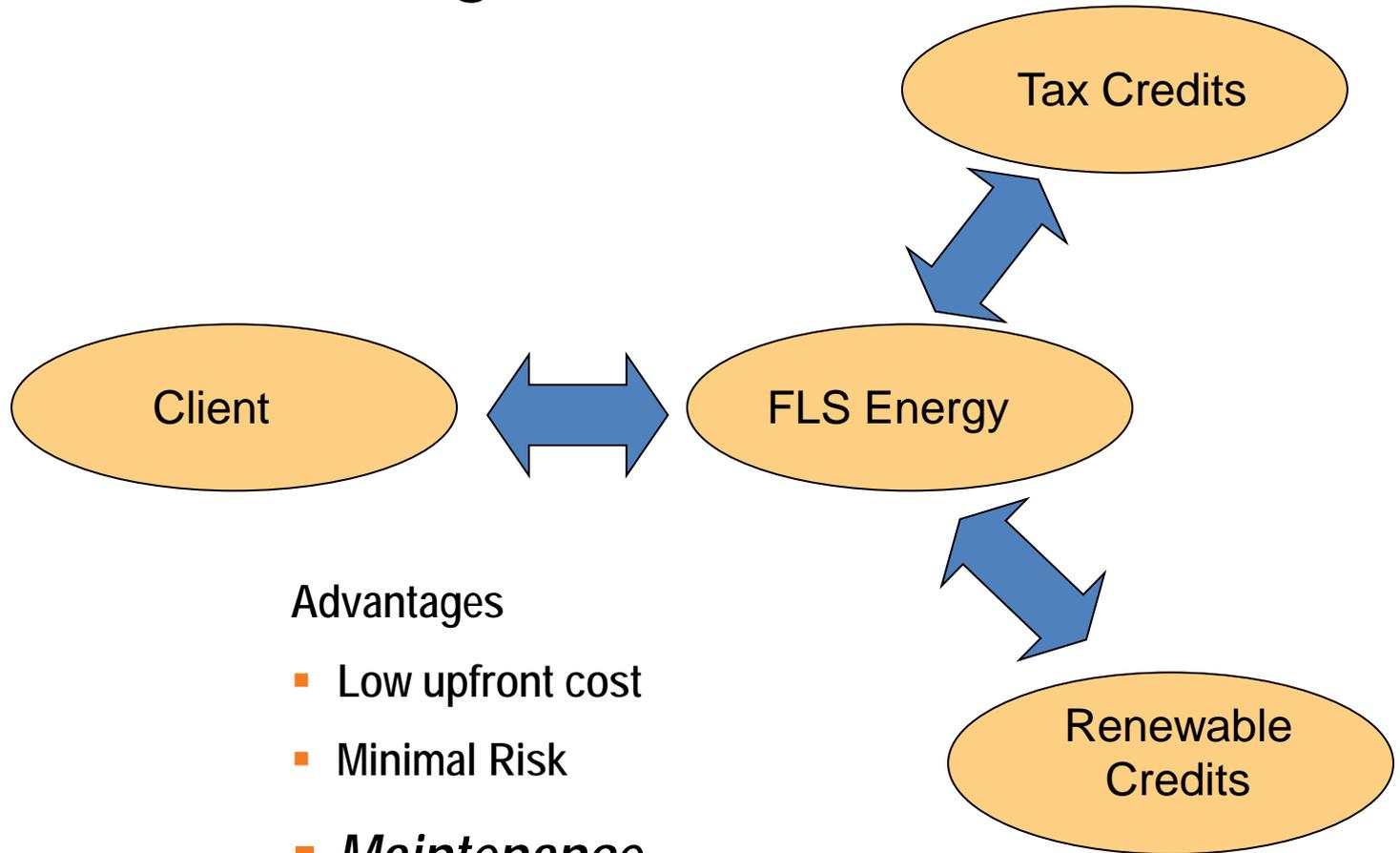
1,380 square feet

# Other Options

- Bundle with other ECMs
  - Can you remove a boiler?
- Look at Average vs Spot Rate
- Consider Alternative Financing
  - *Solar Energy Purchase Agreement*



# Alternative - Solar Energy Purchase Agreement



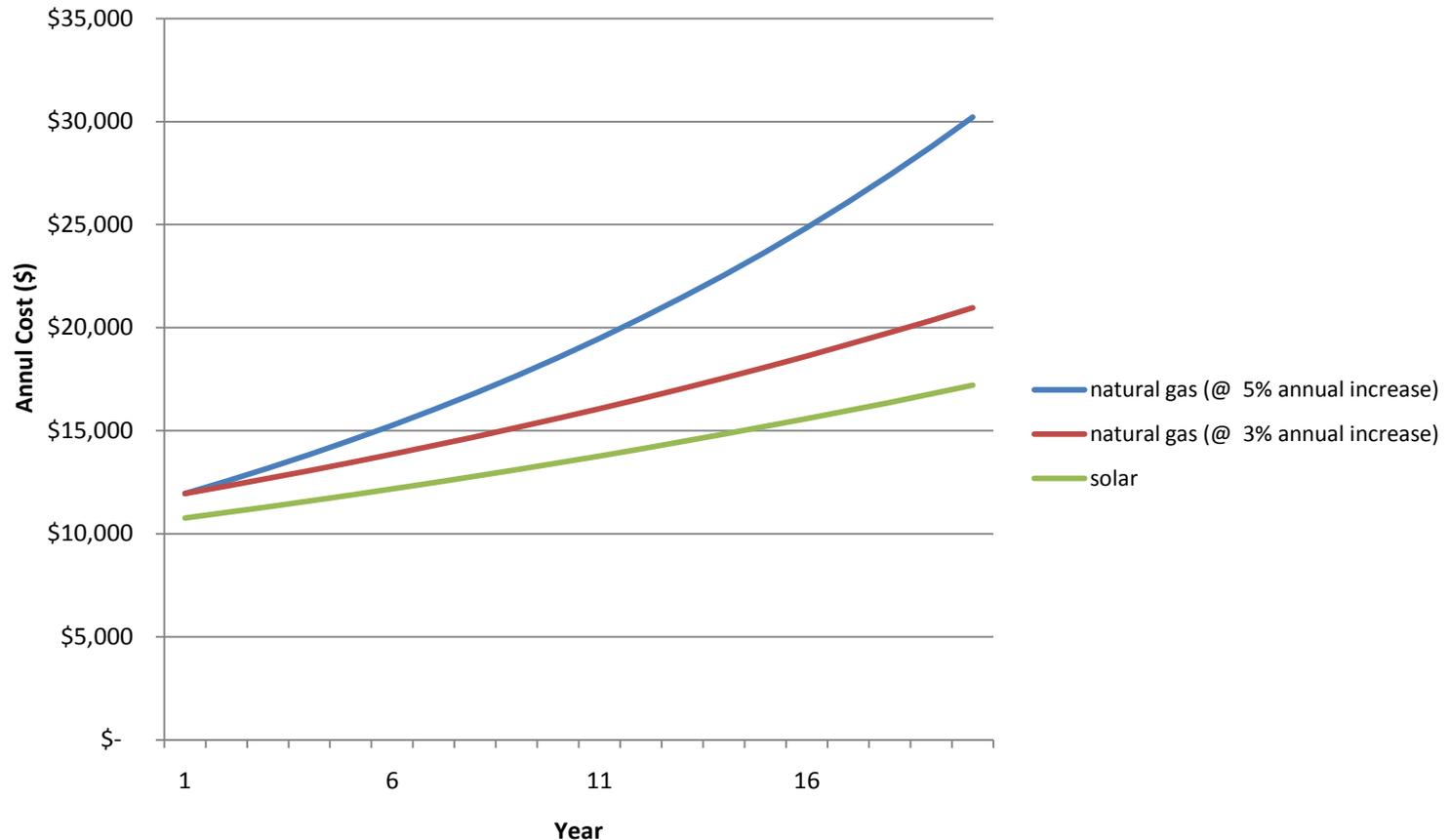
## Advantages

- Low upfront cost
- Minimal Risk
- *Maintenance*
- Predictable energy cost

# Solar Energy Purchase Agreement

## Savings of Solar vs Natural Gas

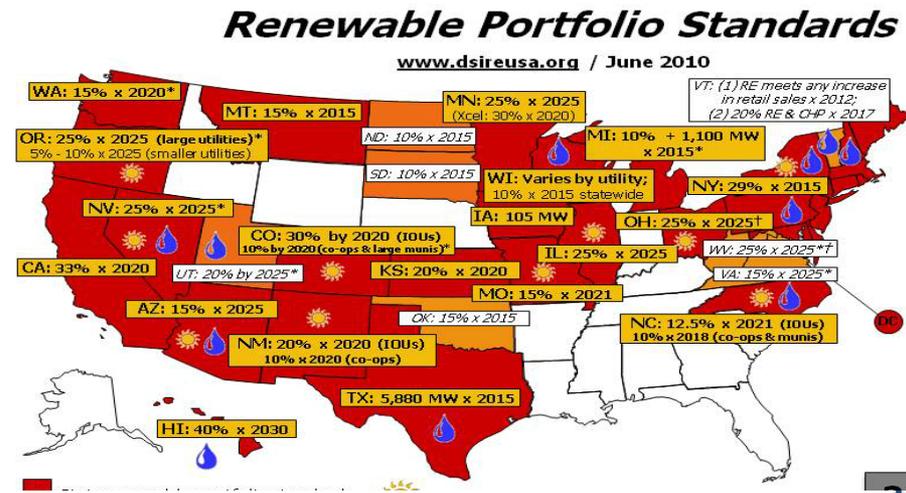
*Based on Given Amount of Hot Water*



## Cash Flow Positive Day 1

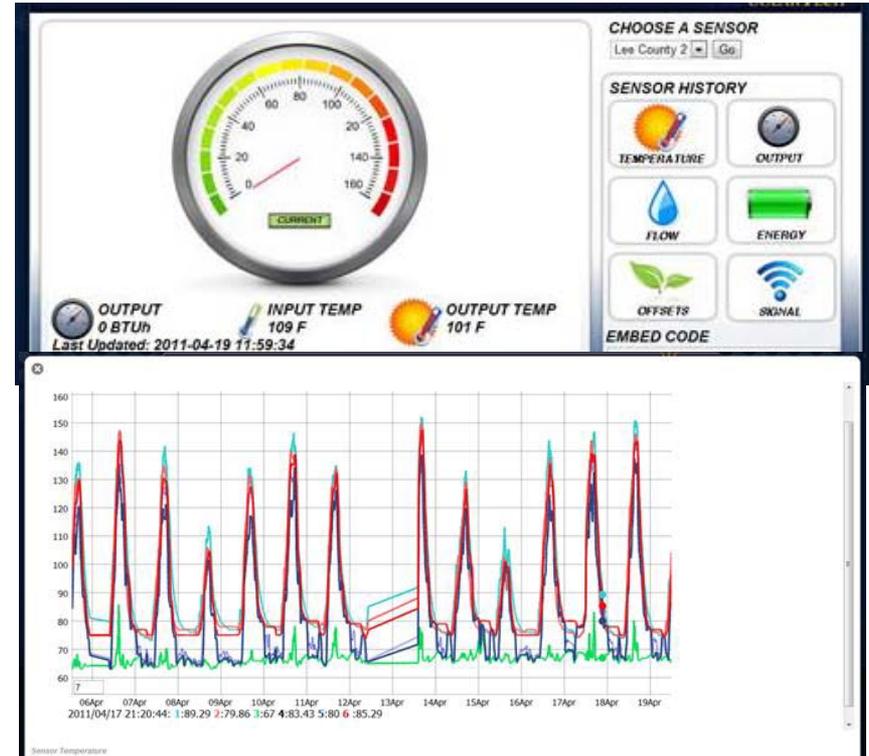
# What Does it Take to Pursue SEPA?

- Incentives
  - Tax Incentives
  - Solar Thermal RECs
  - Utility Rebates
- Fuel Source and Rate
  - Natural gas
  - Electricity
  - Propane
- Contracting Vehicles
- Address RECs Issue



# Consideration: Monitoring and Verification

- Remote and Local Monitoring Down to the Array Level
- Metrics:
  - BTUs
  - Flow
  - Temp
  - Pressure
  - Glycol %
  - PH Level
  - Solar Insolation



***Track Performance Against Mandates  
Improve performance  
Reduce Maintenance Costs***

# Summary

## Solar Thermal

- 3:1 Advantage on KWh equivalents vs. PV
- Mandated 30% on new construction
- More cost effective option for renewable on certain applications
- Consider bundling to blend payback
- Alternative financing
  - Address Contracting and REC issues



# Contact Information

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