



Land Use and Siting Solar in Vermont

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Vermont Energy and Climate Action Network

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Outline

- Basic scheme of land use regulation in Vermont
 - Three types:
 - Traditional (farming and forestry)
 - Development (Act 250)
 - Energy: public-good criteria in “Section 248”
- Farmland in Section 248
- “Above and beyond”
 - Pollinator-friendly
 - “Agrivoltaics” – i.e. farming within solar
 - Or both!?



1. Traditional land use

- Farming and forestry
 - Farming is defined in the development law.
 - ... as not subject to development laws.
 - Certain activities are named, and “principally produced on the farm”
 - Land-use laws on farming mainly protect water quality and affect taxation.



2. Development

- Above a certain size, statewide regulation “Act 250”
- Farmland destroyed must be mitigated through conservation for use as farming
 - “prime ag,” i.e. primary agricultural soils as defined in statute
- On-site preferred, off-site carries an acreage multiplier
- Statewide Natural Resources Board, regional District Commissions who review projects.



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3. Energy

- Statewide siting, “Section 248”, [30 V.S.A. § 248](#)
 - Weighing the public good
 - Some utility system and economic criteria (subsection (b))
 - Uses environmental criteria from Act 250, including farmland
 - Farmland: “no undue adverse impact”
 - I.e. be able to put it back the way you found it.
 - Primary agricultural soils defined in 10 V.S.A. § 6001



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NRCS-mapped farmland

Farmland Classification Systems for Vermont Soils

April 2018

United States Department of Agriculture
Natural Resources Conservation Service



Vermont NRCS State Office
356 Mountain View Drive, Suite 105
Colchester, VT 05446

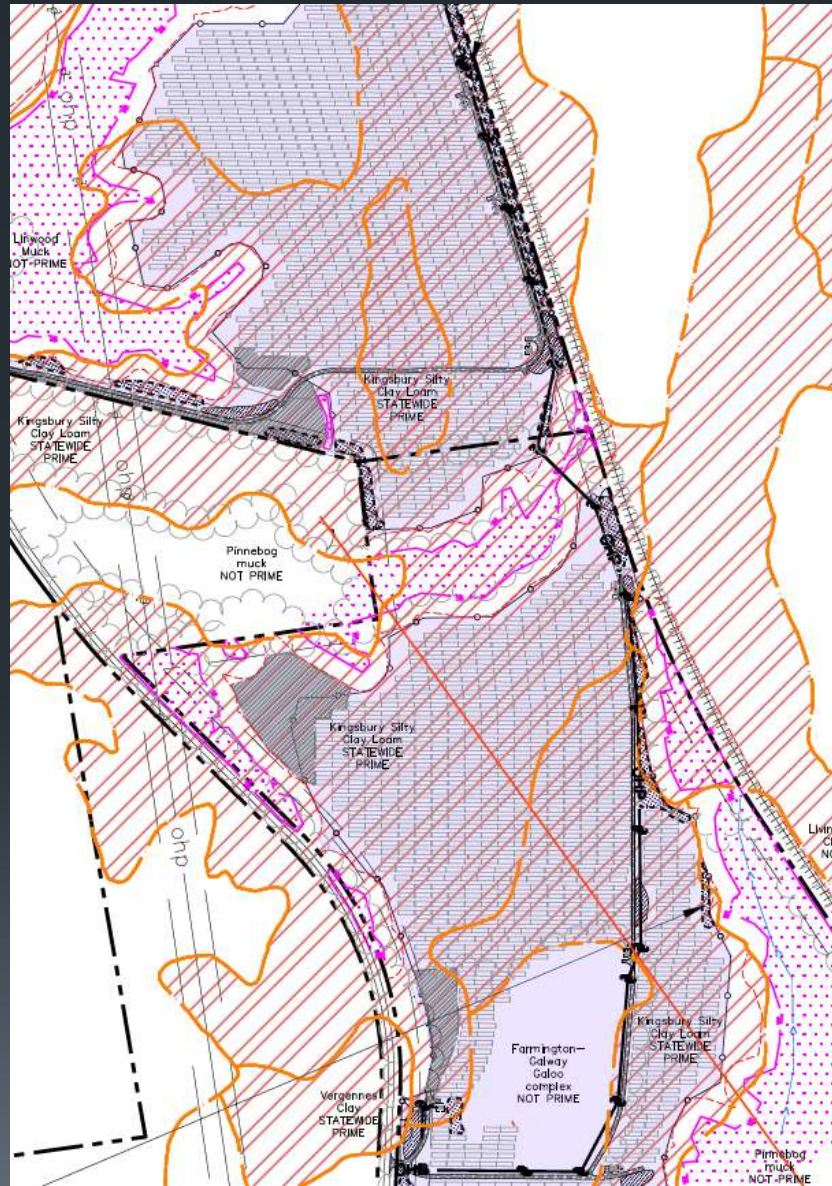
USDA is an equal opportunity employer, provider and lender.



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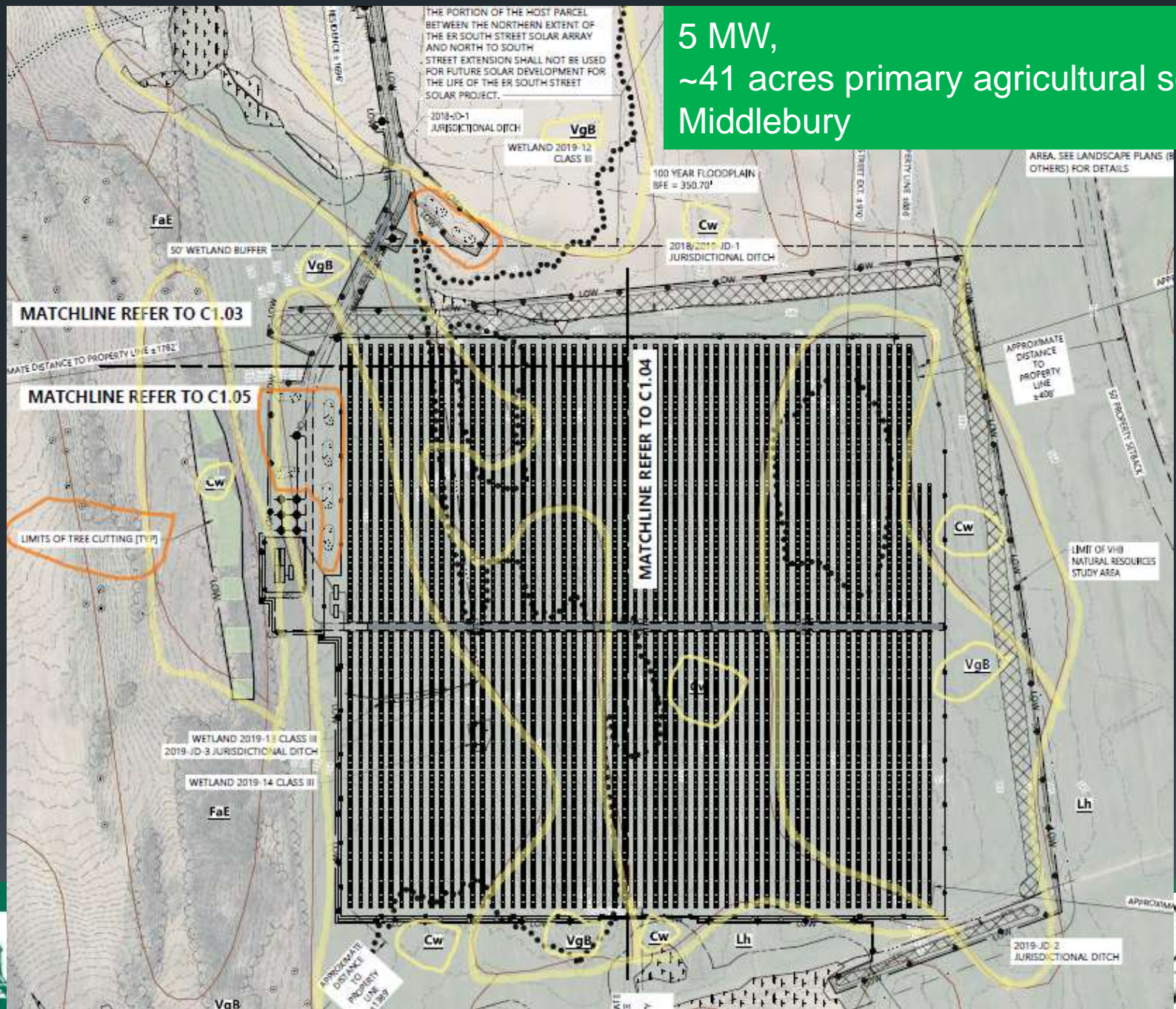
... and de-facto farmland



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5 MW,
~41 acres primary agricultural soils,
Middlebury



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MARKETS

Above and beyond

- Pollinator-friendly standard
- September 2020 webinar is now on-line
- Reversing biodiversity decline
 - Nesting birds
 - Insects
 - Plant communities
 - ... and effects on neighboring properties!!
- Agrivoltaics
- Future work and suggestions – including yours!



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<https://www.uvm.edu/extension/agriculture/pollinator-friendly-solar>

UVM EXTENSION CULTIVATING HEALTHY COMMUNITIES

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Pollinator-Friendly Solar Resources



Land under and around solar arrays can be planted with pollinator-friendly vegetation: a benefit to agriculture, clean energy, bees and birds.

To achieve this, many solar projects are now integrating a vegetative management plan that features a mix of low-growing and shade tolerant, pollinator friendly plants throughout the array.

Pollinator-Friendly Planting Tips



Considering installing solar at your farm, home or business and want to be sure it's friendly to pollinators? Here's how to get started:

Workshop-Descripti...pdf
[Open file](#)



POLLINATOR
FRIENDLY
SOLAR

New! Fresh Energy leads the creation of a national pollinator-friendly solar clearinghouse:

**CENTER FOR POLLINATORS
AND ENERGY**

Bright Idea: Kiernan Pairs Solar Arrays and Bees, Addison Independent:



Show all X



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"Solar Energy in Vermont's Working Landscape"

UVM EXTENSION CULTIVATING HEALTHY COMMUNITIES

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THE CENTER FOR SUSTAINABLE AGRICULTURE

Grazing and Solar Energy in Vermont's Working Landscape

Kimberly Hagen Helps Host September 2020 Panel



Can grazing livestock, pollinator-friendly plantings, crops and bird habitat compatibly share the finite space beneath and surrounding solar array panels? How can multiple enterprises share and operate

compatibly, and even complement each other on the same parcel of land

, looking at examples of the production, and solar photovoltaic development, experts and stakeholders adoption as well as requirements

BY CHERYL HERRICK



RELATED LINKS

- Pollinator-Friendly Solar Resources
- Solar Energy in Vermont's Working Landscape Panel Playlist on YouTube

Solar Energy in Vermont's Working Landscape



Playlist of sessions



“It’s a two-pronged approach to solving the climate crisis - not only producing clean energy but helping reverse biodiversity decline in the process. And then there are the added benefits on top of that, most of which we don’t fully understand yet!

The real question is not so much about native pollinators being attracted to plants within the actual site itself – that’s pretty obvious-- it’s more about what’s going on in the surrounding landscape.

Can we measure a boost in biodiversity in the areas *around* each of these sites? and what does that mean for neighboring properties. Will a nearby farm see a boost in pollination services, or an increase in pest control from birds and beneficial insects?"

Jason Mazurowski

Field Assistant, Gund Institute for Environment

Lecturer, Environmental Program

University of Vermont



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“It would be really cool a few years down the road to take these data, and to be able to show a farmer that by leasing a solar site they can turn that unused field in the ‘back 40’ into a biodiversity hotspot that will make them money, provide clean energy to Vermonters *and* increase crop yields for their themselves or their neighbors.

The concept is sound, people believe in it, but we don’t have real, long-term data to back up the economic benefits. Once that comes along, it could be a game-changer.”

Jason Mazurowski

Field Assistant, Gund Institute for Environment
Lecturer, Environmental Program
University of Vermont



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Photo cr. Jason Mazurowski



The Upshot

- There are ~300 species of bees native to Vermont (not including the honeybee). They come in all colors, shapes and sizes.
- Native bees are *better* at pollinating most crops than the European honeybee, and they declining at alarming rates.
- The #1 cause of insect decline is habitat loss.



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Photo cr. Jason Mazurowski



The Upshot

- We already know that introducing pollinator habitat will increase the abundance and diversity of native bees *within* the arrays.
- But what's going on in the surrounding landscape?



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Research Questions

- Will the addition of pollinator-friendly habitat beneath solar arrays provide a measurable increase in pollination services to neighboring farms?
- Will there be a measurable increase in overall biodiversity? Bees, birds, beneficial insects etc.?
- How will this change over the lifetime of the panels? Will biodiversity continue to increase as the site matures? Will it plateau after a couple of years?

Photo cr. Josh Brown



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Pilot Study 2019-2020

- The initial pilot study was a collaboration between Audubon VT and The Gund Institute
- Monitored biodiversity at 5 P-F solar sites throughout the Champlain Valley
- Baseline surveys of breeding birds and native bee populations were established *before* solar development began
- Monitoring will continue each year as the site is constructed and habitat becomes established.

Photo cr. Josh Brown



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Goals for 2021

- Move beyond “pilot phase”
- Expand to 12 total sites across the state
- Conduct baseline surveys at new sites, and follow-up surveys at existing sites
- Implement bird-friendly shrub buffers around at least 1 demonstration site.
- Survey at least one site with a combination of agrivoltaic practices.

Photo cr. Josh Brown



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“In nature, some of the greatest success stories have come from mutualisms -- multiple organisms become stronger, greater than the sum of their parts through cooperation. Is this an instance where farmers, solar developers, and Vermont’s native flora and fauna all benefit without any real drawbacks? Is that even possible?”

When I initially started this research, I thought that it was ‘too good to be true’. But nothing I have seen so far suggests that’s the case.”

Jason Mazurowski

Field Assistant, Gund Institute for Environment
Lecturer, Environmental Program
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Agrivoltaics – what's possible?

- ... a lot.
- Grazing sheep – easy
- Cropping – getting easier
- Active systems, non-permanent systems



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Guide to Farming-Friendly Solar



With the proliferation of solar energy generation throughout Vermont, interest in on-farm solar generation has grown. For many communities, this has raised concerns about loss of valuable farm land and impacts to the visual landscape.

Two Rivers-Ottawquechee Regional Commission worked with the Vermont Agency of Agriculture, Food & Markets and the Center's Pasture Program to come up with recommendations for how to balance the needs of community and farm-scale energy needs with a shared commitment to protecting agricultural lands.

The team met with farmers and planners to come up with a plan to guide land use planners, farmers, and agricultural service providers in their planning and decision-making. That guide is now available so that "local planners can protect primary agricultural soils (often referred to as "prime ag") and the working landscape as a matter of town policy by



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What's on tap for grazing solar?

- Nationwide: American Solar Grazing Association
- Checklist and menu
 - Checklist. One page: infrastructure and needs of developers and shepherds
 - Menu – An A La Carte document to assess a site and the cost to graze
 - These will both benefit from feedback from the ASGA community as they are developed.
- Utilizing the farm finder web site for grazers and developers to find each other.
 - <https://vermontlandlink.org/>
 - Free membership! Gets you notifications of new additions to the website.
 - Your posting automatically includes an additional posting on the New England Farm Finder website. <https://newenglandfarmlandfinder.org/>
 - Use key words. There are no categories. Be specific: “Solar field available for grazing sheep”



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Maple Ridge Meats
Massachusetts-style (high off the ground)
For cattle



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REMTEC.energy
Guyed structure (think shade cloth)
Tracking PV



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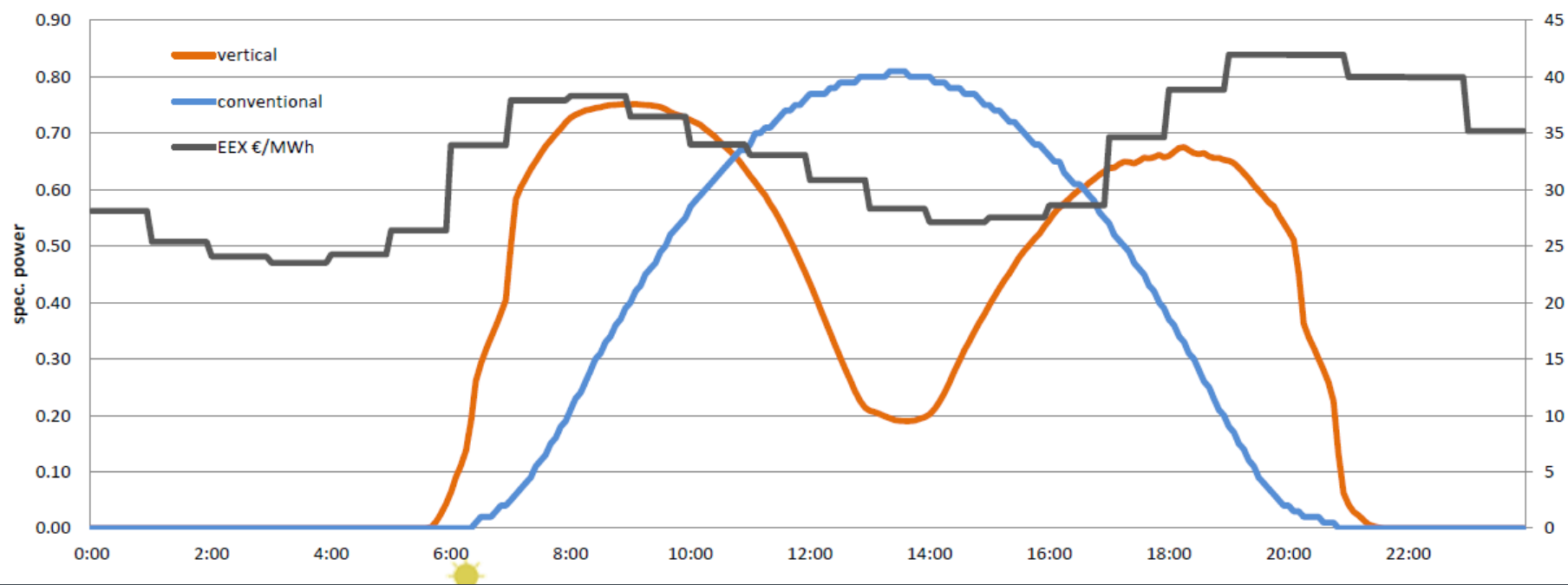
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Vertical, two-sided ("bifacial")
Laid out N-S
Afternoon view

Specific generation capacity during the day [kW / kWp], prices power exchange (EPEX) Spot hourly contracts (26.5.2017)

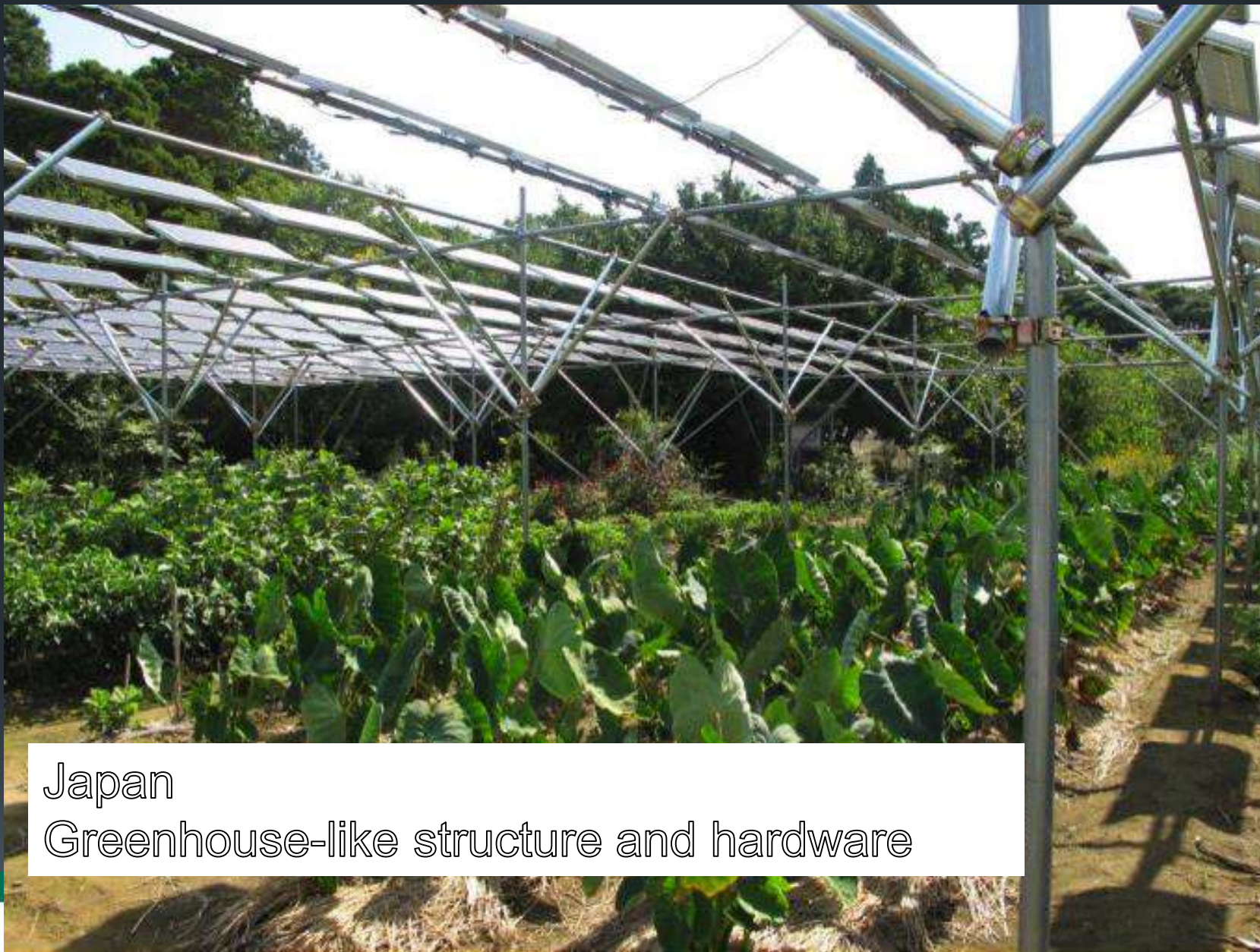


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Japan
Greenhouse-like structure and hardware



Big picture suggestion

- “...solar energy... systems can incite conflicts with conversion of farmland, grassland, and forest. Further, the development of solar photovoltaics can too easily leave out the very communities that would most benefit from their application. An innovative set of practices for solar photovoltaic installations, involving bird and pollinator habitat, farming, grazing, and restoration, can help resolve these conflicts, charting a way forward for the integration of technology, land, labor, and community. This project will support research, collaboration, and outreach on bird-, pollinator- and farming-friendly solar to improve their implementation and broaden their application in Vermont. More broadly, this project will provide the basis for a campaign and set of standards for comprehensive and inclusive solar development in Vermont.”



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Suggestion: Pre-qualify willing landowners

- Potential USDA funding \$100,000.
 - due 2/1/2021
- Get more specific than town and regional plans
 - “We like this kind of area and not this other one”
 - “Agriculture is good. Renewable energy is good.”
- Instead: identify willing landowners and provide a map to solar developers and/or facilitate matches.



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