PENN STATE CHAPTER OF THE AMERICAN SOLAR ENERGY SOCIETY

State College Solar Tour

2015

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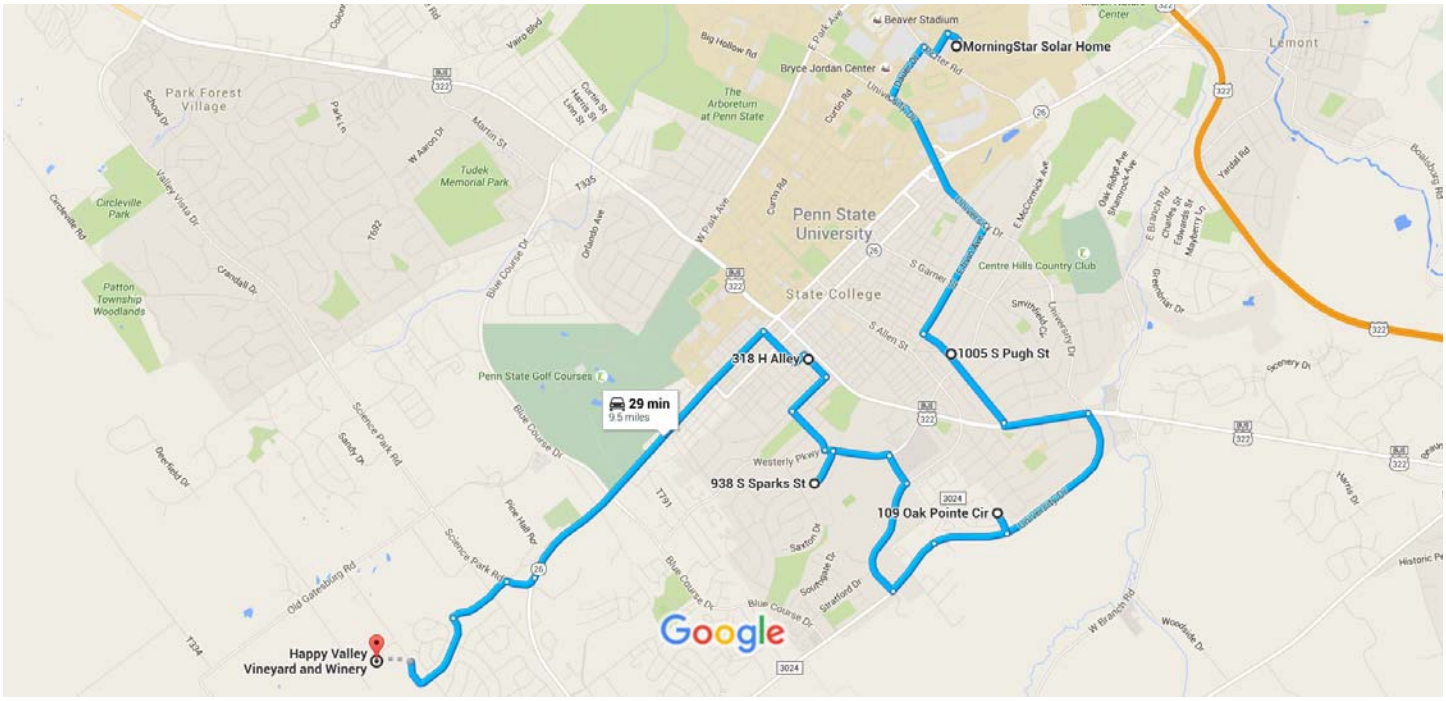
This document includes details on the PSU ASES State College Solar Tour. The beginning of this document contains driving directions to all of the stops including maps. Following the driving directions are instructions for arrival at each location including where to park. Finally there is a case study for most of the tour stops that provides information on system cost, size, and benefits.

Google Maps

MorningStar Solar Home to Happy Valley Vineyard and Winery

Drive 9.5 miles, 29 min



Map data ©2015 Google 2000 ft

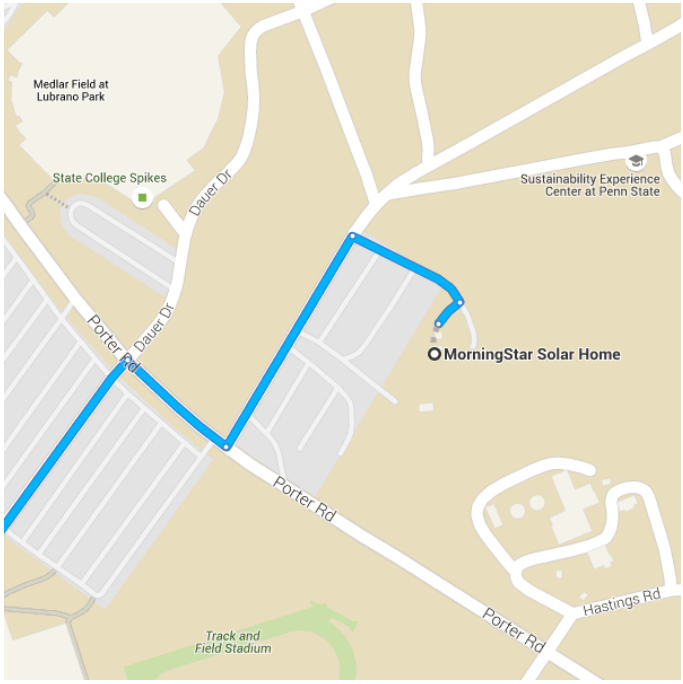
MorningStar Solar Home

University Park, PA 16802

Continue to Porter Rd

1 min (0.2 mi)

1. Head northeast — 79 ft
2. Turn left toward Porter Rd — 335 ft
3. Turn left toward Porter Rd — 0.1 mi



Turn right onto Porter Rd — 34 s (344 ft)

Turn left onto Dauer Dr

2 min (0.3 mi)

Turn left onto University Dr

2 min (0.8 mi)

Continue on E Irvin Ave. Drive to S Pugh St

2 min (0.8 mi)

7. Turn right onto E Irvin Ave

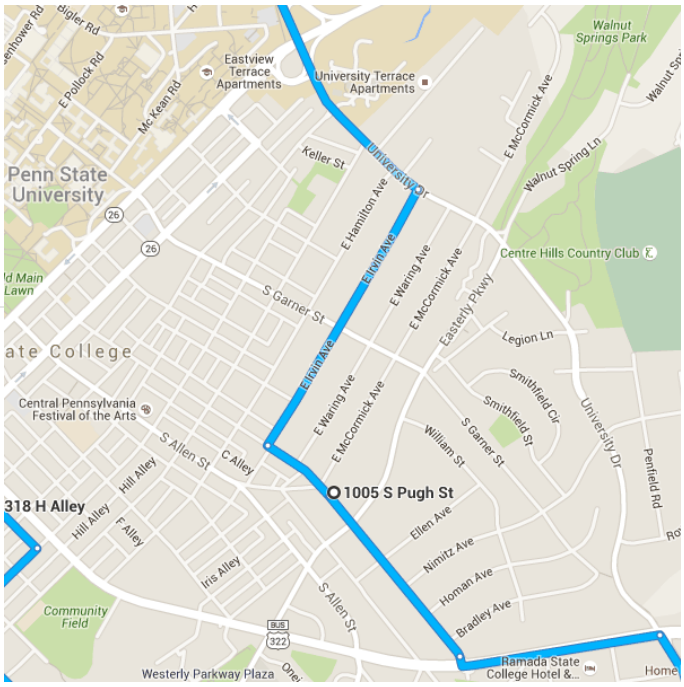
0.6 mi

8. Turn left onto S Pugh St

Destination will be on the left

0.2 mi

7 min (2.1 mi)



1005 S Pugh St

State College, PA 16801

9. Head southeast on S Pugh St toward Easterly Pkwy

0.4 mi

10. Turn left onto S Atherton St

0.4 mi

11. Turn right onto University Dr

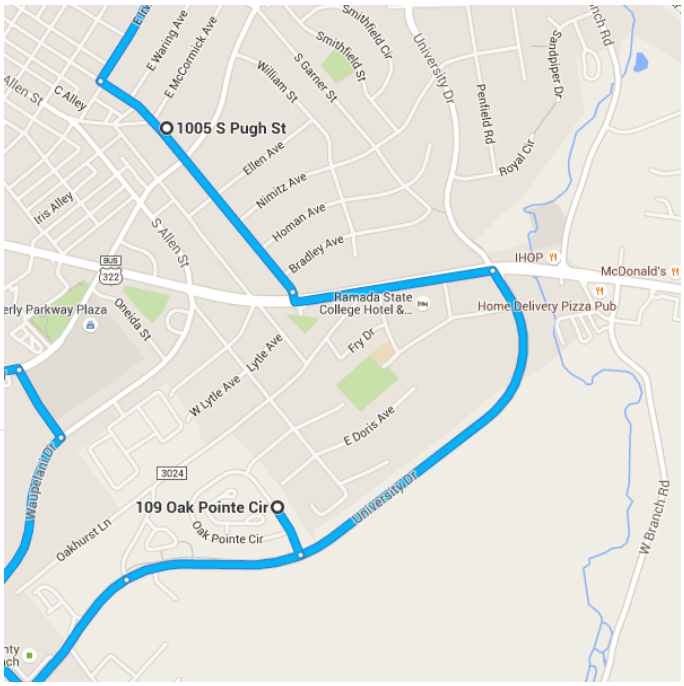
0.8 mi

12. Turn right onto Oak Pointe Cir

Destination will be on the right

0.1 mi

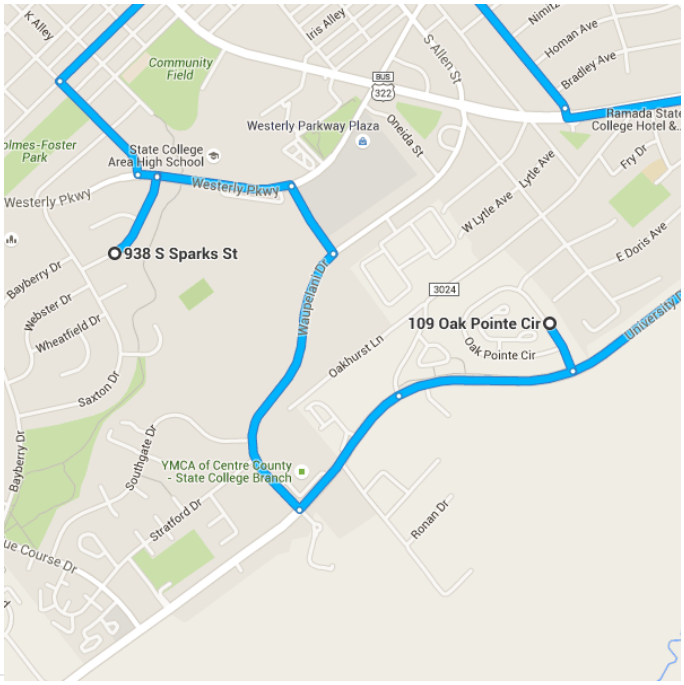
4 min (1.7 mi)



109 Oak Pointe Cir

State College, PA 16801

13.	Head southeast on Oak Pointe Cir toward University Dr	0.1 mi
14.	Turn right onto University Dr	0.4 mi
15.	Continue onto W Whitehall Rd	0.3 mi
16.	Turn right onto Waupelani Dr	0.6 mi
17.	Turn left onto O Bryan Ln	0.2 mi
18.	Turn left onto Westerly Pkwy	0.3 mi
19.	Turn left onto S Sparks St Destination will be on the right	0.2 mi

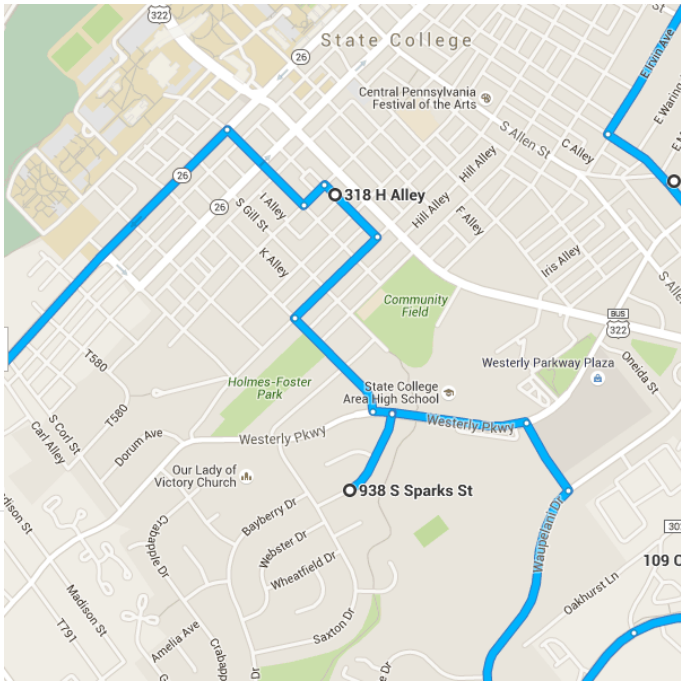


5 min (2.0 mi)

938 S Sparks St

State College, PA 16801

20.	Head northeast on S Sparks St toward Storch Rd	0.2 mi
21.	Turn left onto Westerly Pkwy	223 ft
22.	Turn right onto S Sparks St	0.2 mi
23.	Turn right onto W Fairmount Ave	0.2 mi
24.	Turn left onto H Alley Destination will be on the left	0.1 mi



3 min (0.8 mi)

318 H Alley

State College, PA 16801

25. Head northwest on H Alley toward W Foster Ave

148 ft

26. Turn left at the 1st cross street onto W Foster Ave

315 ft

27. Turn right onto S Barnard St

0.2 mi

28. Turn left onto PA-26 S/W College Ave

1.6 mi

29. Turn right onto Science Park Rd

0.2 mi

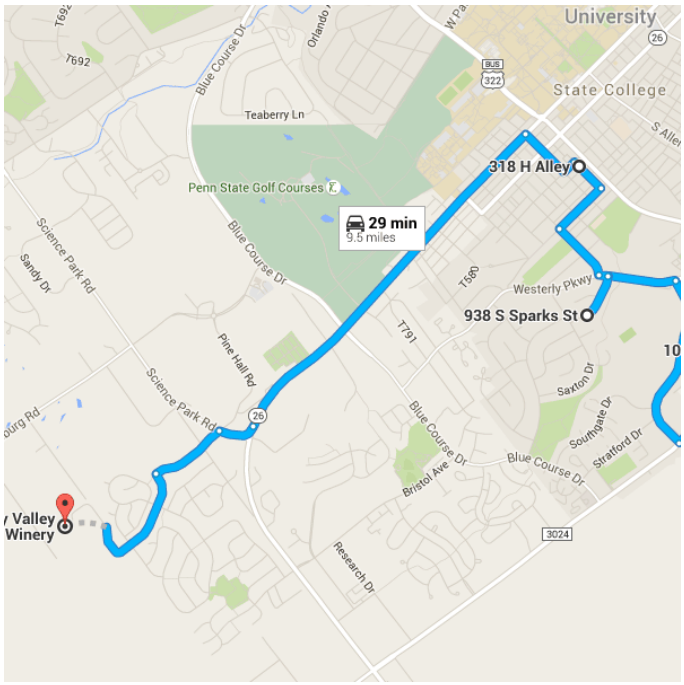
30. Turn left onto Pine Hall Rd

0.3 mi

31. Turn left onto Foxpointe Drive

Destination will be on the left

0.5 mi



9 min (2.9 mi)

Happy Valley Vineyard and Winery

576 S. Foxpointe Dr, State College, PA 16801

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Live traffic	Fast	Slow

Parking instructions for tour locations:

Stop 2: Pugh St - Brockopp

Park only in the southbound lane, across the street from the property. Coming from the university, park on the right. Do not block the CATA bus stop that is south of the property.

Stop 3: Oak Point Cir – Neely

Parking is available on either side of the street.

Stop 4: Sparks St – Najjar

Park across the street from the residence, use the Najjar driveway to turn around and park.

Stop 5: H Alley - New Hope

Parking is available off the alley directly behind the church and behind Goodall and Yurchak Attorneys.

Stop 6: Happy Valley Winery

Ample parking available by building

State College Solar Tour
System Case Study – Brockopp – 1005 S Pugh

1. Year of installation
   May 2015
2. Size of the system (kW)
   8.23
3. Number of panels
   32
4. Type of inverter (microinverters or string inverter)
   String inverters with DC optimizers
5. Yearly output (kWh's)
   4.52 MWh (so far, hasn't been installed for an entire year)
6. How much was you monthly electric bill was before and now after?

Before:	After:
$150-$200	**$6.16**

7. Yearly cost savings
   Unknown - reduction in bill due in part to increased conservation by tenants.
8. What is the brand of your panels/inverters? Are you satisfied or would you have investigated your equipment choice more before installing?
   Canadian Solar panels, Solar Edge optimizers and inverter. Very satisfied
9. How many SREC's does your system generate in a calendar year?
   Unknown; estimate 9-10
10. How did you pay for your system? Would you do it again that way or find another way?
    Refinanced mortgage; would do again
11. PA Sunshine Act Rebate (Yes/No)
    No
12. Expected payback period (when installed)
    ~10 years
13. What were you motivations for installing a solar system? (being green, saving money, etc)
    Reducing carbon footprint; providing a (nearly) carbon neutral rental property
14. Did your system meet your personal expectations and what was given in the design
    Yes, and I have plans to add a solar carport in the near future.
15. Would you do it again? On another home?
    If I could, but I have 80 foot oak trees around my house.
16. If you have any other details you would like to include that you feel are significant to your system, please do so here.
    Hip roof allows for SE and SW exposure; note outlet was installed for electric vehicle or plug-in hybrid.

State College Solar Tour
System Case Study – Neely – 109 Oak Pointe Cir

1. Year of installation
   2013
2. Size of the system (kW)
   8.1
3. Number of panels
   36
4. Type of inverter (microinverters or string inverter)
   microinverters
5. Yearly output (kWh's)
   Over 8,000 kWhs. Total since March 2013 is 23,000
6. How much was you monthly electric bill was before and now after?

Before:	After:
$55	**$5 for grid access**

7. Yearly cost savings
   $585. West Penn Power also paid us $395.16 in last 2 years.
8. What is the brand of your panels/inverters? Are you satisfied or would you have investigated your equipment choice more before installing?
   SunPower. Satisfied
9. How many SREC's does your system generate in a calendar year?
   7 or 8
10. How did you pay for your system? Would you do it again that way or find another way?
    Cash
11. PA Sunshine Act Rebate (Yes/No)
    Yes
12. Expected payback period (when installed)
    Unknown
13. What were you motivations for installing a solar system? (being green, saving money, etc)
    Concern about climate change
14. Did your system meet your personal expectations and what was given in the design
    a. Would you have tried to make your system bigger?
    Probably not - a tree shaded part of roof
15. Would you do it again? On another home?
    Yes

State College Solar Tour
System Case Study – Najjar – 938 S Sparks

1. Year of installation
   October 2010
2. Size of the system (kW)
   4.2
3. Number of panels
   18
4. Type of inverter (microinverters or string inverter)
   Microinverters
5. Yearly output (kWh's)
   About 4000-5000
8. What is the brand of your panels/inverters? Are you satisfied or would you have investigated your equipment choice more before installing?
   Schott panels and Enphase inverters. I am satisfied
9. How many SREC's does your system generate in a calendar year?
   4-5
10. How did you pay for your system? Would you do it again that way or find another way?
    We paid up front. It worked fine. We had just refinanced our house and so had the funds.
11. PA Sunshine Act Rebate (Yes/No)
    Yes, about $5000
12. Expected payback period (when installed)
    8-12 years
13. What were you motivations for installing a solar system? (being green, saving money, etc)
    Climate change!
14. Did your system meet your personal expectations and what was given in the design
    It has met expectations. Only downside has been that the hardware for putting the system data online failed. Replacing it was too much money: $500
15. Would you do it again? On another home?
    Yes

State College Solar Tour
System Case Study – New Hope Church – 318 H Alley

1. Year of installation
   August 2015
2. Size of the system (kW)
   0.09
3. Number of panels
   One
4. Type of inverter (microinverters or string inverter)
   Charge controller only: MorningStar
5. Yearly output (kWh's)
   115
7. Yearly cost savings
   $11.60
8. What is the brand of your panels/inverters? Are you satisfied or would you have investigated your equipment choice more before installing?
   SunPower module. Satisfied with this high efficiency, high performance, previously investigated module.
9. How many SREC's does your system generate in a calendar year?
   Off-grid system, no SRECS generated.
10. How did you pay for your system? Would you do it again that way or find another way?
    Balance of system funded out of pocket after individual and local company donations.
11. PA Sunshine Act Rebate (Yes/No)
    No.
12. Expected payback period (when installed)
    No expected payback.
13. What were you motivations for installing a solar system? (being green, saving money, etc)
    Motivation to install was to provide an alternate source of power to light the outdoor sign without having to install a conventional AC system and add circuits to an already congested electric load. Secondly, the low price ($1,500) was worth the effort to get started with PV. Thirdly, the system was designed for educational purposes promoting the use of energy storage backup.
14. Did your system meet your personal expectations and what was given in the design
    The system is performing beyond expectations of having the sign lit ~4 hours/night - it stays lit until dawn. The system has built-in capacity for additional load. Currently considering adding an additional, separate hybrid grid-tied/battery backup PV system.
15. Would you do it again?
    Yes!

16. If you have any other details you would like to include that you feel are significant to your system, please do so here.

    Although at relatively small capacity, the system was designed with scalability in mind using all the basic components (modules; deep cycle solar battery storage; charge controller; disconnects; ground fault protection; solar rated fuses; heavy duty wiring) required for a larger off-grid system with DC loads.

    It is designed to demonstrate the feasibility of getting started or for providing a platform to launch PV energy storage into existing battery-less systems.