Low-Conflict Solar

2021 Solar Law Symposium June 18th, 2021



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Agenda

- Introduction to Lightsource bp
- Climate Goals and Policy
- Solar Integration on the Landscape
- SETO Research on Land Competition and Social Resistance
- Menu of Science Based Biodiversity Initiatives
- Biodiversity Initiatives by Project
- Biodiversity Internal Checklist
- Challenges
- Policy/Coalition Building
- Project Examples
- Solar Symposium

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Leading Solar Development



Lightsource bp in the U.S.

Since 2017, the team has developed a pipeline of 9GW of large-scale solar projects at various stages of development in 21 states across the United States.





Lightsource bp in Pennsylvania



Whitetail Projects

72 Megawatts in Franklin County

Whitetail 1,2, and 3 are powering 25% of all Penn State University campuses, while saving the University \$14 million in electricity bills over the contract term. Commercial operation began in September 2020.

Elk Hill Projects

46 Megawatts in Franklin County

Two solar farms with the Southeastern Pennsylvania Transportation Authority (SEPTA) will generate an estimated annual total of 67,029 MWh of clean and affordable solar energy, or nearly 20 percent of SEPTA's 380,000 MWh per year electricity demand.

Cottontail Projects

191 Megawatts in Central Pennsylvania

Commonwealth of PA awarded electricity accounts located throughout the state of Pennsylvania to Constellation, which in turn has executed an agreement to purchase power and project-specific renewable energy certificates (RECs) from Lightsource bp. Located on seven sites spanning six central Pennsylvania counties, the Pennsylvania PULSE (Project to Utilize Light and Solar Energy) is expected to achieve commercial operation by December 2022. Once complete, it will provide clean power to 16 COPA agencies. Pennsylvania is sourcing approximately 50 percent of its annual energy consumption from renewable energy, which is the largest solar commitment by any government in the U.S. announced to date.



Climate Goals and Policy



Biden Administration

- Rejoined the Paris Agreement
- National Climate Task Force declared its goal to cut greenhouse gas emissions to half of their 2005 levels by the end of the decade and reach net zero by 2050.
 - According to the team of energy experts at Princeton University who released <u>Net Zero America</u>, this endeavor will require around 227,800 sq miles of America to be blanketed in wind turbines and solar panels, roughly equal to the size of IL, IN, OH, KY, TN, MA, CT and RI put together.
- American Jobs Plan
 - > Tax Incentives
 - Domestic Manufacturing
 - Transmission Infrastructure
 - Clean Energy Standard

Pennsylvania

Governor Tom Wolf's Climate Change Executive Order

Lowering Pennsylvania's greenhouse gas emissions by 26% by 2025 and 80% by 2050, compared with 2005 levels as well as obtaining at least 40% of electricity from in-state clean energy sources.



Successful Solar Integration on the Landscape

- ✓ Low or No Conflict Siting
- ✓ Site Specific Environmental Studies
- Construction and Operations Best Management Practices
- ✓ Stakeholder Benefits and Engagement
- ✓ Plan for recycling and decommissioning
- ✓ Dual Land Use Strategies

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No or Low Conflict Siting

Utilize best in class publicly available data on species, natural resources and land designations to identify low- conflict locations.

- Flat
- Contiguous Land
- Floodplains
- Wetlands and
- Water Resources
- Corrosive or
- **Rocky Soil**
- Karst Landscape
- Nat Cap Exposure
- FAA

- •Oil & Gas
- Development
- Housing Density
- Strong
- Stakeholder
- Support
- Forest Land Cover
- •T&E Species
- FAA Conflict
- Prime Farmland
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Site Specific Environmental Surveys

Conduct site specific studies to investigate on-the-ground resources and identify potential risk factors

- Phase I Environmental Site Assessment
- Habitat / Land Use Study
- Threatened and Endangered Species Study
- Wetland and Waterway Delineations
- Cultural Resource Study
- Visual Assessment
- Sound Assessment
- Regulatory Agency Consultation

Best Management Practices

Implement industry standard best management practices for construction and operations.

- Implement avoidance and setbacks from sensitive or valuable habitat.
- Use previously disturbed land at the project site as much as possible.
- Remove habitat outside of species breeding seasons as appropriate.
- Manage invasive plant species by implementing appropriate control measures.
- Dispose of waste and other materials generated during construction promptly and sustainably to avoid attracting wildlife.
- Follow Avian and Power Line Interaction Committee recommendations on power lines and electrical infrastructure as needed to protect raptors from collision and electrocution.
- Conduct Wildlife and Natural Resource Awareness Training for staff and contactors on sensitive resources as needed.
- Develop Environmental Management Plans to document and track sustainability commitments and sitespecific environmental data.

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Stakeholder Benefits and Engagement

Integrate into the community and engage with stakeholders early and often.

Jobs

Solar projects create hundreds of jobs during construction .

Tax revenue

Solar farms contribute millions of dollars in property tax revenue, benefitting local schools, fire departments, parks, and other community public services

Revenue for landowners

Solar farms provide additional, reliable revenue for landowners and generations of their families for 25 or more years, contributing to the economics of farming business.

Educational Opportunities

Solar farms can be "living labs".

Philanthropic Commitments

Charitable donations and involvement with local organizations









Respect Sustainability Drive



Case Study Bighorn Solar in Colorado

Local jobs and job training - with equity

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Preserving and creating local jobs

- Through its cost effective and long-term predictable electricity rates, Bighorn Solar is helping ensure that the local steel mill that employs 1,000 workers is able to remain as well as expand in Pueblo, CO
- The majority of the 300 direct on-site construction jobs will be hired from the local community

Helping make job training accessible to underserved communities

- Grid Alternatives is national non-profit making renewable energy technology and job training accessible to low-income communities and communities of color
- Through this partnership, Lightsource bp sponsored a free solar training program for un- and underemployed workers in Pueblo

End of Project Management

Recycling

- PV panels typically consist of glass, aluminum, copper, silver and semiconductor materials that can be successfully recovered and reused. By weight, more than 80 percent of a typical PV panel is glass and aluminum – both common and easy-to-recycle materials.
- SEIA has created a national PV recycling memberbased program that aggregates the services offered by recycling vendors and PV manufacturers, making it easier to select a cost-effective and environmentally responsible end-of-life management solution.

Decommissioning

- Remove any aboveground and below ground mechanical equipment, wiring, and structural components.
- Any disturbed earth as a result of the removal of the equipment shall be restored, graded and reseeded or immediately returned to another allowed use.
- Post and maintain financial security in the amount of the net decommissioning costs.



Myth Busting: Solar Panel Safety

- > The strong lamination process used during manufacturing of solar photovoltaic (PV) panels would capture any potentially hazardous material within the laminated glass assembly, preventing exposure to the environment.
- > A test called the toxicity characteristic leaching procedure (TCLP) is used to determine if, in the event of breakage of a solar panel, any contaminants could potentially leak into the environment at toxic levels. There are strict limits established by the US EPA under the US Federal Resource Conservation and Recovery Act (RCRA). Sustainability 14_{Drive}

Safety

Integrity Respect

Dual Land Use for Solar

Land Regeneration

- Solar Energy temporarily sets aside land and protects it from permanent loss due to industrialization
- "Resting" the ground will return it to a better condition at the end of the Projects useful life

Ecosystem Services

- Agrivoltaics is the combination of agriculture and solar photovoltaics
- Conservation and food production





Sheep Grazing: utilization of sheep to manage vegetation that would otherwise be removed using herbicides or mowers.

Science -Based Dual Land Use Initiatives for Solar

Pollinator Habitat: Installation of high- or low-density pollinator habitat either among the solar PV arrays or elsewhere within the solar facility footprint area.

Habitat Conservation: Conserve, protect and restore habitats.

Soil Carbon Monitoring: Establish soil carbon levels and its increase over the lifetime of the project.

Bees: Research settings only; questionable conservation meaning in some scientific communities.

Food Crops: more research needed



Dual Land Use Drivers

- Sustainability Commitments
- Project Requirements
- Local Permitting, PPAs
- Stakeholder Influence
- Conservation Community (eNGOs), Regulators
- > Land Competition / Social Resistance
- Dual use land strategies increase community acceptance and land conflict.



Land Competition lightsource bp and Social Resistance

According to recent research completed by DOE's Solar Energy Technology Office, agrivoltaics will play an important role in regions where development may be perceived as a threat to agricultural interests.

- Increases community acceptance for utility scale projects by offering diversified revenue streams for community members and alleviating land use competition.
- Social component can ultimately determine the success of a solar project.

Anonymous solar developer in the SETO study:

"On the operational side it creates complexity, but on the development [side] it helps you build partnerships, it helps you get community approval, it helps you benefit the local environment with pollinators or animals or whatever they're doing to help the land."

Case Study Whitetail Solar in Pennsylvania

Combining agrivoltaics & habitat conservation

• Working with partners on inventive ways for America's farmers to make their land productive and profitable

- Lightsource bp is a member of the American Solar Grazing Association (ASGA), a non-profit dedicated to agrivoltaics: the combination of agriculture and solar photovoltaics through sheep grazing on solar sites to maintain the land and provide an additional source of income to local farmers
- ASGA, in partnership with Ernst Conservation Seeds and Pollinator Service has developed a seed mix called 'Fuzz & Buzz' specially designed for solar sites for grazing, and biodiverse enough to support a range of pollinators
- Lightsource bp has planted Fuzz & Buzz at our three Whitetail Solar sites in Pennsylvania and we're working with ASGA and other partners to potentially use this as a model of combining solar with both grazing and pollinator habitat conservation for future solar developments





Stabilization and revegetation of an overused – overgrazed drainage channel on site.

Challenges

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Pollinator habitat and Agrivoltaics requirements and recommendations are emerging in policy, permitting and legislation.

- Several states/universities have created scorecards or model ordinances to guide the implementation of solar-native vegetation (Perdue, Great Plains Institute, Indiana University)
- Several states and members of Congress have proposed or passed legislation that involves requiring pollinator habitat or Agrivoltaics

Costs of particular seed mixes (like native), costs of seedling establishment, vegetation height restrictions, and long-term maintenance needs are not considered or understood by stakeholders.

Stormwater Construction Permit Requirements can be at risk due to difficulty of establishment.

Local jurisdictions are adopting model ordinances and dual land use requirements.

Example: White County, Indiana:

- Pollinator-friendly seed mix and native plants at a rate of 2:1 for every square foot of solar panel area
- Requires solar panels to be at least 3 feet above grade.
- 40% of the planting on site to be wildflowers

Insurance may require vegetation height restrictions that limit the types pollinator and other habitat under panels.

Providing habitat for threatened and endangered species can create liability under the federal Endangered Species Act.



Policy and Coalition Building

Incentives are needed for the solar industry to provide clean, renewable electricity and implement dual land use strategies.

- Solar projects opt into agricultural taxation and not be subject to rollback taxes for agricultural conversion penalty
- Solar is given a way to opt into existing programs for conservation set aside that NRCS (a division of USDA)
- > Special federal tax class for solar and agricultural use
- Creation of agri-businesses and farm enterprises to support this emerging sub economy of solar

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Solar Symposium December 2021

Goals

- \checkmark Frame state of the science of solar
- ✓ Inform future research
- ✓ Produce proceedings on presentations/panel discussions
- ✓ Publish white paper on solar and wildlife, natural resources, challenges to be addressed



Sponsors/Supporters

U.S. DOE Solar Program, Argonne, NREL(Inspire) labs, EPRI, LSbp, Duke, Apex, NEE, Xcel, AES, Avangrid, Clearway, Cypress Creek, Defenders of Wildlife, Audubon, ASWG

Topics

- Wildlife/habitat conservation/integration with landscapes
- ✓ Land management/Use
- ✓ Water resource management
- ✓ Other environmental issues



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