NAVIGATING THE INTERSECTION 
OF SOLAR ENERGY AND CONSERVATION

Nava Tabak & Mike Kane
October 19, 2019

#Rally2019
The Green Path to a Stable Climate

We Must Cut 30 Gigatons a Year of Carbon Emissions By 2030 If We Are to keep global temperature increases well below 2 degrees Celsius, (3.6 degrees Fahrenheit). Nature can reduce more than one-third of the emissions needed to hit this goal if countries invest in carbon-storing forests, grasslands, wetlands and farmlands.

Weighty Matters

A gigaton equals 1 billion metric tons – the equivalent of about 3,000 Empire State Buildings. Carbon figures below are in millions of metric tons.

Of the 30 gigatons of excess carbon in the atmosphere each year, 11 gigatons could be removed using nature itself.

Protect

- Protect Forests: 3,007
- Protect Wetlands: 962
- Protect Grasslands: 35

Manage

- Manage Timberlands Better: 1,275
- Manage Croplands Better: 1,936
- Manage Grazing Lands Better: 485

Restore

- Restore Forests: 3,037
- Restore Wetlands: 594

The Nature Conservancy

https://www.nature.org/en-us/magazine/magazine-articles/carbon-capture/
LAND CONSERVATION GOALS:
BIODIVERSITY, RECREATION, AGRICULTURE, SCENIC, CULTURAL... AND MORE!

CLIMATE CHANGE
PHOTOVOLTAIC SOLAR ENERGY SITING
PHOTOVOLTAIC SOLAR ENERGY SITING

- State policy
- Regulatory environment
- Local decision making
A siting framework:

- **LOCATE**
  - Protect/avoid impacts to critical resources
  - Promote low-impact location and co-benefits

- **MITIGATE**

- **RESTORE**
Piedmont Environmental Council
- Policy and regulatory environment drives change. Are we ready?
- Assisting local governments develop frame to evaluating & permitting projects

Scenic Hudson
- Analysis of solar suitability and conservation priorities
- Engaging in habitat mitigation at a development site

Q&A/Discussion
The Piedmont Environmental Council (PEC) was founded in 1972 and is a non-profit organization dedicated to promoting and protecting the Piedmont’s rural economy, natural resources, history and beauty.
Large Landscape Conservation.....

...seeking to maintain the integrity of the region’s landscape as a whole
It’s an **interconnected world** requiring a multi-faceted approach…..

- **Land Use/Transportation Policy.** Attention to land use and transportation planning that focuses on smart, fiscally prudent, growth alternatives

- **Land Conservation.** Strategically conserve land that protects natural, scenic, and historic resources

- **Land & Resource Stewardship.** Promote and provide guidance for creating sustainable wildlife habitat on private lands

- **Rural Economy.** Encourage agricultural practices that enhance farm productivity, sustainability, and profitability

- **Connecting People to the Land.** Foster citizen engagement and the creation of a community wide conservation ethic
...and, finally, promoting sustainable energy choices

- Demonstrating power of small scale solar and geo-thermal
- Leading local campaigns to promote distributed energy / solar
- Evaluating efficacy of energy transmission & generation facilities
“Virginia is slated to embark on a period of accelerated renewable energy development”

---- The Commonwealth of Virginia’s 2018 Energy Plan
"The Solar Energy Industries Association projects that solar energy will grow by an additional 2,293 MW (in Virginia) over the next five years."

--Energy Plan, p.9

"Virginia has seen a dramatic increase in its installed solar capacity, growing from 17 MW in 2014 to more than 320 MW installed and a total of 750 MW of solar resources permitted through the PBR as of August 2018."

--Energy Plan, p.14
DEQ has issued 26 permits for solar projects, with an additional 63 Notices of Intent to apply in the PBR queue totaling 3,534 megawatts. –VA DEQ
What’s generating all this heat for solar facilities?
VIRGINIA ACTS OF ASSEMBLY -- 2018 SESSION

CHAPTER 39

Be it enacted by the General Assembly of Virginia:

1. That §§ 56-52A-2, 56-52A-3, 56-52A-4, 56-52A-5, 56-52A-6, 56-52A-7, 56-52A-8, 56-52A-9, and 56-52A-10 of title 56, chapter 52A, code of Virginia are hereby amended and reenacted and the title of chapter 52A, code of Virginia is amended by removing the words, "electric" and inserting the words, "electric or";

2. That § 56-52A-2 is hereby amended and reenacted;

3. That § 56-52A-3 is hereby amended and reenacted.

Approved March 5, 2018

[5.06]
Market and Regulatory Forces

- Reduction in production costs
- Demand from corporate users seeking renewables
- Regulatory and tax incentives
  - SB 966 declares that 5,000 MW of utility-owned wind and solar in the public interest
  - DEQ (not SCC) permits facilities 5MW to 150MW via Permit By Rule (PBR)
  - Machine & Tool Tax (M&T) Exemption—80% exemption for projects generating between 20 MW and 150 MW
More energy production from renewable sources. That’s good news. Right?

Yes, there are obvious environmental, economic, and public health benefits to expanding the renewable energy portfolio.
Distributed Energy Vs. Utility-Scale Solar

Utility-Scale Solar needs about 8 acres to generate 1 MW of electricity

...and the vast majority MW generated from projected solar energy development occurring in VA will be Utility-Scale Solar
How Much in VA?

5,000 MW in public interest * 8 acres
= 40,000+/- acres?

63 Notices to DEQ totaling 3,534 MW
= 35,834 acres
(or 10.1 acres per MW)

5 Yr Forecast of
2,293 MW * 8 acres
= 18,344+/- acres?
Every Source Has Its Cost

Or, there is no such thing as a free lunch
Southampton Solar

- 100 MW
- 1,437 acres,
- 1% of agricultural land in County
- 1,288 acres under panels
Overhead View From Northwest of Luray
The Spotsylvania Solar Energy Center (Project) is a 500-Megawatt (MWac) solar project encompassing approximately 6,350 acres. The Project Site currently consists of recently timbered land and is bordered by other forested lands and scattered single-family residences.
The size, scale, and number of projects are raising concern about the impact of solar facilities:

- Loss of productive and economically viable farmland
- Destruction of forest land
- Threats to significant natural and cultural resources
- Uncertainty about how utility scale solar fits into local comprehensive planning
A company suggested installing solar panels near Virginia Civil War battlefields. Locals raged — and what happened next will happen again, experts say.

The impacts are generating an angry contingent of neighbors and conservationists.
And...state agencies and local governments are playing catch-up
A first cut—The local planning district, the Rappahannock-Rapidan Regional Commission (RRRC) provided “guidance” by analyzing areas where utility scale solar might be “optimal”
RRRC—Guidance on Siting Utility Scale Solar

### Methodology

<table>
<thead>
<tr>
<th>Step</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Total study area</td>
</tr>
<tr>
<td>1</td>
<td>Not in 100-year floodplain</td>
</tr>
<tr>
<td>2</td>
<td>Not in wetland</td>
</tr>
<tr>
<td>3*</td>
<td>Not in protected areas</td>
</tr>
<tr>
<td>4</td>
<td>Slope &lt; 5 or 5-10% and South Facing</td>
</tr>
<tr>
<td>5</td>
<td>Adjacent to high capacity transmission line (within 1 mile)</td>
</tr>
<tr>
<td>6</td>
<td>Within 3 miles of substation</td>
</tr>
<tr>
<td>7</td>
<td>Not on prime ag lands</td>
</tr>
</tbody>
</table>

*Step 3* is conditional.
## Results

<table>
<thead>
<tr>
<th>County</th>
<th>Sq. Miles</th>
<th>% of Total Land</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fauquier</td>
<td>40.2</td>
<td>6.2%</td>
</tr>
<tr>
<td>Culpeper</td>
<td>23.2</td>
<td>6.1%</td>
</tr>
<tr>
<td>Madison</td>
<td>5.4</td>
<td>1.7%</td>
</tr>
<tr>
<td>Orange</td>
<td>45.5</td>
<td>13.3%</td>
</tr>
<tr>
<td>Rappahannock</td>
<td>5.1</td>
<td>1.9%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>119.4</strong></td>
<td><strong>6.1%</strong></td>
</tr>
</tbody>
</table>

![Optimal Areas for Utility Scale Solar](image.png)
Cricket Solar – Utility Scale Solar Proposal
Culpeper County, VA

- Proposed 1,500+ acre development within the area RRRC identified as “optimal” for utility scale solar
- Rapidan River (1.5+ Miles), with associated wetland and floodplain areas
- Forest land (240+ Ac DOF)
- Prime/Statewide Soils (600+ Ac)
- Morton's Ford and Racoon Ford Battlefields (Core and Study)
- 3 National Register Sites w/n 1-mile (Greenville, Eckington School, Lessland)
The RRRC “guidance” did not consider important natural and cultural resources.

“Optimal” turns out to be not necessarily “appropriate”.

Cricket Solar – Utility Scale Solar Proposal
Culpeper County, VA
So, what is a land trust to do?
Engaging & Educating Local Jurisdictions

-PEC has been working with localities in our region since utility-scale solar applications arose

-Educate officials, citizens, and developers:
  -siting considerations, long-term impacts, and mitigation measures to address specific impacts

-Submission of written comments, local presentations, creation of local ordinances
Utility Solar Siting Considerations

Avoid
Co-Locate
Mitigate
Restore
Local Policy and Regulatory Tools

PUBLIC PROCESS (PERMITS)
- USS = Industrial Facilities
- Conditional or Special Use Permit in agriculturally zoned areas
- By Right in existing industrial zoned areas
- No spot zoning

SITING CRITERIA (POLICY DOCUMENT)
- Use Comprehensive Plan as guideline
- Highlight potential impacts, mitigation measures, and conflicts with county resources
- Delineate impacts to be avoided and those that could potentially be mitigated
- Set clear expectations for industry/citizens
Avoid impacts to prime and productive agricultural soils
Avoid impacts to historical and cultural resources
Avoid disrupting the visual integrity of scenic landscapes
Avoid impacts to significant natural systems and features, such as wetlands, natural heritage resources, etc
Siting—Target Existing Developed Areas

Siting solar facilities on rooftops, parking areas, or other previously disturbed land like “brownfields is preferable to development on valuable open space or agricultural land.
Siting—Co-locating with other infrastructure

Remington Solar Facility
20 MW - 196 acres under panels
After ensuring proper site selection, manage construction and operation of facility to mitigate impacts. Design to:
Mitigate Impacts—Address Stormwater

Require Erosion and Sediment Control Plan (ESCP) that includes:

- Extent of grading and appropriate grading phases;
- Management of runoff during and after construction/grading activities and throughout Project lifetime;
- Address the impervious nature of solar panels and the creation of “drip-line erosion”
Mitigate Impacts—Minimize ground disturbance

Grading and fill should be avoided. In cases where grading is required, topsoil should be stored on site and replaced after the grading is completed.

Photo Credit: RBI Solar via Solar Power World
Mitigate Impacts—Incorporate agricultural uses?

Figure 8: Beekeeping activities on a USS Facility.
Vegetate with native species, warm season grasses and a diversity of pollinator plants amidst and surrounding panels.

Control invasive and non-native plant species through integrated management approaches.

Document wildlife travel corridors prior to construction activities. Divide large contiguous sites with single perimeter fencing into smaller fenced sub-parcels.

Perimeter fence should either be no more than 61" high OR greater than or equal to 96" (8') high.

Mitigate Impacts—Natural Systems & Habitat
Restoration after decommission

- Site should be returned to its pre-construction condition, with all traces of the system removed at the end of a facility’s useful life.
- Assessment / documentation of resources prior to construction (for baseline) and at time of decommission.
- Specific decommission instructions and costs can be accomplished with a contract condition (landowner) and bonding from the company.
Need to make the transition to renewables. But...

- **State and local policy** will drive the size, scale, siting, and pace of utility scale solar facilities.
- Utility scale solar facilities are **large industrial uses**, with dramatic space requirements (at least until technology improves).
- Site considerations need to take place at **regional** and **site specific** level. There will be impacts on natural, cultural, scenic resources.
- Local government should take a comprehensive approach planning for and permitting facilities. **Land trusts can help** locals understand the siting and design issues and related trade-offs.
Our Mission
Scenic Hudson preserves land and farms and creates parks that connect people with the inspirational power of the Hudson River, while fighting threats to the river and natural resources that are the foundation of the valley’s prosperity.
THE HUDSON RIVER VALLEY
RENEWABLE ENERGY SITING

STRATEGIC LAND CONSERVATION (Hudson Valley Conservation Strategy)

SEA LEVEL RISE
- Tidal wetland conservation
- Waterfront community resilience

STEWARDSHIP & RESTORATION
- Agricultural practices
- Shoreline restoration
- Forest management
VISION FOR THE HUDSON VALLEY

To rapidly transition the Hudson Valley to a sustainable, low-carbon region increasingly powered by renewable energy in order to mitigate climate change, while protecting and preserving the region’s invaluable scenic, historic, agricultural, environmental and economic resources.
2019: CLIMATE LEADERSHIP AND COMMUNITY PROTECTION ACT
70% renewables by 2030
100% renewables by 2040

NYS Article 10 Law
Siting Review for electric generating facilities >25 MW

### Exhibit 4-1. Large-Scale Renewables Generation and Installed Capacity, By Alternative

<table>
<thead>
<tr>
<th>RENEWABLE SOURCE</th>
<th>REGENERATION (GWH)</th>
<th>INSTALLED CAPACITY (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BASE CASE</td>
<td>HIGH LOAD</td>
</tr>
<tr>
<td><strong>To 2023</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land-based Wind</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PPA</td>
<td>6,251</td>
<td>8,311</td>
</tr>
<tr>
<td>BLEND</td>
<td>5,853</td>
<td>7,570</td>
</tr>
<tr>
<td>FIXED REC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utility-scale Solar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PPA</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>BLEND</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>FIXED REC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydro</td>
<td>591</td>
<td>354</td>
</tr>
<tr>
<td>PPA</td>
<td>565</td>
<td>766</td>
</tr>
<tr>
<td>BLEND</td>
<td>539</td>
<td></td>
</tr>
<tr>
<td>FIXED REC</td>
<td>605</td>
<td>576</td>
</tr>
<tr>
<td>Biomass/ADG</td>
<td>286</td>
<td>732</td>
</tr>
<tr>
<td>PPA</td>
<td>485</td>
<td>1,098</td>
</tr>
<tr>
<td>BLEND</td>
<td>684</td>
<td></td>
</tr>
<tr>
<td>FIXED REC</td>
<td>732</td>
<td>1,098</td>
</tr>
<tr>
<td>Offshore Wind</td>
<td>579</td>
<td>1,776</td>
</tr>
<tr>
<td>PPA</td>
<td>654</td>
<td>1,769</td>
</tr>
<tr>
<td>BLEND</td>
<td>729</td>
<td></td>
</tr>
<tr>
<td>FIXED REC</td>
<td>1,776</td>
<td>1,769</td>
</tr>
<tr>
<td>Imports</td>
<td>759</td>
<td>1,776</td>
</tr>
<tr>
<td>PPA</td>
<td>654</td>
<td>1,769</td>
</tr>
<tr>
<td>BLEND</td>
<td>729</td>
<td></td>
</tr>
<tr>
<td>FIXED REC</td>
<td>1,776</td>
<td>1,769</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7,707</td>
<td>11,778</td>
</tr>
</tbody>
</table>

| **To 2030**      |           |           |           |           |           |           |           |           |           |           |
| Land-based Wind  |          |           |           |           |           |           |           |           |           |           |
| PPA             | 13,651   | 19,802    | 18,749    | 4,000     | 4,188     | 4,375     | 5,905     | 5,738     | 5,570     |
| BLEND           | 14,326   | 19,276    | 18,410    | 4,188     | 4,375     | 4,650     | 6,032     | 6,865     |
| FIXED REC       |           |           |           |           |           |           |           |           |           |
| Utility-scale Solar |        |           |           |           |           |           |           |           |           |
| PPA             | 3,274    | 6,144     | 8,110     | 2,376     | 3,855     | 4,974     | 5,200     | 6,032     | 6,865     |
| BLEND           | 4,582    | 7,127     |           | 2,376     | 3,855     | 4,974     | 5,200     | 6,032     | 6,865     |
| FIXED REC       |           |           |           |           |           |           |           |           |           |
| Hydro           | 2,899    | 2,867     | 2,808     | 608       | 587       | 566       | 624       | 616       | 609       |
| PPA             | 7,220    | 2,837     |           | 587       | 566       | 546       | 624       | 616       | 609       |
| FIXED REC       | 2,630    |           |           |           |           |           |           |           |           |
| Biomass/ADG     | 722      | 732       | 2,472     | 110       | 175       | 240       | 111       | 235       | 359       |
| PPA             | 1,179    | 1,602     |           | 175       | 240       | 310       | 111       | 235       | 359       |
| FIXED REC       | 1,637    |           |           |           |           |           |           |           |           |
| Offshore Wind   | 6,839    | 7,826     | 5,467     | 1,599     | 1,000     | 400       | 1,830     | 1,554     | 1,278     |
| PPA             | 4,275    | 6,646     |           | 1,000     | 400       | 1,000     | 1,830     | 1,554     | 1,278     |
| FIXED REC       | 1,711    |           |           |           |           |           |           |           |           |
| Imports         | 1,759    | 2,879     | 2,644     | 455       | 516       | 576       | 834       | 777       | 721       |
| PPA             | 1,972    | 2,761     |           | 516       | 576       | 576       | 834       | 777       | 721       |
| FIXED REC       | 2,185    |           |           |           |           |           |           |           |           |
| **Total**       | 29,054   | 40,249    | 40,249    | 9,508     | 10,320    | 11,132    | 14,504    | 14,953    | 15,403    |
RENEWABLE ENERGY GOALS
IN RELATION TO RESOURCES ON THE GROUND
IN THE HUDSON VALLEY

Land Needed

Land Suitable
State renewable energy goal for region (MW)

- Other renewables
  - Rooftop/Parking lot
  - Brownfield
- Solar
  - Community (≤20MW)
  - Utility/Industrial (>20MW)
NYISO Load Zones
Scenic Hudson Focus Counties

1700 - 1950 MW
430 - 630 MW
Land Needed

Land Suitable

APPROX.

6,200 – 7,900 ac*

* Assumes 6 ac/1MW. All of Zone G + ~36% of Zone F (based on proportion of open land class area within 1.5mi of transmission lines in Zone F vs that in SH counties in Zone F)
“Solar-suitable”
“Solar-suitable”

• Open land cover (habitat)
“Solar-suitable”

- Open land cover (habitat)
- Within 1.5 mi of transmission lines
“Solar-suitable”

- Open land cover (habitat)
- Within 1.5 mi of transmission lines
- Slope
- Aspect
- State regulated wetlands + 100 ft buffer
- ≥ 50 contiguous acres
Land Needed

APPROX.
6,200 – 7,900 ac*

Land Suitable

APPROX.
187,000 ac

* Assumes 6 ac/1MW. All of Zone G + ~36% of Zone F, based on proportion of open land class area within 1.5mi of transmission lines in Zone F and in SH counties in Zone F
“Solar-suitable”

- Open land cover (habitat)
- Within 1.5 mi of transmission lines
- Slope
- Aspect
- State regulated wetlands + 100 ft buffer
- ≥ 50 contiguous acres

Resources

- Habitat
  - Rare species and natural communities
  - Audubon Important Bird Areas
- Agriculture
  - Important farmland soils
  - Scenic Hudson’s Foodshed Farms
Solar-suitable: 187,767 ac total

Farm Soils: 1,416,871 ac total

Not overlapping: 36,674 ac
- 20%

Not overlapping: 1,265,778 ac
- 89%

Overlap: 151,093 ac
Solar-suitable
187,767 ac total

Prime Farm Soils
435,138 ac total

Not overlapping:
132,749 ac
71%

55,018 ac
overlap

Not overlapping:
380,120 ac
87%
Solar-suitable
187,767 ac total

Rare Species/Habitat
111,456 ac total

Not overlapping:
183,887 ac
99%

Not overlapping:
108,978 ac
98%

3,880 ac overlap
RENEWABLE ENERGY GOALS
IN RELATION TO RESOURCES ON THE GROUND
IN THE HUDSON VALLEY

• On a coarse scale, there is ample land for commercial scale solar siting that is not coincident with our highest conservation priorities

• Agricultural land will likely be impacted - prioritize Prime soils for protection

• Some impacts to these resource can be avoided or minimized by project design
GREENE COUNTY GRASSLANDS

- Rare overwintering raptors
- Grassland breeding birds
REGIONAL CONTEXT

- Greene County Grasslands
- Greene Land Trust
  Coxsackie Creek Grasslands Preserve
REGIONAL CONTEXT

- Management Plan (2014)
Grasslands Preserve

REGIONAL CONTEXT

• Management Plan (2014)
• Coxsackie solar development proposals
• Little research/data available on raptor response to solar PV

40 – 100 ac
100 – 250 ac
250 – 500 ac
500 – 715 ac
Proposed Projects in Greene County, NY

- Flint Mine Solar Project
- Hecate Greene Solar Project
FLINT MINE SOLAR

- 100 MW, 1800 acres total, ~600 ac of solar arrays
- 51% Agricultural lands (16% active, 35% abandoned)
- Multiple landowners (proposing leases and fee acquisitions)
- Topography and panel layout minimize visibility
- Mitigation proposed in the form of preservation of grassland habitat and archeological site
HECATE GREENE

- 50MW, 933 acres total; ~400 acres of solar arrays
- Single farm landowner – solar lease needed for farm viability
- Portion of project within NYSDAM Agricultural District
- Visibility is more extensive, though still limited
AGRICULTURAL RESOURCES

- Farm soils
- Farm viability

- Prime Farmland
- Prime Farmland if Drained
- Farmland of Statewide Importance
Consultation with Greene Land Trust and grassland habitat experts

- Assess the cumulative impact of the two proposals
- Examine alternate array layouts to reduce impacts
- Consider additional habitat mitigation options
Consultation with Greene Land Trust and grassland habitat experts

- Cumulative impact: very high
- Propose a layout of arrays: Flint Mine has higher potential for lesser impact (west)
- Habitat mitigation: some potential locations off-site, need to integrate on-site, need to design cumulatively
NEXT STEPS – Greene County Grasslands

• Seeking project review intervenor funding
• Hiring consultant with expertise in avian ecology and mitigation to review designs, propose mitigation scenarios, and provide expert testimony (if needed)
• Engaging directly with developers, as opportunities allow
• Promoting research to fill knowledge gaps
NEXT STEPS - Regionally

- Solar siting decision support tool (guidelines with online mapper)
- Working with municipalities and the siting tool
- Zoning: step-by-step guide for developing a local solar zoning law
SUMMARY

- State policy & regulation are key drivers
- Local decision makers often need support
- Understand the region to promote smart siting
- Be prepared to address site-specific impacts
NAVIGATING THE INTERSECTION OF SOLAR ENERGY AND CONSERVATION

Nava Tabak & Mike Kane
October 19, 2019

#Rally2019
Navigating the Intersection of Solar Energy and Conservation

DISCUSSION

• Your Region:
  • Tools/strategies
  • Challenges
  • Policy/regulatory environment
• Siting renewables on conserved lands
• Transmission lines