



Dual-Use or (Agrivoltaic) Solar Installations



What is Dual-Use?

- Dual use is the integration of agricultural production with a photovoltaic (PV) system. It allows for solar energy production while maintaining agricultural activities.
- Typically it is considered the installation of a solar array that partially obstructs solar penetration to crop production (either forage land or crops).
- Solar mounted on barns, greenhouses, or floating on agricultural ponds may also be considered dual-use operations.

Benefits of Dual-Use

- Landowners diversify their incomes streams while continuing to produce agricultural products.
- Protects against loss of productive farmland due to permanent solar development.
- Provides a marketing opportunity to a sustainability-minded audience.
- Required security fencing doubles as an extra secure enclosure for livestock.
- Shaded soils may retain more moisture and reduce water consumption for some species of crops.
- Provides relief for workers and animals beneath the array.

Potential Drawbacks

- Loss of tax benefits for the conversion of land into solar production for landowners enrolled in the State's Farmland, Open Space, and/or Tree Growth Tax Programs.
- Although well established in some countries, experimentation in the Northeast is just beginning.
- Potential for reduced crop yields, and limitations on mechanical harvesting equipment access beneath the solar array.



Crop production around a solar array
Source: Grist / National Renewable Energy Lab



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Dual-Use Applications

Greenhouse systems

- Applications can include rigid or flexible or thin-film solar cell modules seen to the right. (Flexible solar module technology still being developed).
- Strategic placement of modules to optimize sun in winter and selective shading/cooling in summer.
- Applications being studied in Maine.



Flexible module application on a greenhouse in Maine
Source: Arch Solar

Cropping systems

- Growing crops directly beneath, between, and around solar arrays in a field.
- Clearance beneath the array will vary depending on harvesting techniques (hand vs mechanical harvest).
- Spacing between panels may vary depending on location and desired shading effect.
- May include the mechanical or manual solar tracking and tilting of the array to optimize production.
- Northeast crops that are more shade tolerant and show potential for this application include: peppers, broccoli and chard.

Grazing

- Height of array may vary for different livestock.
- Offers protection from predators.
- Applications may include: sheep, cows, chickens, and horses.



Sheep grazing under a solar array in Massachusetts
Source: BlueWave Solar

Interested in learning more?

- Explore the American Solar Grazing Association's webpage: <https://solargrazing.org/>
- Visit the US Department of Energy's website for a Farmer's Guide to Going Solar: <https://www.energy.gov/eere/solar/farmers-guide-going-solar>
- The University of Massachusetts Amherst's Clean Energy Extension is another great source: <https://ag.umass.edu/clean-energy/research-new-initiatives/dual-use-solar-agriculture>
- Check out Maine Sustainable Agriculture Society's dual-use research: <https://mesas.org/syra/>
- FMI on Solar Installations please see our factsheet at: <http://www.maine.gov/dacf/ard/resources/docs/solar-installation-applications-factsheet.pdf>