

Solar Thermal PPA's and the need for monitoring

Putting the “R” in ROI

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SunReports, Inc.



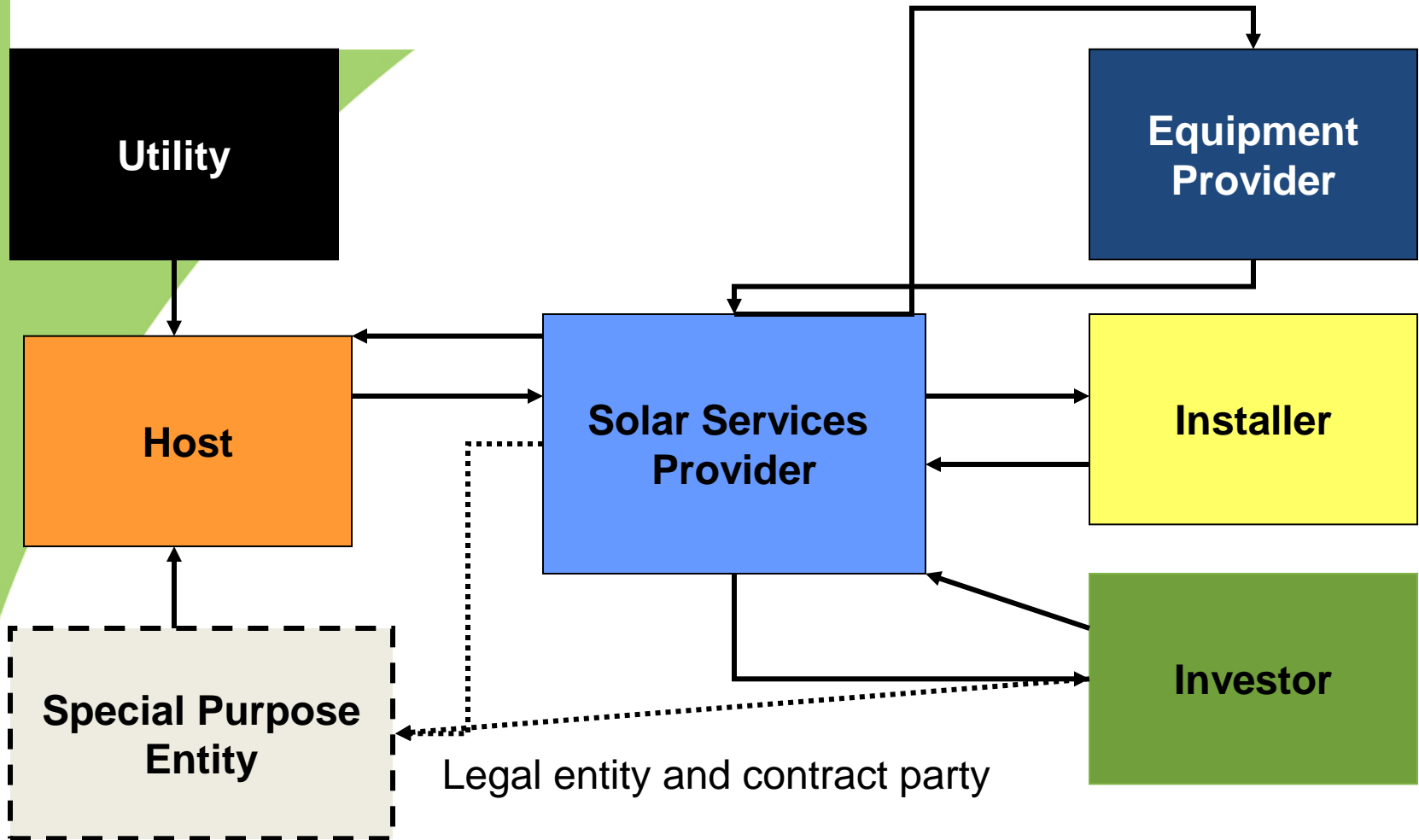
PPA Basics

- Power Purchase Agreement
 - Third party ownership
 - No up-front capital required by host
 - Pre-determined costs per unit of power
 - Low risk for host
 - Fixed term
 - Option to purchase system at end of contract

Contracting Basics

- Pretty complex negotiations between the Parties
 - Complex deal structure = costly legal fees
 - Who is responsible for performance?
 - Solar PV fairly straightforward, Solar HW not so much

Solar PV PPA Deal Structure



What's Different for HW PPAs?

1. No grid to take excess generation
2. Building loads matter, a LOT
3. System performance not as easy to estimate
4. Moving parts
5. Bankers don't get it
6. No track record

Alternatives?

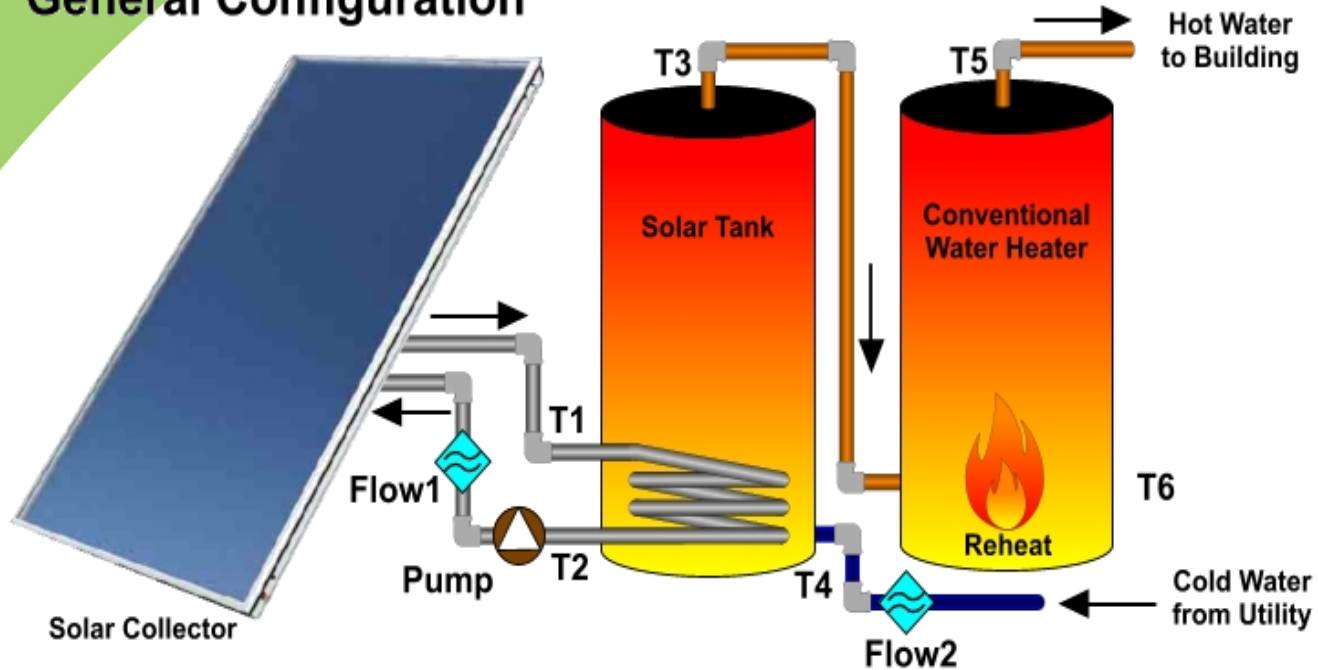
- ESCO model
 - Energy Services Companies
 - Performance Contracts
- Basic Lease structure, with similarities to PPA
- The Customer's utility budget is reduced by the impact of generation
 - Budget 'delta' is used to fund the lease payments
- A 3rd party is still on the hook for performance

Putting the “R” in ROI

- Either model requires performance monitoring and measurement
- BTU meters not enough
- System performance is critical
- Installer / system guarantor on the hook for performance
- Generation impact must be known or the deal falls apart

System Overview

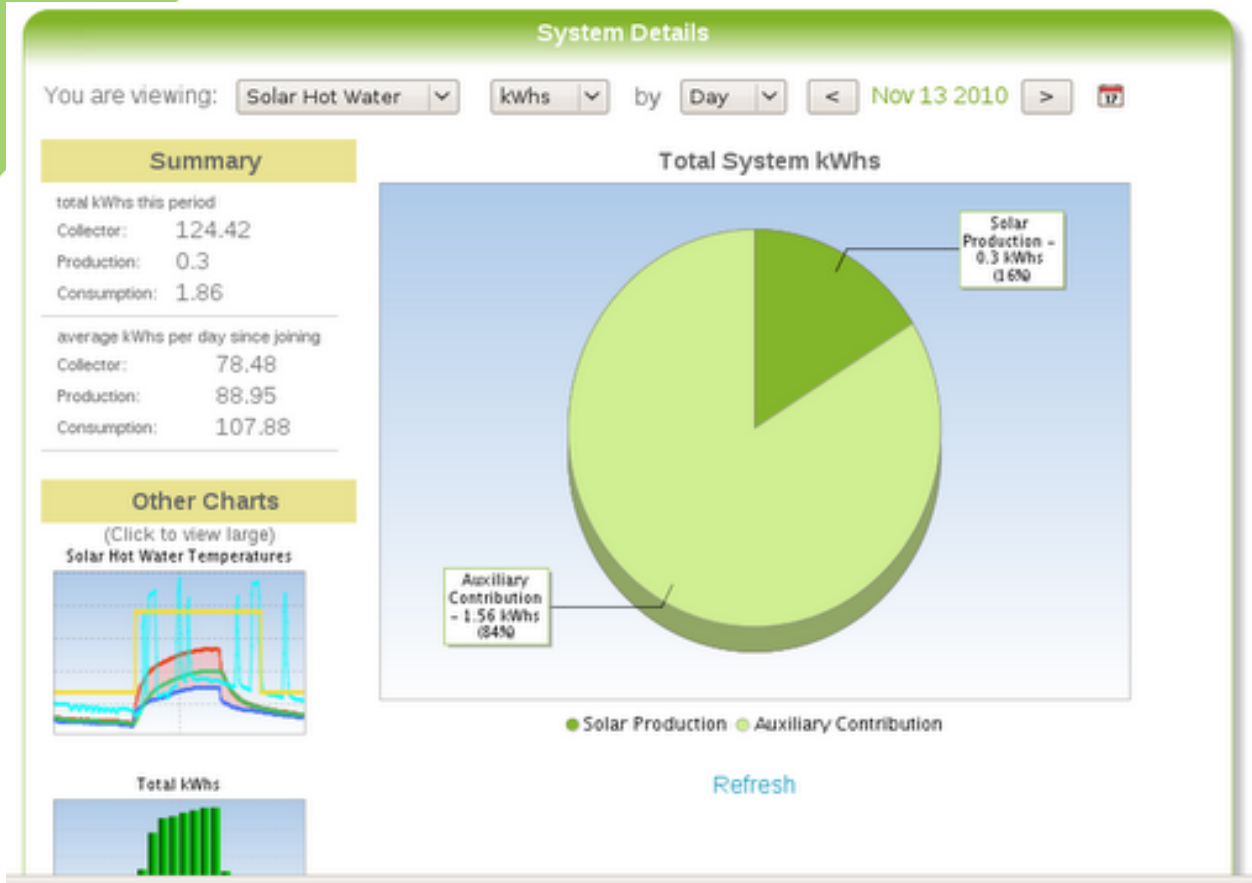
General Configuration



T1 - Collector Loop Heat Exchange Input
T2 - Collector Loop Heat Exchange Output
T3 - Collector Loop Top of Tank
Flow1 - Collector Loop Flow Sensor

T4 - Cold Water In
T5 - Hot Water Out
T6 - Optional (ambient)
Flow2 - Water Loop Flow Sensor

Total BTU and Solar-Fraction



BTU View

Customer

[Edit](#)

Linda Erkelens
2085 Hayes St
San Francisco, CA 94117
 415 826 4011
Signed up on 11/13/2009

Alerts

[Configure Alerts](#)

Details

[Configure device](#)

Serial #:
00:19:B9:55:AC:15
Nickname: [Add](#)
Installed: Unknown

[View data readings](#)
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System Details

You are viewing: by

Summary

479,079

total BTUs this period

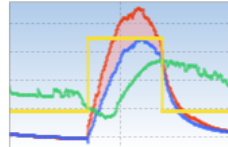
380,280

average BTUs per day since joining

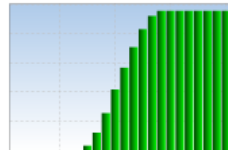
Other Charts

(Click to view large)

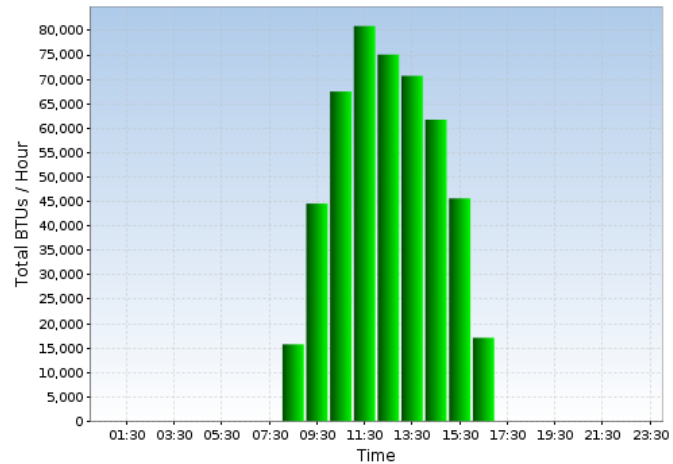
Solar Hot Water Temperatures



Cumulative BTUs



Total BTUs



BTUs

[Refresh](#)

Data View

Customer

[Edit](#)

Linda Erkelens
2085 Hayes St
San Francisco, CA 94117
415 826 4011
Signed up on 11/13/2009

Alerts

[Configure Alerts](#)

Details

[Configure device](#)

Serial #:
00:19:B9:55:AC:15
Nickname: [Add](#)
Installed: Unknown

[View data readings](#)
[Enter expected values](#)

System Details

You are viewing: by

Summary

479,079

total BTUs this period

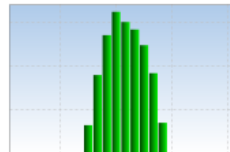
380,280

average BTUs per day since joining

Other Charts

(Click to view large)

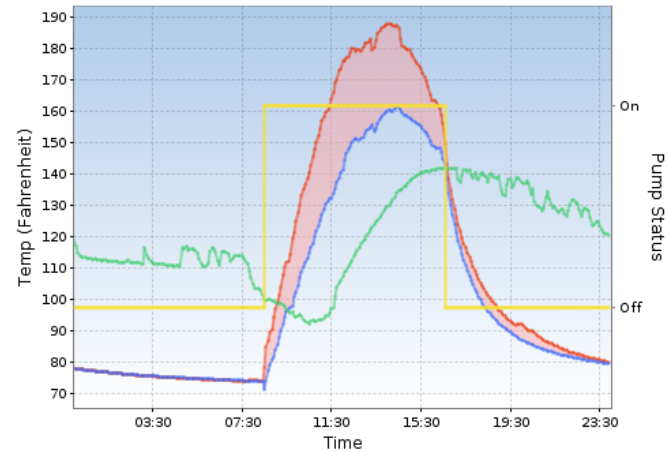
Total BTUs



Cumulative BTUs



Solar Hot Water Temperatures



Temp (Fahrenheit)

Pump Status

— Tank Input — Tank Output — Top of Tank — Pump Status — System is heating
— System is cooling

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Troubleshooting



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[My Dashboard](#) > *Customer: Kremen, Gary*

Customer

[Edit](#)

Gary Kremen
2217 Gerth Lane
Los Altos Hills, CA 94022
Signed up on 12/30/2009

Alerts

[Configure Alerts](#)

Details

[Configure device](#)

Serial #:
00:19:B9:55:AC:1F
Nickname: [Add](#)
Installed: Unknown

[View data readings](#)
[Enter expected values](#)

System Details

You are viewing: by

Summary

39,886

total BTUs this period

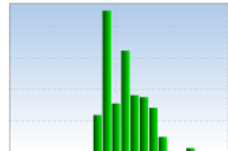
33,388

average BTUs per day since joining

Other Charts

(Click to view large)

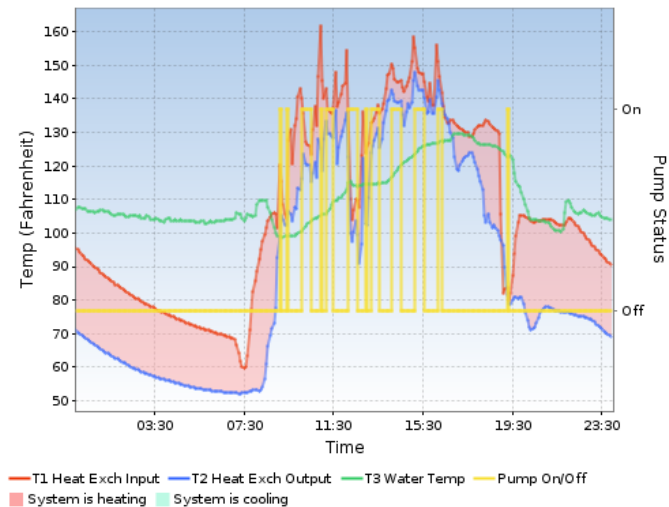
Total BTUs



Cumulative BTUs



Solar Hot Water Temperatures



[Refresh](#)

Conclusion

- Solar HW PPAs are do-able
 - Complex deal structures
 - Monitoring and Measurement required
- ESCO-type lease structure an alternative
 - Less complex deal structure
 - Monitoring and Measurement required
- BTU-only vs. BTU + Data monitoring systems