

- MAY 6, 2019 -

Solar Grazing for Farmers



- PRESENTED BY -

Lexie Hain, Lewis Fox
American Solar Grazing Assn.

- HOSTED BY -



Food Animal Concerns Trust



Introductions



Food Animal Concerns Trust (FACT) is a national nonprofit organization that advocates for the safe and humane production of meat, milk, and eggs.



Larissa McKenna
Humane Farming Program Director
Email: lmckenna@foodanimalconcerns.org
Website: foodanimalconcernstrust.org/farmer

FACT's services for livestock and poultry farmers include:

- Fund-a-Farmer Grants
- Conference scholarships
- Free webinars
- Humane Farming Mentorship Program

Our Presenters



Lexie Hain & Lewis Fox
American Solar Grazing Association
Agrivoltaic Solutions LLC



Solar arrays need vegetation management: Excessive shading and neglect of a solar site.



“The practice of using livestock to manage vegetation under solar arrays”



Advantages of using sheep to control vegetation:

- it's effective
- compatible with pollinator projects / plantings
- keeps land in agricultural use
- Good publicity for the solar companies
- typically reduces maintenance expenses for solar companies



Sheep + Solar

- dual use
- co-location
- agrivoltaic

Disadvantages of other kinds of vegetation management



- herbicides
- poor mower access under panels
- poor mower performance at steep sites
- mower damage at uneven, rocky sites
- weedwacking under panels
- dust & rocks thrown from mowers
- erosion
- poor compatibility with pollinator plantings
- low to zero ag value
- high costs to solar owners
- carbon sequestration???



Solar Infrastructure

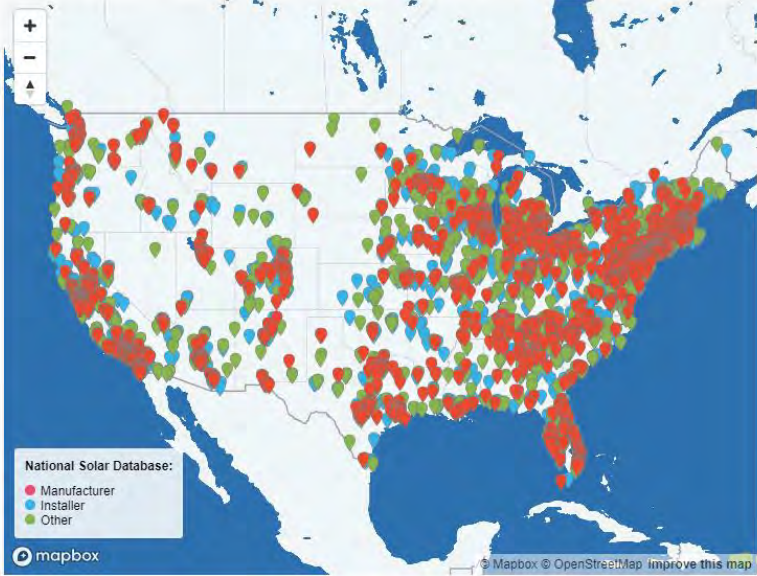
Clean energy by state

<https://www.seia.org/resources>

of data available in excel-based formats for advocacy and non-profit purposes only.

Should you have edits to be made to the information presented in the map, please fill out the survey below and we will update the map accordingly.

SHARE



National Solar Database:
● Manufacturer
● Installer
● Other

mapbox

Mapbox © OpenStreetMap Improve this map

Complete the National Solar Database Survey

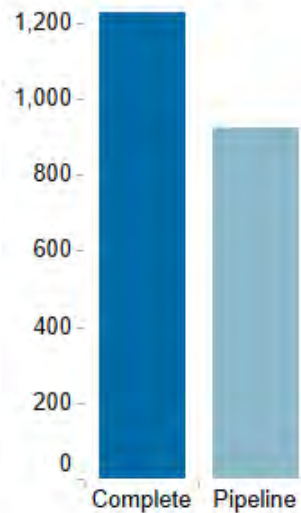
All respondents who provide a complete response will receive a free copy of the [SEIA/Wood Mackenzie Solar Market Insight 2017 Year in Review Full Report](#). The full report has detailed analysis on state markets and forecasts beyond what is

Photos (1).zip

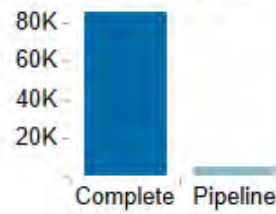
Show all



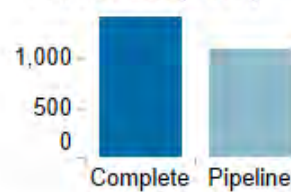
Total Capacity (MW DC)



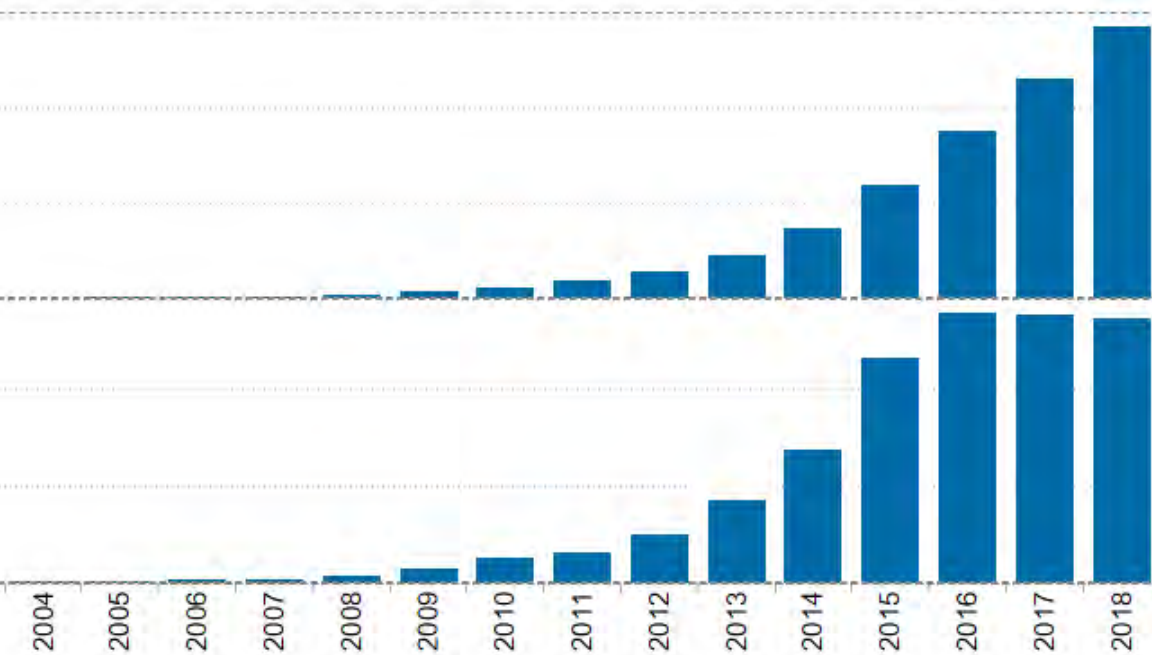
Number of Projects



Expected Annual Production (GWh)



Annual Trends (Completed Projects Only) Expected Annual Production

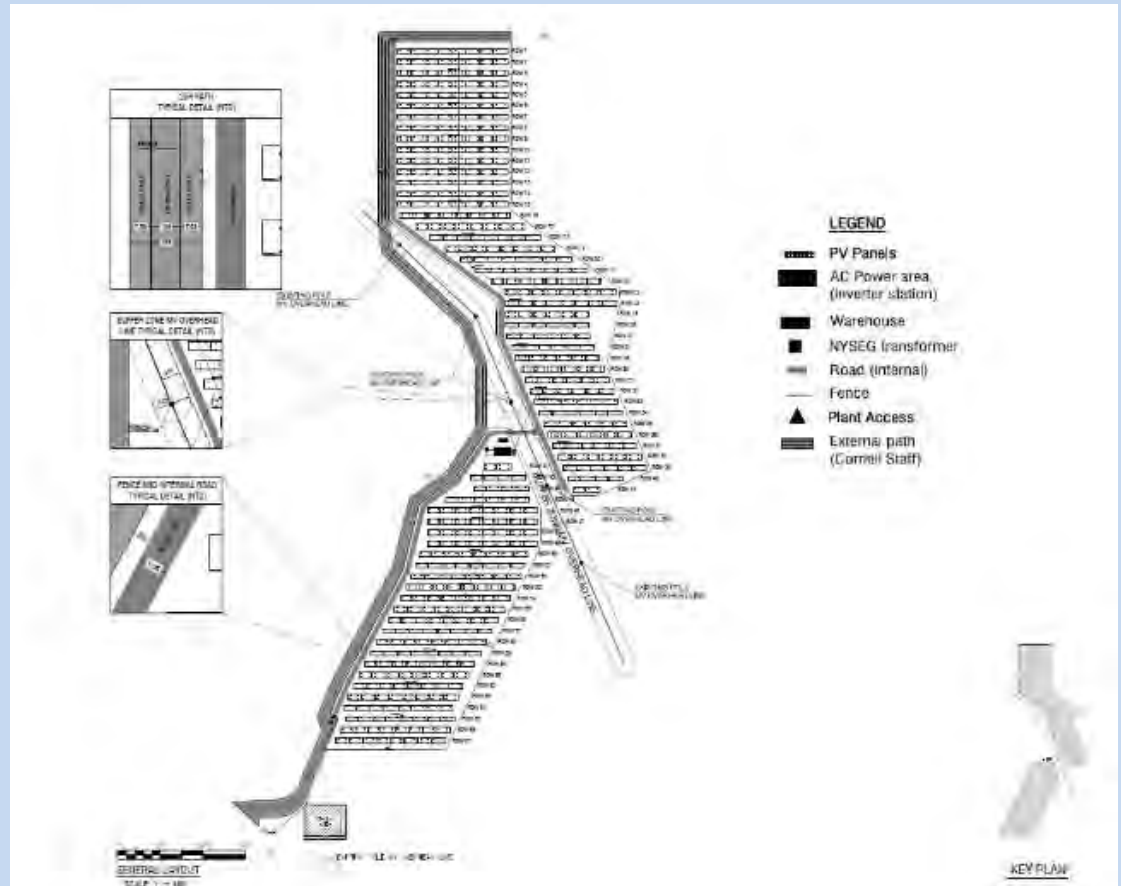


Solar Trends: Ground Mounted Solar

Scale of solar projects

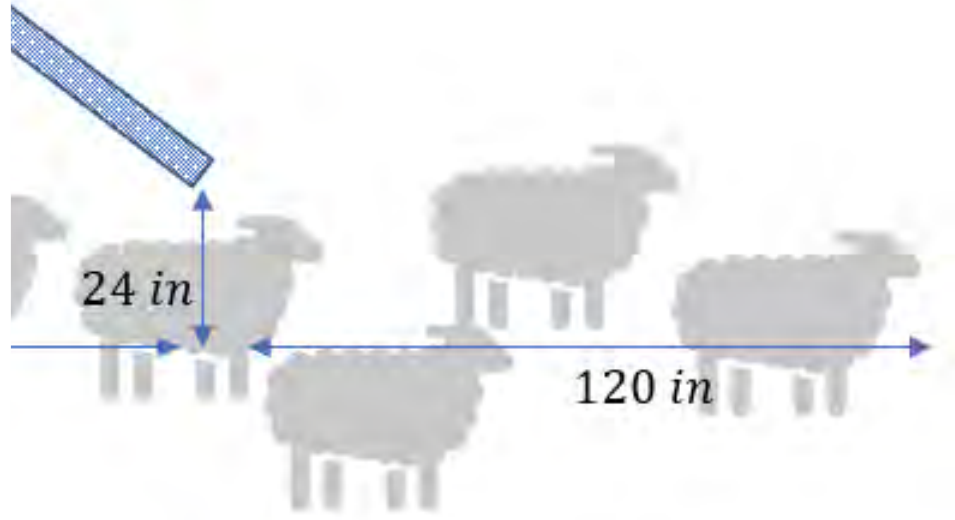
Utility: 50 acres +
Community: 10 to 50 acres
Commercial: 1 to 25 acres
Residential: not applicable

5 to 8 acres per MegaWatt - MW



Solar grazing research trials: highlights

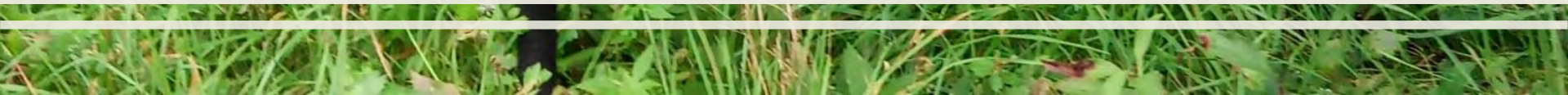
WHAT RESEARCH CAN TELL US



Sheep fit under the panels



Sheep maintain the vegetation under the panels better than people do





Sheep benefit from the easy access to protective cover, windbreak & shade

Oregon: OSU

-solar increases vegetation growth rates

“There are some plants that are happier in shaded environments,” he said. “The amount of water that went into the making those plants is tremendously smaller than in the open field. You get double the yield, less water and all the solar energy.

Higgins, OSU, 2018

Selected Results: Study by the Atkinson Center For a Sustainable Future at Cornell University

“The agricultural, economic and environmental potential of co-locating utility scale solar with grazing sheep” (2019)

N. Kochendoerfer; L. Hain; M. Thonney.



A group of sheep, including several white and black ones, are standing in a snowy field. In the background, there is a chain-link fence and some industrial-looking structures. The overall scene is dimly lit, suggesting an overcast day or a dark filter applied to the image.

FARMERS ARE CHARGING FOR
THIS SERVICE

\$326-555/ACRE ON AVERAGE PER
SEASON IN THE EAST

LIMITED DATA SET SUGGESTS
SOME CHARGING MUCH MORE

Using sheep is more efficient and cost effective than using landscaping services



“Utilizing sheep for site vegetation management required a total of 139 hours including travel time, resulting in 2.5 times fewer labor hours than traditional vegetation management (mowing and string trimming) on site.”

Selected Results

- The sheep left the site healthy at the end of the season, with good body condition and low parasite load.
- Bottom category – in red- suggested intake levels for 150 lb dry ewes
- Vegetation management success

DDM	CP
61.0	17.8
58.7	18.1
68.3	14.6
60.0	14.1
63.3	12.8
62.0	14.3
56.3	14.1
62.3	19.9
55.0	10.0



Targeted grazing at solar sites

WHAT FARMERS NEED



Management: a targeted grazing vs a fixed grazing season





Management: Trailer Training





Management Considerations: rotational grazing, grain training



Interior
paddocks



Portable Water & Minerals

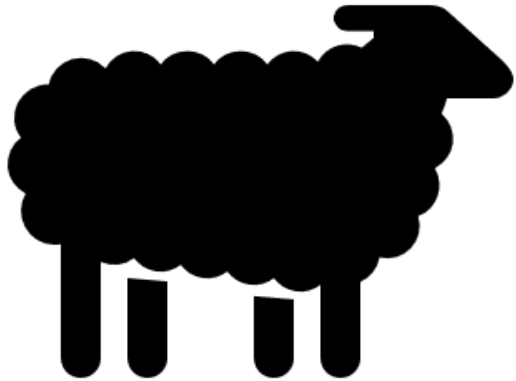
Management Considerations: Lambing Plan for Solar Grazing

Table 2 — Yearly Sheep Operation Calendar — Winter Lambing

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Basic internal parasite treatment	—	—		X	X		X				X	—
Flush ewes							—					
Breed ewes							—	—	—			
Lamb	—	—										—
Dock, castrate, vaccinate lambs	—	—										—
Creep feed	—	—	—	—								—
Weaning			—	—								
Feed lambs*			—	—	—	—						
Market lambs*					—	—						
Shear & market wool*				X							X	
Pasture ewes				—	—	—	—	—	—	—	—	—
Labor input (H-High; M-Medium; L-Low)	H	H	M	M	M	L	L-M	L-M	L-M	L	L	M-H

Key: X — Sheep treated once during month.

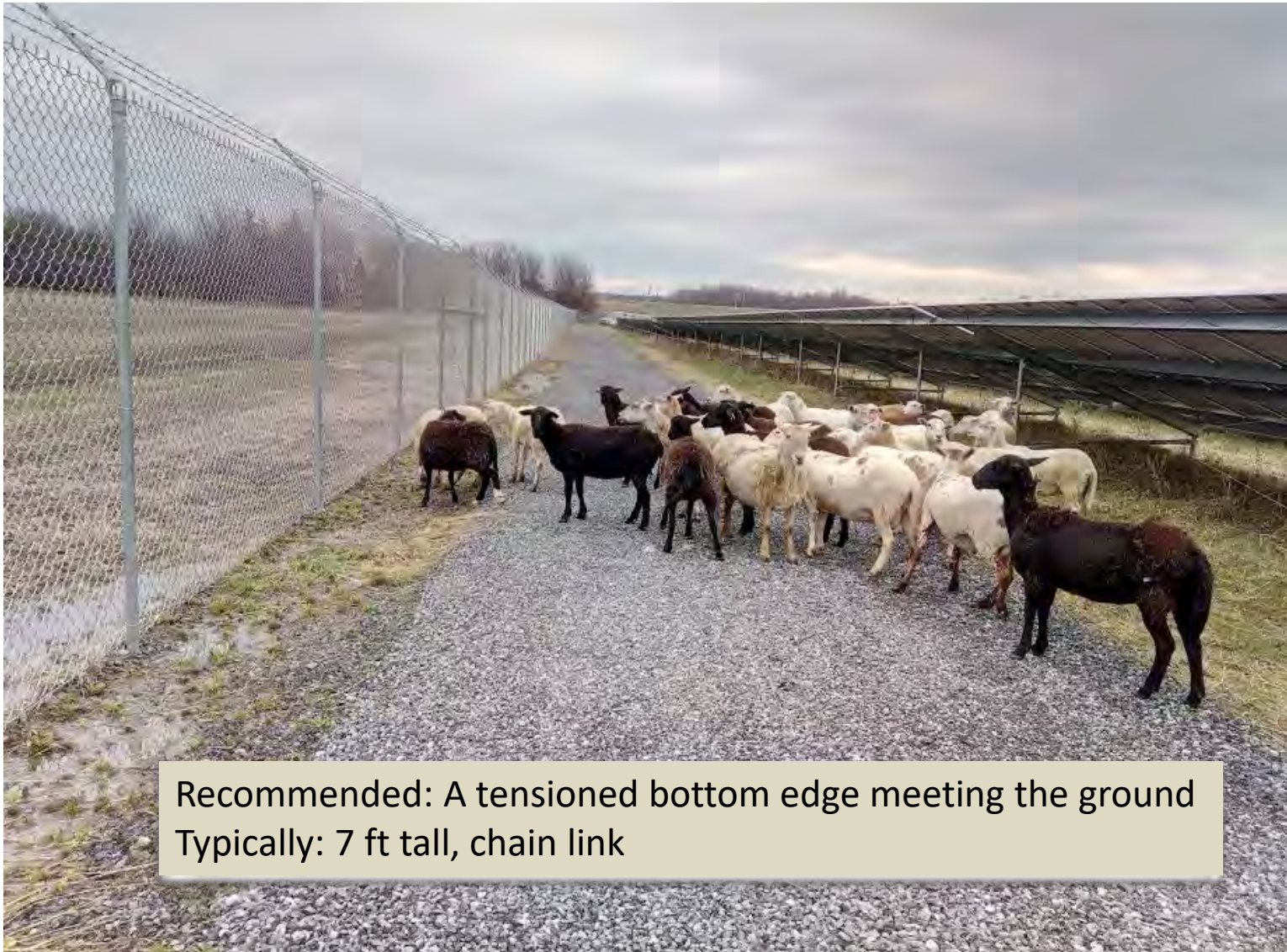
* — Timing of these operations will vary with the individual program.



Farmer considerations:

- different features and varieties of solar sites
- mobile targeted grazing operations versus on farm solar sites
- budgeting guidance available
- NC CHOICES
- ASGA www.solargrazing.org

Perimeter Fencing: FERC



Recommended: A tensioned bottom edge meeting the ground
Typically: 7 ft tall, chain link



Perimeter Fencing: 2



Repairs...



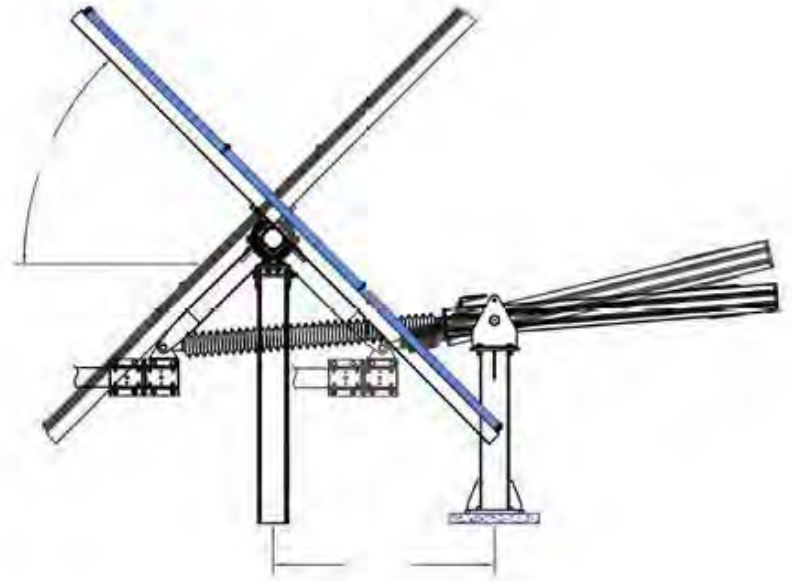
Inverter Pads



www.laur



www.laurakozlow



Two Kinds of Ground Mounted Solar:
fixed and tracker



Trackers





Trackers



Trackers: cable
trays



Handling
Facilities

what the solar companies need from the farmers

CRITERIA FROM THE SOLAR COMPANIES



Compliance
PPE, site
login/logout



Leading edge of the panel



Working with other site users

- Offer a training for the other site users
- Provide documentation of sheep welfare/ wellbeing if asked
- Participate in free animal welfare assessment offered by your state vets
- Offer solar site tours to the solar company employees & friends

www.mowingsolarfarms.com

Meet The Grazing Sheep

Hello! We are Mowing Solar Farms LLC and we are happy to be at your solar site.

Your solar site has sheep grazing. These sheep are owned by a local farmer and will be kept at this site during the grazing season, or the spring, summer and fall.

Different numbers of sheep will be at the site at different times, this is not something to be concerned with, simply a way to manage the site vegetation.

Sheep are friendly but can be scared easily by loud noises, people chasing them, stray dogs, or other factors. Please just keep your distance and respect the fences.

Electrical Contractors



Get signs made





Additional signage





portable electrified fence around the
in be turned on and off at the solar po
n it on or off, or simply step over the f
ON. The electricity in this fence is low
keep a gentle reminder about where
ences already before they come to so

Interior electric fence: it's safe to use
on solar arrays but label the wires and
train the other site contractors

SHEEP GRAZING
please close the gate



Mowing Solar Farms LLC
607-342-6721

ASGA member

www.solargrazing.org

Best Management Practice Guidelines from ASGA & SEIA

By Summer 2019

Insurance

ACORD		CERTIFICATE OF LIABILITY INSURANCE		DATE (MM/DD/YYYY) 04/10/2018		
THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.						
IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).						
PRODUCER		INSURED		INSURER		
Elmera		NY 14901		INSURER A		
				INSURER B		
				INSURER C		
				INSURER D		
				INSURER E		
				INSURER F		
COVERAGES		CERTIFICATE NUMBER:		REVISION NUMBER:		
THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.						
POST TO	TYPE OF INSURANCE	ACC. DURS. REQ. (Y/N)	POLICY NUMBER	POLICY EFF. DATE (MM/DD/YYYY)	POLICY EXPIR. DATE (MM/DD/YYYY)	LIMITS
A	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS MADE <input checked="" type="checkbox"/> OCCUR <input type="checkbox"/> GENL. AGGREGATE LIMIT APPLIES PER POLICY <input type="checkbox"/> PER POLICY <input type="checkbox"/> PER OCCASION <input type="checkbox"/> OTHER	Y N		05/25/2018	05/25/2019	EACH OCCURRENCE DAMAGE TO RENTALS PERMITS (EA. OCCURRENCE) \$ 1,000,000 MED EXP (Any one person) \$ 5,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMPAR AGG \$ 2,000,000
A	AUTOMOBILE LIABILITY: <input checked="" type="checkbox"/> ANY AUTO <input type="checkbox"/> OWNED AUTOS ONLY <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS ONLY <input type="checkbox"/> NON-OWNED AUTOS ONLY <input type="checkbox"/> AUTO'S ONLY	N N		05/25/2018	05/25/2019	COMBINED SINGLE LIMIT (Per Occur) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accidnt) \$ PROPERTY DAMAGE (Per accidnt) \$
A	UMBRELLA LIAB <input type="checkbox"/> EXCESS LIAB <input type="checkbox"/> OCCUP <input type="checkbox"/> CLERICAL <input type="checkbox"/> RETIRE	N N		05/25/2018	05/25/2019	EACH OCCURRENCE AGGREGATE \$
A	WORKERS COMPENSATION AND EMPLOYERS LIABILITY AND DISABILITY BENEFITS (EXCEPTIVE OFFICERS/EMERIT ENCLUSTED) (Nondiscrim in RM) If yes, describe in brief (DESCRIPTION OF OPERATIONS)	N N		05/25/2018	05/25/2019	<input checked="" type="checkbox"/> B.L. EACH ACCIDENT \$ 1,000,000 <input type="checkbox"/> B.L. DISEASE - SA EMPLOYEES \$ 1,000,000 <input type="checkbox"/> B.L. DISEASE - POLICY LIMIT \$ 1,000,000
DESCRIPTION OF OPERATIONS (LOCAL HOUS / VEHICLES (ACORD 101), additional Permits or Schedules may be attached if you so desire) (optional)						
Cert holder is listed as additional insured RE: Cornell Geneva Solar Farm - 3425 Sutton Rd, Geneva, NY 14456						
CERTIFICATE HOLDER			CANCELLATION			
Telemachus Solar LLC, Building Energy Asset Management LLC, Building Energy Development US LLC, Building Energy Holding US LLC 1275 K St NW, Ste 1200, Washington DC, 20005			SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE			
AC: ACORD 25 (2016/03)		Email: The ACORD name and logo are registered marks of ACORD		© 1988-2015 ACORD CORPORATION. All rights reserved		

Assurance of Animal Well Being & compliance with USDA regulations



ASGA: Ask A Vet

Contract



Available at
Solargrazing.org
farmer resources

EXAMPLE SHEEP GRAZING AGREEMENT

This agreement (the “Agreement”), is made and entered into this ____ day of _____, 20____, by and between _____ (“Sheep Farmer”) and _____ (“Solar Site Manager” and, together with Sheep Farmer, each a “Party” and collectively the “Parties”).

RECITALS

WHEREAS, Solar Site Manager is the [owner/operator] of [name of solar site], located at [address] (“Solar Site”), as more fully described attached hereto as Exhibit A.

WHEREAS, Sheep Farmer owns sheep that will be grazed on the Solar Site; and

WHEREAS, the Parties desire and intend to enter into this Agreement to facilitate the grazing of Sheep Farmer’s sheep on the Solar Site for the purpose of vegetation management.

NOW THEREFORE, in consideration of the foregoing recitals that are incorporated herein by reference and covenants made herein and other good and valuable consideration, the Parties, intending to be legally bound, agree as follows:

TERMS OF THE AGREEMENT

\$\$\$ What to charge?

Credit to 2019 Atkinson Center Report

Table 3. Per acre income and expense of solar grazing in New York and across the Eastern United States.

	Eastern United States			
New York State	Eastern United States			
Directly contracted	Subcontracted	Directly contracted	Subcontracted	
Income	\$555	\$320	\$326	\$308
Expenses	\$46	\$46	\$64	\$64
Net	\$509	\$274	\$262	\$244

\$\$\$ What to charge?

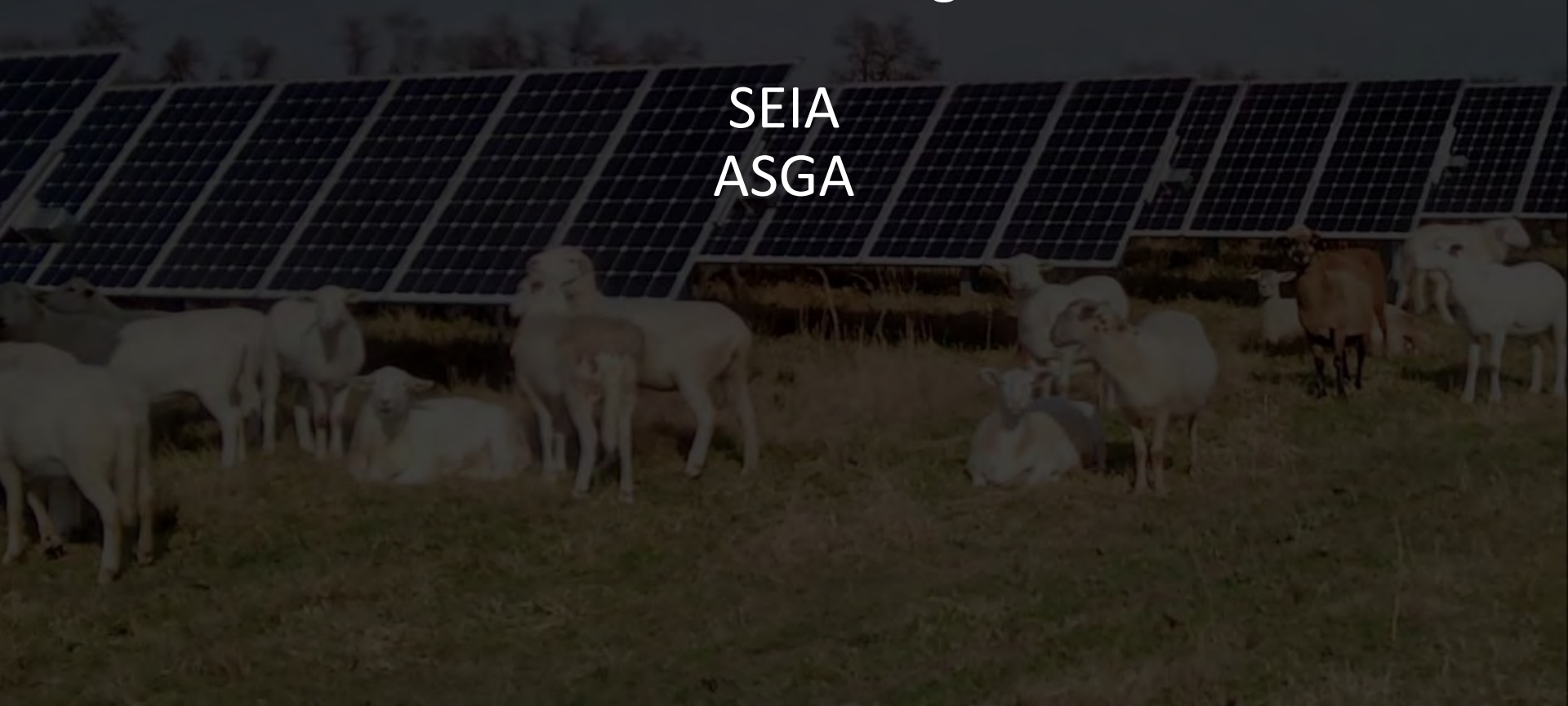
Credit to 2019 Atkinson Center Report

Table 2. Income statement for grazing 56 sheep on 22 acres.			
Item	Total	Per acre	Per head of sheep
<i>Investment</i>	\$1,690	\$77	\$30
<i>Grazing income</i>			
Directly contracted	\$11,000	\$500	\$196
Subcontracted	\$5,500	\$250	\$98
<i>Grazing expenses</i>			
Mileage	\$2,125	\$97	\$38
Labor	\$2,084	\$95	\$37
General liability insurance	\$1,500	\$68	\$27
Directly contracted total	\$5,709	\$260	\$102
Subcontracted total	\$4,209	\$191	\$75
<i>Net</i>			
Directly contracted	\$5,291	\$241	\$94
Subcontracted	\$1,291	\$59	\$23

How do I solar graze? How do I find a site?

Site Matching

SEIA
ASGA



Questions & Answers

Please type your Q's into the chat bar



eker Farm

Connect with



Upcoming webinars

- May 15: Success With Interns on Your Farm
- *Webinars will start up again in the fall!*

Grants, Scholarships, Mentorship & More!

- Scholarships accepted on an on-going basis
- Grant applications will be available in fall 2019

Sign up for emails @ foodanimalconcernstrust.org/farmer/

Join us on social media

