

## Dual-Use: Farm Operations Considerations



In 2018, the Massachusetts Department of Energy Resources (MA DOER) established the Solar Massachusetts Renewable Target (SMART) program, which regulates incentives associated with new solar photovoltaic (PV) development in the state. This document is part of a series of fact sheets designed to help farmers navigate the program. Additional fact sheets and information are available on the UMass Clean Energy Extension (CEE) website, <https://ag.umass.edu/clean-energy>.

To realize the full benefits of an on-farm dual-use solar array, the design and layout of the solar PV array will need to be compatible with overall farm operations. The array will not only produce a pattern of increased shading on land beneath it, but will also alter patterns of airflow and precipitation, and installation of the system could lead to soil compaction. You will have to navigate farm equipment and personnel around the solar array as part of everyday farm operations, and the panels themselves may require care to maximize electric production. Listed below is a selection of operational aspects to consider when thinking about integrating dual-use solar PV into your farm.

### Installation type and soil disturbance

Traditional solar array installation can involve extensive soil disturbance. The SMART program requires dual-use arrays to be installed with minimal land disturbance. Talk with your solar installer about installation methods to minimize disturbance and compaction of topsoil, in order to ensure array installation meets program requirements and avoids loss of land fertility.

### Choice of agricultural production compatible with solar PV

Dual-use systems are relatively new and experimental. These systems may not be successful for production of all agricultural products. Please review our *Crops and Livestock Considerations* fact sheet, and consult with UMass Extension in designing your Agricultural Plan. Planning for dual-use agriculture should include consideration of the full range of agricultural activities that might be conducted on the farmland underneath the array over its 20-25 year lifespan.

## Operation of farm equipment

In developing a dual-use system design, it is important to consider height and width clearances of all existing farm equipment likely to be used on the site, as well as potential equipment and vehicle purchases to be made in the future. Over the 20-25-year lifespan of a solar array, there may be significant changes in your farm equipment inventory, choice of crops, and production practices. Carefully review your current and anticipated needs for cultivation, planting, irrigation, fertilizer and pesticide applications, animal husbandry practices, etc., to be sure the system design is compatible with these activities.

## Water management

Shading from solar panels is likely to increase water retention beneath panels. This may result in more humid conditions that reduce irrigation needs, but could increase disease risk. While humidity may be higher, plants grown directly under panels will be sheltered from precipitation, which may reduce plant access to water. Rainwater dripping from solar panels also has the potential to cause soil erosion – consider whether precipitation could be re-directed to irrigation systems or elsewhere.

## Pest and weed management

Shaded areas under panels can be expected to have increased humidity and altered airflow patterns. While shelter might be an asset under hail or heavy rain, these conditions are likely to result in greater risk of disease spread, especially for fungal pathogens. Some insect pests seek cool, shady conditions, and may be more active under panels during daylight hours than they would be in an open field. Managing weed growth around solar panel mounting structures can be particularly challenging, and may require fine-scale management with hand tools or pesticides, leading to increased labor costs.

## Manure management

If you are managing a livestock or poultry operation, keep in mind that animals may prefer to stay in the shade during hot sunny days. Use of chain dragging a few times during the grazing season may be necessary to spread manure which has accumulated under the solar panels.

## Solar panel maintenance

Dust has the potential to significantly reduce the efficiency and power production of solar panels, especially in dust-prone areas. Your solar installer can provide guidance as to whether panel cleaning will be required. Thrown rocks from equipment can damage panels. For sites incorporating livestock grazing, be sure animals are considered during the system design phase. Solar panel mounts are relatively stable structures, but large livestock have the potential to damage or destroy mounts and panels, if the system is not designed with these animals in mind. In addition, animals like pigs and goats can interfere with cables and wiring; mounts should be designed to make these connections inaccessible to livestock.

## More Information

For more information, visit our website: <https://ag.umass.edu/clean-energy/solarag>.

After reviewing website materials, you can contact Zara Dowling (zdowling@umass.edu, 413-545-8516) with any additional questions related to solar PV use on your farm.