

# Research & Policy Brief Series

## Achieving Large-Scale Solar in New York State: What are the Research & Information Needs?<sup>1,2</sup>

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### What is the Issue?

New York State (NYS) is pursuing an ambitious goal to source 50% of its electricity needs from renewable sources by 2030. To meet this Renewable Energy Standard (RES) target, the state will need to greatly expand large-scale solar, a process that will present new challenges for planners, landowners, utilities, environmental organizations and government at all levels. Over the past year, researchers at Cornell University have assessed the potential impacts of solar expansion in NYS, identified obstacles to sustainable solar development, and interviewed multiple stakeholders, focusing on those currently involved in the various aspects of solar siting. As a part of this work, we identified unanswered questions and information needs that are central to NYS meeting its renewable energy goals while supporting sustainable, prosperous communities. The six broad areas of interest described below prioritize areas for further study.

### Understanding the Varying Scales and Impacts of Expanding Solar

At a basic level, researchers must understand the likely patterns of solar development in NYS to identify obstacles to meeting the state's 2030 goals. Models that incorporate technical and socioeconomic factors influencing the pace, location, and scale of solar development can also more realistically highlight the costs and benefits of development. Research highlighting how these costs and benefits are likely to be distributed across time, geography, and socioeconomic groups is needed to support the informed engagement of key stakeholders. Such research would ideally be designed to improve understanding of how important economic, social, and environmental costs and benefits manifest at the site, local/regional, and statewide levels. Analysis at different geographic scales of the impacts of solar development would help stakeholders maximize both site-specific and cumulative potential benefits (e.g., rural economic development, brownfield redevelopment, grid reliability, reduced fossil fuel emissions, net improvements in carbon budgets, etc.) while mitigating possible negative effects (e.g., farmland conversion, reduced scenic values, soil compaction or erosion, habitat impacts, increased impermeable surface, etc.).

### Solar Facility Siting

Solar developers and community stakeholders often have different preferences for locating solar facilities. A systematic study of how developers weigh different site characteristics, including how those priorities vary due to differing development strategies, landowner input, and technology, could help planners craft realistic zoning and incentives and inform the evolving Article 10 siting process. Insofar

as this work could be designed to simultaneously help developers understand public sector and community siting concerns, the overall siting process could be enhanced.



Sheep grazing at Cornell University solar site.

### Incentives and Questions Regarding Grid Integration

The state's transition to renewable energy would benefit from further research on effective incentives to improve coordination between solar developers, the NY ISO, and other electrical utilities. A variety of economic and technical issues are involved, including but not limited to transmission system upgrade planning, queue management, monitoring and control of distributed generation assets, substation backfeed, and anti-islanding protection.

### Local Planning for Solar Development

There are approximately 1,600 general purpose local governments in NYS, each of which has policies relevant to solar development. State agencies have been called upon to provide strong support to the vast majority of local governments that are new to large scale solar development. Researchers can play a significant role in conducting regional economic analyses that highlight circumstances and policies likely to maximize economic development while capturing associated job, income and tax benefits locally, and in developing best practices for local cost-benefit analysis, commercial-scale solar zoning, and assessment of solar assets. More work is needed to, for instance, help

communities predict taxes and employment from solar development and assess the long as well as short term impacts of infrastructure associated with solar projects. What guidance can be provided about the likely long term lifecycle of solar sites given evolving technology, climate and energy policy, grid development? What are the implications for best practices in decommissioning or panel recycling policies? Solar developers would also benefit from better information on realistic time frames for permit processing and the impact of different local government policies on solar siting and project success.

## Public Education & Involvement in Planning

Renewable energy is broadly popular, but renewable energy projects often run into local opposition. Developers and planners need a better understanding of the factors that drive local support for, or opposition to, large solar projects. What role will public support or opposition play in the attainment of renewable policy goals, both at the site specific level and statewide? A better understanding is required of the economic, social and political implications of large-scale renewables development in rural communities (mostly upstate) to provide energy for urban (mostly downstate) demand. In addition to the direct effects of construction and operation of solar arrays, expansion of transmission infrastructure may have significant impacts in affected areas. Do current regulatory frameworks promote meaningful, effective public involvement or need to be improved? This applies to facility permitting processes that involve local reviews and for those over 25 MW that are to be managed by a State siting board under Article 10. Messaging and effective education may also be factors in local discontent or negative spillover effects associated with solar projects. Further study may help government, developers, and civil society groups promote public understanding of the challenges and opportunities associated with solar development.

## Solar Development Lease Terms

Landowners, planners, community policy makers and others would benefit from reliable information on the typical terms and potential risks of solar development leases that have been and may be offered to NYS landowners. Given that large-scale solar is relatively new to NYS, there is a gap in knowledge regarding the individual and collective implications of various solar lease conditions for the social, economic and environmental health of the involved companies, landowners, and communities. Developing best practices for solar leases would help to ensure that development benefits the communities hosting facilities and facilitate public engagement. Trusted research into the drivers of landowners' decisions to pursue or reject a proposed solar lease could support the expansion of solar power by reducing the friction, suspicion and resentment that can arise from durable contracts that are based on mismatched expectations. For example, it may be fruitful to investigate what constitutes a "successful" lease from various perspectives.

## Solar Development on Farmland

The attractiveness of NYS farmland for large-scale solar development can present special challenges for landowners, farmers, planners, regulators, policy makers, and others. Further study of the impacts of solar development on agricultural land is needed to develop specific

best practices and to identify the implications of restrictions (or no restrictions) on commercial-scale solar development of farmland. There are special concerns about development on valuable soils which should be informed by a stronger research base, part of which would address the implications for farms and for solar development of different standards for defining "valuable soils".

Another pressing subject for study is the effect of solar development on farm viability, local agricultural economies, and any ancillary short and long term impacts on food supply and security. Specific topics of study should include the financial and other benefits and costs that might accrue to individual farmers and to different types and sizes of farms and farmers, as well as research to help predict farmers' behavioral responses to this potential source of non-farming revenue. This work would enhance understanding of how frequently solar development might stimulate changes in farm management and land use ranging from agricultural intensification to the accelerated release of acreage for a variety of nonfarm uses.

Particular consideration should be given not only to the implications of solar development or restrictions on development for farmers' credit constraints and for on-farm reinvestment, but also for investment or disinvestment in the rural communities and nonfarm business that enable farm families to thrive. Research should try to identify and quantify the amount and types of farmland most likely to be developed for solar; highlighting areas where solar developers might compete with agriculture for land, and the mechanisms through which competition would be effected. A related topic is the potential effect of solar leasing on the price and availability of rented farmland, and the significance of this new activity for different kinds of farmers and the different kinds of landowners who rent to farmers. Research should address the extent to which renewables development on some farms could affect other farms, whether through economic or biological interdependencies; and the likelihood that land developed for solar will be returned to agriculture.

Colocation of agriculture and solar farms is another important research prospect. Overall, practical obstacles to dual use have made colocation the exception rather than the rule for solar facilities on agricultural land. Research could help inform policy decisions about the relationship between colocation and reduced agricultural assessments. Developers, farmers, regulators and landowners would benefit from a clearer understanding of the tradeoffs in management and design with agriculture/solar dual use. In addition, this work could inform policies to incentivize appropriate colocation enterprises.

## Conclusion

Given the State's ambitious renewable energy goals, it is important that New York move quickly to identify and respond to public policy problems associated with the expansion of large-scale solar. Effective policy and planning (both at the state and local level) are important for maintaining a predictable business environment for developers, avoiding undesirable land use changes, and ensuring a measure of public support. Further research on the subjects highlighted above will help ensure that planning is based on data rather than anecdote.

<sup>1</sup> This report is based on activities funded by the Cornell University David R. Atkinson Center for a Sustainable Future, under Rapid Response Fund (RRF) Project, "Identifying and Anticipating the Key Issues Affecting the Transition to Large-Scale Solar in New York"

<sup>2</sup> This brief is based on a longer CaRDI Report, Large-Scale Solar Information and Research Needs in NYS, Issue 18, published May 2018. Please reference this longer report for more detailed background information and other resources. All CaRDI publications are available on our website at: [www.cardi.cornell.edu](http://www.cardi.cornell.edu)

