

# Can Agriculture and Solar Co-exist?

*Exploring the promise and challenge of agrivoltaics*

Peggy Kirk Hall, Ohio State University Agricultural & Resource Law Program

Jesse J. Richardson, West Virginia University College of Law



# What we'll cover

---

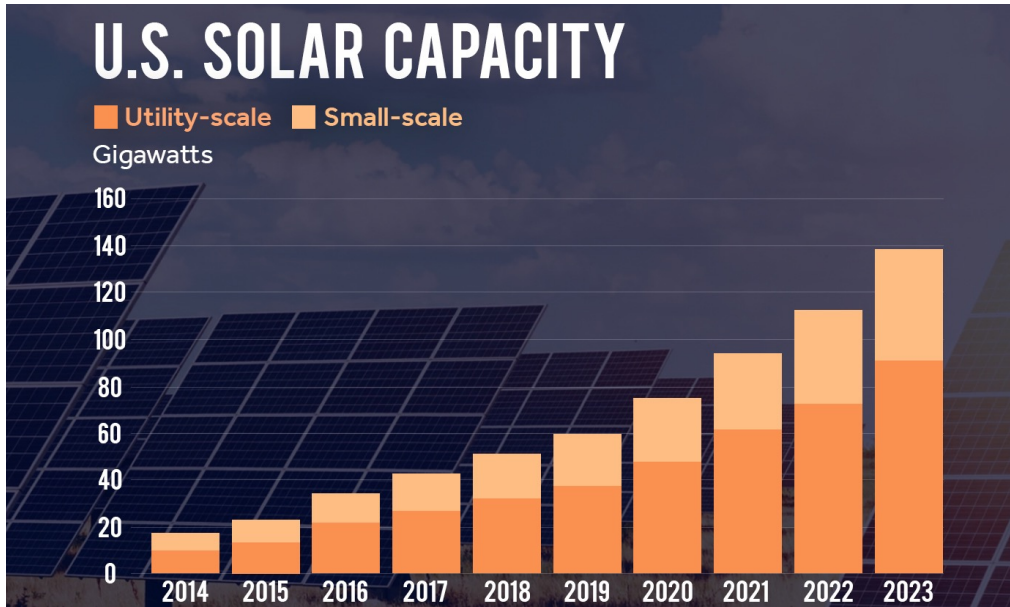
1. Why are we talking about agrivoltaics?
    - Solar development in the U.S.
    - The tension between agriculture and solar development.
    - Is agrivoltaics a solution to the tension?
  2. What are the policy incentives and land use strategies for agrivoltaics?
  3. Concluding thoughts: can agriculture and solar co-exist?
- *Our slides and a list of references and resources are on the NALC webinar page.*



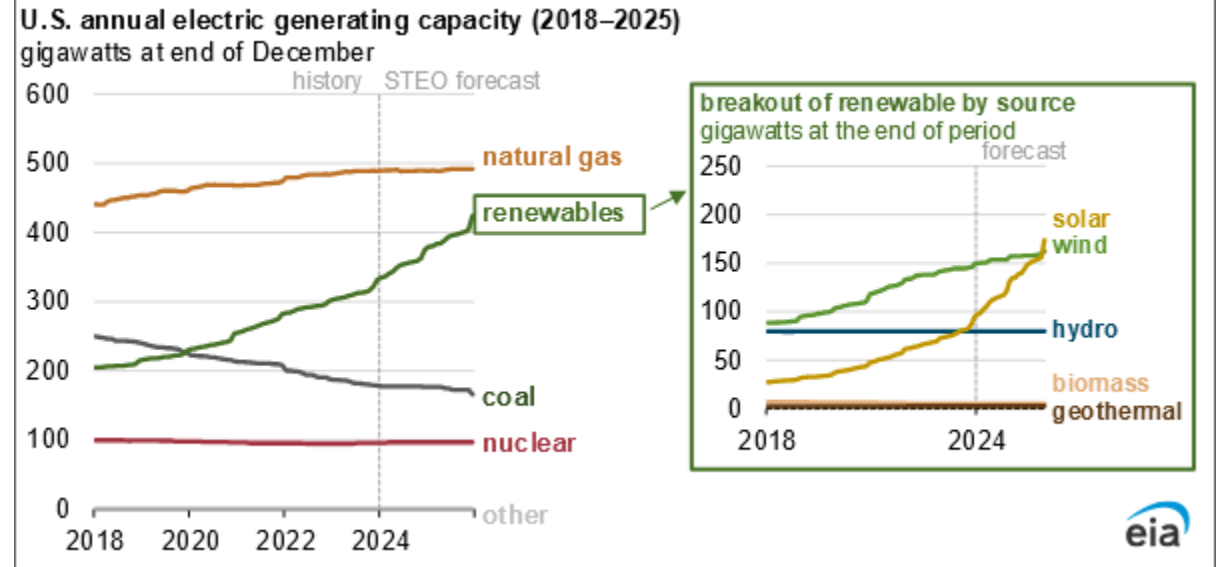
# Why agrivoltaics?



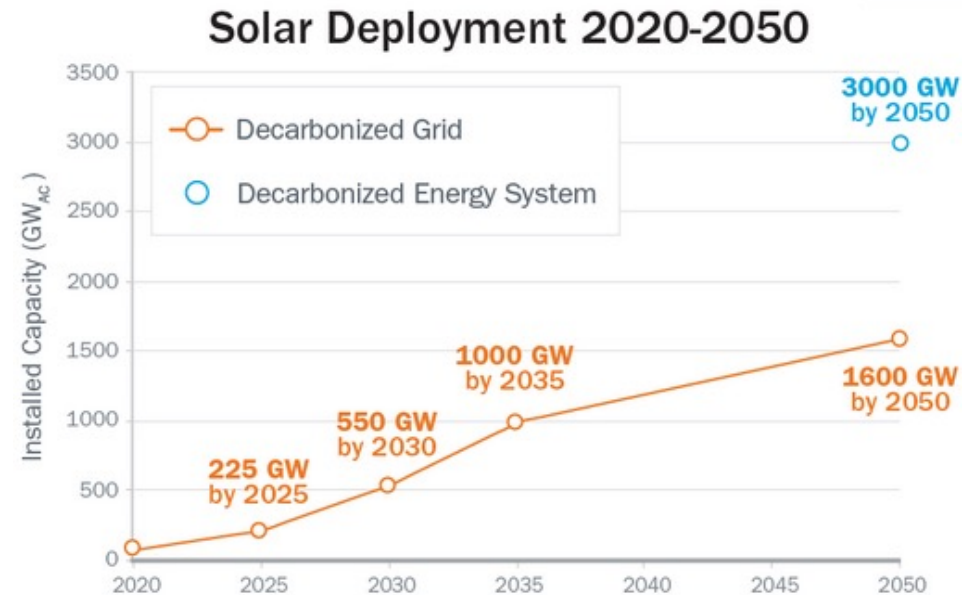
# Solar energy development in the U.S.



Source: U. S. Energy Information Administration via climatecentral.org



Source: U. S. Energy Information Administration



Source: U. S Office of Energy Efficiency & Renewable Energy

# The tension between agriculture and solar development

## Solar developers prefer farmland

- Due to level terrain, existing land disturbance, decreased likelihood of endangered or threatened species, proximity to transmission and substations.
- Easier to negotiate with farmers than governmental entities.
- Easier to lobby for local land use changes than deal with permitting and environmental review processes.

## Solar development has met resistance in rural areas and concerns for farmland protection.

- Loss of agricultural land for production, especially prime soils.
- Concern for effects on local agricultural economy and infrastructure.
- Loss of rural landscape.
- Effect on property values?
- NIMBYism.



# The tension: federal policies

Several federal proposals currently address solar development on farmland.

- SUNRAY for Energy Act – H.R. 7391– NRCS best practices for protecting soil health for solar on agricultural land, USDA research on agrivoltaics.
- Preserving America’s Farmland Act – H.R. 8277 – USDA study on effects of solar on prime, unique, or locally important farmland.
- Agriculture Resilience Act – H.R. 1840 – USDA research and assessments on agrivoltaics.



# The tension: federal policy reactions

## House Farm Bill proposal

- Requires USDA to study the impacts of solar installations on private forestland and prime farmland, as inspired by H.R. 8277, H.R. 7391, and H.R. 1840.
- Limits the Secretary's authority to utilize USDA dollars to convert private forestland or prime farmland into ground-mounted solar installations, based on the policies and concepts laid out in H.R. 792.

(Original Signature of Member)

118TH CONGRESS  
2D SESSION

**H. R.** \_\_\_\_\_

To provide for the reform and continuation of agricultural and other programs of the Department of Agriculture through fiscal year 2029, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

Mr. THOMPSON of Pennsylvania introduced the following bill, which was referred to the Committee on \_\_\_\_\_

**A BILL**

To provide for the reform and continuation of agricultural and other programs of the Department of Agriculture through fiscal year 2029, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*  
2 *tives of the United States of America in Congress assembled,*

3 **SECTION 1. SHORT TITLE; TABLE OF CONTENTS.**

4 (a) **SHORT TITLE.**—This Act may be cited as the  
5 “Farm, Food, and National Security Act of 2024”.

6 (b) **TABLE OF CONTENTS.**—The table of contents for  
7 this Act is as follows:

Sec. 1. Short title; table of contents.

g:\WG\052124\G052124.011.xml (926941|46)  
May 21, 2024 (9:38 a.m.)

# The tension: federal policy reactions

## Senate Majority Farm Bill proposal

### Sec. 2504. Best Practices Guidance for Solar Energy Land Management

- Directs NRCS, DOE and USDA to collaborate to develop nationally and regionally relevant guidance on best practices for the protection of soil health and productivity during the siting, construction, operation, and decommissioning of solar energy systems on agricultural land.

### Sec. 9010. Agrivoltaic System Projects

- Requires outreach, education and reporting on agrivoltaics for applicable programs administered by the Rural Utilities Service.
- Requires coordination between USDA and the Department of Energy to issue guidance on best practices for agrivoltaics.



UNITED STATES SENATE COMMITTEE ON  
AGRICULTURE, NUTRITION, & FORESTRY

U.S. SENATOR DEBBIE STABENOW, CHAIRWOMAN

### The Rural Prosperity and Food Security Act

#### Keeping Farmers Farming, Families Fed, and Rural Communities Strong:

- **Makes investments to strengthen the farm safety net;** supports beginning, underserved, and small farmers and ranchers; and focuses assistance on the farmers with dirt under their fingernails and not billionaire and foreign investors.
- **Helps families working hard to make ends meet** by investing in nutrition assistance that puts food on the table, increasing access to fruits and vegetables, and supporting people on their path to self-sufficiency while cracking down on bad actors.
- **Improves the quality of life in rural communities** by improving rural health care, childcare, and education; creating-good paying jobs; expanding access to high-speed internet; and lowering costs for families and businesses.

#### A Strong, Bipartisan Path Forward:

- **The Rural Prosperity and Food Security Act contains more than 100 bipartisan bills** to keep farmers farming, families fed, and rural communities strong.
- **Senate Democrats are showing leadership by putting forward a bill that reflects bipartisan priorities** and meets the needs of farmers, families, and communities.
- Unfortunately, Republicans are pursuing the same, failed strategy in the House from 2013 and 2018 of playing politics with food assistance and splitting the Farm Bill coalition. **Senate Democrats have a proposal that holds together the broad coalition** of farmers, nutrition and hunger advocates, conservationists, and the climate community that has always been the foundation of a successful, bipartisan Farm Bill.

#### Building on Historic Progress:

- **The Rural Prosperity and Food Security Act builds on the historic progress** we have made for rural communities, families, and farmers in addressing the climate crisis in the *Infrastructure Investment and Jobs Act*, the *Inflation Reduction Act*, the *American Rescue Plan*, and others.





# The tension: land use regulation

- Inconsistent or conflicting state and local regulations.
- Some states have preempted local regulations, in part or in whole.
  - Michigan gave siting authority to the Michigan Public Service Commission.
  - In Maryland, the state holds most of the authority.
  - Ohio granted broad control to counties to prohibit large scale solar development over 50 MW.

# Agrivoltaics: can we have our cake and eat it too?

- Agrivoltaics is the “co-location” or “dual-use” of land for solar arrays and agricultural production.
- Agricultural production can be livestock or crop production or pollinator habitat.
- Two types of systems:
  - Production beneath elevated panels, utilizing shade and reducing water needs.
  - Production between rows of panels.



Source: Jack's Solar Garden

# Agrivoltaics: what do we know?

Production research is still underway ...  
and lags behind solar development.



Source: Ohio State University



## Crop production issues

Between panels: some success with forages -- lack of data on commercial alfalfa and cool season hay crops.

Beneath panels: success with kale, peppers, swiss chard, broccoli, celery, winter wheat, clover, potatoes.

Lack of research on shade intolerant crops.

Fruit trees usually not compatible with solar.



## Livestock production issues

Most success is with sheep – open ewes, stocker lambers, ewes with lambs at least a few weeks old.

Chickens, ducks and geese may be successful – panels must be high to prevent roosting.

Goats are not generally successful - jump and climb on panels.

Some success with cattle – requires raising and reinforcement.

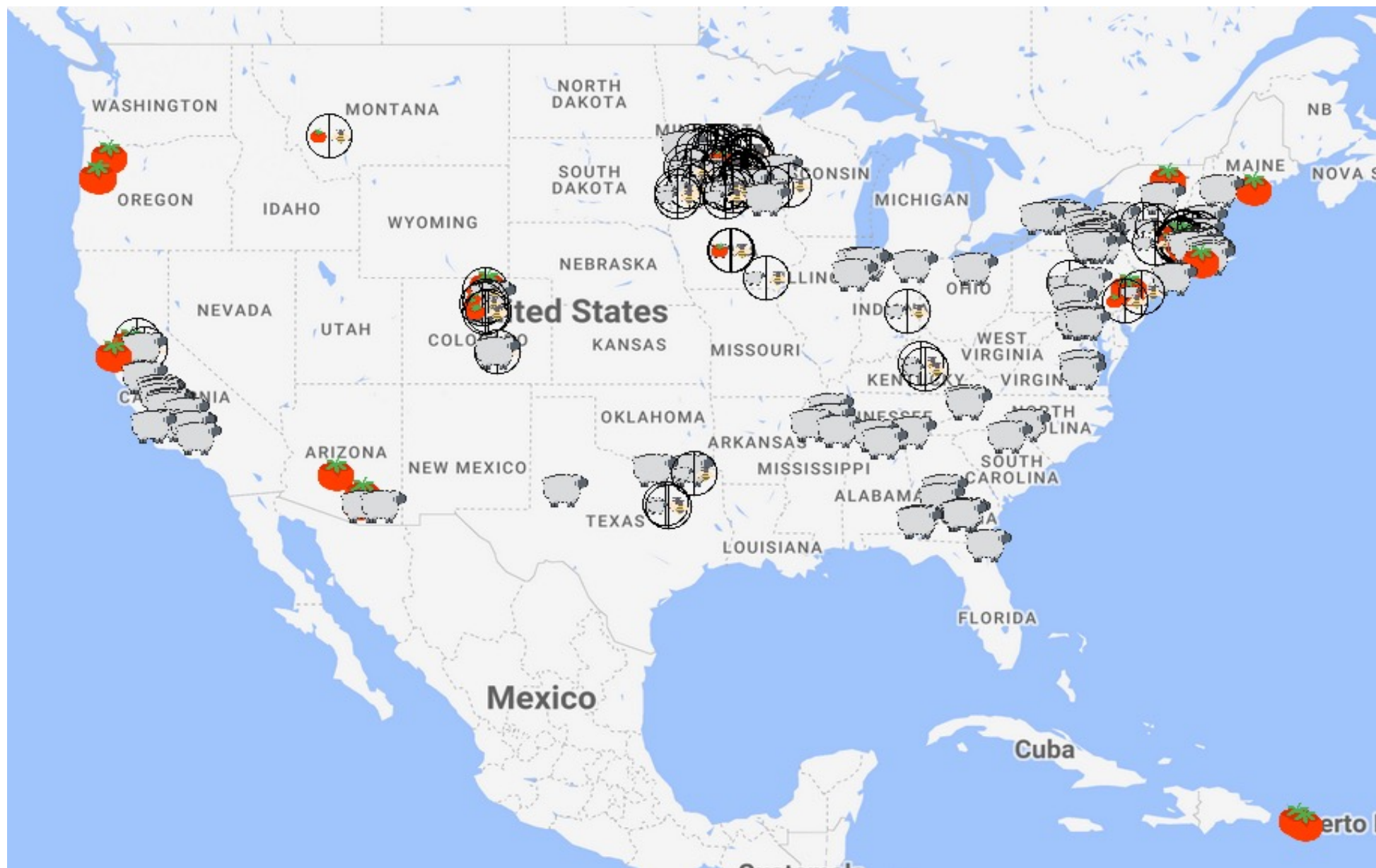
Pigs, and horses are also not recommended.

# Current estimate of agrivoltaics in the U.S.

- 567 projects
- 10,005 MW
- 62,092 acres

Source: InSPIRE  
Agrivoltaics Map

Europe is ahead of us with more projects.



# Benefits of agrivoltaics

## Landowner benefits

- Supplemental and diversified income sources.
- Maintains agricultural use of prime soils.
- Water conservation benefits due to shade and vegetation.
- Yields of some crops maintained or increased.
  - Shade tolerant and heat sensitive plants do well.
- Expands production opportunities in high heat regions (and for minority farmers?)
- Shade for grazing livestock.
- Increases pollinator, native and critical habitats.

## Solar developer benefits

- Lower costs for solar developers on farmland
  - Costs to remove vegetation
  - Weeding
  - Dust suppression
- Solar panel efficiency increases
  - Panels become less efficient as their temperatures increase, vegetation keeps temperatures up to nine degrees lower.
- Less community opposition?

# Challenges of agrivoltaics



## Project design challenges

Must design the project to accommodate agriculture.

Often too late if lease is executed and regulatory process is underway.



## Costs and risks for developer

Wider rows, higher panels, sturdier poles, deeper foundations, reinforcements.

Risk of damage to solar arrays from farming activities.



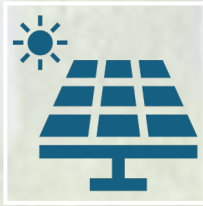
## Adoption costs for farmer

Could require transition to different crops--currently not practical with grain crops like corn, soybeans, and wheat.

Equipment and implements must change to accommodate solar arrays.

Are markets available?

# Challenges of agrivoltaics



## Impact on “agriculture” laws

Are “solar farms” really “farms” for legal purposes?

Does it qualify for differential property tax assessment?

Does it qualify as “agriculture” for zoning purposes?

Is it permissible on conservation or agricultural easement land?



## Community issues

Does it affect community acceptance of solar development?

Is it a ploy for community acceptance?

Will farmers who lease for agrivoltaics face community criticism?

Will it affect local property values?



## Farmland protection

Still a loss of prime soils.

Still a larger footprint than other energy sources.

# Policy incentives and land use strategies for agrivoltaics

---



# New Jersey Dual-Use Solar Energy Act

- Directs NJ Board of Public Utilities to consult with NJ Dept. of Agriculture and Rutgers to develop a dual-use pilot program for solar projects on working farmland that keep the farmland in continued agricultural production.
- The pilot program seeks up to 200 MW generating capacity from dual-use solar in the first 3 years, with additional capacity if program is extended and will serve as the basis for a permanent dual-use program in New Jersey.
- Also permits certain dual-use land to be eligible for differential use farmland assessment.
- N.J.S.A. 48:3-87.13



Source: Rutgers University Agrivoltaics Program

# Solar Massachusetts Renewable Target (SMART)

A long-term, sustainable solar incentive program to promote cost-effective solar development in the Commonwealth



## **Massachusetts SMART Program and Agricultural Solar Tariff Generation Units (ASTGU)**

- Promotes installation of certain types of grid-connected solar arrays through incentives based on a fixed price per kWh that appear as a “tariff” payment to the solar array owner.
- Qualifying agrivoltaic systems can receive an additional ASTGU incentive under the SMART program, currently \$0.06 per kWh added to the base compensation rate of \$0.14-\$0.26 per kWh.
  - System must be designed to optimize a balance between electrical generation and agricultural production.
  - System must be compatible with the proposed crops and estimated productivity.
  - Land must be under continuous agricultural production over the 20-year SMART program period.



# Maine solar energy compensation fee law

- Grants solar permitting authority to Dept. of Agriculture, Conservation and Forestry.
- Prohibits solar development on +5 acres on “high-value agricultural land” without a permit and establishes a compensation fee
- Developer may choose mitigation or conservation in lieu of fee.
  - Dual-use is a mitigation strategy.
  - Conservation must be similar land and protected by a perpetual conservation easement.
- Fees are to be used by DACF to preserve similar land.
- 38 MRSA §484-C.

# Maryland Community Solar Program



Source: Maryland Department of Planning

- Includes agrivoltaics projects in the new permanent Community Solar Program that allows for net metering for energy from community solar projects.
- Provides personal and property tax exemptions for agrivoltaics projects.
- Md. Code 7-306.2

# Zoning strategies

- Designate areas where agrivoltaics are allowed and others where solar or agrivoltaics are not allowed.
  - Solar farms often only allowed in industrial zones.
  - Different agricultural districts (A-1, A-2) or overlay zoning.
  - Based on prime farmland soils or other factors.
- Different regulations for small-scale v. large-scale.
- Access roads.
- Height.
- Visual screening.

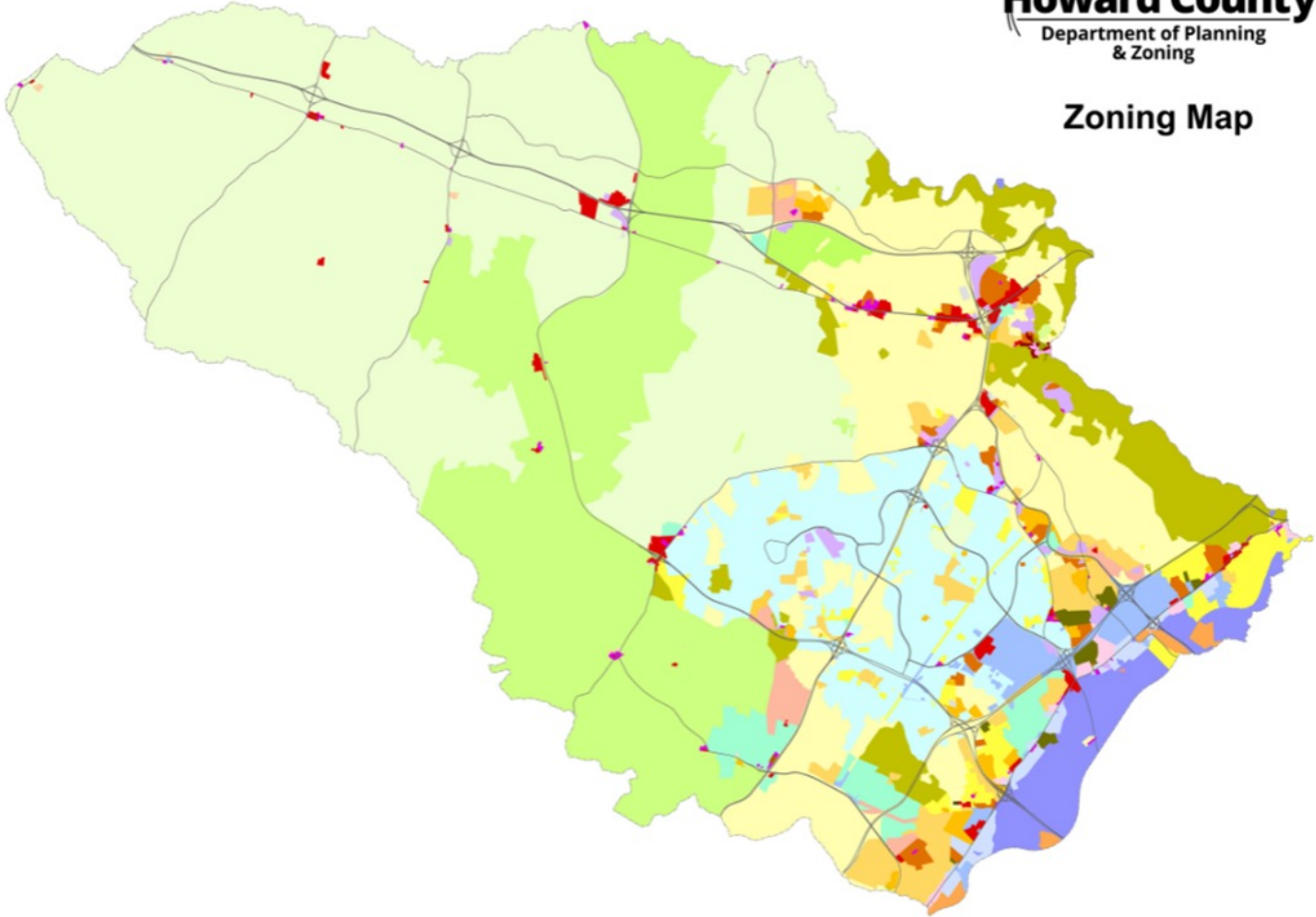
# Zoning strategies

- Segment and repurpose topsoil removed during excavation.
- Require drought resistant, native vegetation in non-agricultural portions of the site.
- Setbacks.
- Fencing.
- Lot coverage/impervious surface coverage.
- Decommissioning plan.
- Require bonding or other financial responsibility for decommissioning.

# Zoning

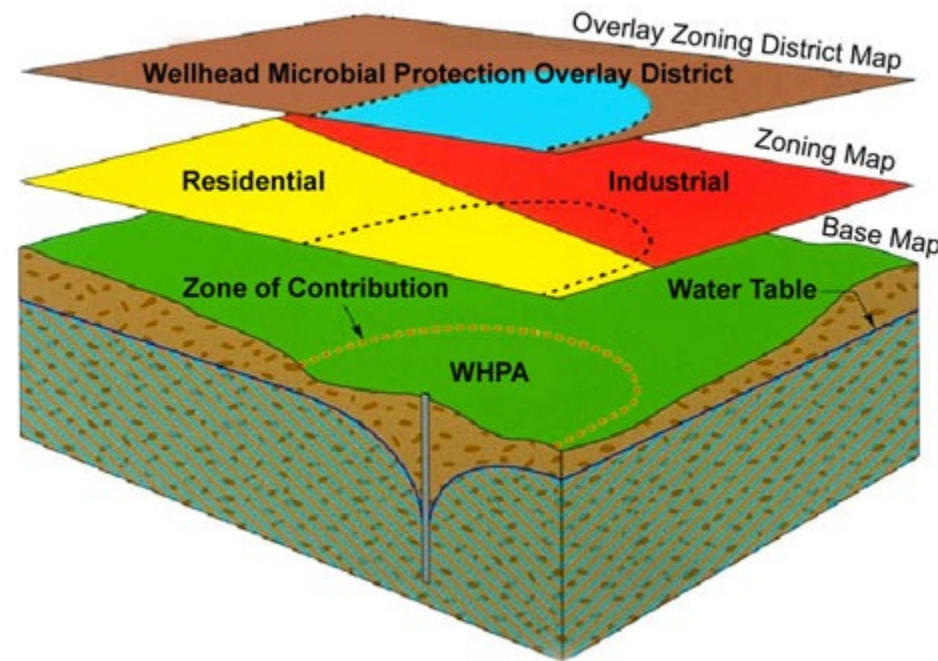


Zoning Map



# Overlay Zoning Districts

- Mapped district is superimposed on one or more established zoning districts







# What if you don't have zoning?

- Many rural communities do not have zoning.
- In that situation, solar producers decide when, where, and how much?
- Example: West Virginia
  - Most counties have no zoning.
  - In some West Virginia counties, thousands of acres are under solar lease.
  - Concern about the continued viability of agriculture.



## **Concluding thoughts... promises and challenges**

- Is a win-win possible?
  - Type of agricultural production matters ... and might have to change.
  - Location matters -- solar can open new ag opportunities in some locations.
  - Certain projects in certain places might achieve successful co-existence.
  - Zoning can guide development and reduce impacts.
- There can be efficiency sacrifices, both for energy and agriculture.
- Policies and land use may need to choose a priority: energy or ag?
- Coordination between state and local policies is necessary.
- Research will help, but already lags behind development.
- Policy incentives may increase adoption of agrivoltaics.

# Can Agriculture and Solar Co-exist?

*Exploring the promise and challenge of agrivoltaics*

Peggy Kirk Hall, Ohio State University Agricultural & Resource Law Program  
aglaw@osu.edu

Jesse J. Richardson, West Virginia University College of Law  
jesse.richardson@mail.wvu.edu

