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Solar Grazing Is the American Sheep Industry Ready?

By Nick Armentrout © 2024

2024 Annual ASI Convention

Production, Education & Research Council

January 11, 2024

Environmental mitigation at solar facilities

- Impervious solar panels on the land raise concerns for storm water run-off, sedimentation, and water quality.
- Vegetation as erosion control and to retain, filter, and improve storm water.
- Governments require native grasses and pollinator plantings for project permitting.
- Agriculture and conservation want a continuation of farming and habitats nurtured.
- Vegetation must be managed for energy production and site operations and safety – requiring a mowing regime and/or grazing.

Lewis Fox, Agrivoltaic Solutions, VT

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"Solar and Sheep Industries need each other." L. H.

- Sheep keep vegetation from shading PV modules, reducing production, and interfering with drives.
- Reduce fire hazards and maintain a clean, orderly site.
- Sustain agricultural land use in conjunction with power generation.
- Lower operations and maintenance costs compared to traditional mowing and associated damages.
- Minimize the carbon footprint associated with vegetation control at solar facilities
- *Sheep are essential* if project and energy costs are to remain during the renewable energy expansion.

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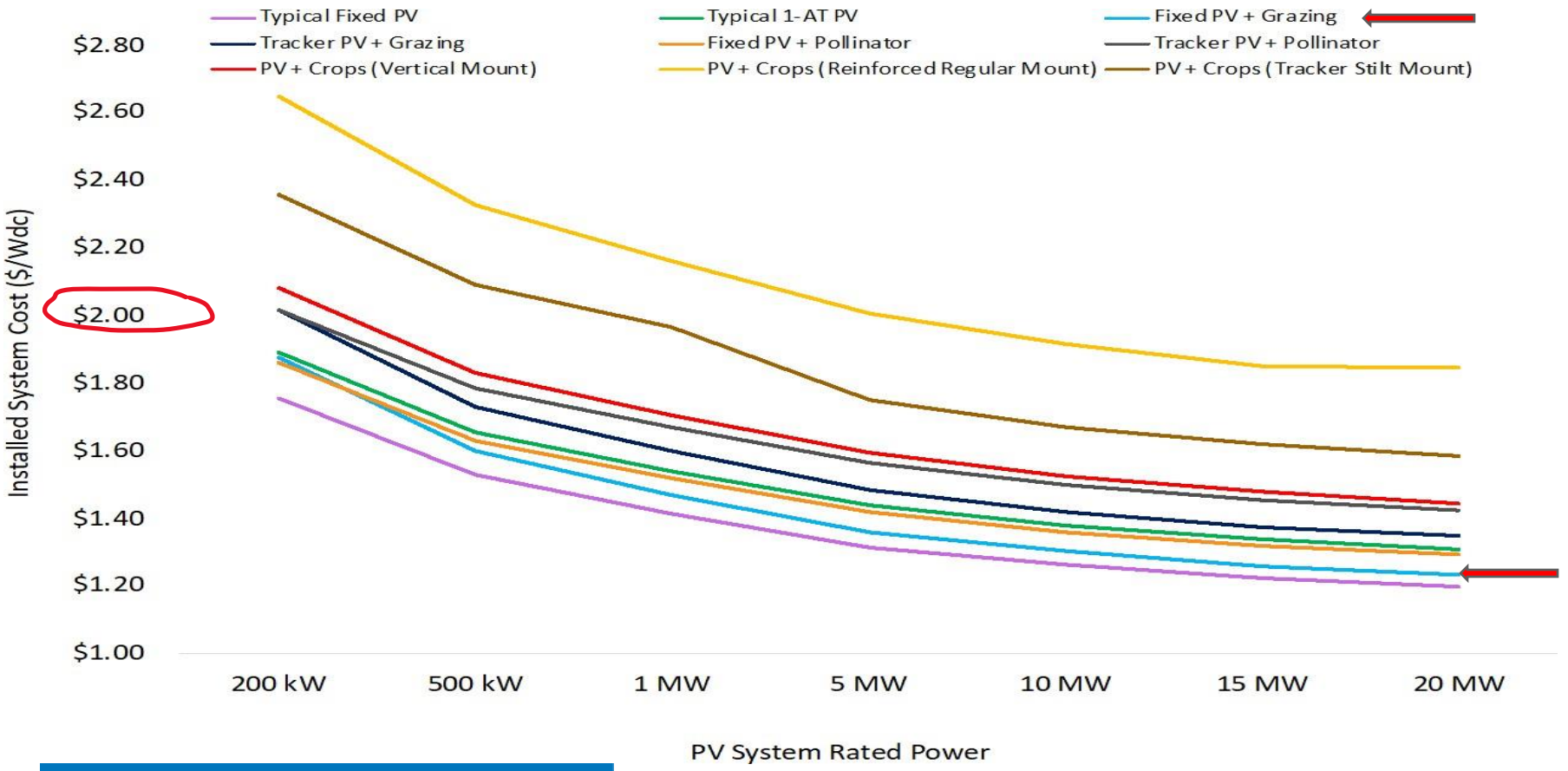
Dual-use system implementation costs (2020)



NREL

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"U.S. businesses and top global brands are making historic investments in solar energy." **SEIA 2022 Solar Means Business Report**

Top 10 Rankings

Share this data

		Installed Capacity (MW)			Installed Capacity (MW)
1.	Meta	3,588.06	6.	Target	515.06
2.	Amazon	1,113.43	7.	Cargill	342.00
3.	Apple	987.25	8.	Kaiser Permanente	302.51
4.	Walmart	688.91	9.	Anheuser-Busch	300.67
5.	Microsoft	550.06	10.	Evraz North America	300.00

www.solarmeansbusiness.com

The U.S. Energy Information Administration (EIA) projects the percentage of U.S. electric capacity additions from solar will grow from 56% in 2023 to 62% in 2024.

www.energy.gov/eere/solar/quarterly-solar-industry-update

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The Solar Energy Industries Assoc. Major Projects List DEC 2023

- A database of U.S. ground-mount solar projects 1 megawatt (MW) scale or larger, operating, under construction or in development.
- More than 6,540 major solar projects currently in the database, representing over 224-gigawatt (GW) dc of capacity.
- More than 116 GW_{dc} capacity of large-scale solar projects are in the pipeline - either under construction or in development.
- The SEIA list shows that there are **over 108 GW of major solar projects currently operating in US**.

- *1 Gigawatt = 1000 Megawatt*
- *1 Megawatt requires approx. 6 acres of land space*
- *108 GW = 108,000 MW x 6 acres avg. = 648,000 acres x 1.5 sheep/acre. = 972,000 sheep (20% US flock)*
- *There were an estimated 5.02 million head of sheep in the US as of January 31, 2023*

(USDA, NASS, Sheep & Goats, Jan. 31, 2023)

- **We need more sheep!** And Shepherds, and Shearers, and Packers, and…

* Source: https://seia.org/research-resources/major-solar-projects-list

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Sheep are best fit to graze solar - investment needed!

- Silicon Ranch Corporation sheep breeding barn – Houston Solar Project, Georgia
- Housing for 400 ewes & lambs
- Record keeping as part of the National Sheep Improvement Program (NSIP).
- Additional investments in critical infrastructure required.
- What other industry support services will step up?

(Panelists are examples)

www.siliconranch.com/us-solar/ga/houston-solar-project

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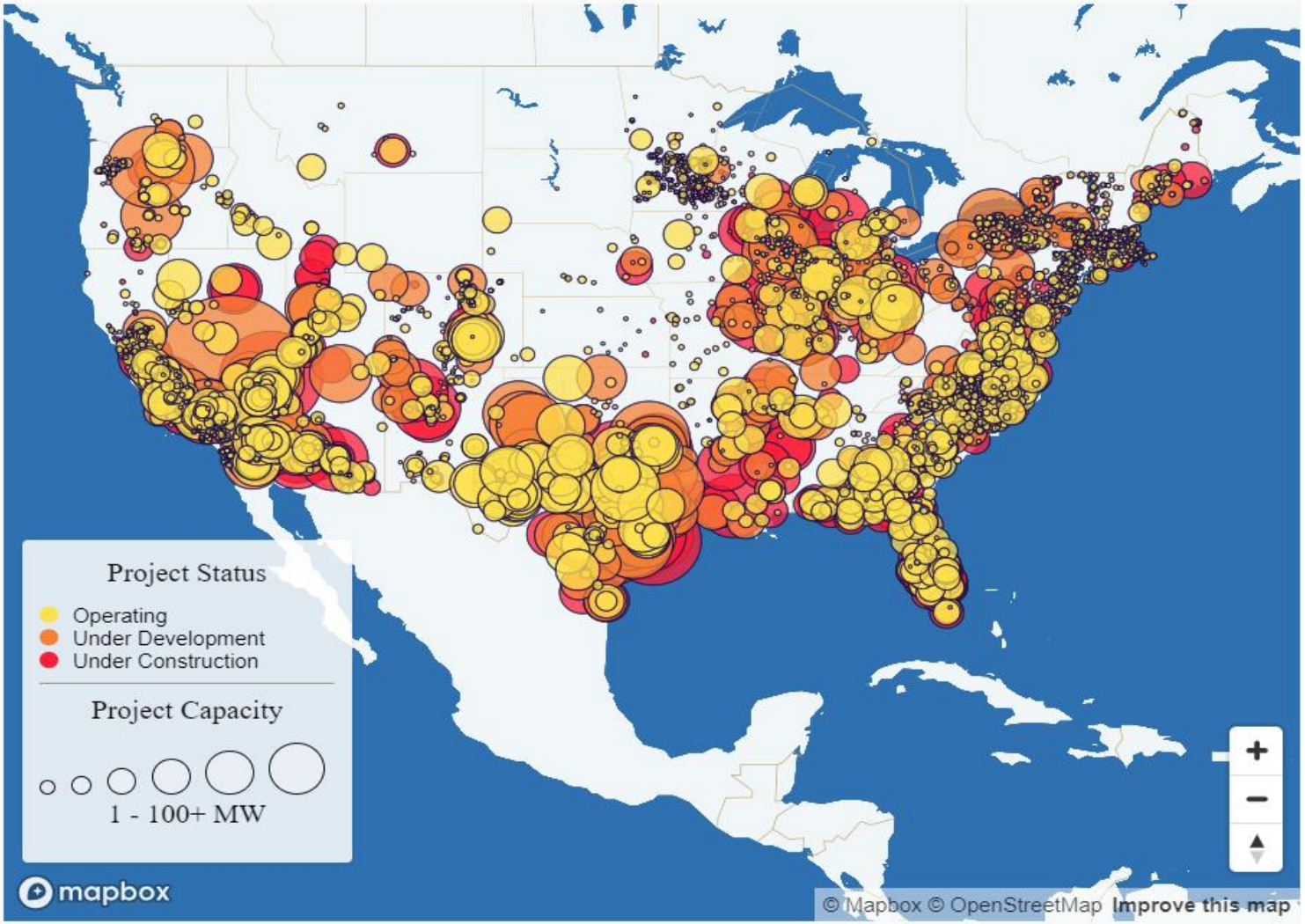
Project Location Map

See the locations of the major solar systems identified by this research on our interactive map.



Solar Energy Industry Association, DEC 2023: www.seia.org/research-resources/major-solar-projects-list

ASGA
AMERICAN SOLAR GRAZING ASSOCIATION

Founded by Farmers to promote solar grazing

www.solargrazing.org

Tools & Resources:

- Model contracts for solar grazing
- Solar Grazing budgeting tools
- Fuzz & Buzz Solar Seed mixes
- Grazing Training Certification (ALB)
- Monthly Webinars & Teatimes
- Stocking rates and Forage testing
- Fact Sheets (outreach & education)
- University & Private Research

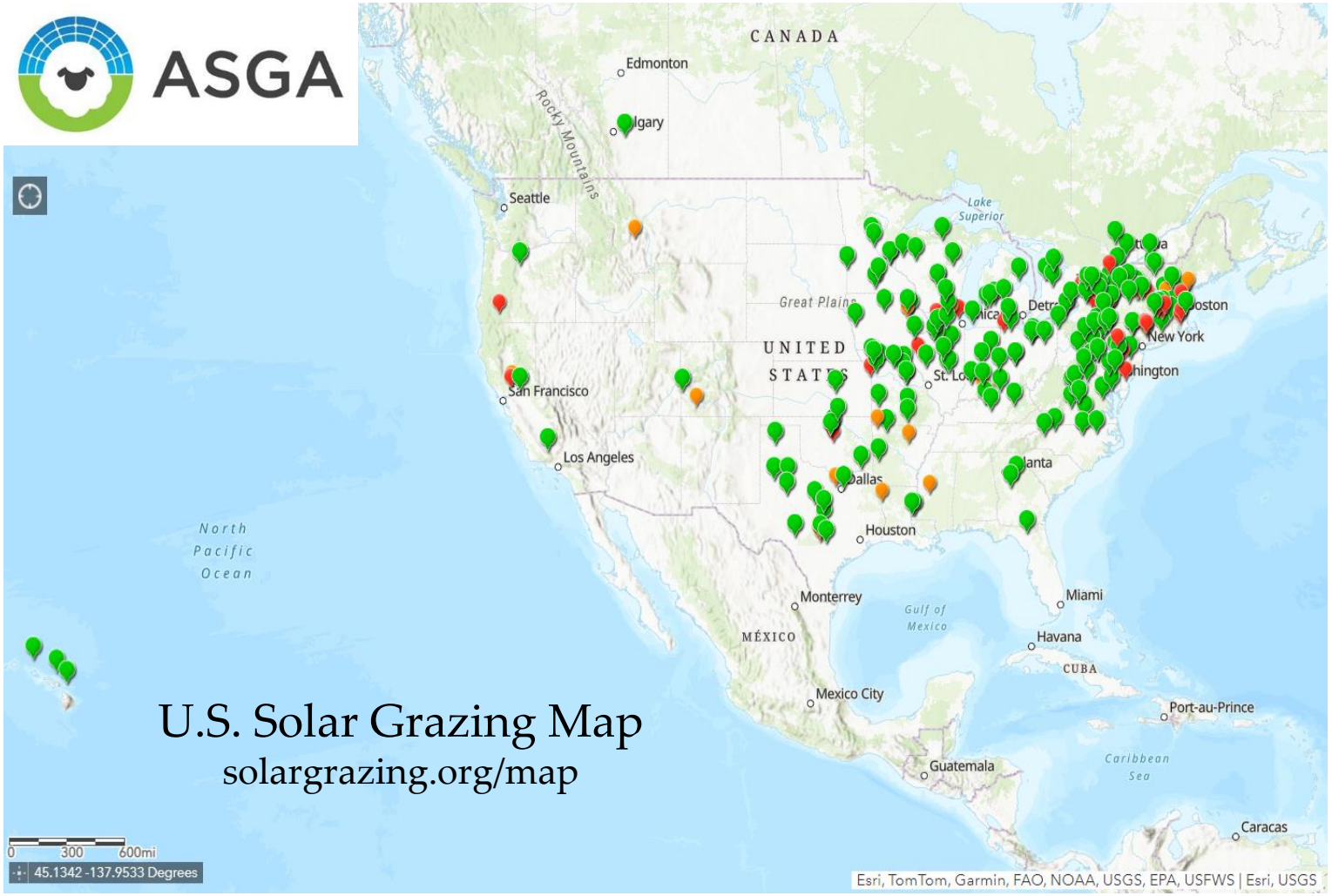
ASGA CERTIFIED SOLAR GRAZING TRAINING

AMERICAN Lamb BOARD

NREL

AgriSolar Clearinghouse

A growing branch of industry in high demand – rebuilding markets



>850 Members & Subscriber Network of close to 1000
30 U.S. States, Africa, Asia, Australia, and Europe
Farmers, Graziers, Researchers, Solar Firms, Landowners, and Supporters

First U.S. Solar Grazing Census – open through JAN

Part of an on-going study funded by the National Renewable Energy Laboratory (NREL).

Collecting farmer/grazier input to develop guidelines related to:

- ✓Site design, and construction,
- ✓Groundcover selection and establishment,
- ✓Solar policies and ordinances,
- ✓Contract and lease guidance,
- ✓Operations and management.

A clearer picture of our industry is emerging.

solargrazing.org/ASGASurvey2023

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U.S. the global leader in solar grazing

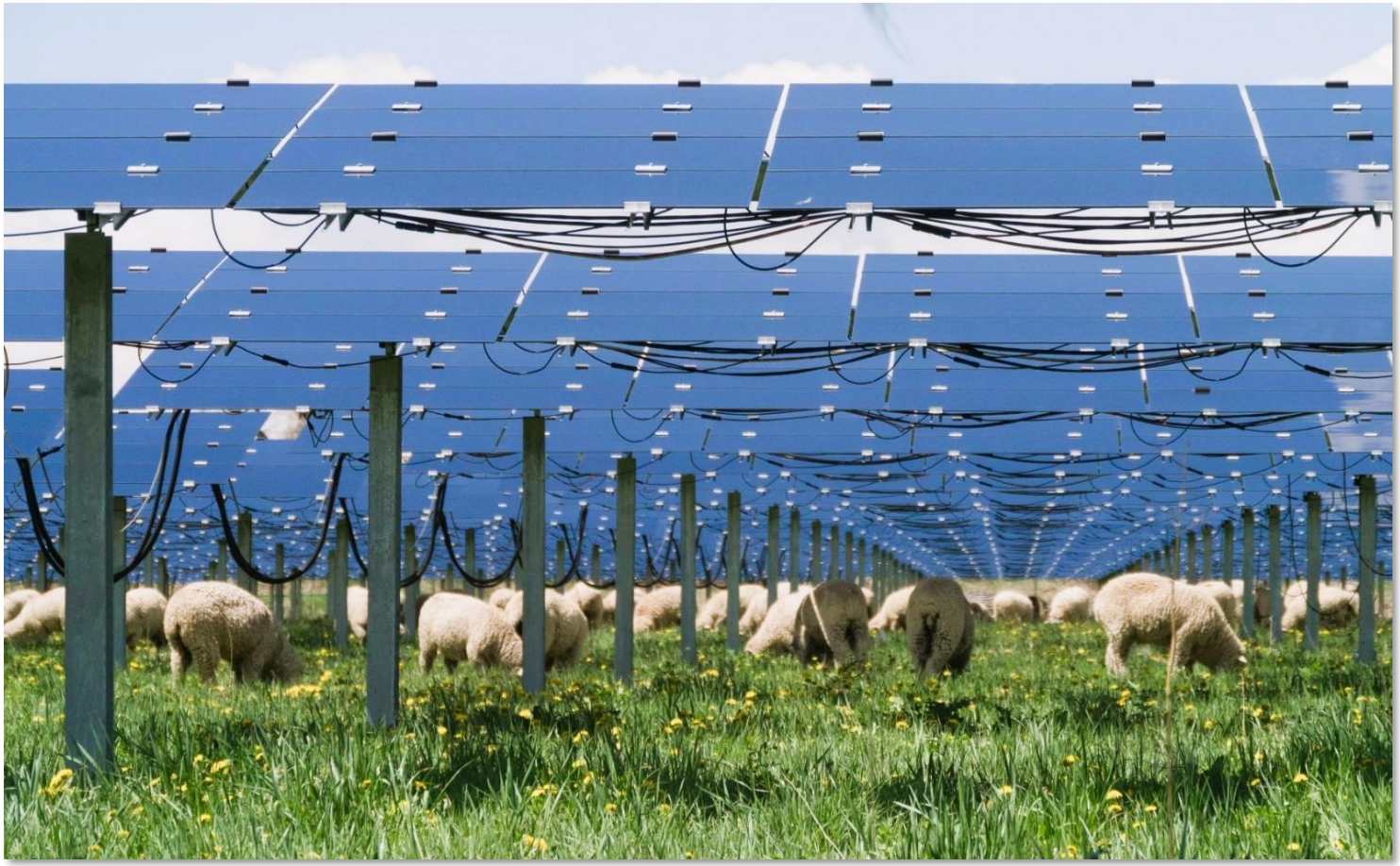
- Over 60,000 solar acres grazed in 2023
- More than 72,000 sheep
- New, beginning, and *renewed* farmers
- Producers are paid for management services (rates vary)
- "Solar-grazed" a differentiated product for the grazier, the developer, and the community.

* Solar grazing is also known to occur in Australia, China, Germany, South Africa, South America, Spain, and Sweden.

Niko Kochendoerfer – Cornell University Solar Grazing Research Flock

Solar Grazing = Targeted & Prescribed Grazing:

Using livestock behavior, timing, duration, and intensity to mange vegetation and to improve soil health and function at solar arrays



Craig Scariot, Sky Pilot Farm

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Unique qualities of a solar farm for industry competitiveness?

- Fenced grasslands and solar canopy offer protection from predators.
- Shaded, cool micro-climate decreases heat stress and water consumption (Oregon State and Univ. of Minnesota)
- Site conditions could be overlaid with animal welfare standards.
- Field results showing favorable conditions to grow wool (T. Warren, G. Ostini, NSW, AU)
- Might the solar farm have a beneficial influence on fiber profile, strength, and point of break?
- Can LCA's account for climate-smart lamb and wool produced in solar?

"Solar grazing is the most prevalent form of complementary land use for utility scale solar farms"

Clean Energy Council Australia

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Circular solar-wool products

- Managed sheep grazing can improve soil conditions. Expand the role of wool to do the same.
- How can wool grown from solar be used as part of accountable solar development?
- Develop wool fiber products to replace mixed plastic geo-textiles, especially those used near surface waters.
- Ecological products to meet the needs of the massive global solar energy expansion: erosion control, wattles, silt fence (MSU Western Transportation Institute).
- Wool-based fertilizers, mulches and hydro seeds – phase out synthetic fertilizers sourced from globally limited resources and adversarial providers (Wild Valley Farms).
- Prototypes exist – partner with environmental remediation and market to the renewables industry to foreword the concepts.

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Let's meet the opportunity.
Lamb and wool - its renewable

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