

Resource Center



The right site for solar:

Fostering renewable energy without sacrificing natural resources

ANJEC strongly supports the goals of New Jersey's Energy Master Plan to surpass the current renewable portfolio standard goals by achieving 30 percent of the State's electricity needs from renewable energy sources, such as solar, by 2020. As the solar market evolves, however, wide scale industrial solar development has raised questions about optimal siting of large ground arrays to safeguard other natural resources.

Below, three ANJEC staffers explore the potential impacts of large-scale solar development and how towns can protect the environment by guiding solar development to appropriate locations. Obviously, this article only begins to identify the important issues. ANJEC is currently in the process of developing a Resource Paper and workshop to provide more guidance for planning boards and environmental commissions. In the meantime, please contact the ANJEC Resource Center (resourcecenter@anjec.org) for more information and copies of sample ordinances.

Will solar farms overshadow garden state agriculture?

By **Cheryl Reardon,**

ANJEC SJ Bayshore Project Director

State and federal incentives have made large-scale projects financially attractive to investors, especially the ability to earn Solar Renewable Energy Certificates, tradable certificates issued to solar energy generators of at least one megawatt. On average, these certificates were selling for over \$570 each in April.

Since early solar generation is not expected to trigger costly capital upgrades at the substations, current circumstances have created a "grid space race" (similar to that of the California Gold Rush) for farmland throughout New Jersey – especially in Salem and Cumberland Counties – due to the availability of flat, affordable land, the presence of sufficient intercon-

nection locations (substations) and – as stated by one applicant – "you have more sun down here."

With the recent slump in residential development providing some relief from the decade-long housing boom, South Jersey towns have been hoping to obtain Garden State Preservation Trust funding to preserve more farmland and open space. But those hopes are now in jeopardy as solar developers are offering landowners as much as \$1,000/acre per year for leased land and up to \$28,000 per acre for outright purchase.

Planning boards and environmental commissions are suddenly faced with numerous commercial solar applications proposing to convert thousands of prime agricultural soils to "solar farms" – claiming they "harvest the sun." Applications are being filed so rapidly that it is difficult to keep a current tally of what's in the application pipeline; however, total acreage is expected to quickly exceed 3,500. In addition to putting prime agricultural soils at risk, several applica-



Large scale solar developers propose to cover thousands of acres of South Jersey farmland.

tions also propose to clear woodlands, disturb wetlands, and place solar arrays within 300-foot buffers required for C-1 waterways.

What's at stake?

Recent New Jersey legislation classifies solar panels as an "inherently beneficial use" and not to be included in impervious cover calculations. Some municipalities are trying to identify ways to determine suitable placement for large, commercial solar installations while supporting visions outlined in their master plans to promote agriculture-based economies and protect environmentally sensitive areas.

What's at risk:

- South Jersey contains the vast majority of remaining contiguous prime agricultural soils in the Garden State.
- South Jersey farms provide an affordable supply of fresh fruits and vegetables to suburbs and urban centers essential to the health and well-being of millions.
- South Jersey agriculture provides thousands of jobs, such as packing, warehousing, cold storage, transportation, tractor/equipment companies, seeds, and irrigation. Other than short-term installation jobs, commercial "solar farms" support few permanent employees.
- With many farmers dependent on leasing additional farmland to remain viable, a decrease in available land

creates hardship for farmers and may drive up lease costs.

- Devoting more prime agricultural land to solar development could undermine farmland/open space preservation plans.
- There is a lack of scientific research on the long-term impacts of large-scale solar development on wildlife within the Northeastern Climate Region – most solar installations and studies

pertain to arid climate conditions. It's not known how inappropriate siting might impact wildlife and lead to loss of habitat for dependent species within the Bayshore region.

- Installing large expanses of solar arrays could cause soil erosion, compaction, changes in runoff patterns and release of toxic materials such as cadmium from broken photovoltaic panels.
- Fast evolving technologies could lead to decommissioning and disposal issues for abandoned, obsolete panels.
- Negatively impacted scenic vistas could affect tourism.

Master planning is key

It is important for master plans to contain a clear vision statement and description of what is essential to the future well-being of the town, as well as specific woodlands and environmentally sensitive areas that are to be protected. Towns should refer to their environmental resource inventories and farmland/open space preservation plans, which may need to be updated and should be adopted as part of the master plan.

Further, planning boards should consider adopting a sustainable energy ordinance that clearly states their towns' objective to ensure compatibility of sustainable energy goals and sustainable agricultural and environmental policies within the community and region.

Solar siting and sustainable land use

By **David Peifer**,
Highlands Project Director

Despite the fact that “green energy” generation has been deemed “inherently beneficial” by the New Jersey legislature, not every land use is appropriate everywhere, even when it serves a desired social objective or is profitable. Large-scale ground-mounted “solar farms” – not to be confused with systems serving individual homes, businesses or farms – can occupy hundreds of acres and may pose serious siting concerns for municipalities, including loss of prime farmlands.

The location, scale and character of “solar farms” can be regulated under the Municipal Land Use Law to protect the public health, safety and welfare, but it is highly unlikely that current municipal planning and zoning frameworks adequately address this type of land use. In the absence of any coherent statewide plan or control, municipalities should seriously consider appropriate planning and zoning responses, including the development of ordinances to control the siting of these facilities.

Begin with your ERI

Like the creation of any land use ordinance, the process begins with fact finding until a clear picture emerges as to just what the proposed use will mean for the town. The environmental resource inventory (ERI) provides an excellent

foundation for this process, as well as the master plan, open space plan, farmland preservation plan and other municipal planning documents. Examining and visiting other large, operational solar sites is also recommended.

Once potential impacts are understood in relation to the municipality’s natural resources, planning goals and objectives, the conflicts as well as opportunities for the land use can be assessed.

“No brainers”

Even without an ERI, one could reasonably conclude that large solar features should not be located on existing surface water, beaches and dunes or on wetlands, vernal pools and their transition zones that are regulated by the New Jersey Department of Environmental Protection (NJDEP). Cemeteries, public parks and other permanently deed-restricted open spaces and preserved farmland might also fall into this category.

Critical areas constraints

While some critical areas constraints, such as septic suitability, may be of little concern for solar development, others could pose serious concerns. For example, floodprone areas, not just 100-year floodplains, present obvious problems, such as interruption of electric service, damage from flood debris and lack of access during floods.

Since solar farms remove all natural vegetation, they are unsuitable for riparian zones where filtration of surface run-off, discharge of groundwater, wildlife interaction between aquatic and terrestrial

Installing ground-mounted solar arrays can disturb soils, fragment habitat and increase stormwater runoff.



environments, stream shading and a host of other chemical and biological functions take place.

The ERI should contain a soil section that can be used to address a wide range of concerns such as soils with high seasonal water tables that may pose severe constraints for seasonal access, and structural stability. Some facilities use steel supports that are driven nearly 20 feet into the soil. These projects also typically involve extensive trenching or “running sand” that can be problematic in wet conditions.

Erosion potential is also a concern due to the extensive land clearing and grading involved. Upland forests and trees are especially precious natural features in many South Jersey farming regions, and they are of key importance to the hydrologic functioning of their watersheds.

Since forests sequester carbon dioxide, clear-cutting of forests to establish “green energy” is also not logically sustainable. Impacts on wildlife habitat come primarily from land clearing, coverage with structures, and fencing. Areas of high sensitivity, such as Natural Heritage Priority Sites, all threatened and endangered species habitat and critical grassland habitat also pose serious constraints.

Agricultural preservation

Large solar farms may compete directly with agriculture for land resources. Examination of the master plan coupled with the ERI will reveal the community’s commitment to agricultural preservation and the location of the best soils.

Competing uses

Many communities have planned and zoned for center based development and redevelopment areas. Because land is a scarce commodity in these zones, large ground mounted solar facilities should be precluded, but roof mounted facilities should be specifically encouraged.

Where should solar facilities go?

There are several land use categories that can support large scale solar facilities under most circumstances without creating

serious conflicts. These could include rooftops, existing impervious areas, brownfields, and sand and gravel pits. Rooftops, in particular, have the advantage of being near electrical demand, reducing the need for transmission lines and substations. A local ordinance might prioritize these areas for use.

Conclusion

Municipal environmental commissions can play an important role in interpreting the ERI and advising the planning board and governing body on the development of master plan changes and new ordinance provisions for solar siting. Such an ordinance should also encourage solar development in the most appropriate locations.

Manage water impacts of solar development

By **Abigail Fair**,
ANJEC Water Resources Director

Ground-mounted arrays of solar panels on undeveloped land create impervious surfaces. Rain runoff flowing off the edges of the panels strikes the ground surface in a concentrated way that inhibits infiltration and could lead to erosion over time, carrying sediment and polluting nearby waterways. Resulting erosion could also undermine the stability of the panels. On-site stormwater management for solar installations could be critical to protect the installation itself and to protect neighboring properties from flooding and damage.

Keep solar development out of wetlands

ANJEC has suggested to the NJDEP that developers should be restricted from locating solar panels in wetlands. Even if supported by single posts, the installation of solar panels into wetland soils would permanently damage wetland functions.

Use of heavy equipment during installation, maintenance and replacement would further damage and disrupt the functions that wetlands serve.

Potential impacts of solar installations in wetland environments could include:

- Virtual loss of the vital carbon sequestration function due to lack of or impaired access to sunlight;
- Permanent compaction of hydric soils;
- Loss of light needed for particular vegetative communities and natural succession;
- Invasion of alien weeds due to soil disruption and reduced vitality and competitive ability of light-loving native wetland species;
- Disruption to and loss of animal species using the wetland habitat;
- Disruption to the hydrology of the wetland complex, due to severe slowing of evapotranspiration;

- Reduced ability to absorb nutrients and filter pollutants due to lack of vegetative biomass;
- Increases in erosion and downstream sedimentation due to the loss of perennial root systems and conversion to mostly annual, alien weeds.

Solar arrays can have many different sizes and configurations, and the physical character of the sites for solar panels can vary widely. Because of the many variables, installation of solar energy projects calls for site-specific considerations. Stormwater management should always be a consideration in siting ground-mounted solar arrays, and wetlands should be off limits for solar development.

Note: for an expanded version of these articles, please contact the ANJEC Resource Center at resourcecenter@anjec.org or by calling (973) 539-7547. 