Emerging Agrivoltaic Regulatory Systems
A Review of Solar Grazing

By Jessica Guarino & Tyler Swanson

Bock Agricultural Law & Policy Program
College of Agricultural, Consumer, and Environmental Sciences

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

About the Authors

Jessica Guarino

Jessica Guarino is a Postdoctoral Legal Research Associate with the Bock Agricultural Law & Policy Program at the University of Illinois, Urbana-Champaign. She earned her J.D. and LL.M. in Food and Agricultural Law at the University of Arkansas, Fayetteville and is licensed to practice in California. Jessica engages in research and writing in the fields of agricultural, food, and environmental law, with focuses on misleading food labeling and the reasonable consumer, agritourism risk management, the legal regulatory structure at the nexus of renewable energy and agriculture, and justice issues within the agricultural production system.

Tyler Swanson

Tyler Swanson is a senior at the University of Illinois Urbana-Champaign studying Agricultural & Consumer Economics with a concentration in Environmental Economics & Policy and minors in Sustainability and Urban Planning. Tyler's research interests focus on studying how emerging markets in the green economy influence rural economic development. Tyler has received his departmental undergraduate research award two years in a row (2020-2021) for his work on sustainability in agritourism and analysis of voluntary renewable energy markets.

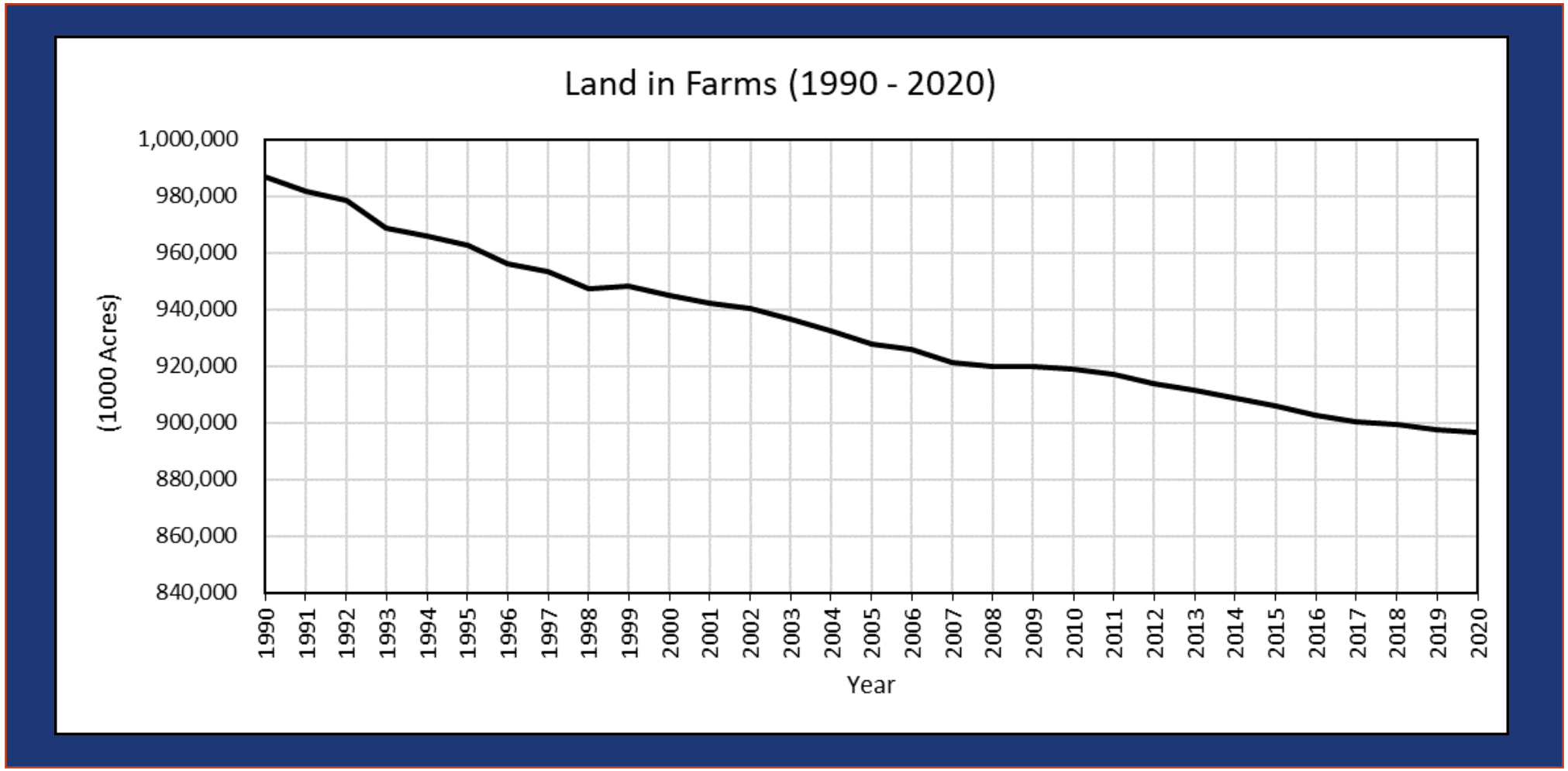
Introduction

- Rapid development of Utility-Scale Solar Energy (USSE) facilities has garnered tension in in rural communities over the proper use of rural land.
- This ongoing tension has motivated some landowners to co-locate solar panels and crops or livestock on the same plot of land, known as agrivoltaics.
- Agrivoltaics has evolved from an experimental land use strategy into a viable diversification method for farmers, but further growth necessitates an analysis of existing zoning laws, tax policies, and contractual agreements that farmers must abide by.
- Our research performs this analysis through a review of the history of agricultural land use as well as current agrivoltaics zoning and taxation policy. Further, we review existing grazing contracts used for solar grazing and adjacent grazing industries to recommend best practices.

Presentation Roadmap

- How Agricultural Land Use has Shifted Over Time
- Zoning & Agrivoltaics
- Taxation & Agrivoltaics
- Solar Grazing: Benefits & Limitations
- Review of Solar Grazing Contract Templates
- Policy Examples for Solar Grazing
- Conclusion

Agricultural Land Use Is Shifting



Source:
USDA, *Farms and Land in Farms*, https://usda.library.cornell.edu/concern/publications/5712m6524?locale=en (last accessed August 22, 2022) (Information synthesized from dozens of reports on this page).

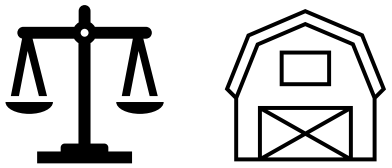
Factors Impacting Land Use Changes

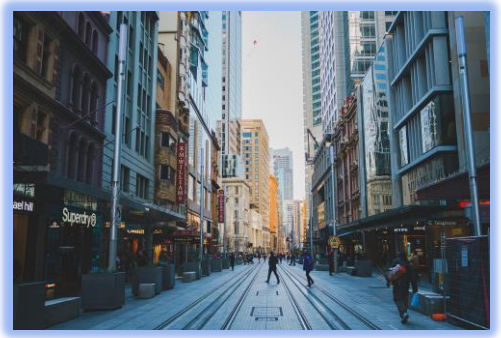
Changing commodity and timber prices

Agricultural and natural resource policies

Urban Pressure

Environmental factors (droughts, flooding, etc.)

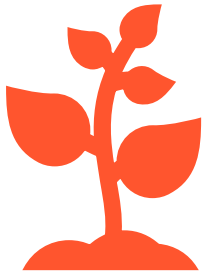




Environmental Implications for Land Use Changes

Highly simplified agricultural landscapes

Climate events like major droughts have led to increased voluntarily use of conservation reserve program—a shift from crop production.



Degraded ecosystem services

Degraded Soil fertility

Lack of Nutrient Cycling

Lack of Genetic Biodiversity

Solar And Farmland

- 90,142 farms hosted solar energy systems as of 2017
- Transitioning from agricultural to solar land use can be enticing due to higher $/acre
- Increasing development of solar farms has led to efforts by state and local governments to ban or restrict solar energy development
  - Corrituck County, NC, banned solar energy development in 2017
  - Connecticut government passed a law requiring state DEEP to consider solar impacts on prime farmland in CBAs
  - Oregon Land Conservation and Development Commission banned solar development on class 1 and 2 soils.

Can Agrivoltaics Be The Answer?

Agrivoltaics And Zoning

- Zoning traditionally and generally views renewable energy land uses and agricultural land uses as incompatible.
- Agrivoltaic systems, predicated on dual-land-use, do not fit well into existing “this *or* that” zoning dynamics.
- Agrivoltaic systems are subject to the regular processes of conventional PV zoning with the added difficulty of building on agricultural land, which often has separate zoning distinctions and financial implications.
- Local governments often hold the unique power to influence agrivoltaic development through zoning ordinances, but zoning ordinances and policies are inconsistent county-to-county and across states, creating regulatory uncertainty and confusion.

Potential Solutions: Zoning

1. Create overlay districts, allowing local governments to strategically locate agrivoltaics in the community

- Overlay zoning is one regulatory tool that allows certain zoning districts to be superimposed over basic districts.
- Overlay zoning is often used as a tool to signal encouragement of and/or a need for development of a particular kind.

2. Address barriers to agrivoltaics in zoning ordinances

- Unduly burdensome decommissioning plans
- Temporary and long-term land-use standards
- Explicit approval of agrivoltaic development
- **Lack of precise definitions of agrivoltaic operations and reconciliation with solar "farm" definitions**
- High fees and burdensome application processes for approval
- California Solar Rights Act
  - Prevents unreasonable solar siting standards at the local level.
- Illinois Public Act 102-1123
  - Establishes standardized siting and zoning requirements (counties may not be more stringent) and prohibits bans on solar energy development.

3. Encourage Dual-Use at the State Level

- New Jersey:
  - ➢2021 Dual-Use Solar Pilot Program allows for the construction, installation, and operation of dual-use solar energy projects on unpreserved farmland, while maintaining the affected land in active agricultural or horticultural use.
- e.g., Massachusetts' financial incentives for dual-use projects.

Agrivoltaics And Taxation

Taxation policies for agricultural land typically relate to zoning categorizations, disincentivizing agrivoltaic installations:

In some states, agricultural land must be **rezoned** to allow solar energy development	Current use policies incentivize private landowners to **keep their land undeveloped**	State laws regarding the taxation of agrivoltaic operations are **complex and**

A range of approaches to taxing solar arrays installed on agricultural land creates inconsistent approaches to regulating agrivoltaics:

Solar arrays may **never** be sited on enrolled agricultural land	Solar arrays are not permitted on **quality soils**	Solar arrays may be sited on a **case-by-case basis**	Solar arrays of **limited size** may be sited on enrolled land	Solar arrays **serving the farm** may be sited on enrolled land	Solar **defers or cancels current use enrollment without penalty**

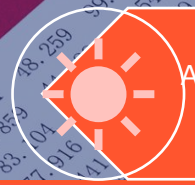
Potential Solutions: Taxation

Ensure all agrivoltaic systems within local government jurisdictions continue to be zoned and taxed agriculturally, given the agricultural function of the land is maintained.

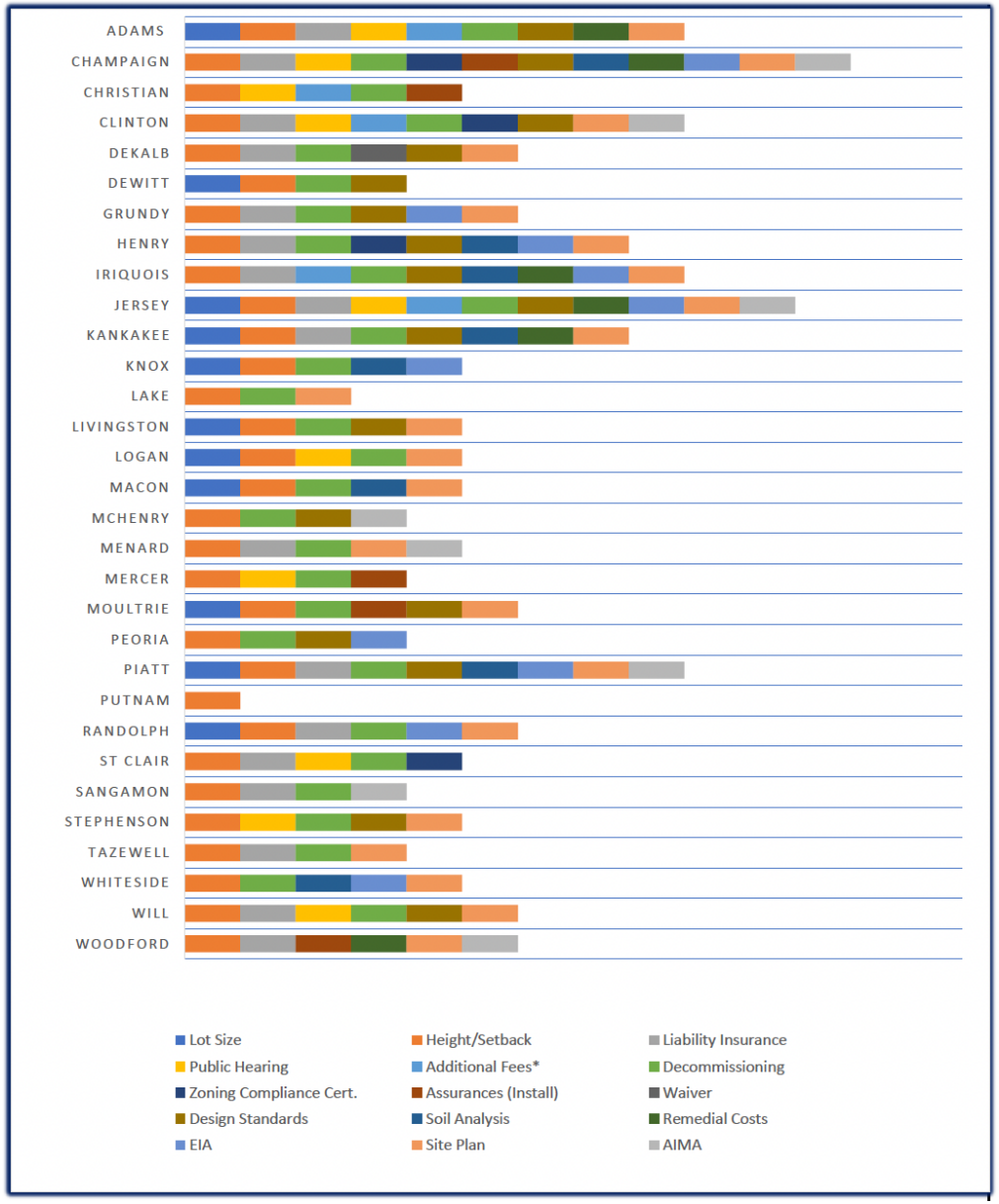
Contract to shift financial burden of changes in taxation rate to solar developer.

Create a short tax holiday to incentivize agrivoltaic deployment and maintain local agricultural employment on the land.

One Example: Colorado Senate Bill 23-092, introduced January 30, 2023
"Section 5 amends the statutory definition of 'solar energy facility', used in determining the valuation of public utilities for property tax purposes, to include agrivoltaics and aquavoltaics."



Avoid using the term "solar farm" **or** carefully and precisely define terms like "solar farm" to include agrivoltaics for the sake of clarity in zoning ordinances that impact tax classifications.



***IL Public Act 102-1123 standardizes the requirements counties may impose upon commercial solar siting and development, prohibiting bans on solar development and providing review procedures to be utilized by local governing bodies.

- Local requirements MAY NOT be more restrictive than those set forth in the act.
- IF siting and permitting requests meet the statutory requirements of 102-1123 (and otherwise comply with state and federal laws), the county MUST approve the request.
- If the county elects to establish solar siting standards, a public hearing must be held and a decision rendered not more than 30 days after conclusion of the public hearing.
- Counties “may allow test wind towers or test solar energy systems without formal approval by the county board.”
- A county with an existing zoning ordinance in conflict with this Section shall amend that zoning ordinance to be in compliance with this Section within 120 days after the effective date.
- “A commercial solar energy facility to be sited so that no component of a solar panel has a height of more than 20 feet above ground when the solar energy facility’s arrays are at full tilt.”
- Requirements can be waived with consent of the owner of each affected non-participating property.

Term	Definition	Counties Using Definition
Commercial Grade	A solar system that is harvesting solar energy for the purpose of providing power to two or more homes and does not apply to solar energy systems that are installed for the purpose of powering a single residential home.	Fayette
Commercial/Large Scale Solar Farm (SES)	Ground Mount solar energy systems that are primary use of the lot, designed for providing energy to off-site uses or export to the wholesale market.	DeWitt
	A utility scale commercial facility that converts sunlight to electricity, whether by photovoltaics, concentrating solar thermal devices, or various experimental technologies for onsite or offsite use with the primary purpose of selling wholesale or retail generated electricity.	Menard, Randolph
Commercial/Large Scale Solar Farm	A utility scale commercial facility that converts sunlight to electricity, whether by photovoltaics, concentrating solar thermal devices, or various experimental technologies for onsite or offsite use with the primary purpose of selling wholesale or retail generated electricity. A COMMERCIAL SOLAR FARM is the principal land use for the parcel on which it is located.	Tazewell
Solar Energy Systems, Commercial	Any device or combination of devices or elements which rely on power obtained by harnessing the energy of the sun's rays. intended primarily to be sold to wholesale or retail markets	Piatt
Solar Energy System, Utility	A solar energy system that is used in order to produce energy for commercial distribution.	Putnam
	A commercial Facility that converts sunlight into electricity, whether by photovoltaics (PV) concentrating solar thermal devices (CST), or other conversion technology, for the primary purpose of wholesale sales of generated	Adams, DeKalb, Whiteside
Solar Garden	A commercial solar-electric (photovoltaic) array, of no more than 20 acres in size, that provides retail electric power (or a financial proxy for retail power) to multiple households or businesses residing in or located off-site from the location of the solar energy system. A county solar garden may be either an accessory use, when a part of an existing or a proposed subdivision or a special use if it is a stand-alone garden.	DeKalb, Whiteside
	A commercial solar-electric array, of no more than 5 acres in size that provides retail electric power to multiple households or businesses residing in or located off-site from the location of the solar energy system. A solar garden may be either an accessory use or a special use if it is a stand-alone garden.	Henry
	A commercial solar-electric (photovoltaic) array that provides retail electric power (or financial proxy for retail power) to multiple households or businesses residing or located off-site from the location of the solar energy system. A community solar system may be either an accessory or a principal use.	Jersey
	A commercial solar-electric array, of no more than 5 acres in size that provides retail electric power to multiple households or businesses residing in or located off-site from the location of the solar energy system.	Knox

Why Definitions Matter

How do we distinguish solar "farms" from agrivoltaics?

What really counts as utility/large scale solar?

What level of agricultural use is/will be required of agrivoltaic systems?

Large Scale Solar Energy System	Energy generated from multiple solar panels over a large parcel in which this would be the primary land use. Poles and racks of multiple solar panels would be used that would generate direct current (DC) rated capacity.	Henry
Solar Energy System, Large-Scale	A ground-mounted solar energy system that occupies at least 40,000 square feet of surface area (equivalent to a rated nameplate capacity of about 250kW DC or greater).	Lake
Solar Energy System – Large Scale	A Solar Energy System with PV Arrays occupying more than one (1) acre of land and/or rooftop space.	Stephenson
Solar Energy System – Mid Scale	A Solar Energy System with PV Arrays occupying more than 4,000 square feet of land and/or rooftop space, but less than one (1) acre.	Stephenson
Solar Energy System, Medium-Scale	A ground-mounted solar energy system that occupies more than 1,750 square feet but less than 40,000 square feet of surface area (equivalent to a rated nameplate capacity of about 10 to 250 kW DC).	Lake
Solar Energy System, Small-Scale	A ground-mounted solar energy system that occupies 1,750 square feet of surface area or less (equivalent to a rated nameplate capacity of about 10 kW DC or less).	Lake
Solar Energy System- Small Scale	A Solar Energy System with PV Arrays occupying less 4,000 square feet of land and/or rooftop space	Stephenson

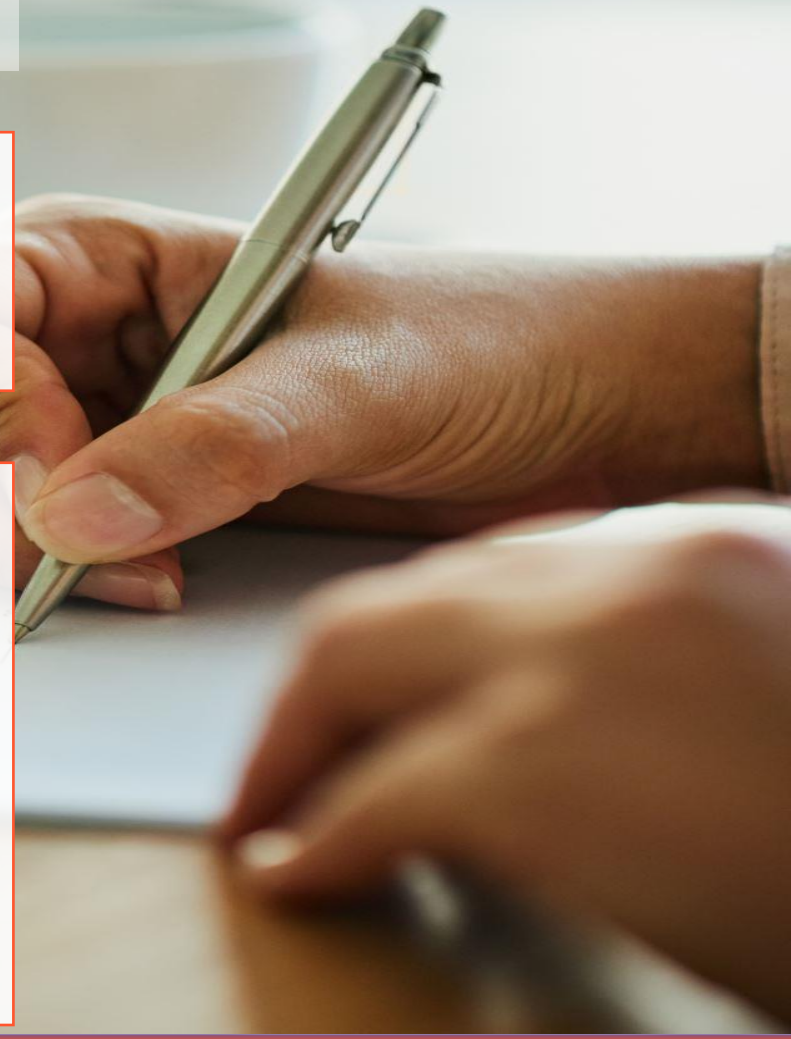
Solar Grazing Contracts

Contract Templates Available

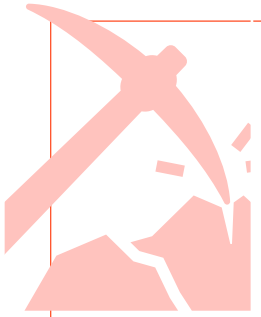
- American Solar Grazing Association
- North Carolina Cooperative Extension and Center for Environmental Farming Systems Initiative

Standard clauses:

- Scope and term of work
- Payment arrangements
- Indemnification
- Insurance Requirements
- Subcontractors
- Sheep Management, Health, and Welfare
- Post Termination Land Access
- Early Termination

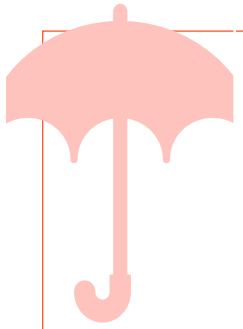


Potential Solutions: Contractual Arrangements



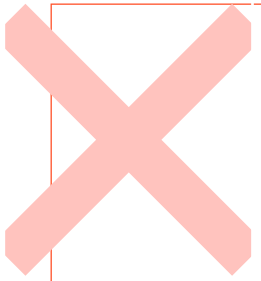
Shift Labor Costs

- Grazier uses site for solely grazing and solar utility hires O&M company for management.



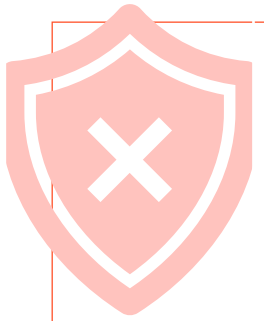
Shift Insurance and Tax Costs

- Partial or full subsidization of insurance premium costs and tax burden shifts by solar utility.



Balanced Renegotiation and Termination Terms

- Bilateral versus unilateral right to termination.



Balanced Indemnification Terms

- Look for indemnification against gross negligence or willful misconduct—questionably enforceable in court.

Regulatory Lessons from Targeted Grazing: California East Bay Regional Park District

California's East Bay Regional Park District allows livestock grazing on park grounds as a means of wildfire management

Farmers pay rent for the license year, which is determined by the average selling price of beef cattle and the number of animal unit months the farmer will graze on park lands. Generally, $16-24/AUM

Licensees must own various insurance policies all covering a minimum $1,000,000 per occurrence

- Commercial general liability
- Automobile liability
- Workers' compensation

Insurance must include other protections for park staff and visitors.

Regulatory Lessons from Targeted Grazing: Dubuque, Iowa

Dubuque, Iowa has enacted a controlled livestock grazing program for private landowners within city limits

Livestock limited to female and neutered male sheep and goats

Herds may only graze a property up to 30 days a year

Contractors must obtain a $300 permit and $5,000 surety bond to operate

Insurance requirements are negotiated by the contractor and landowner

Conclusion

Comments or Questions?
We would love to talk!

Thank you for your time.

Jessica Guarino,
jguarino@Illinois.edu

Tyler Swanson,
tswans4@Illinois.edu

- The current zoning confusion on agrivoltaics can be oppressive and disincentivizing, preventing development over fears of fines or legal action. The background context of major delays in project approval and development does not help.
- Zoning concerns align with taxation concerns, as a change in land use designation can result in a change to tax levies and potential penalties for a landowner.
- Farmers wishing to engage in agrivoltaics must consider the liability and financial risk they are taking on.
- Governments can promote agrivoltaics by developing overlay districts, creating tax incentives, promoting dual-use at the state level, and disseminating legal resources to improve agrivoltaic contracts while reducing costs.