

A Solar PPA Designed for Positive Externalities

Penn State Sustainability Institute
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Lightsource BP
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Vice President of Business Development



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Agenda

- Introductions
 - Sustainability Institute and Penn State
 - The Nature Conservancy
 - Lightsource BP
- Background
- The Request for Proposals
- Project to date
- Questions



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Sustainability Institute

- Consultants and coaches to guide and bolster sustainability efforts at Penn State in:
 - Student and staff engagement
 - Curriculum development
 - Operations
 - Outreach and community-student projects
 - Research



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THE NATURE CONSERVANCY

Mark Anderson PhD., Director of Conservation Science,
Eastern Region

Pennsylvania Staff:

- Evan Endres, Climate and Energy Policy Manager
- Keith Fisher, Director of Conservation Programs
- Liz Johnson, Director of Land Conservation
- Tamara Gagnolet, Conservation Science & GIS Manager



Lightsource BP is a Global Leader in Energy Development

Over 2 GW of large-scale solar in operating assets and over 4 GW of U.S. pipeline

Operational Track Record



2.5 GW
of solar operating assets
w/4 GW of pipeline in U.S.

Full Lifecycle Capabilities



350+ staff
covering the full project lifecycle
in-house, from development
through to operations

Global Platform

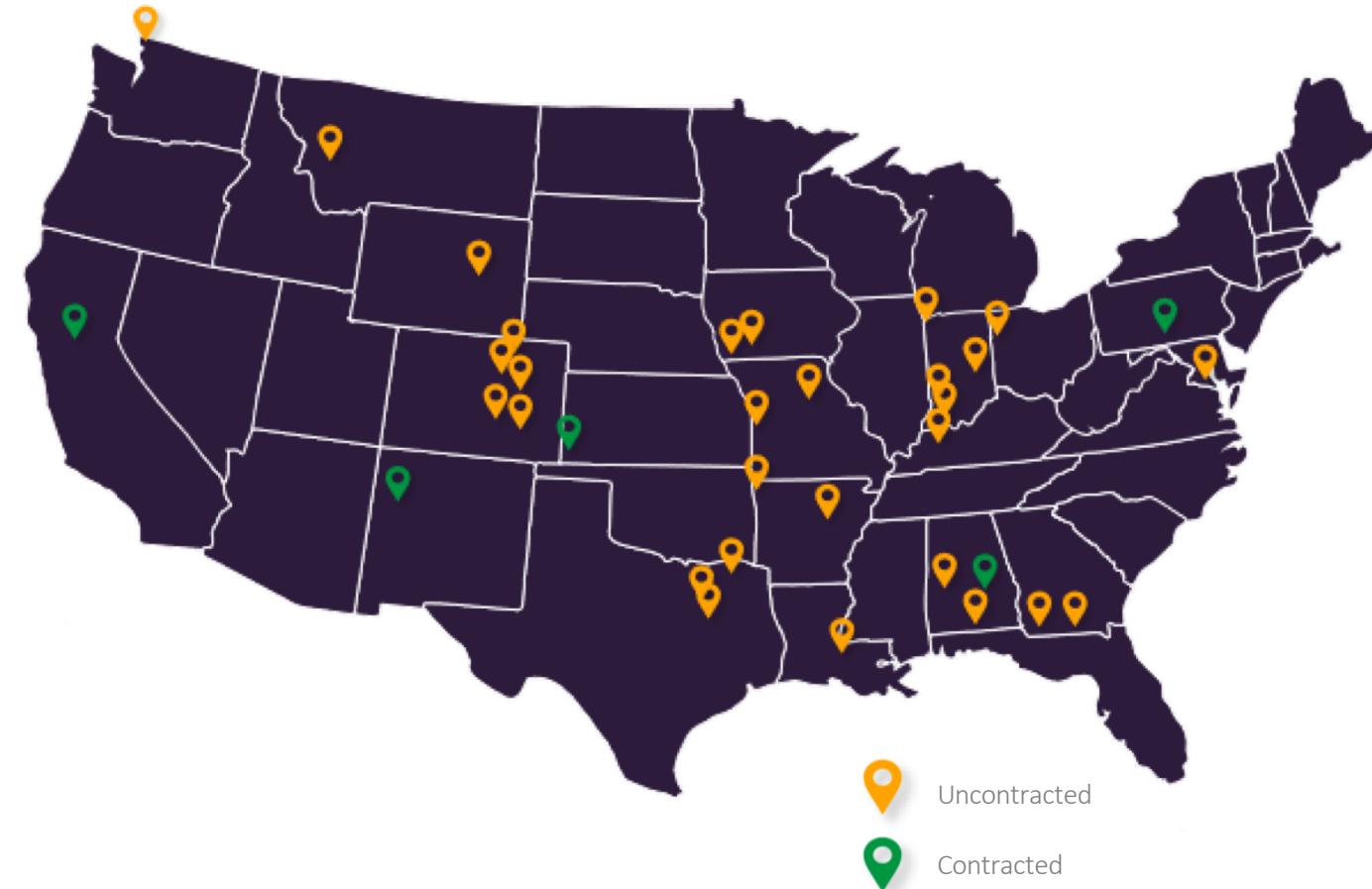


16 offices
across 3 continents and growing,
enabling economies of scale for
supply chains and finance

BP Strategic Partnership



\$200 million
BP committed to fund new solar
projects, from a strategic
partnership announced Q4 2017

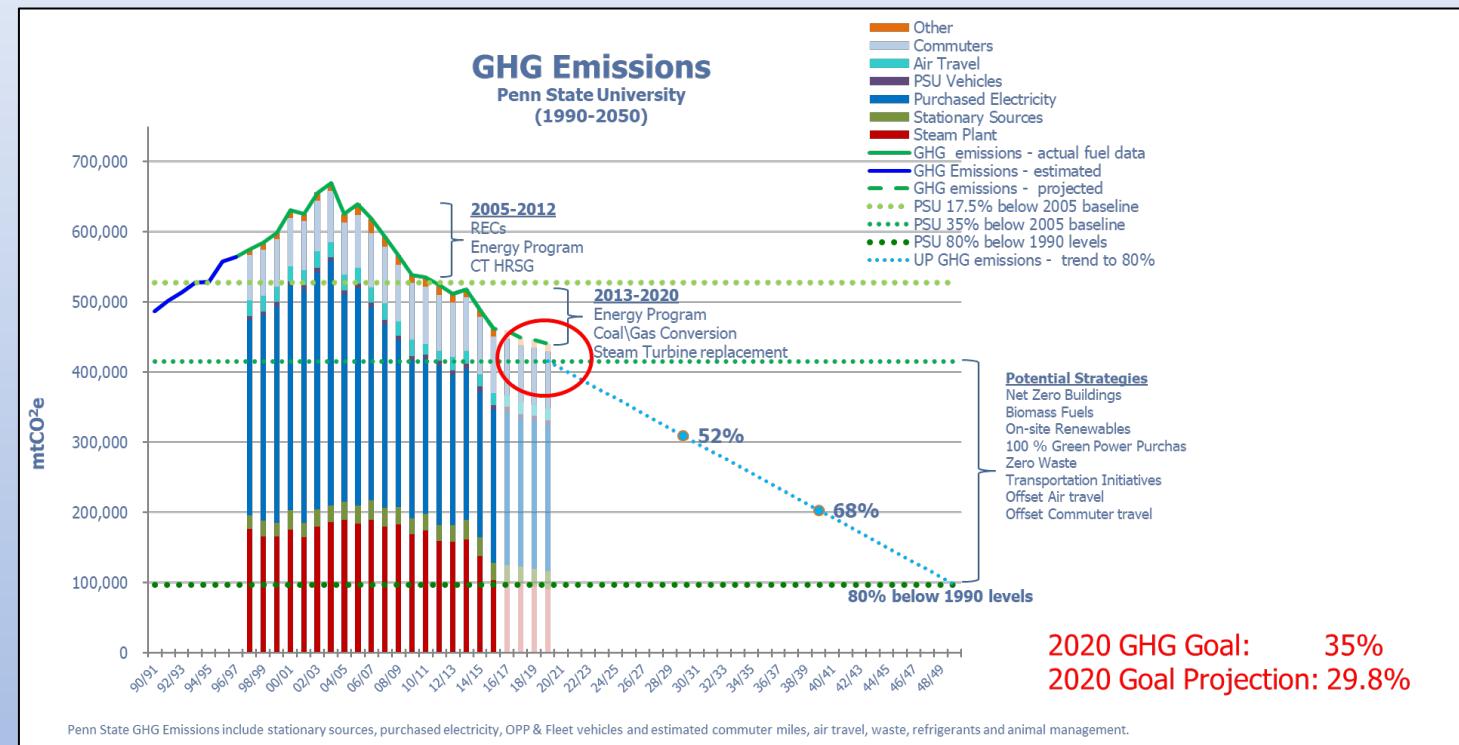


Lightsource BP, advancing solar



Background

- Penn State's GHG Emissions Reduction target
 - 35% reduction by 2020 (from 2005)
- Projected reduction in 2017
 - 29.8% reduction in 2020
- Gap of 33,000 mtCO₂e



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Background

- Possible Strategies to reach the reduction goal:
 - Increase Energy Savings Projects (ESP) funding by \$45M
 - Though has the best long-term outlook, not feasible by 2020
 - Purchase Renewable Electricity Generation
 - Solar – has a high value due to generating electricity during peak price times
 - Wind – generates during low price times
 - Appeared doable by 2020
 - Internal analysis suggested Offsite Solar Project viable, but lots of questions remained
- A Request for Information was issued in January 2018 to help answer questions and inform the development of an RFP



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Request for Information

- What projects are out there?
- Are they big/small enough to meet our current needs?
- How many projects can be in operation by 2020?
- Are we targeting the right size project?
- What kind of terms would be available?
- Does Solar really beat wind?
- Where would we take the power?
- How close to breakeven can we get?
- Will developers keep and operate the project or flip it?
- What are the available contract structures?
- Are there many qualified and experienced vendors?
- What kind of land would be used?
- What is the cost difference between projects in PA and projects in other states?



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THE PENNSYLVANIA STATE UNIVERSITY

REQUEST FOR INFORMATION
SCOPE & SPECIFICATIONS DOCUMENT

RFI #GMZ-PRCH-RFI-1332-E

Renewable Electricity Generation

CRITICAL MILESTONES	DATE
Release of RFI	November 29, 2017
Deadline for Questions	December 13, 2017
Information Due Date	January 5, 2018



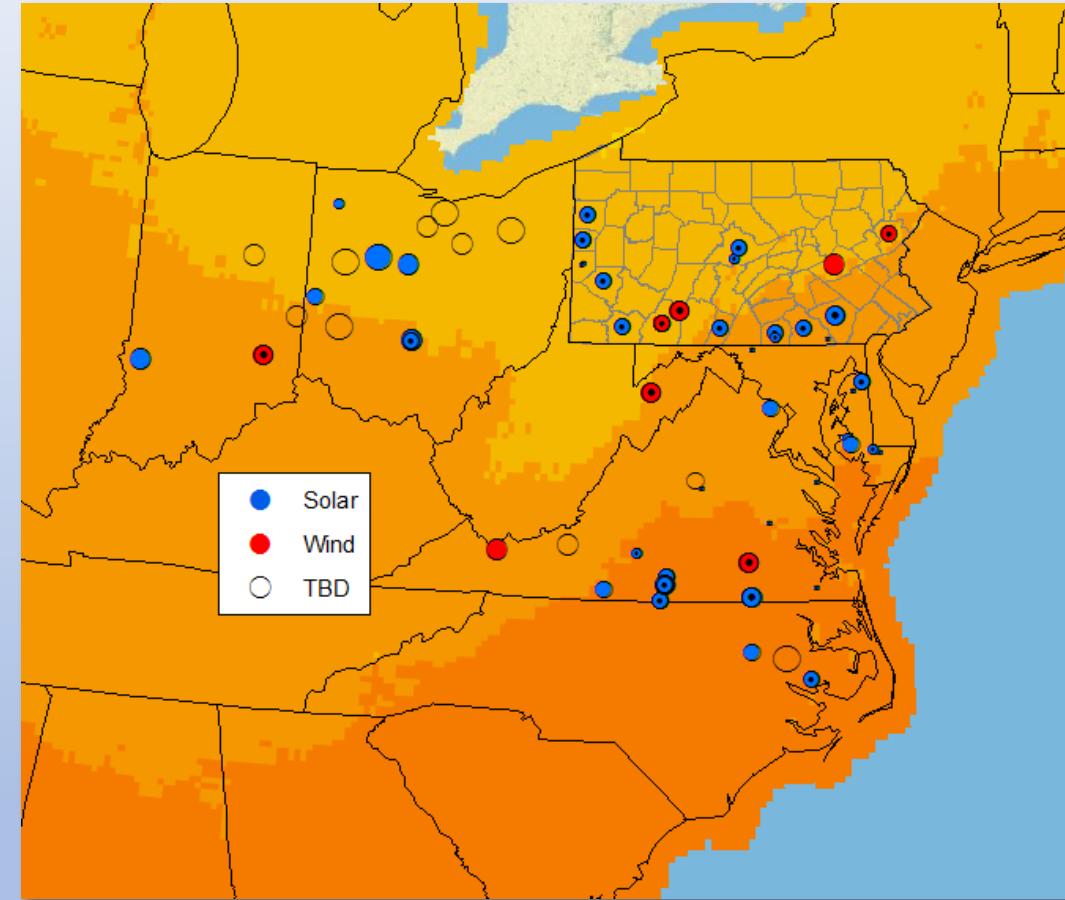
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RFI Results

- 18 Responses out of 30 Invitations
 - Solar indicative rates beat wind
 - Virginia is currently the lowest cost market for solar projects, but PA viability is growing
 - Most projects can meet a June 2020 in-service date
 - Over 64% of projects meet or exceed the size of our targeted purchase size
- Gave us confidence to generate a Request for Proposals



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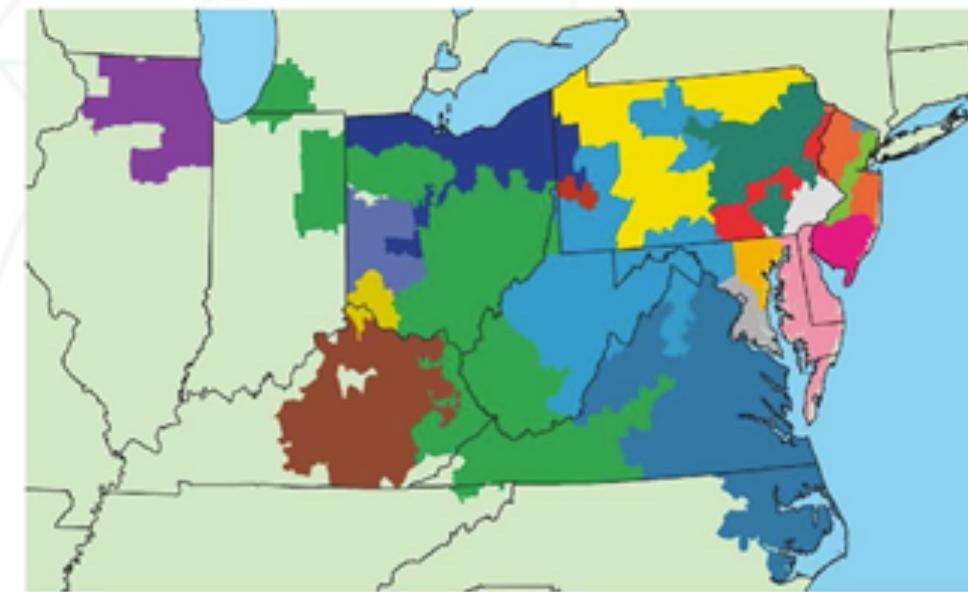
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Purchase Specs

- Purchase Size
 - 60 million kWh per year
- Location
 - Broader 11 state PJM region
 - Preference for PA
- Schedule
 - In-service by June 2020
- Renewable Energy Certificates
 - Bundled w/ the Project
- Contract Structure
 - Power Purchase Agreement
 - Term 20 to 30 years

Figure 1-1 PJM's footprint and its 18 control zones



Legend

Allegheny Power Company (AP)	Duquesne Light (DLCO)
American Electric Power Co., Inc (AEP)	Eastern Kentucky Power Cooperative (EKPC)
American Transmission Systems, Inc. (ATS)	Jersey Central Power and Light Company (JCP)
Atlantic Electric Company (AECO)	Metropolitan Edison Company (Met-Ed)
Baltimore Gas and Electric Company (BGE)	PECO Energy (PECO)
ComEd	Pennsylvania Electric Company (PENELEC)
Dayton Power and Light Company (DPL)	Pecony
Delmarva Power and Light (DPL)	PPL, Electric Utilities (PPL)
Dominion	Public Service Electric and Gas Company (PSEG)
Duke Energy Ohio/Kentucky (DLOK)	Rockland Electric Company (RECO)



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Request for Proposals (RFP)

- Convened an inclusive Steering Committee
- Role
 - Determine project priorities
 - Weight the priorities
 - Generate RFP questions
 - Read and score proposals
 - Interview potential partners
 - Select project

PSU Steering Committee Members

Office of Physical Plant - Shelley Mckeague, Mike Prinkey, Rob Cooper
Purchasing - Ben Hoffman, Greg Zabrosky
Corporate Controller's Office - Sue Wiedemer
Risk Management Office - Richel Perretti
Office of General Council - Jennifer Eck
Strategic Communications - Susan Bedsworth
Sustainability Institute - Peter Buckland, Jeremy Bean
Applied Research Laboratory - Meghan Hoskins
EMS Energy Institute - Jeffrey Brownson, Seth Blumsack
OPP Student Interns - Nita Williams, Nick Budzynski
PRX Energy – Gregg Shively



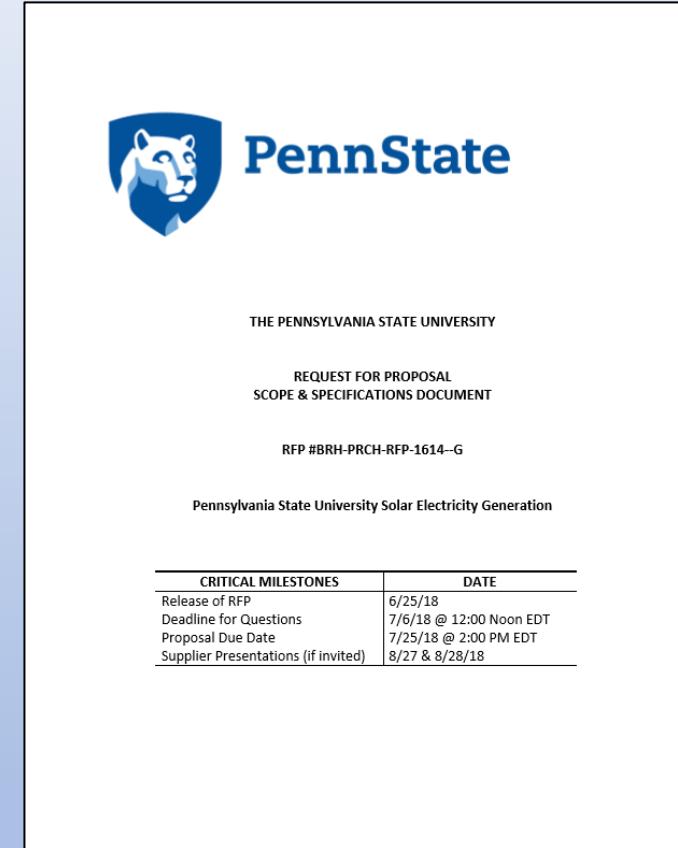
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Request for Proposal Evaluation Criteria

- Cost
 - Price of electricity
- Location
 - PA is a preference
- Size
 - Meet 60,000 MWh/year, prefer a single project
- Counterparty
 - Role of bidding entity and its financial strength
- Penn State Benefits
 - Accessibility (physically and virtually) for academics and research
- Host Community Benefits
 - Project benefits to the community where it resides
- Ecosystem Benefits
 - Utilization of the land and any improvements

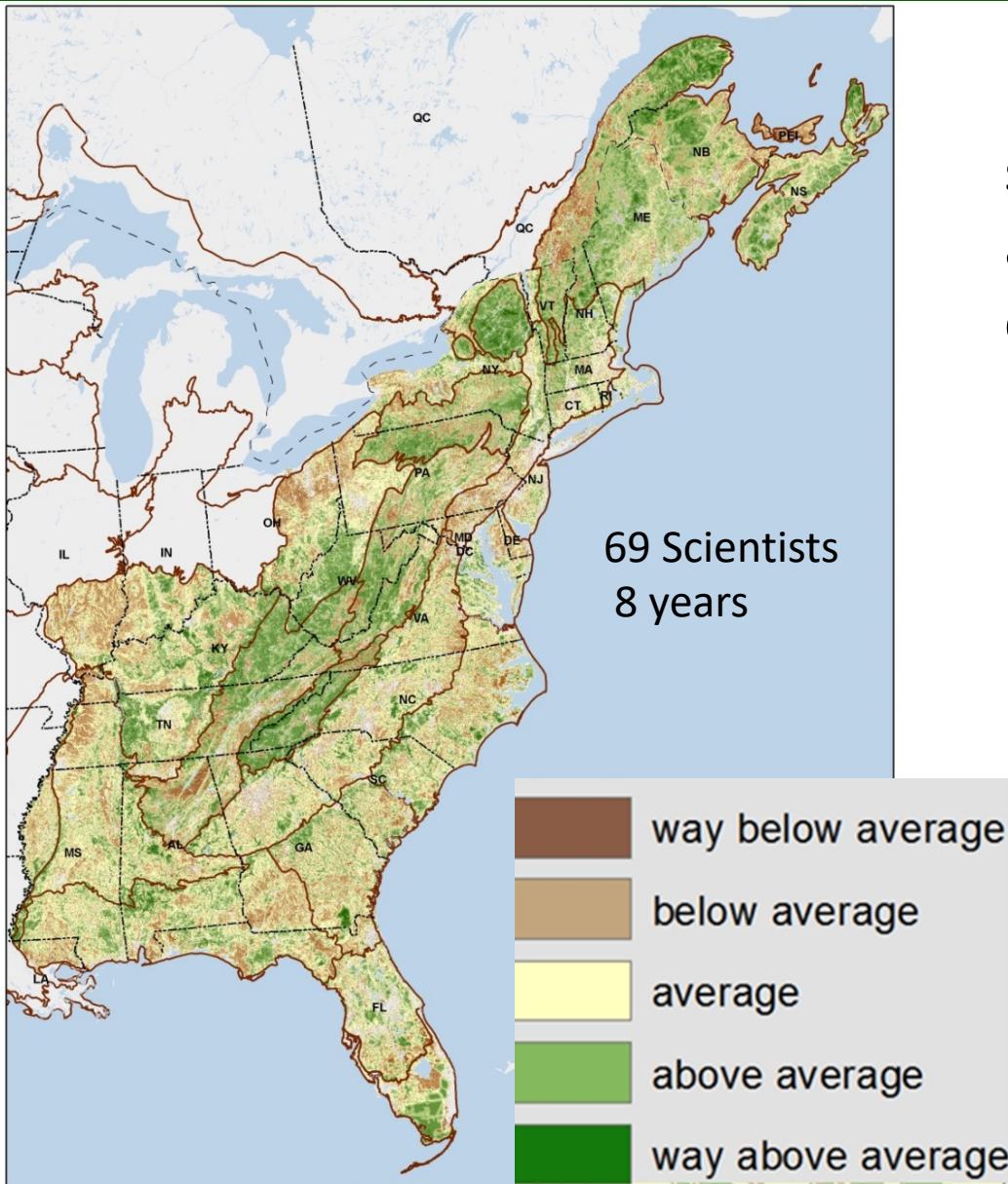


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Climate Resilience



Resilient sites = sites that continue to support biological diversity, productivity and ecological function even as they change in response to climate change.

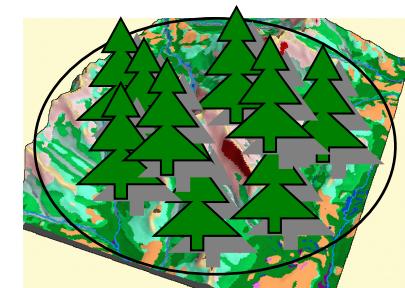
**Many
Microclimates**

Create climate options

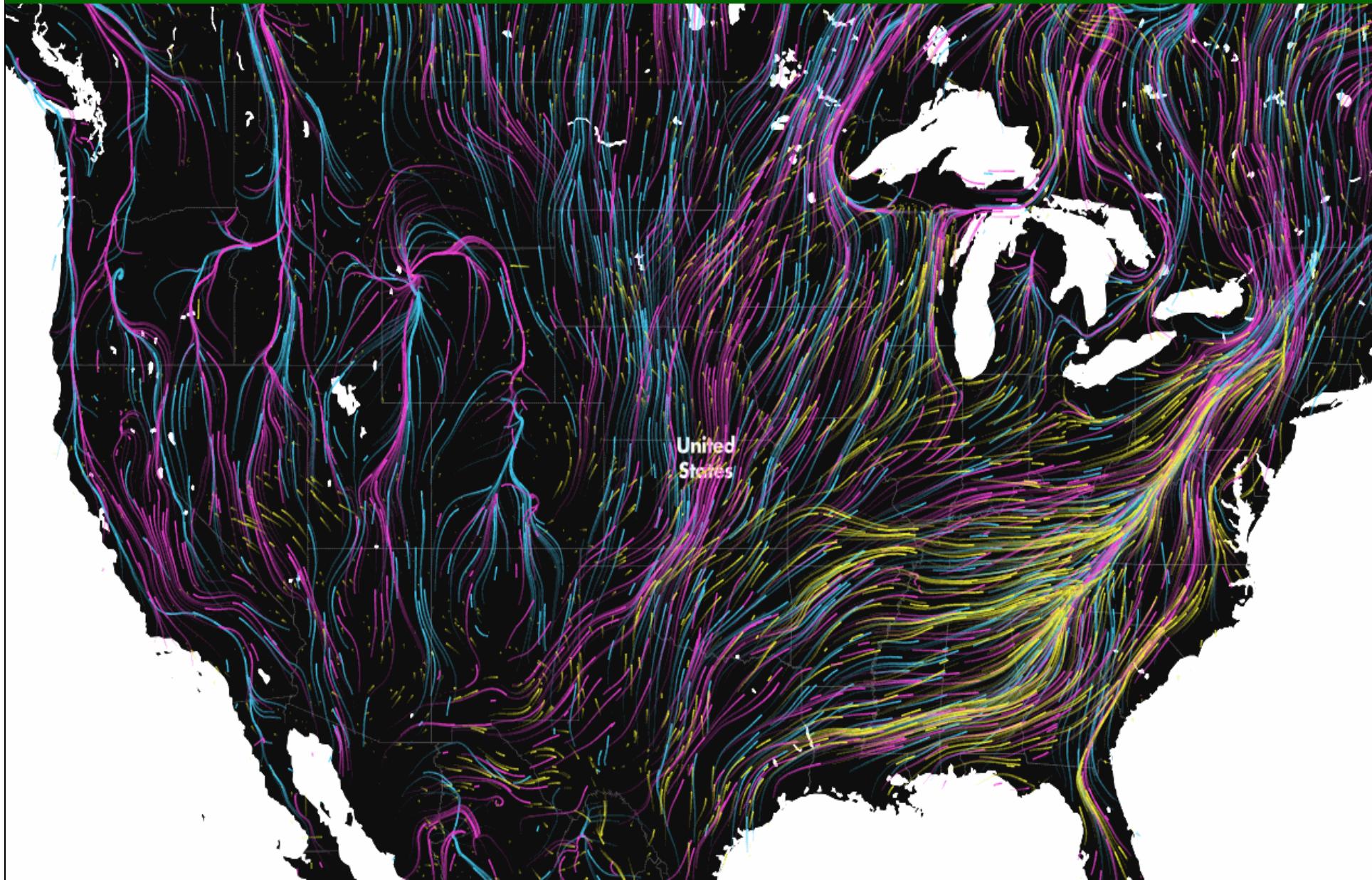


**Locally
Connected**

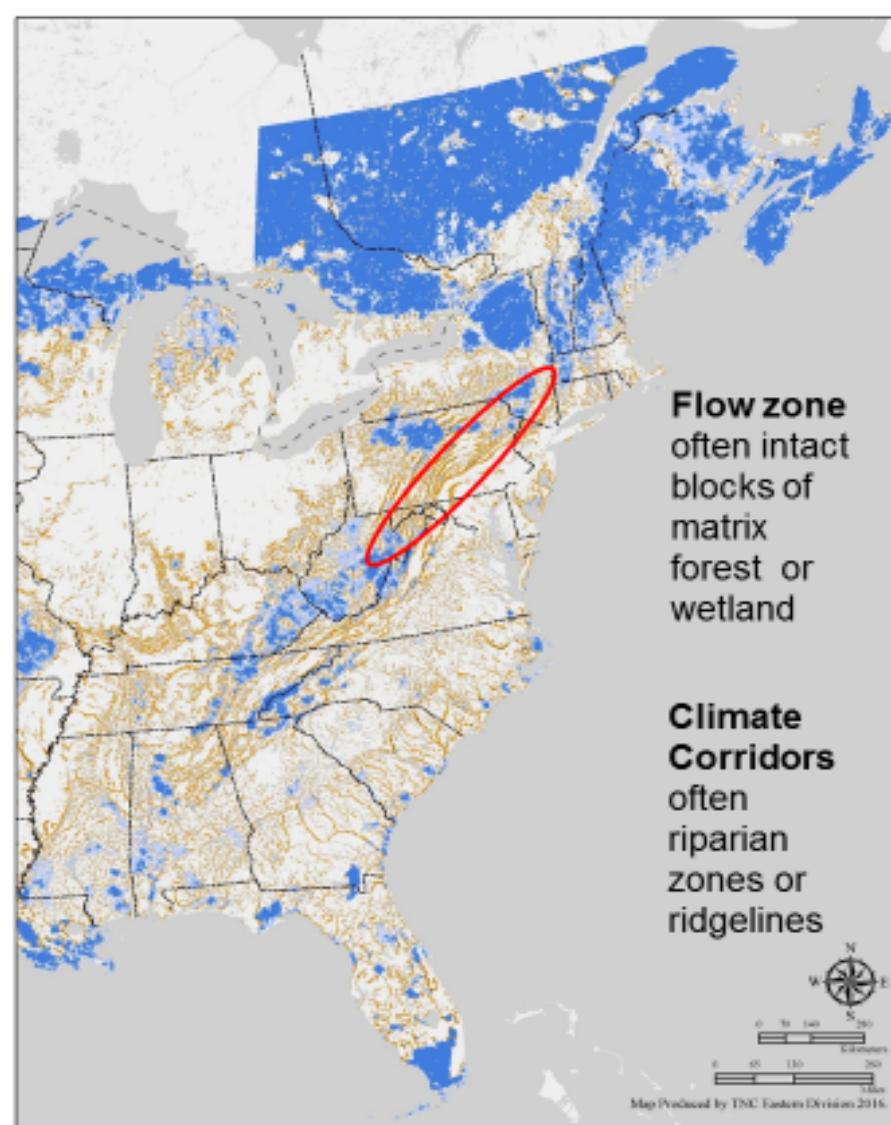
Allows species to move



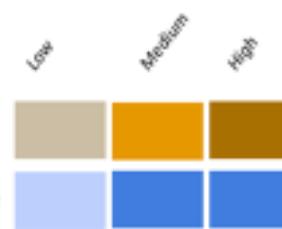
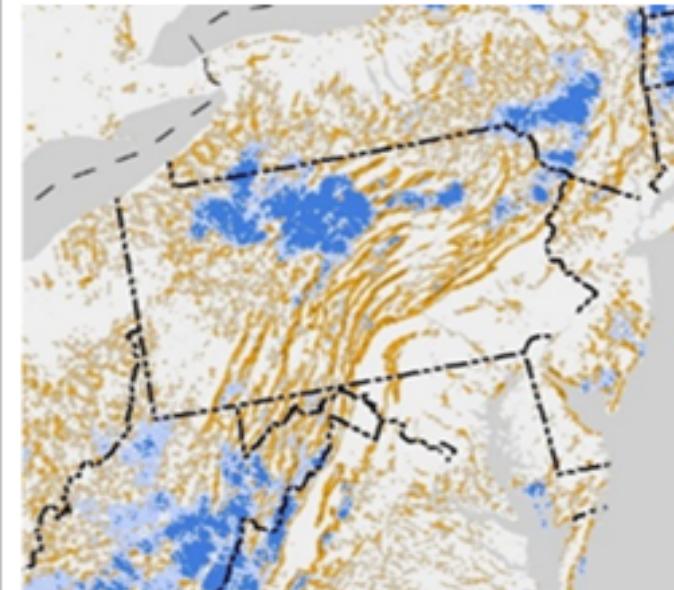
Continental Connectivity



Resilient & Connected Network



Flow Zones and Climate Corridors

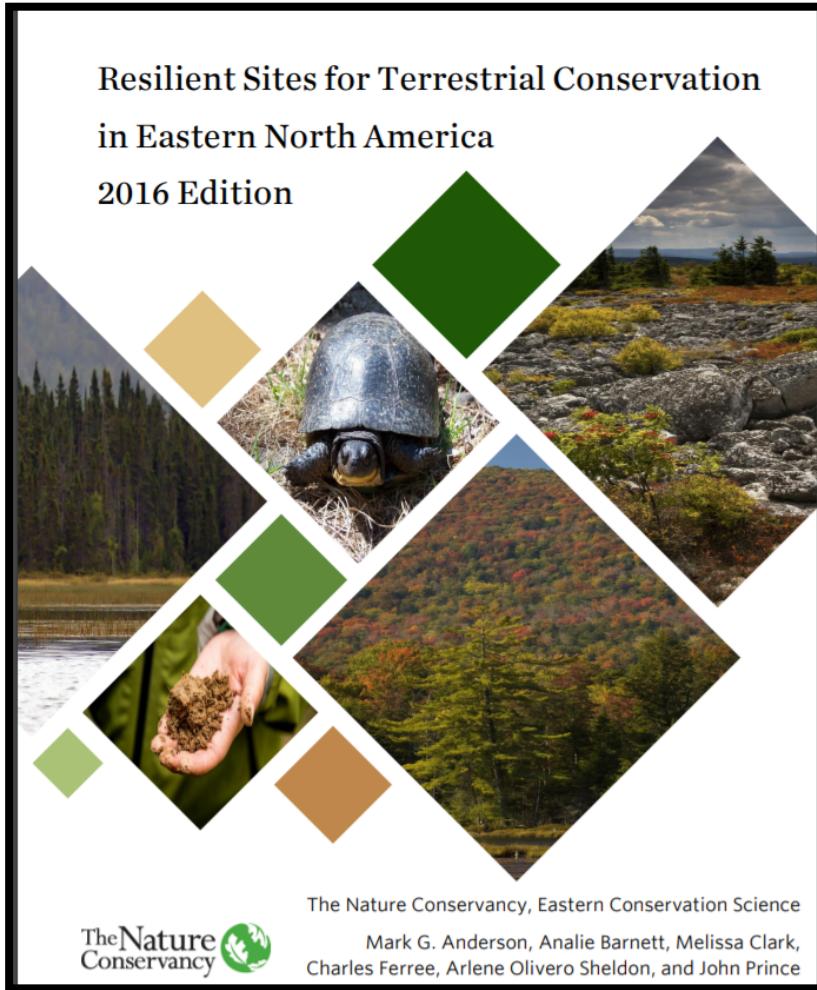


Climate Corridor

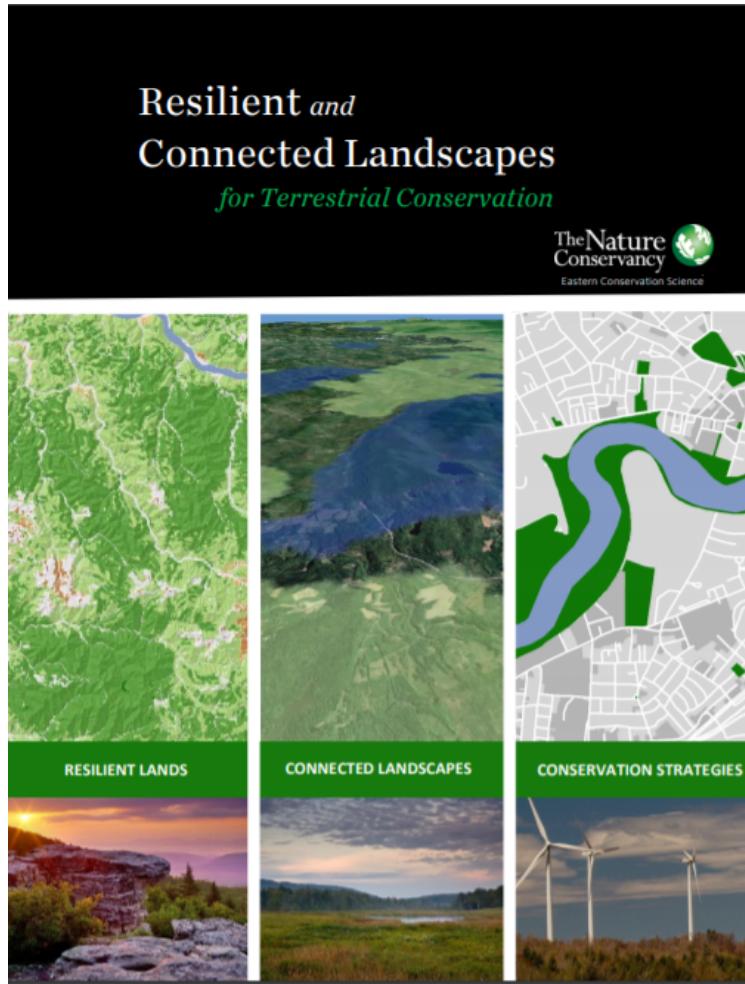
Climate Flow Zone

TNC PA's Renewable Energy Theory





www.conservationgateway.org
<http://maps.tnc.org/resilientland/>



Ecosystem Services

Questions asked in the RFP:

- *Is or has the proposed host property been considered degraded land?*
 - If no, will the impacts to soil, surface water/ground water, and wildlife be minimized or mitigated during construction?
 - If yes, describe the changes planned (or completed) for the site and interconnection to prepare for the solar installation.
- *What additional ecosystem services can be benefitted from the use of the Project's land beyond hosting the solar Project?*



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Penn State Benefits as an R1

- Collaboration with Penn State faculty and staff on potential research opportunities that could include "solar ecology, biodiversity, water cycling, nutrient capture,...technology development/testing to support increased system performance, decreased system costs and risk management (microclimate management, solar resource assessment and forecasting), etc.
- Undergraduate, graduate, or post-doctoral opportunities during development and/or operation of the Project.



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Community Benefits

- Temporary and permanent jobs.
- Tax revenue estimates for the local municipality.
- Background on projects built in the same jurisdiction.
- Will **community concerns** be addressed prior to or during construction? If so, describe plans to engage the community.



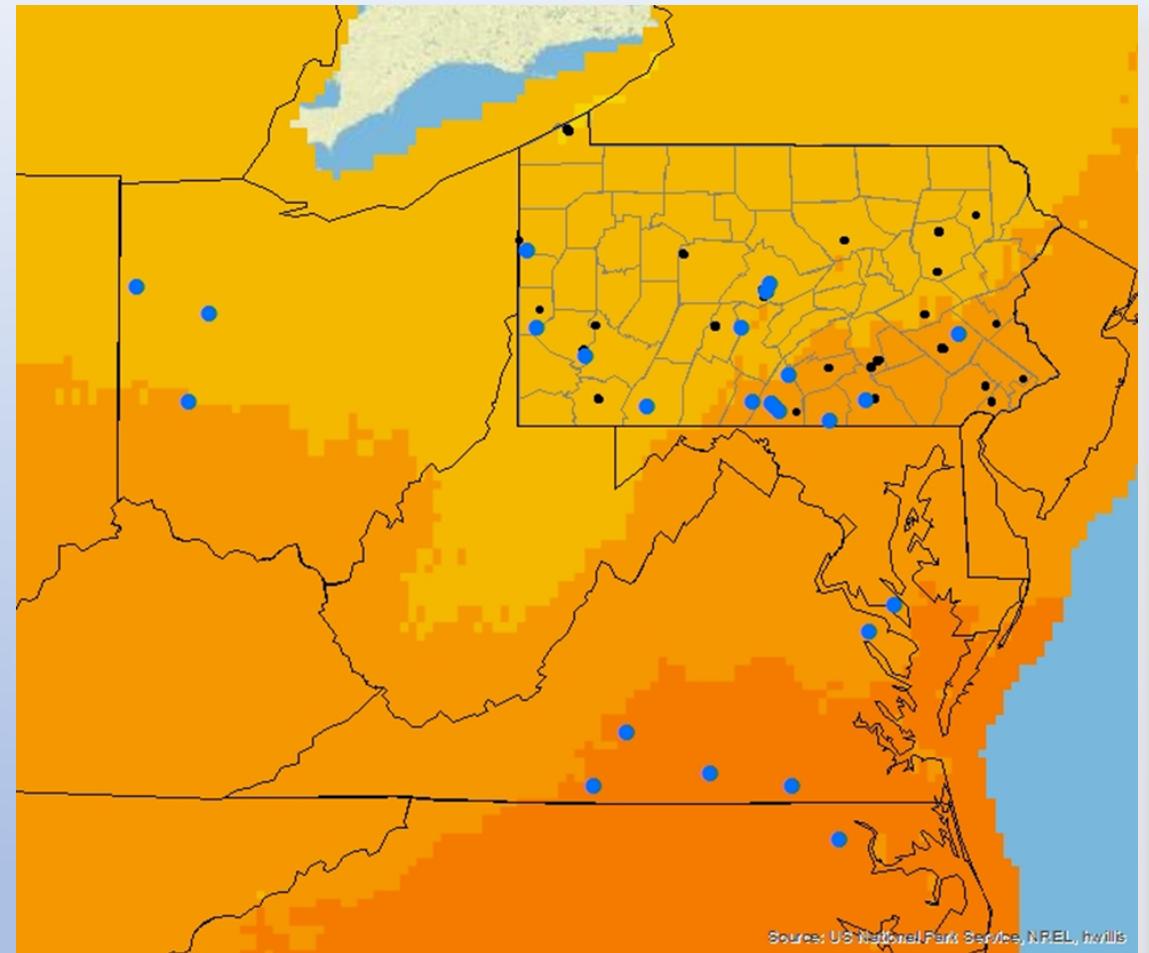
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RFP Results

- 43 Invitations/15 responses
- Location
 - 25 distinct project sites
 - 5 sites in PA
- Multiple Options
 - Sizes
 - Term Lengths
 - In-Service Dates
 - Escalators



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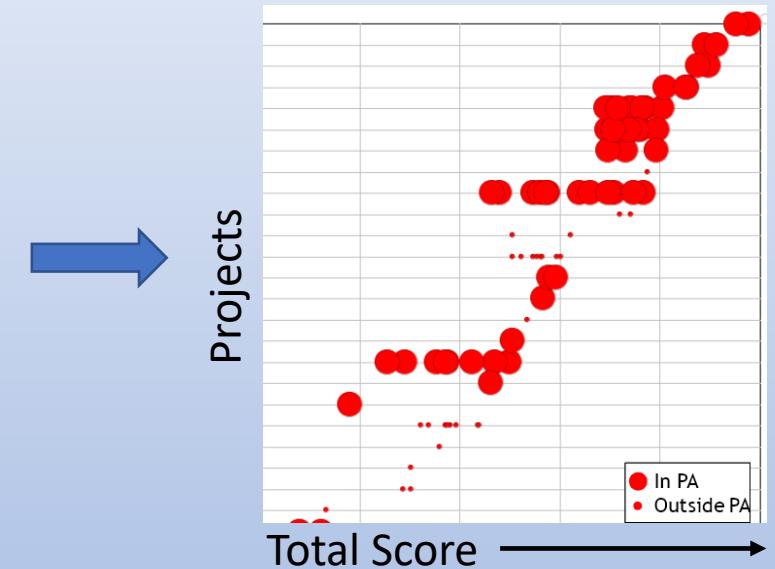
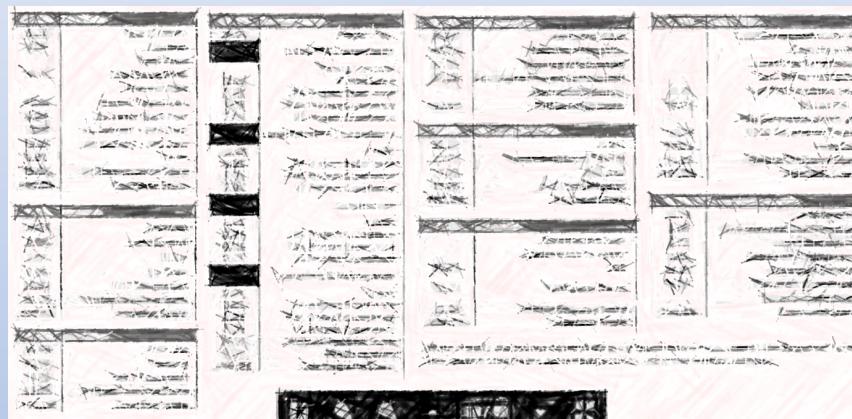
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Scoring Process

- Evaluation Criteria → RFP Questions → Score Sheet

Cost
Location
Size
Counterparty
Penn State Benefits
Host Community Benefits
Ecosystem Benefits



- Screening Team scored everything
- Full Committee reviewed results, selected four for interviews



<http://prxenergy.com/> <http://www.atsv.psu.edu/>



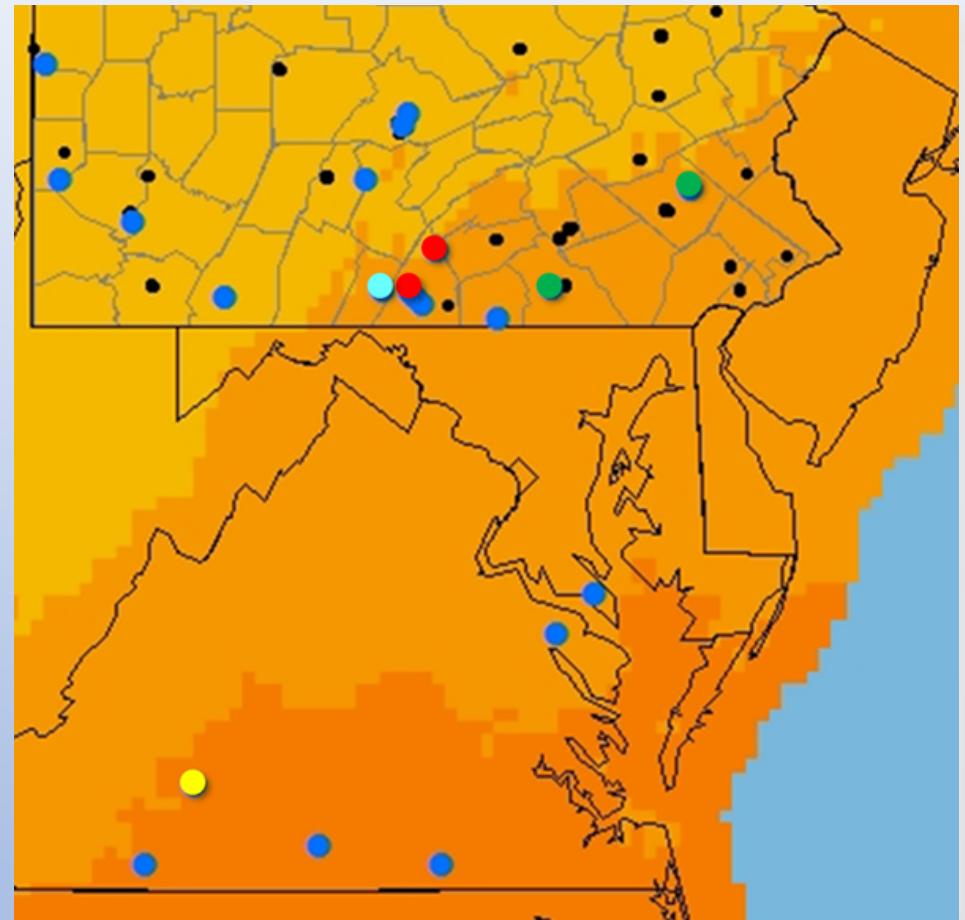
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Top Four Projects

- Observations
 - Three Projects in PA, one in VA
 - Three projects provided break even economics or better
 - VA Project has good value, but optics not as good
- Best Project is in PA
 - Scored highest overall
 - Actually 3 smaller projects near Penn State Mont Alto







Case Study: Supporting Penn State's Sustainability Goal Achievement



In February 2019, Lightsource BP and Penn State announced the development of 70 megawatts of offsite solar energy, enabling Penn State to achieve its goal of a 35% GHG reduction by 2020 while saving the university millions of dollars on their electricity bills and providing long-term budget certainty.

Project capacity

70 megawatts (DC) / 53 megawatts (AC)

Electricity production

102,000 megawatt-hours per year, 25% of the university's statewide annual electricity demand

Owner and operator

Lightsource BP

Power purchaser

Penn State, who will also receive in-state Solar Renewable Energy Credits (SRECs) from the project

Total project investment

\$75 Million by Lightsource BP

Total size

150,000 solar panels installed across three locations, encompassing 500 acres

Contract

25-year power purchase agreement (PPA)

Location

Franklin County, Pennsylvania, north of Penn State Mont Alto

Expected Completion

Summer 2020



70MW
CAPACITY



\$75M
LIGHTSOURCE BP
FUNDED



25%
PENN STATE'S
ANNUAL POWER
DEMAND



57,000MT
ABATED
GREENHOUSE GAS
EMISSIONS



2020
COMPLETION DATE



250
LOCAL JOBS

Benefits Beyond the Low Cost of Solar Electricity

We collaborate with universities and local communities, during solar planning and development all the way through the 30+ year lifetime of our solar farms. We foster solar energy education, local economies and ecosystems, to truly become a home-grown asset that communities can be proud of.



Revenue for Local Landowners

Provides landowners and their families with a new source of reliable income for 25-30 years



Job Creation & Economic Development

Grows local solar markets, creating scores of jobs in construction, operations, maintenance and asset management



A Healthier Environment

Lowers greenhouse gas emissions, helping universities meet their sustainability goals



Clean, Local Energy

Diversifies energy portfolios and increases security with locally generated power



Enhanced Biodiversity & Agriculture

Solar farming can boost crop yields, provide pollen, and be co-located with agriculture such as small livestock grazing, hay farming, and bee keeping



Student Involvement – A Living Laboratory

Students develop real-world experience in designing utility solar projects that help conserve the environment, along with Lightsource BP internships



Intended Project Benefits

- Lowers electric generation costs
- Provides long term budget certainty
- Lowers GHG emissions
- Positive Public Relations
- Curriculum and Educational Value
- Research Potential
- Internship Opportunities
- Reflects Student Attitudes
- Supports Governor Wolf's recent Executive Order committing the state to GHG reduction goals of 26% by 2025 and 80% by 2050
- Creation of 50 to 100 PA jobs over 6 months
- Lease payments to landowners
- Tax income for host community
- Ecosystem Benefits

➤ Create demand for responsibly developed projects



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Thank you!

Penn State Sustainability Institute

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Questions?



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