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Non-Power Purchase Agreement (PPA) Options to Financing Solar Deployment at Universities

Alexandra Aznar, Shivani Mathur, Andy Kim, Jim Martin Schramm

10/04/2016

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Housekeeping

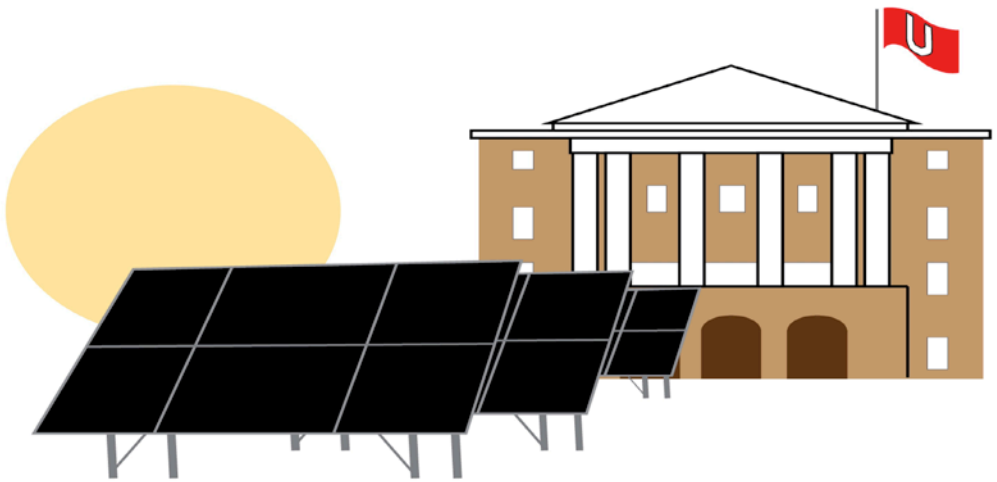
- Participants are joined in listen-only mode.
- Use the Q&A panel to ask questions during the webinar. We will hold all questions until after all speakers have presented.
- Slides from today's webinar will be shared later this week with all registered attendees.
- If you have technical difficulties with the webinar, contact the GoToWebinars Help Desk at 888.259.3826 for assistance.

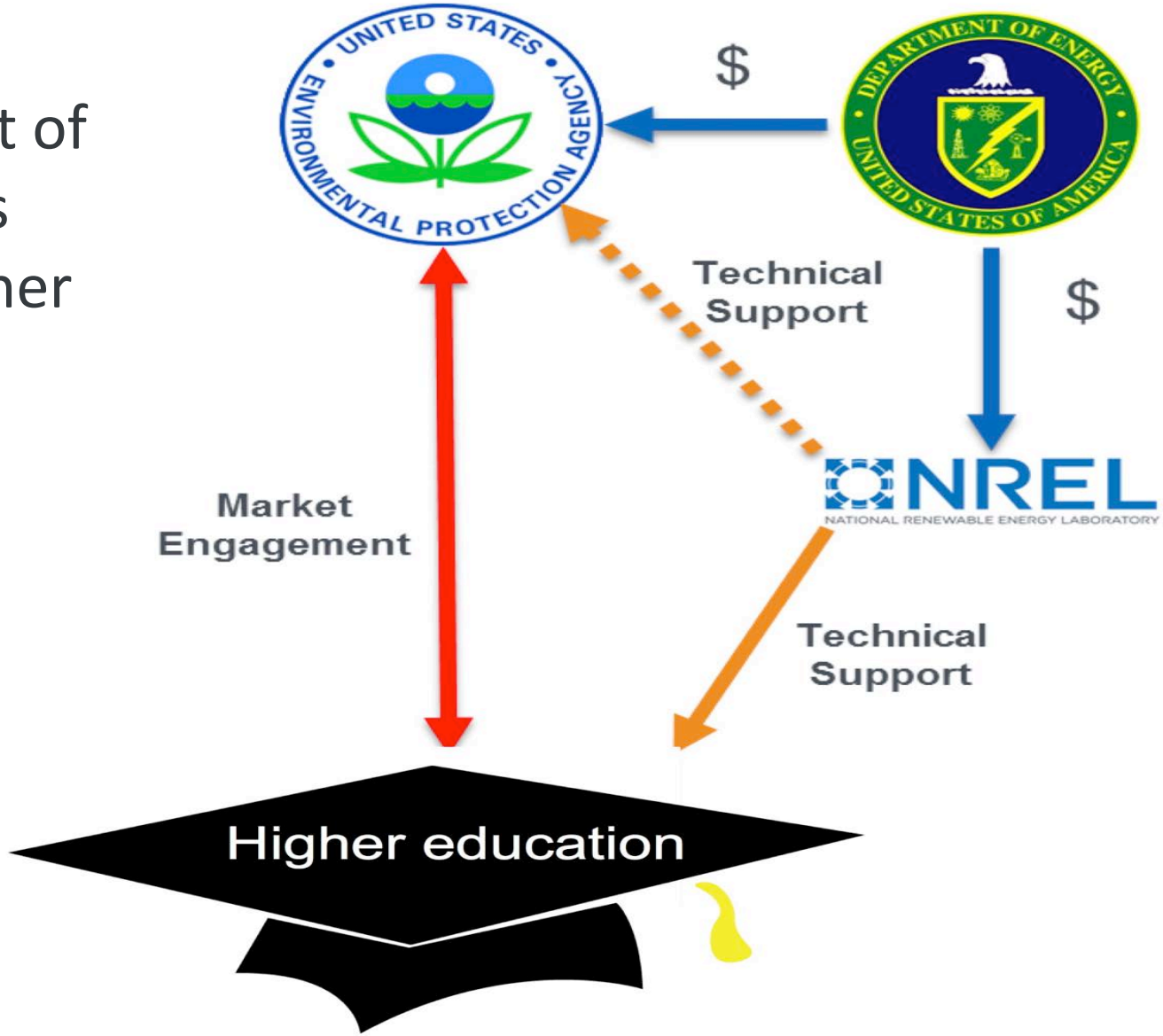
Webinar Plan

- Program Overview
- Non-Power Purchase Agreement (PPA) Options to Financing Solar Deployment at Universities: Summary
- Case Study 1: Austin Community College District and Q&A
- Case Study 2: Luther College and Q&A

NREL is Assisting Universities to Deploy PV

With funding from the Department of Energy's SunShot Initiative, NREL is providing technical support to Higher Education Institutions





NREL Resources

1. **Technical Assistance for Universities** http://www.nrel.gov/technical-assistance/universities.html
   - PV Screenings using NREL's REopt model, application period **closing October 15**
   - Implementation Assistance; application period open later this fall.
2. **Educational Materials**
   - Using Power Purchase Agreements for Solar Deployment at Universities, http://www.nrel.gov/docs/gen/fy16/65567.pdf
   - Writing Solar Requests for Proposals (RFPs): Lessons from NREL's University PV Implementation Assistance Program, http://www.nrel.gov/docs/gen/fy16/66369.pdf
3. **Publications on Midscale Solar**
   - Bird, L., Gagnon, P., and J. Heeter (2016). *Expanding Midscale Solar: Examining the Economic Potential, Barriers, and Opportunities at Offices, Hotels, Warehouses, and Universities.* Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A20-65938. http://www.nrel.gov/docs/fy16osti/65938.pdf
   - Fact Sheet: Financing Options When PPAs are not Feasible (forthcoming)
   - Case Study: PV at Colorado State University (forthcoming)
   - Midscale Solar Market Policies (forthcoming)

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Non-Power Purchase Agreement (PPA) Options to Financing Solar Deployment at Universities: Summary

Shivani Mathur, Jenny Heeter

10/04/2016

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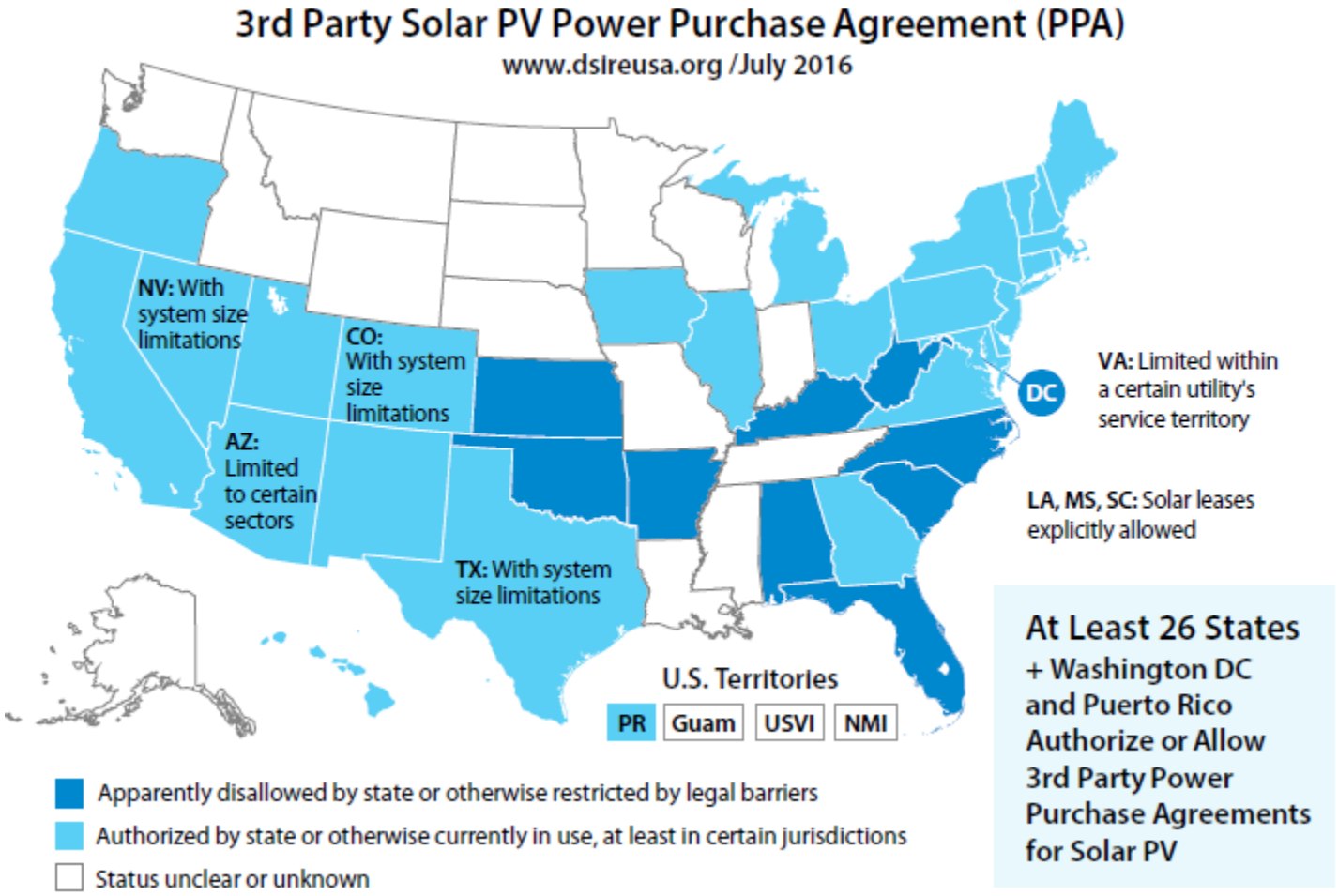
Background: PPA regulations in states across the U.S.



Source: DSIRE, 2016

Non-Power Purchase Agreement (PPA) Options

- Institution-owned model:
  - Financed by university- pays upfront cost
  - University ownership
  - University is responsible for design, construction, installation, and operation and maintenance of the system- can be third party contracted or internal
- Lease model
  - Financed by third-party project lessor- pays upfront cost
  - Lessor takes advantage of federal tax incentives and depreciation benefits
  - University pays lessor
  - Negotiated contract terms determine each party's rights to electricity generated and its environmental attributes

Funding and Revenue Streams

- **Grants and incentives:** Grants are external sources of capital that are not required to be repaid by the university or tax payers. Some state and utility incentive programs offer substantial rebates.
- **Solar Renewable Energy Credits:** They represent the environmental attributes of solar energy systems and can be traded separately from commodity electricity.
- **Bond financing:** Public universities can issue or obtain tax-exempt low-interest bonds to invest in capital projects or to refinance prior-issued bonds.
- **Donor funding:** Wealthy donors can partially or fully invest in RE projects using lease arrangements.
- **Internal funds:** Use of internal operating or capital budget, and budget allocation to fund solar procurement.
- **Student funds:** Sustainability or renewable energy funds based on a nominal amount charged to students.
- **Other mechanisms:** Pro bono panels by manufacturers or leasing land for solar installations.

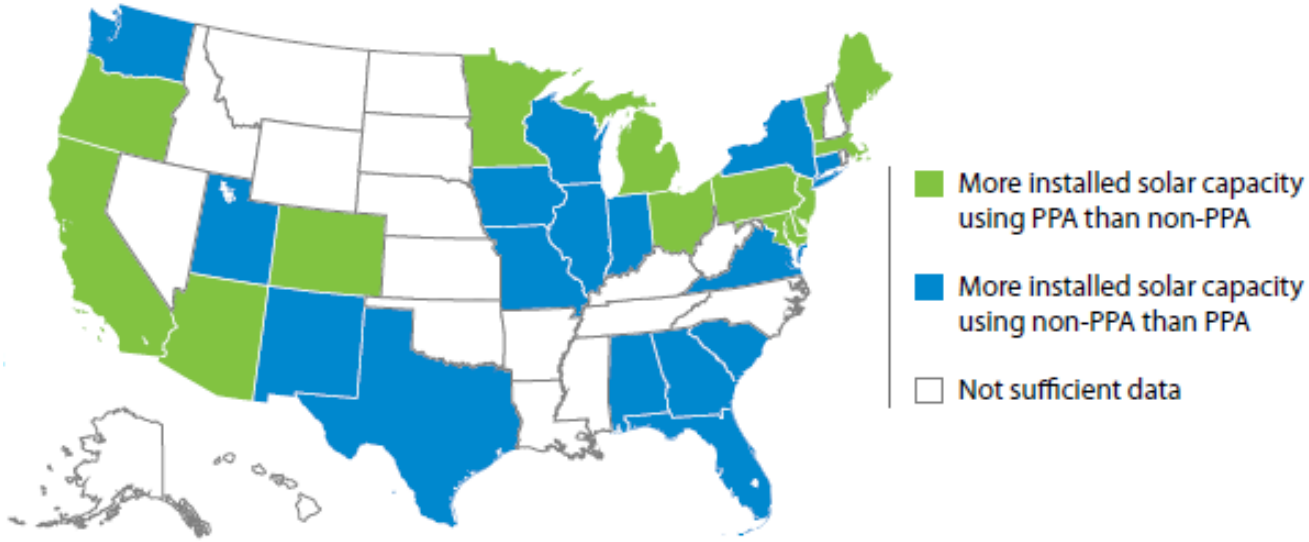
Solar Procurement Processes within the University

- Key drivers
  - University commitment
  - Solar energy champion
  - Student initiatives
  - Sustainability branding
- Internal or external solar procurement process
- Approval process

17.4 MW array at Mount Saint Mary's in Maryland

Campus Non-PPA Projects by the Numbers

Description	Quantity
University solar capacity installed through non-PPA models	>50 MW
Number of universities using a non-PPA model	72 universities (in 27 states)
Percentage of university capacity installed using a non-PPA model	31%
Average system size with a non-PPA model	447 kW



State variations in installed capacities of solar projects using PPA and non-PPA models

Source: The Association for the Advancement of Sustainability in Higher Education Campus Solar Photovoltaics Installation Database, 2016

Case study: Rutgers University

1.4 MW Plant

- Installed: 2009
- Model: Institution owned
- Type: Ground mounted solar
- Project Cost: $10 million
- Funding:
  - Rebates
  - Bond financing
  - SRECs
- Annual savings:
  - CO2: 1,200 tons
  - Utility costs: $200,000 approximately

8 MW Plant

- Installed: 2012
- Model: Lease
- Type: Solar parking canopy
- Project Cost: $40.8 million
- Funding:
  - Lease
  - SRECs
- Annual savings:
  - CO2: 6,364 tons
  - Utility costs: $1.2 million approximately

Case Studies

- Austin Community College District (ACCD): Leveraging Grant Funding with a Campus Green Fund
- Luther College: Using Donations and the Lease Model

Thank You!

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Jenny Heeter
<Jenny.Heeter@nrel.gov>

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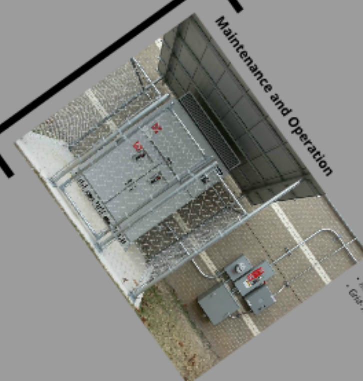
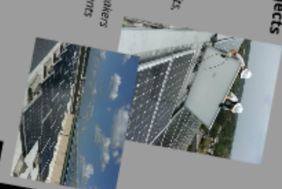
Maintenance and Operation



- Site Safety / Security
- Indoor VS. Outdoor
- Grid-Tied VS. Battery Backup

Preparing for future projects

PV ready Campus Design
- Roof orientation and pitch
- Layout of roof penetration - mech. units, vents, etc., to prevent shading
  Maximize the roof real-estate
- Structure : roof dead load, wind load
- Expandable service panel and circuit breakers
- Space for PV inverters and other equipments



Resources

ACC Board Policies : http://www.austincc.edu/board/policies.php#policies

ACC Sustainability Portal: green@austincc.edu

http://www.austincc.edu/sustainability/

Solar Projects at a Community College District

-PREPARE TO BE READY-

Presenter : Andy Kim, AIA, C.E.M., LEED AP

Director, Energy & Sustainability

Austin Community College District

Austin, TX

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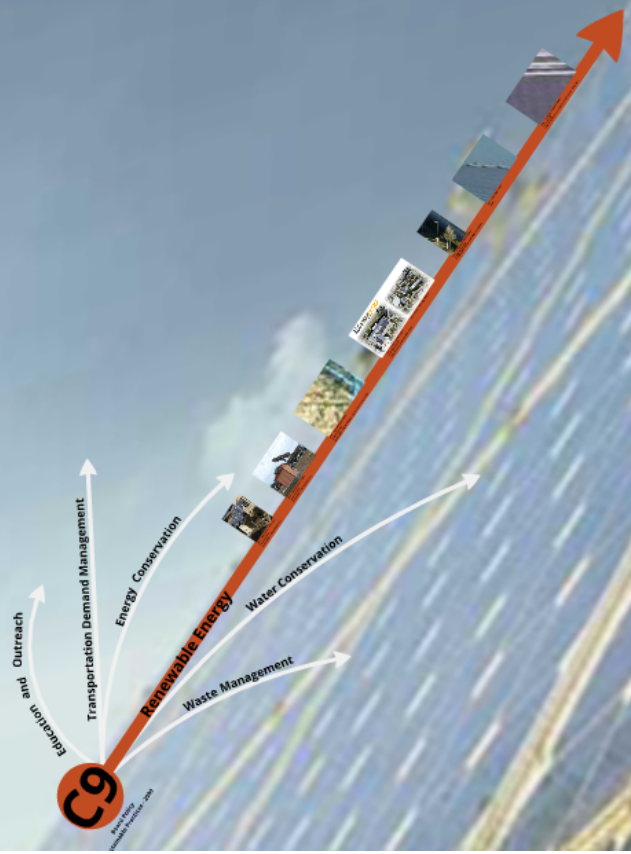


sustainable ACC

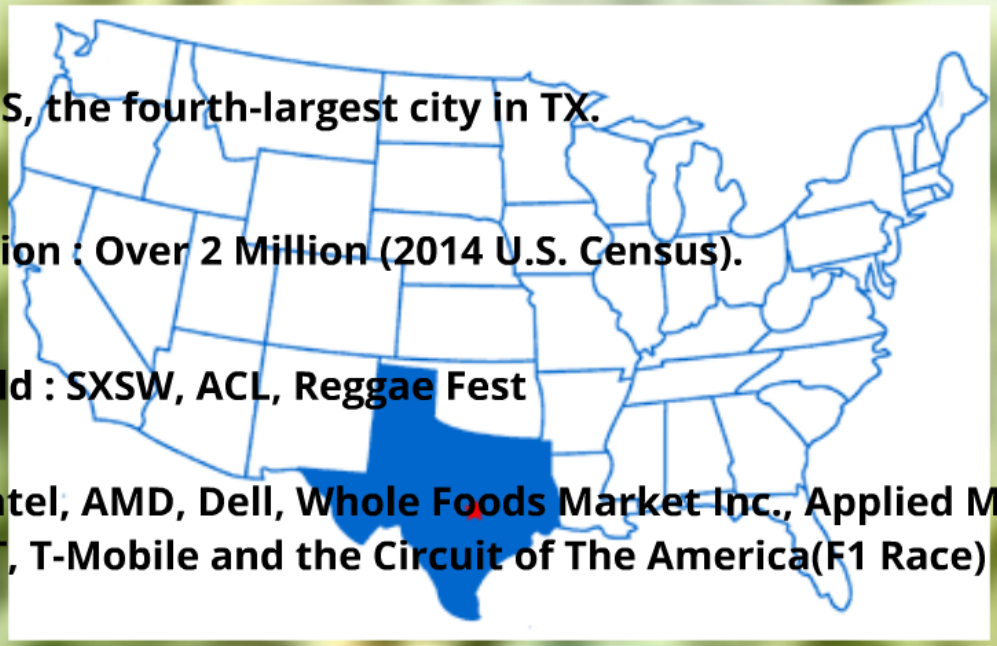
Austin, Texas

- The 11th-largest city in the US, the fourth-largest city in TX.

- Austin-Metropolitan population : Over 2 Million (2014 U.S. Census).

-Live Music Capital of the World : SXSW, ACL, Reggae Fest

-Industry : Apple, Samsung, Intel, AMD, Dell, Whole Foods Market Inc., Applied Material, Silicon Laboratories Inc., AT&T, T-Mobile and the Circuit of The America(F1 Race)



Austin Community College District (ACC)

- 40th. Anniversary in 2013
- Offers over 250 Degree Programs
- 11 Campuses, 12 Centers covering 7,000 Square Miles in 7 Counties
- Serves over 40,000 Credit Students, 15,000 Non-Credit Students

Board Policy
Sustainable Practices - 2009

C9

Board Policy
Sustainable Practices - 2009

Renewable Energy

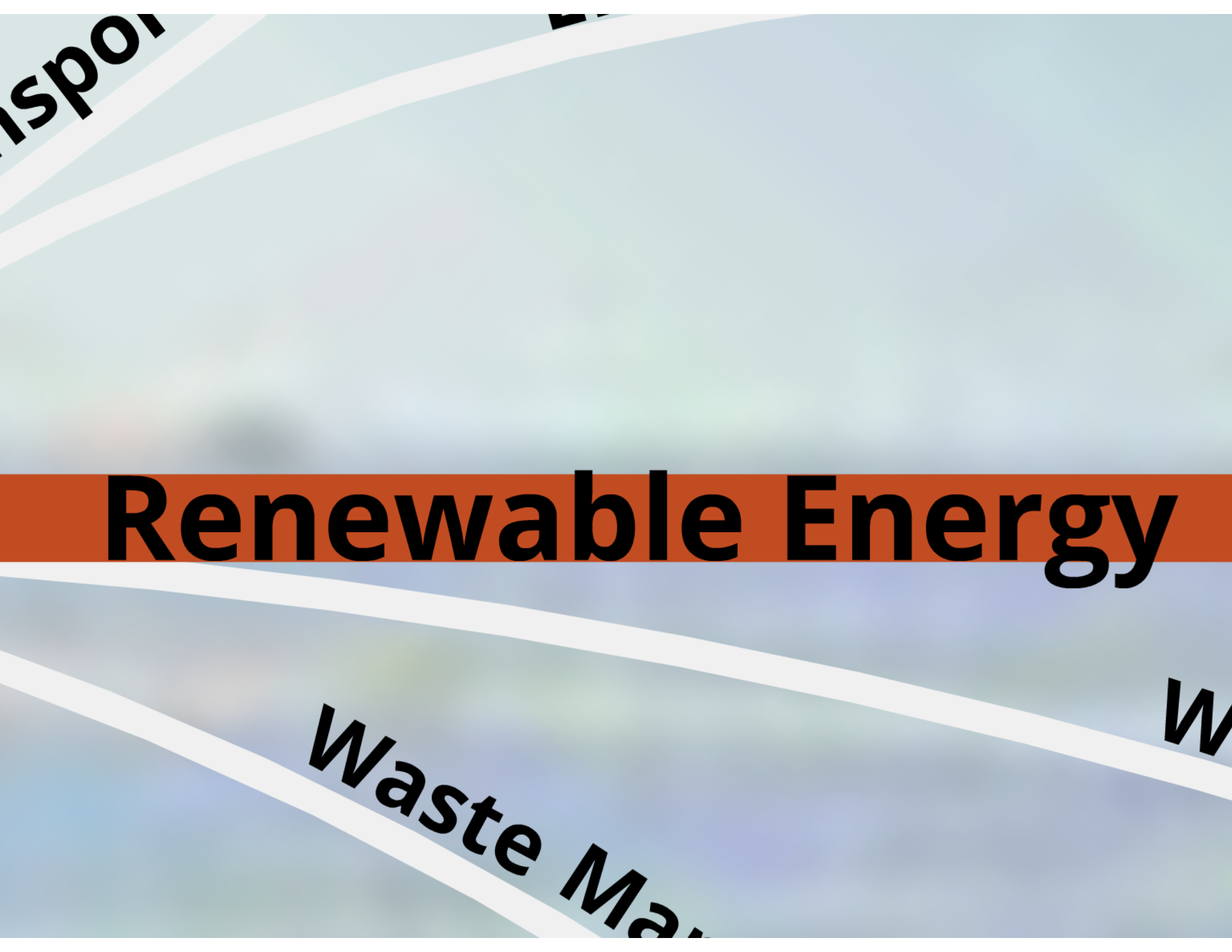
Education and Outreach

Transportation Demand Management

Energy Conservation

Waste Management

Water Conservation


Renewable Energy
Waste Ma

2009 - 2.4kW -Rio Grande Campus

$41,000 ($17/kW)

$11,000 (ACC) + $30,000 (DOE Grant)

20

$4

$1

2009 - 2.4kW -Riverside Campus

$41,000 ($17/kW)

$11,000 (ACC) + $30,000 (DOE Grant)

2010 - 12 kW -Riverside Campus

$100,000 ($8.4/kW)

$10,000 (ACC) + $40,000 (Workforce Grant) + $50,000 Utility Rebate

ACC energyproject

2011 - 101 kW -Eastview Campus
$2,000,000 ($5.8/kW)
$400,000 (ACC) + $1,600,000 (ARRA Grant)

2011 - 245 kW -Northridge Campus

ACC Energy Projects

Renewable energy-Solar

American Recovery and Reinvestment Act Grant

First year - $40,000 utility saving

Round Rock Campus - 312kW

$1,200,000 - Total Project Cost
$900,000 - Federal Grant
$364,000 - Utility Rebate

= $64,000 Saving

austincc.edu/sustainability

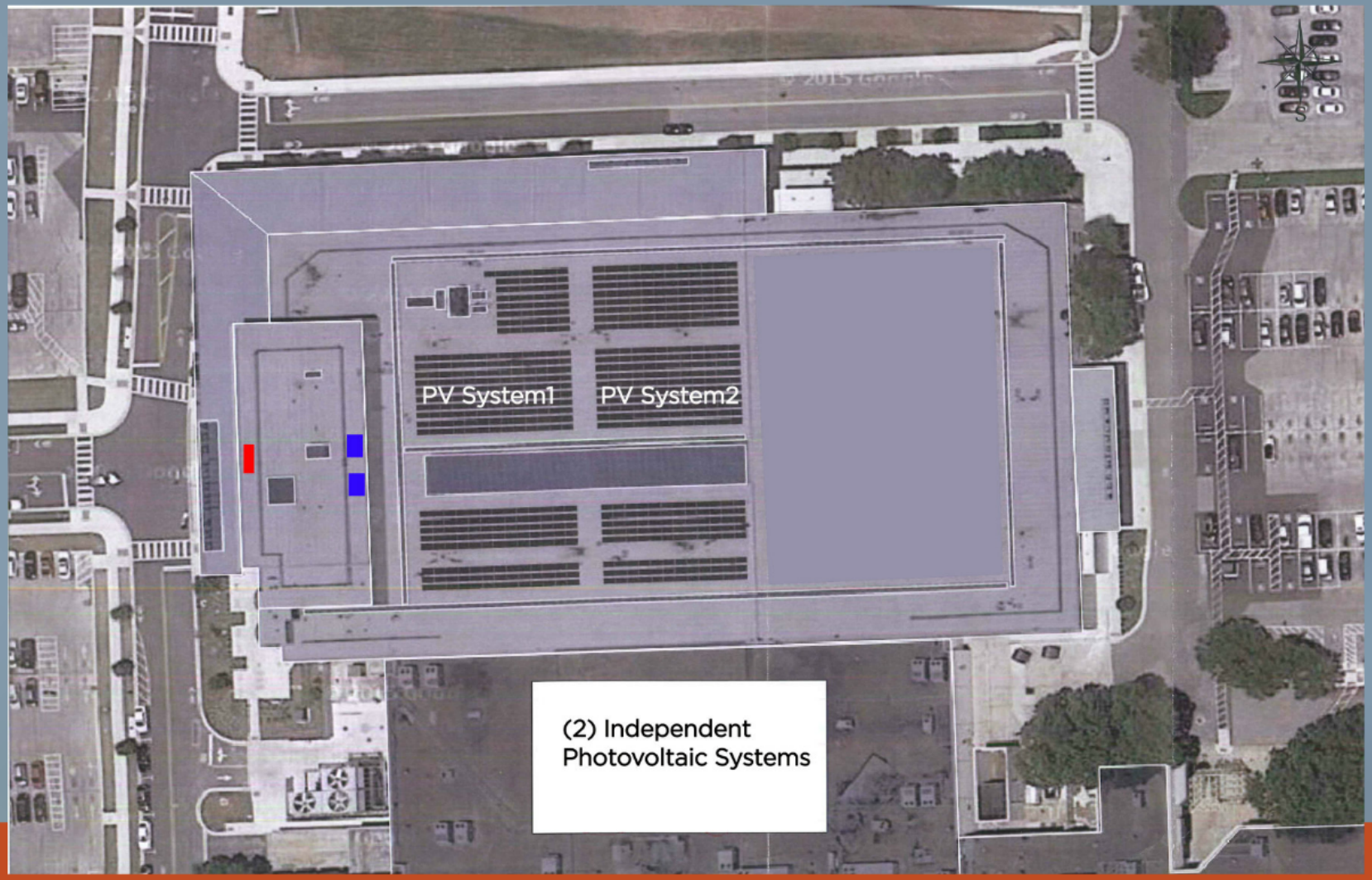
Austin Community College District

Printed on Recycled Paper

2012 - 312 kW -Round Rock Campus
$1,200,000 ($3.8/kW)
$900,000 (ARRA Grant) + $364,000(Utility Rebate)

2013 - 14 kW -Elgin Campus

$Free.



2016 - 170 kW(est.) -Highland Campus

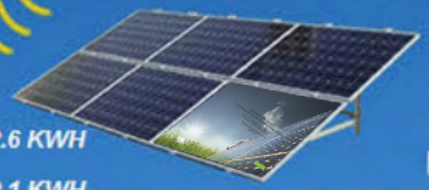
Total : $357,000

$150,000 (EBSCO Grant) + $25,000 (CAPCOG Grant) + $182K (ACC)

System Overview

Austin Community College District

Today's Solar Production: *1,766.7 KWH*



Yesterday	*3,052.6 KWH*
Last Week	*21,130.1 KWH*
Last Month	*95,699.7 KWH*

Last Month's Savings:

110,533.2 lbs | *8,900.1 $* | *2,612.2 _gal*

Imported From Utility Today: *6,079.3 KWH*

Yesterday	*10,738.3 KWH*
Last Week	*69,100.3 KWH*
Last Month	*336,927.4 KWH*


buildingdashboard
Connect
CAMPUS
Austin Community College
CAMPUS
Elgin Campus
Electricity
Photovoltaic
Water
Irrigation
Natural Gas
LAYER ON
PV Array Production
(kWh)
Last Month
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 1
50.0
40.0
30.0
20.0
10.0
TODAY
WEEK
MONTH
YEAR
2.6
Kilowatts
343
Kilowatt-hours so far this month
kWh
LEED
Silver
by USGBC
Homepage
Comparison
Green Features
Green Team
Electricity Breakdown
ABC
MENU
12:00 AM – 4:21 PM
EXTERIOR LIGHTING
6.6 kW
HVAC ELECTRICAL CONSUMPTION
117 kW
Elgin, TX
Fair
84 °F
Humidity: 40%
Pressure: 29.84 in
Wind: 6 mph
Visibility: 10 mi
Sunrise: 7:22 am
Sunset: 7:15 pm
Today
Tue
Wed
Thu
Fri
87 / 67°
89 / 71°
86 / 71°
90 / 71°
89 / 66°

Maintenance and Operation

- *Site Safety / Security*
- *Indoor VS. Outdoor*
- *Grid-Tied VS. Battery Backup*

Preparing for future projects

PV ready Campus Design

- Roof orientation and pitch

- Layout of roof penetration - mech. units, vents, etc., to prevent shading
Maximize the roof real-estate

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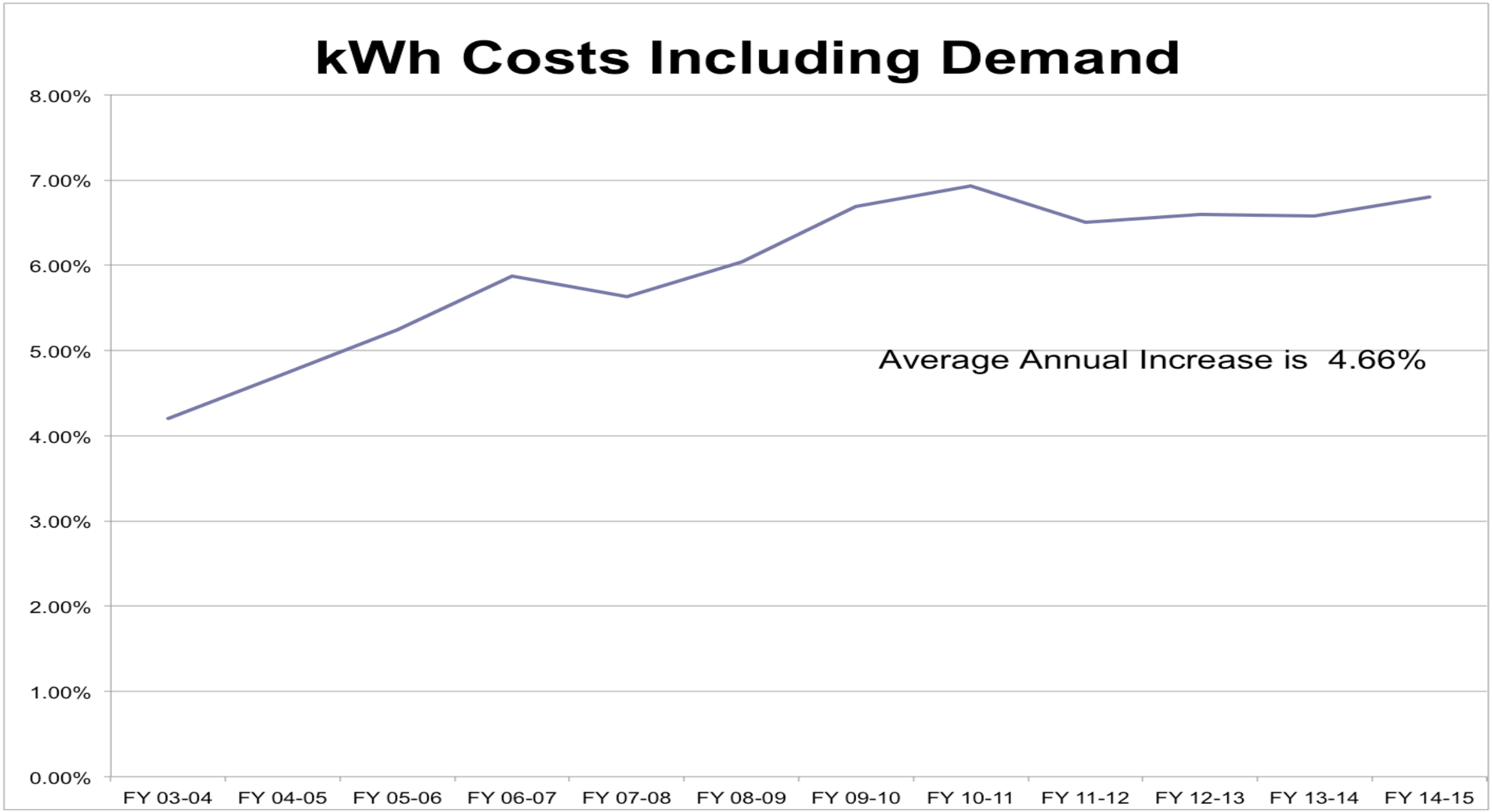
Financing Methods for Solar Projects at Luther College

Non-Power Purchase Agreement (PPA) Options to Financing Solar Deployment at Universities

National Renewable Energy Laboratories (NREL) Webinar, October 4, 2016

Motivations

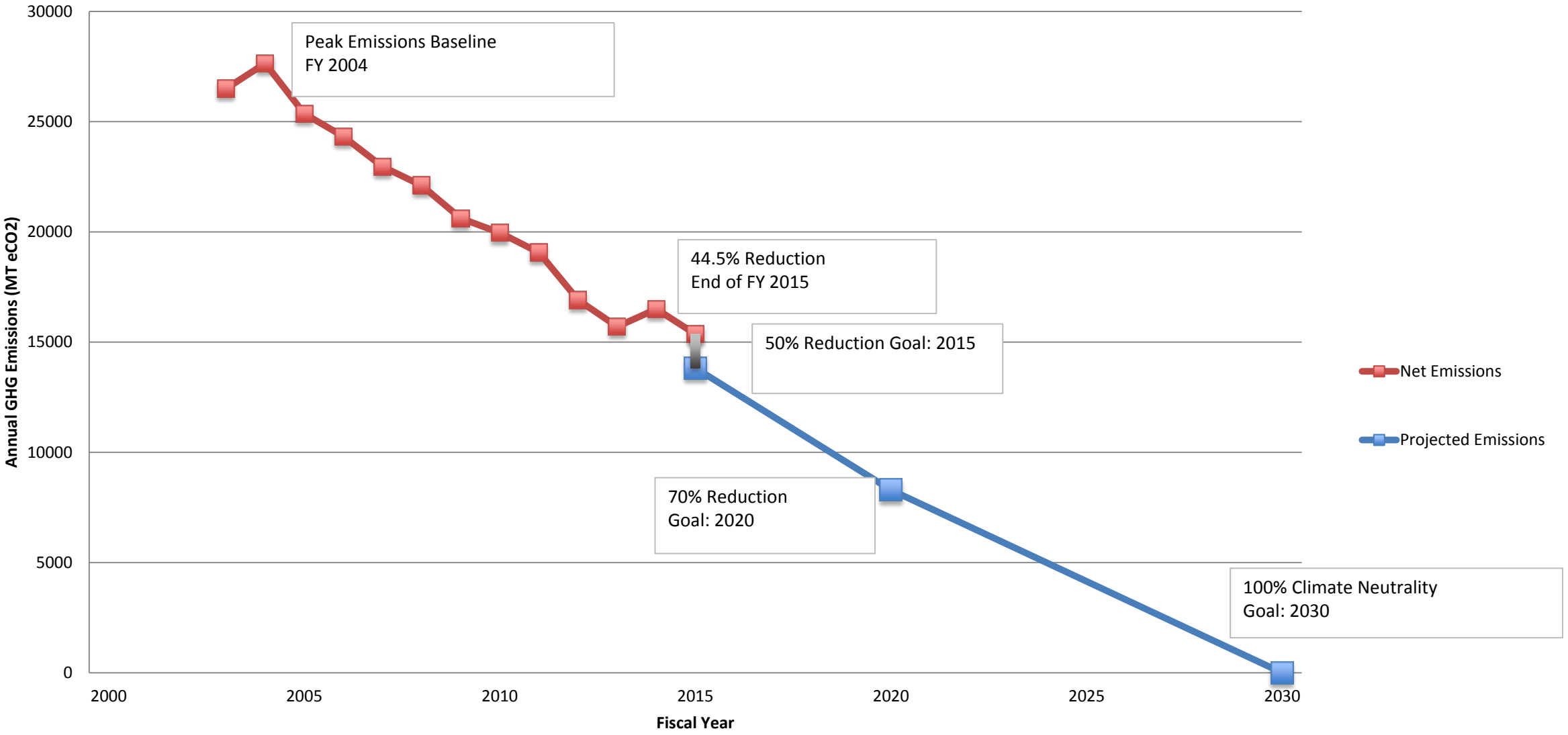
- Reduce operating costs
- Environmental stewardship


kWh Costs Including Demand
8.00%
7.00%
6.00%
5.00%
4.00%
3.00%
2.00%
1.00%
0.00%
Average Annual Increase is 4.66%
FY 03-04
FY 04-05
FY 05-06
FY 06-07
FY 07-08
FY 08-09
FY 09-10
FY 10-11
FY 11-12
FY 12-13
FY 13-14
FY 14-15

Motivation: Environmental Stewardship

- Luther College became a charter signatory in January 2007.
- Two long-term goals:
  - Make sustainability a part of every student's learning experience
  - Achieve carbon neutrality by a date we determine
- Interim goal: Reduce Luther's greenhouse gas emissions 50%

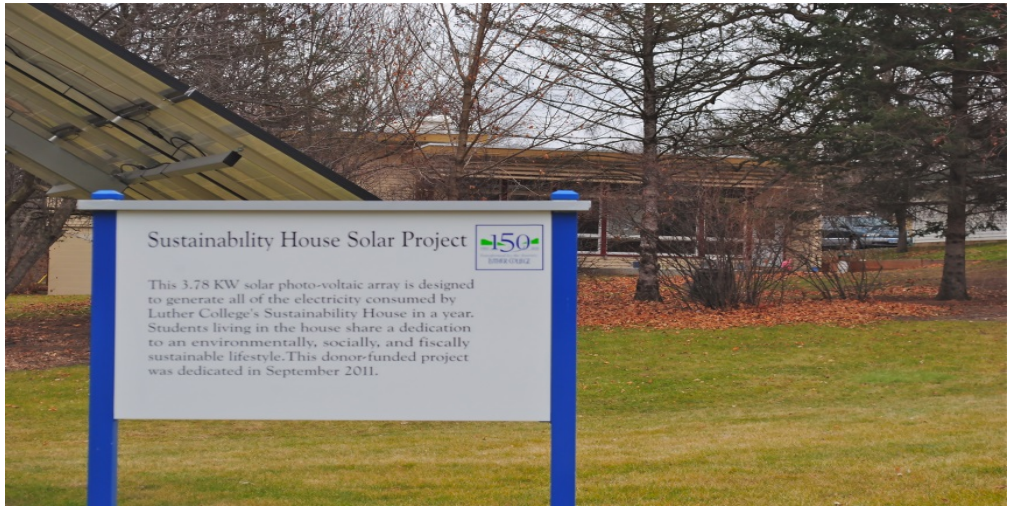
Luther College Carbon Footprint



Luther’s Solar Projects

Sustainability House (4 kW)

- $22,000
- Installed in August 2011
- 4 kW ground-mounted array
- Sized to provide all electricity for the house
- 100% Donor-funded
- Net-metered



Shirley Baker Commons (20 kW)

- $76,000
- Installed in May 2013
- Public demonstration site for marriage of geothermal energy and solar PV
- 40% Donor-funded
- 40% DOE grant funding
- 20% Utility rebate

President's House I (5.3 kW)

- $18,000
- Installed August 2013
- To honor former President, Rick Torgerson and his wife, Judy, for their commitment to sustainability
- 80% Donor-funded by faculty, staff, and friends of the college
- 20% Utility rebate

President’s House II (13.66 kW)

- $37,537
- Installed August 2016
- To honor former President, Rick Torgerson and his wife, Judy, for their commitment to sustainability
- 100% Donor-funded

Baker Village Array (280 kW)

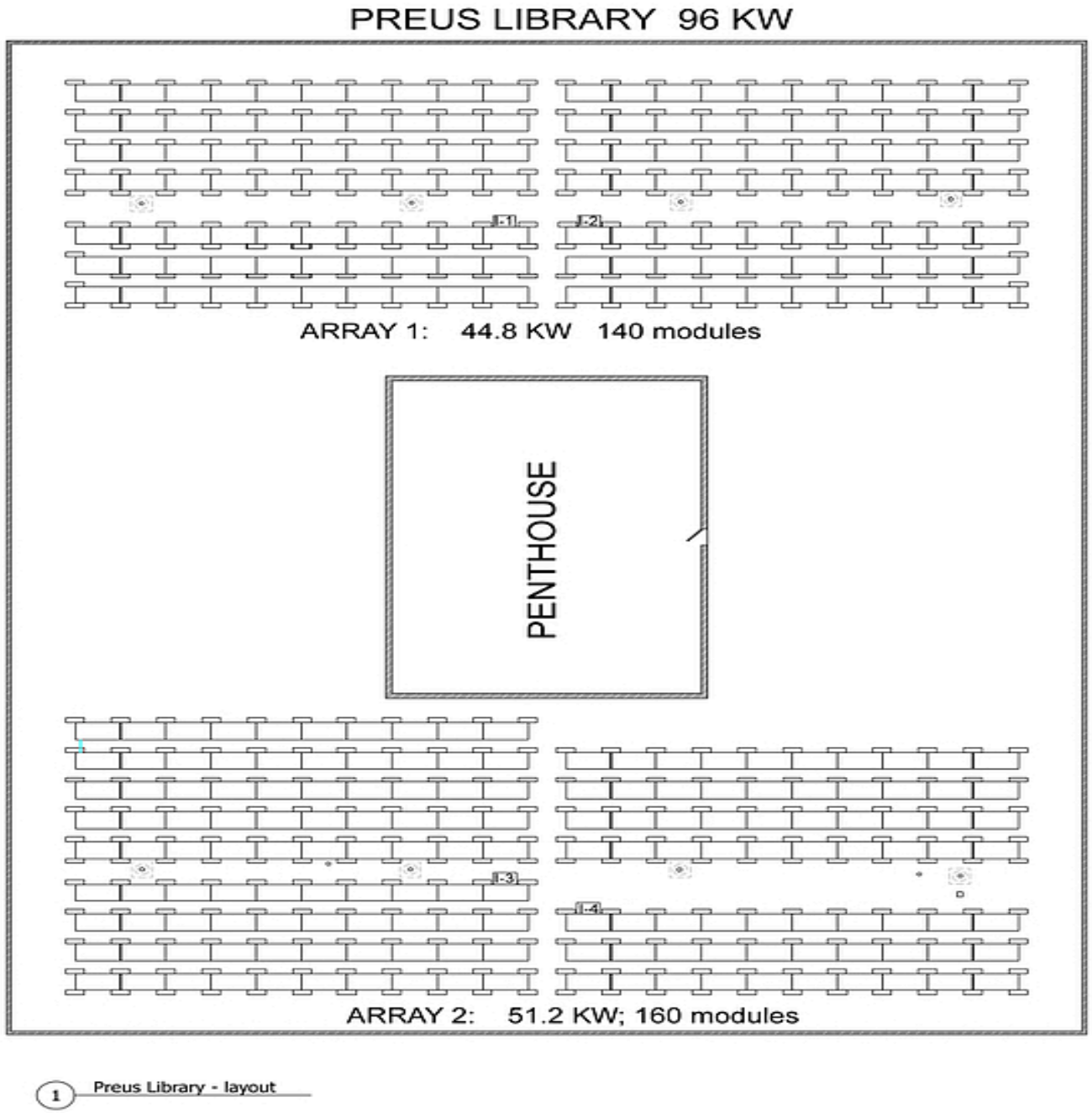
- $1.2 million
- Installed Summer 2012
- Leased from Decorah Solar Field, LLC, which utilized the Section 1603 Cash Grant and accelerated depreciation
- 280 kW array
- 355,000 kWh/yr offsets Baker Village consumption
- Net metered

Main Campus Arrays (822 kW)

- $1.6 million
- Installed: August – October 2015
- 96 kW on roof of the library
- 726 kW in two ground-mounted arrays
- Third Party Power Purchase Agreement with Oneota Solar, LLC, which used a USDA REAP grant, the Federal ITC, State PTC, and MACRS
- Projected generation: ~1,118,000 kWh/yr
- Annual carbon footprint reduction: 5-6%
- 11-year payback for Luther

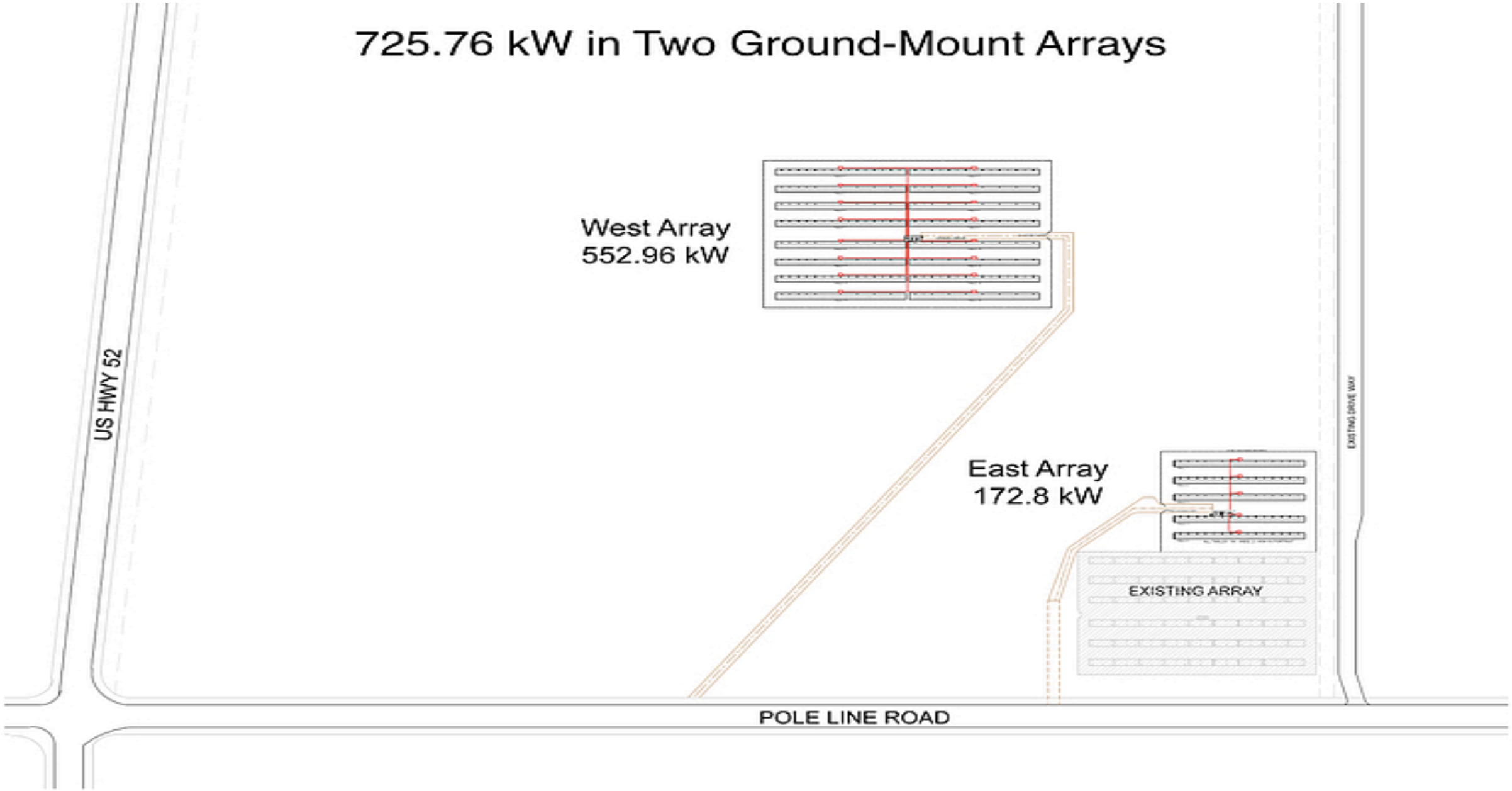

UTHER COLLEGE

96 kW on Preus Library Roof



1 Preus Library - layout

725.76 kW in Two Ground-Mount Arrays



Financing Methods for Solar Projects at Luther College

Contact:
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Question & Answer Session

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