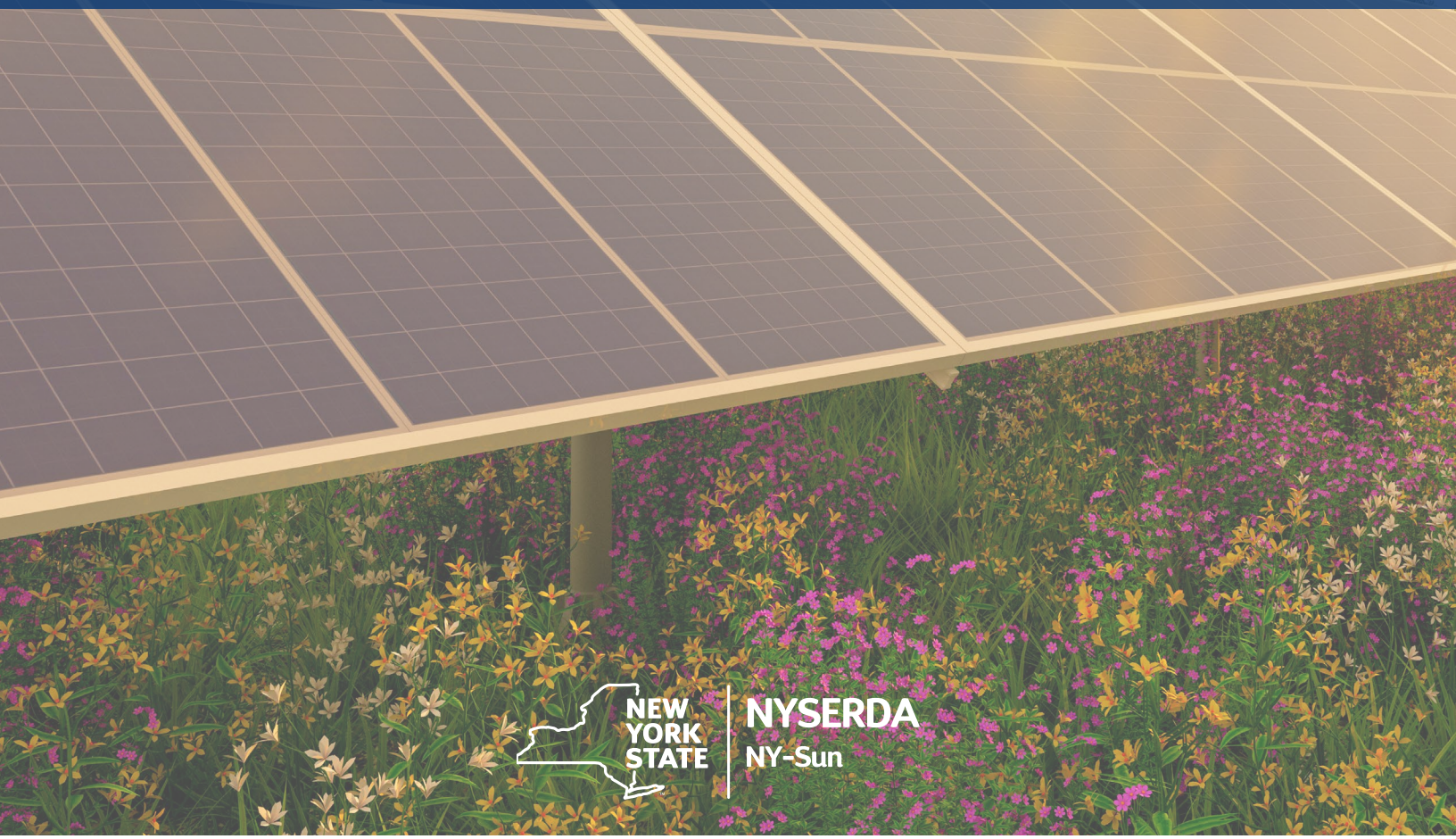
Section 3

Landowner Considerations

Identifying key questions and potential impacts of leasing land for solar projects.



Section Contents

Overview

When deciding to lease land for solar, landowners have many factors to consider before committing. Throughout this section, we provide landowners with the necessary information to take their solar development project to the next step by discussing the topics of site selection, solar leases, typical lease payment structures, easements, agricultural assessments, conversion penalties, agrivoltaics, and other potential impacts and considerations when in the decision-making process.

1. Solar For Your Land

The size of a solar installation is measured by its capacity to produce energy. In New York, 1-megawatt alternating current (MW AC) installation will generate between 1,152,000 and 1,394,000 kilowatt hours (kWh) each year depending on its location.[1] This amount of electricity would meet the annual needs of well over 100 single family homes in our region.[2] A kWh is how electricity usage is measured on your utility bill. A 1-MW AC system will generally require about five acres of land for 3,000 to 4,000 individual solar panels and likely cost $2 to $3 million to build.

Solar PV systems built on open land (ground mounted) will connect directly to the electric grid and will have their own utility meter. For a community scale solar facility (projects less than 5MW), the amount of land desirable for a lease generally ranges from 10 to 30 acres, depending upon the size of the solar array. Large scale renewable (LSR) projects (typically greater than 5 MW) typically use at least 100 acres so the individual parcel size sought after by the developer may be more variable.

Solar panels are typically warrantied for 25-35 years, but a system can last longer if maintained well and the market factors support the continued operation expenditures. Solar leases range from 20 to 30 years with optional extension periods once the initial term ends but only if the facility owner wishes. It's not unusual for the total potential lease period to be 40 years when accounting for the options to extend. See Solar Lease Phases and Considerations.

1.1 Is your property a good candidate for solar?

Solar developers typically search for land that is undeveloped, open, and flat near existing distribution or transmission lines with available capacity. Solar facilities must be able to connect to the electricity grid safely and reliably without jeopardizing the existing connections or service. Evaluating nearby interconnection is the first step to determine if a parcel is a good candidate for solar.

Interconnection Considerations

Small residential solar systems up to 50 kW can be connected to single-phase electric distribution lines. Single-phase distribution lines deliver power to residential homes. Solar facilities between 50kW and 5 MW AC must be near a three-phase electric distribution line (ideally less than 2,000 feet away), with enough capacity and appropriate voltage to accommodate the proposed solar facility. It is usually not cost-effective to connect a small project to a very high-voltage transmission line because the cost to connect typically increases with the voltage of the line.

LSR projects connect to the grid by connecting directly to a substation or using a transmission line that is usually at least 34.5 kilovolts (kV) or higher. Transmission lines move electricity at higher voltage compared to electric distribution lines. Higher voltage lines reduce energy losses over long distances. Substations are high-voltage electric facilities used to control and protect the electricity being transmitted by the power lines.

[1] NREL PVWatts Calculator https://pvwatts.nrel.gov/index.php
[2] Electricity use in homes - U.S. Energy Information Administration (EIA)

Interconnection Commentary:

In addition to getting land use, environmental permits, and approvals from the responsible permitting authorities, the developer is responsible for working with utility companies to understand if and how the proposed solar project can be safely connected to the grid using distribution or transmission lines.

Three-phase distribution lines deliver power to commercial and industrial companies at a steady, constant rate. NYS Department of Public Service (DPS) developed the Standard Interconnection Requirements (SIR), for solar projects 5 MW and smaller. SIR is an application process for distributed energy resource (DER) projects, with or without battery energy storage systems, that look to connect to the grid. Solar projects below 50 kW usually qualify for expedited approval procedures with simplified requirements.

Proposed utility scale LSR projects must be evaluated and approved by the New York Independent System Operator (NYISO).

Interconnection costs can be quite high and the point (location) of interconnection is perhaps the most important site consideration for solar developers. During the due diligence phase (detailed in section 2.2 below), the solar developer will evaluate the interconnection potential during the interconnection application process and consultation with the utility company through a number of reviews and studies. Keep in mind that developers are subject to the mandates and requirements specified by the utility company and/or the NYISO's Open Access Transmission Tariff process.

Landowners interested in understanding whether their land might be attractive to developers can start by using online hosting capacity maps available from the electricity utilities using the following links: Distribution Line Hosting Capacity Map (scroll to the bottom to find links for your utility) and Transmission Lines Map. Distribution Line Hosting Capacity Maps show the location of the single-phase lines and three-phase lines. Keep in mind that the distribution map is a snapshot in time that is updated routinely. Thus, they are only an approximate summary of the hosting capacity. Only a formal consultation between the developer and the utility company or NYISO can provide a complete picture of capacity on the lines and the need for any required upgrades.

Distribution Line Hosting Capacity Maps Commentary:

If the distribution hosting capacity map shows that a 3-phase line has little remaining capacity to connect additional solar arrays, it doesn't always mean that interconnection is not possible. It may mean the line or substation may require significant, often costly upgrades, before interconnection is possible. If that is the case, the solar developer would need to pay for the cost of these upgrades. Little or no remaining capacity may also mean that another project may need to drop out of the queue to open up availability.

Solar Laws Consideration

It is important to understand your municipality's local solar law, if one has been adopted. You can search for local laws through the NYS Department of State's website based on municipality type or name, the law number, or the date the law was filed. Use keywords like "solar" or "utility scale solar" in your search. Alternatively, check with your municipality directly. Your municipality's website may provide you direct access to any enacted solar laws. See Chapter 8 of the Solar Guidebook to learn more about solar laws.

Environmental Considerations

Developers will conduct a desktop review of mapped environmental features before deciding on leasing. Environmental considerations include reviewing soils, floodplains, wetlands, waterbodies, cultural, historic, and archaeological resources, threatened and endangered species and habitats, etc. on the parcel. Reviewing mapped features does not replace the need for formal delineations, field surveys, and/ or agency consultations and a deeper dive will be required during the permitting process. Scenic Hudson has developed an interactive mapping tool that helps communities in the Hudson Valley Region get the most out of solar with minimal impacts to precious resources. The Nature Conservancy's Long Island Solar Road Map similar covers Long Island. NYSERDA's Integrated Energy Data Resource mapper can also help evaluate solar development feasibility.

Finding a Solar Developer

To find a solar developer that may be interested in your parcel, look for solar projects that have been permitted or constructed near your parcel.

If you are looking for residential or small commercial solar developers, review NYSERDA's list of solar contractors to explore developers that are located in or serve your county. NYSERDA's database in NYSERDA's Community Solar Map is another resource to identify completed distributed generation projects and their developers across the state.

If you are looking to find solar developers who are interested in constructing LSR projects near you, review New York State Office of Renewable Energy Siting and Electric Transmission's (ORES) website which lists project notices of intent, applications that currently under review, and permitted applications. You can view projects on ORES' map to see which permitted projects are closest to you. Review NYSERDA's Open NY's Database for completed large-scale renewable projects across the state.

Whether you are looking for a residential, commercial, or large-scale solar developer, be sure to reach out to several developers for quotes, read through reviews, and ask for insight from people that who have worked with them. Keep in mind, as in any other industry, developers have different business models, experience, and reputations.

2. Solar Lease Phases and Considerations

New York's solar market is growing fast and demand for feasible locations to install solar energy systems is high. Across New York State, solar developers are contacting farmers and landowners to secure long-term land leases for siting solar arrays. In some cases, solar developers work with land agents to identify potential projects. Land agents locate properties suitable for solar using their expertise on real estate, solar valuations, and various mapping software programs.

A well-crafted lease will deal with all facets of the solar facility operation from its inception to its decommissioning (including restoration). It will address the duration of the agreement, the total acreage affected, ownership of the solar project equipment, responsibility for taxes and utilities, indemnity and liability insurance, access, the developer's right to give tours of or otherwise use the facility (including, possibly, continued agricultural operations), decommissioning of the system at the end-of-life, and every other aspect of the relationship between the landowner and developer. Several of these issues are covered in more detail in the sections that follow.

To most landowners, the critical elements of the lease include provisions dealing with payments (how much, when, and under what conditions), duration of the lease (including renewal clauses), and the owner's right to continue to use the property for farming, hunting, or other purposes that aren't in conflict with the project. From the standpoint of the developer, the one of the most important aspect of the solar lease is that it secures the exclusive right to use defined sections of the property for development, installation, operation, and maintenance of the solar facility and related equipment.

A conversation with the landowner can begin in a number of ways including: phone calls, post cards, or a letter of intent (LOI) that contains the developer's contact information and expressed interest in leasing the property. **We strongly recommend asking an attorney to review any documents (letters of intent, agreements, leases, easements, etc.) before signing it.**

2.1 Letter of Intent

Many developers prefer to send a letter of intent (LOI) that expresses their interest in leasing the land. A LOI is a preliminary letter or agreement that includes the potential lease arrangements and will typically include provisions that state the landowner can't engage with another solar developer and requires the landowner to keep all information about the project confidential. The developer may also include financial commitments or an estimated timeframe. If the landowner is interested, the developer may look to organize an initial site visit to examine the amount of available land and talk specifics in person. Some LOIs are for informational purposes only while others may be legally binding.

2.2 Option to Lease Agreement

If the landowner expresses interest in leasing their property, the developer and the landowner will negotiate an Option to Lease Agreement (Option Agreement) that will include an option payment. This is a binding document that will outline the

proposed lease area, the preferred method for site access, any site-specific requests that the landowner makes, and provides the developer with time to do *due diligence*. The location of the solar facility (proposed lease area) will be determined by mutual consent. The proposed lease area is often a fraction of the area that is covered under the option agreement.

Due diligence is a process whereby the developer assesses whether or not the property is technically and financially appropriate for the installation of a solar facility.

Option Periods (sometimes called Development Term/Phase) is the length of time covered by the Option Agreement. These Option Periods often range between one and five years depending on how advanced the development project is, interconnection study results, regulatory permitting, financing, developer business plan, etc.

The option agreement does not bind the developer to develop the project and similarly does not commit the developer to any payments to the landowner beyond the option period. The option agreement will detail the terms of the solar lease if the solar developer determines that the parcel is desirable for the project and the project meets the permitting, financial, and other contingencies. It has similar provisions to the LOI: exclusivity and confidentiality.

Due Diligence

During the Option Period the solar developer will work to determine the viability of the site. This includes:

- Securing other land parcels/ easements if needed
- Interconnection application and communications with the utility company to ensure there is capacity on the electric grid and the project can be safely connected without jeopardizing the reliability of service (or identifying what service upgrades may be necessary)
- Conducting site visits to determine the environmental and construction feasibility of the site [e.g., wetlands and waterbodies delineations, state and federally listed species habitat surveys, topography surveys, American Land Title Association (ALTA) and/or the National Society of Professional Surveyors (NSPS) surveys), etc.]
- Evaluating the title to ensure any existing rights-of-way (ROW), easements, leases, mortgages etc. do not impact the project area
- Obtaining any required local, state, county, or federal land use and environmental permitting approvals
- Marketing the anticipated power output
- Evaluating property tax obligations
- Securing project financing

It is common at the early stages of development for a developer to be unsure about the exact location of infrastructure. The design of the solar facility may shift to accommodate things uncovered during the due diligence period or to accommodate permit requirements. However, during this phase the landowner can exclude certain areas from development consideration.

During the Option Period, the landowner may receive a one-time payment or request to be paid according to a set schedule (monthly, semiannually, annually), which may include incremental increases, to encourage a developer to act quickly to determine the project's feasibility to ensure the land is not held up for an indefinite amount of time. A developer is unlikely to make significant investments in real estate until they are confident with the feasibility of the project; therefore, option agreements typically include modest fees. During this time, the landowner is typically allowed to continue to use the land so long as they provide access to the leased area for the various environmental and construction feasibility studies /surveys to determine the viability of the project.

Consider the following items while negotiating the Option to Lease Agreement:

- Continued use of the land for farming, hunting, or other recreation rights
- Repair damages (property or crops) from surveys during development and the option period
- Notice of inspections/site visits
- Frequency and amount of option payments
- Clear timeframes
- Inflation and escalation

- Encourage the use of agrivoltaics
- Discuss preferred ground cover and vegetation management options
- Insurance & indemnity provisions
- Use of pesticides and herbicides
- Contact information
- Mineral/ below surface rights
- Property tax increases that would be paid by the developer over the life of the project

The Option Agreement should contain provisions that detail how and when the developer will notify the landowner if the project will not proceed.

Option to Purchase

Some developers may be willing to enter into an Option to Purchase Agreement instead of leasing the land.

2.3 Solar Lease Agreement

It is common for the option agreement and solar lease agreement to be negotiated concurrently, where the option agreement expires at a certain date and the developer either decides to execute a lease agreement or cancel any rights to the property. If the developer proceeds with the project (secured financing and regulatory permits) the solar lease will go into effect. The solar developer is essentially "exercising the option."

A solar lease agreement is a long-term written contract between the landowner and the developer that spells out the landowner's rights and obligations and the rights and duties of the developer. It details the duration of the lease, payment terms, tax and liability issues, rights of access, etc. The lease covers construction, operations, maintenance, and decommissioning of the facility area. Leases should be carefully developed so they clearly address issues important to the project developer and landowner all the way through project decommissioning. While some of these issues will also be governed by the permitting authority, the solar lease is the only legal agreement that requires the landowner's assent.

In some cases, the original parties to a lease will change throughout the life of the project, so it is important that all potential issues are clearly spelled out to prevent future misinterpretation. For example, the lease should contain provisions discussing what happens if the developer's company is acquired by another company, assigns away its interest in the lease, defaults on its loan, or declares bankruptcy. The lease should state that if that happens, the lease terms will remain valid and unchanged. Similarly, if the developer / company takes out a loan for the renewable energy project, defaults on the loan, and the developer/company's lender takes over the lease, the terms of the solar lease should not change. In the event of bankruptcy, the lease should automatically be transferred to the developer/ company's successor. The solar lease agreement should also detail what happens to the lease should the landowner sell their property or become bankrupt.

Developer's Lease Goals

- Long-term with clearly defined amendment rights and extension options
- Well-defined, unimpeded rights to access and use of the property or project area for all potential project development, construction, maintenance, operation, and decommissioning activities
- Well-defined payment structure that spreads the real estate costs over the life of the project and is tied to predictable metrics, such as land acreage or solar project power output
- The ability to transfer the lease

Landowner's Lease Goals

- Fair and adequate compensation for use of the property (or project area) and loss of certain rights
- Well-defined, clearly delineated, and clearly established rights for continuing uses (including access rights) on the property (this includes clarity on restrictions put on the leased acreage on the location of panels, inverters, access roads, etc.)
- Default terms and responsibilities of the developer at the end of the project
- Indemnification in any lawsuits related to the use of the land for the solar facility
- No responsibility for any increased taxes or agricultural conversion penalties (see Section 5 of this chapter)

2.3.1 Construction

Construction can take between 6 months to a few years depending on the size of the project. This is dependent on procurement, seasonal construction requirements/restrictions related to state or federally listed species, work availability, and financing. Construction includes site clearing, installation, grading, and improvement of roads, installation of temporary structures (laydown yards, stormwater pollution prevention measures), fencing, solar racking and modules, inverter pads, transmission equipment, overhead or underground wires, reseeding, and often vegetation plantings.

2.3.2 Operation

Operation of the facility begins when the solar facility is actively generating electricity and connected to the grid. The planned period of operation is usually between 20 and 40 years. During this time, the developer is responsible for making sure the facility will be maintained and running as expected. Maintenance activities include mowing vegetations, cleaning panels, thermographic testing for wire faults, inverter maintenance, system checks, and repairs if needed.

The solar lease may include a provision that details the optional renewal period to extend operations. The optional renewal clause gives the developer an option to allow the facility to run for an additional 5 to 10 years, usually without having to renegotiate the lease agreement.

2.3.3 Decommissioning

Decommissioning of the facility is the removal of the solar facility (the above and below ground infrastructure) and restoring to land to pre-exiting conditions. See Chapter 7: Decommissioning Solar Panels Systems of NYSERDA's Solar Guidebook for additional information. In the solar lease agreement, make sure that there are provisions that specify who is responsible for dismantling the facility if the developer/ company is no longer in business, the panels are damaged/ no longer producing power, or if the solar array ages out and is no longer viable. Keep in mind that the land use permit (obtained from the local municipality or from New York State depending on the size of the solar project) will detail decommissioning requirements that the developer will also need to abide by.

Unless the landowner prefers an alternative outcome, the lease should require the property be returned to its pre-leased condition and any damages caused by removal are repaired. Decommissioning provisions should also include details on what triggers decommissioning, the timeframe required for decommissioning, and consequences for failing to remove the solar facility per the agreement.

Restoration occurs after removal of the project components. The land should be returned to the original condition it was in before the installation of the solar facility. Consider what – if any –- part of the facility you would like to remain after decommissioning (e.g., access roads, vegetation, etc.). Ensure the solar lease agreement details who will be responsible for site restoration.

Below are some of the items a landowner should consider when negotiating a solar lease agreement:

- Clear delineation of area leased for solar and permitted uses within that area
- Continued use of the remaining land for farming, hunting, or other recreation rights
- Agrivoltaics
- Tax implications
- Farmland preservation / agricultural conservation programs
- Selling your property
- Clear timeframes
- Utilities (water, electric, telecommunications, etc. if used by the solar facility though this is very unlikely)
- Property damage during construction, maintenance, operation, or decommissioning
- Property maintenance and notification methods
- Frequency and amount of lease payments, including during option and construction periods
- Inflation and escalation
- Insurance & indemnity provisions

- Use of pesticides and herbicides
- Contact information
- Mineral rights
- Termination clauses
- Inclusion of battery energy storage systems

Prior to signing a solar lease agreement with a solar developer, landowners should examine possible tax consequences and issues associated with the solar facility. Again, we strongly recommend asking an attorney to review the LOI, Option to Lease Agreement, and Solar Lease Agreement before signing it.

3. Easements and Rights-of-Way (ROW)

A solar project developer may seek to secure land rights that do not necessarily require a lease or purchase of land, including the following:

- The right to install, maintain, and repair underground cables or overhead transmission lines connecting the solar facility to substations and, ultimately, to the power grid
- The right to build or improve existing roads or access points for the solar facility
- The right to cross non-leased land for construction, operation, and maintenance of the solar facility and related equipment
- The right to produce noise or other minor nuisances that the construction or operating activities may create
- The right to use property for off-site mitigation to address assumed impacts within the leased area that cannot be mitigated on site

An easement is a right to use property for a defined use. Easements are commonly used for project development needs on land that will not include solar arrays, substations, or other major project construction and operation features, but that provides rights to adjoining land. An easement is a nonpossessory property interest that gives the holder—in this case, the developer—a right of use over the property, or that prevents landowners from doing something that is otherwise lawful, but that would be detrimental to the solar project. Because easements legally transfer ownership or interest of property rights, they must be in writing and filed with the proper municipality or county recorder. The easement will run in perpetuity (forever) unless the instrument granting the easement provides for a term of years.

3.1 Neighbor Agreements and Variances

Neighbor agreements (sometimes called participation agreements) are written agreements between developers and landowners whose property is directly adjacent to a project. Like easements and ROWs, neighbor agreements usually involve compensation to a landowner and are considered mitigation for a quantifiable impact to the landowner. Quantifiable impacts typically addressed by neighbor agreements include visual, and general construction nuisances. Landowners are not typically compensated for their general dislike of a project; however, public involvement and testimony is a standard part of the land-use permitting process in New York State and provides an opportunity for a landowner to share concerns about a project and shape the decision process.

Variances are used to address a land-use regulation when a developer wishes to get an exception to the local law to site a solar project less than 25MW. A common example is when solar arrays or other project features are sited within a setback zone. In these instances, a developer may seek a variance from the local Zoning Board of Appeals. If the variance requested impacts a non-participating landowner (one not under a lease or other property agreement with the developer), the local jurisdiction may request to see proof of a neighbor agreement and the associated compensation. The local jurisdiction will require a developer to obtain all necessary variances before reviewing a permit application, or before it issues a decision on a permit application.

4. Typical Solar Payment Structures

Lease rates vary based on the location of the parcel, acres and slope of land available, proximity to and cost of interconnection, ease of permitting and construction, stability of the regional weather, and other factors.

If you are approached by a developer or have interest in leasing your land, research the going rate for land leases in your area (though note that lessees are usually required to sign non-disclosure agreements so this information may not be readily available). Contact multiple solar developers to gauge interest in your land. Do research online about solar lease rates and consider working with a real estate professional that has expertise negotiating on behalf of landowners with solar companies.

There are a number of ways to collect payments for a solar facility sited on your land.

4.1 Fixed Sum Per Acre Lease Rates

Fixed sum per acre is the most common type of payment option during both the option phase and the solar lease agreement. The developer will offer an annual payment as defined by dollars per acre. As a landowner, ensure the occupied acres are clearly defined in the lease agreement. Keep in mind that the land under option is likely larger than the land that will be "occupied" and under the solar lease. Consider including a map and legal description of the leasable premise to avoid confusion.

4.2 One-Time, Lump-Sum Payment

This type of payment structure is common in the option phase. While this type of contract is not a common arrangement in a solar lease arrangement it may be satisfactory to both parties if the landowner is in need of immediate cash and willing to forego the prospect of a steady income stream, and the developer has the ability to release a large amount of cash up front. This arrangement is most common for easements and ROWs.

4.3 Nameplate Capacity

A less common solar lease payment structure is based on the nameplate capacity. Nameplate capacity is the estimated capacity the installed solar facility can generate under optimal conditions. The lease arrangement will offer a flat payment rate per unit of capacity (usually in MW) of the facility installed on the property, again, made on an annual basis. As a landowner, you should review the local market rates. This payment structure is not used for the option phase of the project.

4.4 Royalty Payments

Some solar lease agreements may offer the landowner royalty payments. Royalties or revenue-sharing models are payments based on the actual production of the solar equipment installed on the property. If this is how you prefer payment, consider the basis of the payment. Royalty payments can be made based on the nameplate capacity (per in MW), per kilowatt-hours (kWh) of power produced, per "gross proceeds" from electricity sales, "net revenue" from power sold, etc. Work with a lawyer and/ or financial advisor to understand and help project the best, average, and worse case projections. Determine if you want to include a minimum payment provision to secure against downside risk (if the facility does not perform up to expectations, e.g., cloudy year). Royalty payments are not very common in the solar industry during any phase of development.

5. Agricultural Assessments

Under the NYS Agriculture and Markets Law, if a landowner receives an agricultural assessment and converts the land to a nonagricultural use, the landowner may be subject to a monetary payment for converting the land. A conversion of land is "an outward or affirmative act changing the use of agricultural lands" (AML §301(8)). Renewable energy facilities (including agrivoltaics facilities) are not seen as agricultural use and would require a conversion payment for changing the use of agricultural lands.

Municipal assessors are responsible for tracking conversions when they occur. Landowners are also required to notify the assessor within 90 days whenever a parcel receiving an agricultural assessment is converted to a nonagricultural use. A penalty of up to $1,000 can be levied against a landowner who fails to report the conversion. To fully understand the impact

of these factors, landowners are urged to consult with an attorney and their municipal assessor before signing any documents.

In addition to the one-time penalty, the lessee will lose the tax exemption associated with the ag assessment. The developer will usually cover this increase in taxes (be sure it's stipulated in the lease agreement) but note that the lessee may also lose their tax exemption on land adjacent to but not included in the lease agreement (this increase in taxable property can also be negotiated with the developer).

5.1 Conversion Payment

The landowner on record is responsible for paying the conversion payment. Your assessor can work with you to determine what the conversion payment may cost. Make sure you know where the solar array will be placed on your property so that a comparative analysis of benefited acres versus total converted acres, by mineral, organic, and farm woodland soil groups, can be determined. Solar developers typically cover this conversion payment; landowners should ensure it be included as a part of the solar lease. See Section 2.3 Solar Lease Agreement of this chapter for more information.

5.2 Solar Panels and Taxes

A solar energy system is "real property" once it has been permanently affixed to land or a structure [Real Property Tax Law (RPTL) § 102(12)(b); 8 Op. Counsel SBEA No. 3]. The definition of "real property" also includes a "power generating apparatus" [RPTL §102(12)(f)]. As such, it is taxable unless it qualifies for an exemption (RPTL § 300). The assessor must determine the contributory value of the solar array to the value of your property. If the value of the converted acreage devoted to the solar array increases, it may affect your taxes. An increase in taxable value may affect your county, town, village, and school taxes as well as other taxes that may be levied, such as highway, fire, ambulance, library, lighting district, drainage district, and other taxes and levies. It may also affect special district taxes for municipal water and sewer districts if the land is no longer predominantly used for agricultural purposes. The developer is typically responsible for covering the increase in taxes.

5.3 Exemptions from School, County, Town, and Village Taxes

There is an exemption statute in State Law that applies specifically to renewable energy systems: Section 487 of the RPTL. Section 487, which also covers wind power systems and farm waste energy systems, provides a 15-year exemption from real property taxation for the increase in value resulting from the installation of a qualifying system. However, the statute allows municipalities and school districts to opt-out of this exemption. Opting out from the exemption means that the municipality or school district chooses to include these renewable energy systems when assessing property taxes. To find out if your county, town, village, and/or school district has opted out, talk to your local tax assessor and/or review the Department of Taxation and Finance exemption list. Leases beyond 15 years will likely have an effect on your tax liabilities going forward. Absent the exemption, the local government may seek to value the solar array at full value. This assessment would again depend upon the contributory value of the solar array on your property at year 16. Even after the 15-year period, the developer and not the landowner should be responsible for the taxes on the value of the array, just as they are responsible for payment of any negotiated PILOT agreement in the interim. See Chapter 6 of the Solar Guidebook: PILOT and RPTL 487.

6. Agrivoltaics Considerations

New York State Agricultural Technical Working Group (A-TWG) defines agrivoltaics as "a simultaneous use of land for solar photovoltaic power generation and agricultural production of 'crops, livestock, and livestock products' as that phrase is defined by Agriculture & Markets Law (AML) §301(2)."[3] Agrivoltaics can present an opportunity for landowners to incorporate agricultural practices within a solar facility to continue existing farm operations, explore new agricultural opportunities, or enable a third party to utilize the land under the panels.

[3] New York State Energy Research and Development Authority (NYSERDA). "Growing Agrivoltaics in New York State: Advancing Understanding of Opportunities to Integrate Renewables into Working Landscapes," NYSERDA Report Number 23-25. Prepared by WSP USA and Agrivoltaic Solutions LLC. 2023. https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Publications/Research/Other-Technical-Reports/23-25-Agrovoltaics-in-New-York--acc.pdf

This section is provided to support landowners in understanding considerations for development of an agrivoltaics project, from planning and design through management. Agrivoltaics is an emerging practice in New York and globally, with active research ongoing. Solar grazing is the most developed of these emerging practices. To stay informed, visit https://www.nyserda.ny.gov/Agrivoltaics and resources from A-TWG.

6.1 Lease Agreement and Insurance Requirements

Make sure the lease agreement includes provisions that discuss planned and unplanned visits by all parties, which may include various people associated with the developer (inspection and maintenance crews, people responsible for vegetation management, etc.) and the landowner (who may farm the property themselves or rent the property to someone else to farm, researchers, etc.). For planned site visits, detail how to contact each other and how much notice is required. For unplanned visits, provide guidance to the other parties as to what precautions to follow. Agree that the other parties will be notified as soon as possible before the unplanned visit occurs and/or immediately after one has occurred. Work with an attorney to ensure the lease agreement details this.

The lease agreement should also specify the insurance that the landowner and solar developer must carry and the terms under which either party is liable for specific types of damage. Likewise, the contract between the farm manager/grazer and the solar developer should stipulate insurance required for each party. It will be important to communicate with your insurance provider before entering a lease or contract to make sure you are covered under a new or existing policy. Insurance providers are generally unfamiliar with agrivoltaic practices, which means communication will be important for coming to appropriate terms. Factors that will impact coverage include the project's specific design, the type of farm equipment used onsite, and the type of agriculture (e.g., livestock, field crops, etc.) that will be onsite.

The solar developer will require the farm manager/grazer to obtain insurance protecting against damage to the solar equipment and solar site. The cost of this insurance will vary from project to project. In the context of solar sheep grazing, the 2021 Mount Morris Agrivoltaic Study estimates $5,000/year for such insurance, based on a project proposing to graze 9,540 lambs on 1,060 acres.[4] For a project grazing 100-ewes on 25-acres, North Carolina Cooperative Extension estimates $300/year.[5] This is in addition to other policies that the grower/grazer would likely hold, such as livestock insurance and professional liability insurance. Make sure you work with your insurance company to understand their options. Who actually pays any increases in insurance coverage levied on landowners can be negotiated with the developer. All people permitted access to the site post-construction may have to undergo safety training.

6.2 Parcel Evaluation

Review your municipality's zoning laws to understand how agricultural practices may be incorporated with the solar facility. Perhaps there are less stringent zoning standards that can be applied if the solar facility includes agrivoltaics. A solar developer and/or an agrivoltaics consultant can help to carefully evaluate your property to determine the best place to incorporate agriculture. They will look at the environmental characteristics on your parcel including delineated wetlands or waterbodies and high value farmland (Mineral Soils Group 1 - 4).

6.3 Solar Facility Design and Construction

While cables need to be buried in accordance with National and State regulations, understanding where and how deep the electric lines are buried is important to avoid impacting them during planting and harvesting. Ensure the developer takes measures to minimize soil compaction. Follow best practices and DEC guidance to protect stormwater resources. Refrain from using herbicides, insecticides, and fungicides whenever possible. The design of a dual-use solar facility should consider the panel height, width, and turning clearances for farm equipment.

Construction of solar facilities can impact soils, from grading to accidental topsoil/subsoil mixing to irregular compaction throughout the site, and on the aisles used to transport supplies. For agrivoltaics projects, pre-construction soil sampling inside and outside the selected solar site can then be used to assess damage and the success of mitigation.

[4] Grasby, S., K. Campbell, J. Shiflett, M. MacKenzie, N. Manapol, R. McCann, L. Hain, and L. Fox. "Mount Morris Agrivoltaic Study. Co-locating Solar and Agriculture at the Mount Morris Ridge Solar Energy Center." 2021. https://solargrazing.org/wp-content/uploads/2022/01/MountMorris-AgrivoltaicReport-FINAL_PRINT_ready.pdf

[5] North Carolina Cooperative Extension. "Sheep Grazing Solar Farm Budget," NC Choices. 2021. https://cefs.ncsu.edu/resources/sheep-grazing-solar-farm-budget-template/

Consider negotiating decompaction or other soil improvements at the end of construction.

Discuss revegetation options with the solar company; some ground covers are optimal for grazing, while others may work better around agricultural crops.

Check solar panel height restrictions and work with the developer to obtain waivers as needed to support agrivoltaics practices.

Discuss improvements to the solar facility design to accommodate farming practices: water access, 120/240 volt electrical access for farm equipment, interior fencing either for rotational grazing and ways to protect high-voltage equipment, etc.

Consider the type of fence you would like around the sit. While the solar project is required to comply with the National Electric Code (NEC) fencing requirements, there is some leeway in the regulations provided the design meets the NEC standards. Increasing fence height an additional foot may help with deer incursions. Would a wildlife friendly fence (fencing with 4 - 8 inch gap at the bottom to allow wildlife to access the site) be acceptable? Note, wildlife friendly fences may not be compatible with solar grazing activities. See *Considerations for "Grazing-Ready" Solar Facilities: Planning for Integration of Sheep* for more information.

Fence location will dictate the size and type of equipment that can move between aisles in the solar array; fences must be far enough from the panel edge to allow for the turning radius of both tractor and implements. If your local solar ordinance allows, placing the fence within the setback will allow more use of available land for your agrivoltaics project.

6.4 Post Construction

Ensure that all personnel understand site access protocols and all site-specific safety precautions. Consider sustainable weed and pest management strategies. Consider adding language to the lease agreement to speak to this.

6.5 Economic Considerations

As agrivoltaics is a nascent space, efforts are underway to better understand cost implications for the farm manager/grazer. The need to change farming practices could have implications for the farm manager/grazer's bottom line, though these costs can be mitigated by site design decisions such as increased spacing between panel rows or increasing the height of the panels, which are costs borne to the developer. It will be important to discuss with the solar developer how integration of agricultural activities can be incorporated into the site design. Talk with developers to determine what agricultural expenses they may or may not subsidize, such as seeds or livestock, or related to the offset of solar operations and maintenance expenses if a grazing enterprise is used to maintain vegetation surrounding panels. Financial returns from agrivoltaics enterprises is an area of active research. A 2019 survey of 14 solar sheep graziers across the eastern U.S. conducted by researchers at Cornell University found a net income of $509/acre was common for solar sheep grazers in NYS, while $262/acre was common across the broader eastern U.S.[6]

6.6 Agrivoltaic Activities

Crop Production:

- The type, placement, and height of the solar arrays may impact crop selection, shading, water needs, and plant height, etc. Ask the developer if the panels will be fixed tilt, vertical mount or single axis trackers. What angle and orientation will the panels be? Understand how high the leading edge of the panels will be. The leading edge is the horizontal edge of the panel that is the closest to the ground. For single axis tracker arrays, understand how high the pivot height (how high the panels are when flat) will be, and what the maximum tilt is (the closer to 90 degrees the tilt is, the wider the aisles will be in the morning and evening). Review the local zoning code to determine if there are height restrictions on solar panels. It may be possible to request a waiver. Ask if the developer will be willing to coordinate tracking with major field operations, tabling or tilting the arrays to allow for agrivoltaics greater tractor access, or provide anti-tracking during certain weeks of crop growth when sunlight is critical to yield.
- Consider how shade will impact crop growth rate, growth period, and production. Select crops that will not grow taller than the leading edge to ensure they will not compromise the productivity of the panels.

[6] Kochendoerfer, N., LA. Hain, and M. Thonney. "The Agricultural, Economic and Environmental Potential of Co-Locating Utility Scale Solar with Grazing Sheep," Atkinson Center for a Sustainable Future, Cornell University. 2019. https://bpb-us-e1.wpmucdn.com/blogs.cornell.edu/dist/c/9310/files/2020/12/Atkinson-Center-report-2018_Final-22l3c5n.pdf.pdf

- Consider what farm equipment you would use between the panels and if the spacing will accommodate movement effectively. Talk with the developer about harvest season and the tasks that surround it. If equipment is needed, ensure there is enough space for it to navigate the solar facility without impacting the solar infrastructure (i.e., panels, the fence, the inverters, and other electrical components).
- Access to water is an important aspect to discuss with the developer. Is there water for irrigation on site? Will a truck be needed to bring the water? If so, will the truck have enough space to safely drive between the panels? Will an irrigation system need to be included as a part of the facility design? If so, who will maintain it? How frequently will you need to water?
- Review the topography of your property to understand the natural drainage of the site. Determine if any changes need to be made to ensure the selected crops can thrive. Does the site contain drainage tiles? If so, will they be impacted during construction of the solar facility. Discuss this with the developer.
- Consider your plan to manage any areas not in crop production and associated costs.
- Consider regenerative agricultural practices[7] to increase biodiversity, create drought resistant soils, increase soil health and fertility, boost crop yields, and increase nutrients available to the plants.

Bee Keeping:

- Consider a native, non-invasive, low growing seed mix that can support the bees from spring through the fall. Evaluate the plant growth seasonally and determine who will be responsible for reseeding if it is needed. Mowing may be needed to keep the vegetation under the leading edge of the panels. Work with the developer to establish a clear schedule that ensures the bees are provided for and the productivity of the panels is not compromised.
- Consider the placement of the apiaries. Will it be installed outside of the gated solar facility or within its bounds? If it is within the fenced boundary, how often will the hives need to be checked, moved, etc.? How far from the electrical equipment and property boundaries will it be located?
- It can be helpful to review co-utilization plans submitted to the Office of Renewable Energy Siting and Electric Transmission (ORES) as part of New York's permitting process for "largescale" renewables to understand how developers are framing potential apiary projects. The Foothills Solar Project and Greens Corners Solar Project plans both provide some context for understanding apiary considerations.
- Review the NYS Department of Agriculture and Markets resources on beekeeping in NYS. Consult with your local beekeeping organization for additional guidance.

Animal Agriculture:

In New York, and elsewhere in the United States and Europe, solar projects have successfully implemented grazing dual-use solar approaches by incorporating livestock—predominantly sheep to date—on-site at solar projects, where the animals are able to graze and forage underneath and around solar arrays.

NYSERDA has developed *Considerations for "Grazing-Ready" Solar Facilities: Planning for Integration of Sheep* in 2024 to support integration of design and construction elements at the facility planning and design stage to help promote "grazing-ready" site conditions that enable integration of grazing at any point in the lifespan of a solar facility. The guide is intended to help encourage discussions among the farming and solar development communities to expand farmer involvement in agrivoltaics. While the guide focuses on sheep, many concepts are relevant for considering other types of animal agriculture; such as fencing considerations that inhibit predation, water availability, and reviewing seed mixes for toxicity. The Solar Grazing Checklist for Shepherds and Solar Site Managers is another relevant resource.

While sheep grazing or integration of poultry don't typically require adjustments to panel height, there may be design modifications needed to accommodate other types of animals, like cattle or pigs, which can increase project costs (poultry may require netting to keep birds off the panels). Note that some animals, like goats, are not generally compatible with solar arrays, unless special measures are taken to keep them from jumping onto the panels, chewing exposed wires, and potentially causing other damage. It will be important to talk with solar developers early in site planning to explore options.

[7] NRDC 2021. Regenerative Agriculture 101. https://www.nrdc.org/stories/regenerative-agriculture-101

Consider what farm equipment you would use between the panels and if the spacing will accommodate movement effectively. Consider what facility access you need and if there is accommodation for loading and unloading of trucks and trailers for delivery of water, supplies, and for movement of animals.

For livestock, development of a grazing management plan is important to outline how grazing and forage will be managed for animal and ecosystem health. The plan should include a description of post-construction site conditions (vegetation, soils, hazards and risks, location of grazing areas, grazing period and schedule, conflict mitigation strategies, risk mitigation strategies, restrictions [(dogs, horses, etc.),.]), and expected communication between the landowner, solar facility owner/ developer and the sheep owners. One example in NYS is the Morris Ridge Solar Energy Center Preliminary Sheep Pasture Rotation and Grazing Plan.

In some areas, there are graziers who may be available to graze your land if you're not interested in doing it yourself.

For additional information, review the Considerations for Agricultural Lands in the Solar Guidebook.

7. Other Considerations

7.1 Site Design – Interconnection and Access Roads

As discussed in the previous section, solar arrays must be connected to the electrical grid. This may require the installation of power poles. Landowners should make sure that pole placement and the height of the wire will not interfere with their ability to farm the land. Keep in mind that all suggested changes to the placement and height of the poles will need to be approved by the utility company.

Road placement is another important consideration since the design may interfere with the use of standard agricultural equipment. Siting roads and power lines near field edges is often preferable for the farmer or landowner.

Further, make sure the access road is constructed so that it does not shed water onto your fields and that the finished grade does not interfere with normal drainage patterns. Ask about the material used to finish the surface of the access road. Will the size of the stone interfere with the operation of your equipment if some of it ends up in your field? Determine if the access road can be used by you and your farm equipment to access the property outside of the solar facility. If so, ensure the design serves both your needs and that of the solar company as much as possible. Be sure to discuss these aspects of the construction of the solar project with the developer before you sign the lease.

7.2 Site Design – Agricultural Lands

Can the solar arrays be placed on land that is not suited for agricultural production, such as support land, sloping pasture, or underutilized areas of the farm? There are a number of possibilities that should be explored. Think about how the siting of a solar array on your property can benefit your farm operation and ask questions. See the Solar Installations on Agricultural Lands section of NYSERDA's Solar Guidebook for more considerations.

Additional Resources

Brocket, Daniel; Johnstonbaugh, Edward. "Landowner Leasing for Utility Scale Solar Farms." Penn. State Univ. Extension, September 2019.

European Academies' Science Advisory Council (EASAC) Policy Report 44. "Regenerative Agriculture in Europe. A Critical Analysis of Contributions to European Union Farm to Fork and Biodiversity Strategies." April 2022.

Shannon Ferrell. "Solar Leasing for Agricultural Lands." National Agricultural Law Center. April 4, 2018. [webinar]

Ferrell, Shannon L. "Understanding Solar Energy Agreements." National Agricultural Law Center Production," 2019.

Hannum, Erin. "Solar Leasing: A Guide for Agricultural Landowners in the Pacific Northwest." American Farmland Trust and Farms Commons.

Kirk Hall, Peggy; Bachelor, Evin, Romich, Eric. "Farmland Owner's Guide to Solar Leasing." National Agricultural Law Center, August 2019.

"Guide to Land Leases for Solar." Solar Energy Industries Association. July 2016.

"Leasing Your Farmland for Wind & Solar Energy Development: A Beginner's Guide for Farmers." New York Farm Bureau. December 2016.

World Economic Forum. "What is Regenerative Agriculture?" Oct 2022.

New York State Energy Research and Development Authority (NYSERDA). "Growing Agrivoltaics in New York State: Advancing Understanding of Opportunities to Integrate Renewables into Working Landscapes," NYSERDA Report Number 23-25. Prepared by WSP USA and Agrivoltaic Solutions LLC. 2023. https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Publications/Research/Other-Technical-Reports/23-25-Agrovoltaics-in-New-York--acc.pdf

https://www.maine.gov/dacf/ard/resources/docs/solar-farm-grazing-best-management-practices-vfinal.pdf

American Solar Grazing Association: https://solargrazing.org/

Questions?

If you have any questions regarding landowner considerations, please email questions to cleanenergyhelp@nyserda.ny.gov or request free technical assistance at nyserda.ny.gov/Siting. The NYSERDA team looks forward to partnering with communities across the State to help them meet their solar energy goals.