Agrivoltaics as a means of preserving agricultural land

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Agricultural land provides food, feed, fiber and fuel. At the same time, much of that land could also support clean electricity by housing utility-scale wind and solar energy installations. This can create conflict between competing land uses.

Many renewable energy developers intentionally locate on lower-value crop or pasture ground. On such land, willing landowners make a rational economic choice to accept energy installations. Energy infrastructure typically occupies a small fraction of the underlying land. The lease payments can support the landowner’s other activities, including farming on more productive land.

But high-value agricultural land can also have high renewable energy potential. Landowners there may be reluctant to give up agricultural production. To preserve such agricultural land, “agrivoltaics” may be an option.

What are agrivoltaics?

Agrivoltaics means the “colocation” of solar energy installations and agricultural production. Colocation means they occupy the same land. Solar panels sit alongside or above crops, livestock or pollinator habitat.

Agrivoltaics have the potential to ease land-use conflicts between agriculture and energy generation. Both landowners and energy developers can benefit.

First, landowners benefit by maintaining agricultural production and diversifying farm income. This can help mitigate risk against market downturns.

The landowner may need to adjust certain inputs, like equipment and implements, to work around the solar panels. Some crops and livestock also tolerate agrivoltaics better than others, meaning the landowner may need to transition crops or livestock.

But certain crops can help cool the solar panels and even increase their energy-generation efficiency. And shade from the solar panels can help conserve water and keep livestock cool. The landowner can save input costs.

Second, agrivoltaics can benefit solar developers by enabling them to secure more land. Agrivoltaic installations may require wider row spacing, higher panels, more risk of damage and costlier construction than traditional solar energy installations. The additional land control can help offset those constraints, but the developer should consider them in developing the project.

Incentives driving agrivoltaics

In addition to benefiting stakeholders, agrivoltaics may also help the project overcome regulatory hurdles. This can be both practically and legally true.

Practically, some agricultural communities have resisted utility-scale renewable energy projects. Opponents, for instance, have complained renewable energy will remove valuable cropland and cannot coexist with agriculture. Some of these claims are false, but this kind of community opposition has caused elected officials to deny permits and adopt prohibitive regulations.

Agrivoltaics have the potential to blunt those arguments. Not only are agrivoltaics consistent with agriculture, but they necessarily incorporate agriculture. They preserve farmland under and alongside the solar panels.

Not every site will be conducive for agrivoltaics. A developer's incorporation of some agrivoltaics, though, may help the community support the overall project. In agricultural areas, agrivoltaics may help renewable energy gain wider community support.

Some jurisdictions have legally recognized agrivoltaics' favored status. Massachusetts, for instance, provides an incentive to landowners that incorporate agrivoltaics. Utilities must compensate customers with solar panels that generate more electricity than the customers consume. Customers that generate electricity using a qualifying agrivoltaic system can increase their compensation. See 225 Mass. Code Regs. 20.05.

Maine also incentivizes agrivoltaics. It requires an impact fee for any solar development on "high-value agricultural land." But that impact fee lessens if the developer uses

mitigation strategies. Among the mitigation strategies are agrivoltaics, i.e., “dual-use agricultural and solar production.”

This legally acknowledges agrivoltaics can help ease the conflict over high-value agricultural land that also has high renewable energy potential. That opportunity may exist in other states, though few other jurisdictions have codified similar measures.

Legal hurdles for agrivoltaics

Without a state policy supporting agrivoltaics, one of its main legal hurdles remains zoning. Not every municipality regulates land use. However, those that do typically designate “districts” where certain land uses may locate. Zoning law generally prohibits any land use a regulation does not specifically list as permitted or conditionally permitted. See Eugene McQuillin, 8 McQuillin Mun. Corp. § 25:145 (3d ed. 2024).

Agrivoltaics remain relatively new. Thus, few zoning regulations specifically list them as permitted or conditionally permitted.

Agrivoltaics installations may be a permitted or conditional use to the same extent as solar farms. But that subjects agrivoltaics to the same restrictions as solar farms. Many zoning jurisdictions prohibit solar farms or prohibitively regulate them. Thus, even in a community that supports agrivoltaics, zoning issues may limit their legal efficacy for now.

Another legal hurdle for agrivoltaics is their taxing status. Nebraska is among the states that provide a preferred taxing status for “agricultural land” but not if such land contains “a solar farm or wind farm.” Such land has a costlier, commercial taxing status.

Under this distinction, where does land containing agrivoltaics fit? The land remains agricultural, although it has components of a solar farm. Nebraska leaves this issue unclear.

Despite agrivoltaics’ potential, legal issues like these threaten its deployment. To overcome those hurdles, states may need to consider pro-agrivoltaic policy incentives like those in Massachusetts and Maine.

This article provides only a general overview of that process and is not a substitute for state-specific, and in some cases federal, analysis of natural resource rights. Always involve experienced local counsel.