

# **Solar Facility Cases in New York State**

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## **Executive Summary**

In 2015, the United Nations set 17 sustainable development goals (SDGs) around the world. Goal 7 ensures affordable, reliable, sustainable, and modern energy. The United States of America, as a global leader, initiated its own environmental friendly plans according to the SDGs. One viable solution is to shift electricity sources from burning fossil fuels like coal and natural gas to generating renewable electricity from wind power, solar energy, and hydroelectric power, etc. New York State (NYS) has an outstanding track record of renewable energy and seeks to be a leading state in the pursuit of green energy. By 2021, NYS ranked as one of the top five states for generating electricity from renewable energy and it is the sixth state in the states of most utility-scale installation facilities. (U.S. EIA, 2022). Hydroelectric power provides 73% of the state's total renewable energy electricity generation and 22% of the state total net generation from all sources. (U.S. EIA, 2021) Wind power accounts for 11% of the state's total renewable energy electricity generation and 3% of the state total net generation from all sources. (U.S. EIA, 2021) New York State Energy Research and Development Authority (NYSERDA) and National Grid have contributed tremendous efforts for solar energy development since 2011. For example, NYSEDA and the National Grid have provided over \$1.4 billion in incentives and leveraged over \$6.9 billion to private sectors. Such investments brought 29 times more solar growth in the state within ten years, created 12,000 jobs in the solar industry, and reduced the cost of solar by over 70%. (NYSEDA, 2022).

## **Acknowledgment**

The consulting project team worked throughout the Fall 2022 semester aiming to collaborate with our client Mr. David Kay and his team in analyzing current solar leasing cases from multiple perspectives via reasonable methodologies and provide recommendations for future New York State solar industry. David Kay is a senior extended associate at Cornell University under the department of global development. Mr. Kay is also an economist with valuable resources within the New York State solar industry. Thank you David Kay for your time and help! A special thank you goes out to our course lecturer Dr. Danielle L. Eiseman as well. Thanks for leading the class and providing helpful guidelines throughout the semester!

## Introduction

To reduce greenhouse gas emissions, achieve net-zero emissions, increase renewable energy usage, and ensure climate justice, New York State has been expanding a series of utility-scale solar projects. Many developers targeted projects on existing agricultural land to provide farmland with opportunities to recover and utilize solar as a steady revenue to produce market volatility. During this project, our team picked two solar projects – the South Ripley Solar Project and Moraine Solar – in the rural areas of the western New York State, specifically in the Southern Tier of New York State that borders Pennsylvania, to conduct two case analyses. We will examine similarities and differences between two developments and try to find how developments affect the properties and social equity within the surrounding community to assist landowners in making leasing decisions, and provide recommendations to future NY solar developments.

The South Ripley Solar Project is a 270-megawatt solar and storage project with a 20-megawatt battery storage component developed by ConnectGen and located in the Town of Ripley, Chautauqua County. By using the existing transmission and compatible solar resource in Chautauqua County that provide less design constraints and more suitability to the project, ConnectGen does not need to construct a new high voltage transmission line in approximately 2,000 acres of land. It is expected to generate power to over 60,000 households in New York State annually. The South Ripley Solar is targeted to operate in Q4 2023 (South Ripley Solar Project, 2022).

The other solar project is the Moraine Solar Project, a proposed 94-megawatt photovoltaic solar energy generation facility developed by EDF Renewables (EDF stands for its parent company Électricité de France), located in the Town of Burns, Allegany County. EDF Renewables will build a substation in Moraine Road to increase the voltage for injection onto the 115kv transmission lines, and interconnect to the New York Power Grid through a new Point of Interconnection (POI) in the Town of Burns. However, at the time of this report, the POI does not have governmental approval. The facility site will occupy approximately 1,625 acres of private lands that are primarily rural in nature. The facility is expected to generate renewable electricity to power more than 25,000 New York households. The Moraine Solar Project aims to become operational in 2025 (Moraine solar, 2022).

## **Data Collection and Methodology**

Since our client Mr. David Kay has sufficient background information and resources in the New York State solar industry, some of our first hand information was provided by him directly in client meetings. According to Mr. Kay, picking one large solar energy site and one smaller solar energy site across New York State is a reliable way to conduct comparative research. Comparisons and contrasts will illustrate the differences and similarities which will contribute to our understanding of areas including technology, policy, economic, and business aspects, as well as public comments, community engagements, and stakeholder opinions.

Other than conducting two case studies, our team will utilize a mixed-method approach of combining both qualitative information and quantitative data from both primary and secondary sources through case study analysis. To enhance the credibility of the analysis, the consulting team intends to triangulate the data found in the desk review. The data collection methodology of the consultation includes secondary sources of document review using internal and external sources, performance indicators assessments, and primary sources of electronic surveys, and structured and semi-structured interviews. Our team plans to, when appropriate, conduct surveys and interviews with business sector leaders, landlords, town supervisors, town planning boards, etc. Interviews and surveys could provide in-depth information, perspectives from different stakeholders, and feedback to our client.

## **Sampling Strategy**

Due to the limited budget and the time constraint, a sampling strategy will be adopted in the consultation at the local and regional level. The consulting team will, when necessary, use a ram sampling approach to select multi-stakeholders of challenge-driven partnership to be interviewed and surveyed. Furthermore, a stratified sampling technique will be adopted to divide multi-stakeholders into relevant characteristics, such as size, locations, and communities. The consultation will ensure equalized representation of multi-stakeholders from different groups in the project – business sectors and local governments. Data from 2 counties in New York State, Chautauqua and Allegany, will be collected, and disintegrated at community levels.

## **Survey**

### **Public comments**

The survey is designed to acquire public opinions and comments regarding the on-going projects. The opinions and comments should be taken into consideration by landlords, solar facility companies, and the general public, which also means the survey should be sent out to the previously listed individuals. A qualified survey should be anonymously conducted and contain

clear-instructed questions and will not be kept after the report is written. Some key components of the survey will include, but not be limited to, asking for surveyees' concerns regarding solar panel facilities, and questions regarding the same facilities. The survey will be performed digitally via Google Survey and sent out via emails according to the contact information of local residents. There should not be a number limit of this survey. The research team wants to collect survey feedback as much as possible. Meanwhile, the research team will select the most valuable concerns and comments to display in the final report, should the survey come to fruition in time.

### **Community Analysis**

In the survey as well as through census data, quantitative data will be collected. Data will be analyzed for the community analysis section. Numbers and percentages are a good representation for the real characteristics of a community. The research team believes numbers will deliver concise but meaningful information, which could lead to cognizable conclusions.

### **Interviews for Stakeholders, Landlords & Government Agencies**

Interviews are designed to collect opinions in a more digestible manner. Interviewees will include, but not be limited to, solar facility's stakeholders, landlords, and local public officials. As a qualitative method of collecting information, interviews will be conducted under a polite and respectful manner via video calls and phone calls. Interviews are guaranteed to be conducted under volunteer commitment where the research team must not allow anyone to participate at any inconvenient time slot. While the research team believes interviews are a valuable tool for data collection, we also understand the reality that within a semester's time parameters we might not be able to conduct meaningful interviews with an array of stakeholders. However, should this project continue through the Brooks School of Public Policy, the team that picks up from this research team would likely conduct further interviews.

## **Case Studies**

### **Case I - South Ripley Solar**

#### **Introduction**

ConnectGen is the builder and operator of the South Ripley Solar project in the Town of Ripley in Chautauqua county in New York State. ConnectGen, an independent renewable energy developer, plans to set up 4,510.78 acres to host the solar site as one of the company's large-scale solar power and energy storage projects in the state. ConnectGen has ample experience operating renewable energy sites including solar, wind, and energy storage facilities across the country. South Ripley Solar is an important portfolio addition for ConnectGen to add into company history as well as in New York State.

The site is designed to be capable of transmitting and generating 275 megawatt (MW) alternating current (AC) photovoltaic (PV) solar energy and to include a 20 MW battery storage. For meeting such requirements, a couple important features should be included, such as a large solar panel system, a large electricity transmission system, sufficient sunlight, large open areas, and landowner cooperation. The facility expects to operate by the end of 2023. According to the 2017 Census of Agriculture, Chautauqua county contains 223,634 acres of farmland including 57% for cropland and 25% for timberland. The county also has the 13th highest agriculture sales of grapes in New York State. Prior to the site being built, the original land was primarily used for dairy farming, crop productions of corn and small grains, hay, and woodland. Moreover, this site has very deep soils with different water-drained conditions, little slope, and mostly fine loamy textures. In Table 1, it is well explained the original land type of the facility site. According to the U.S. Fish and Wildlife Service (USFWS), information of threatened and endangered species on and near facility sites should be collected and analyzed. The species affected here include northern long-eared bats (NLEB; *Myotis septentrionalis*), tall ironweed (*Vernonia gigantea*), short-eared owls (*Asio flammeus*), and the northern harrier (*Circus hydsonius*). (Environmental Design & Research, 2020)

#### **Government Regulations & Policy**

##### **NYS Energy Policy - The Climate Leadership and Community Protection Act (CLCPA)**

The Climate Leadership and Community Protection Act (CLCPA) was enacted in 2019 by then Governor Cuomo. The Act is an extremely ambitious law that seeks to lead the nation regarding shifts to “greener” energy. (Fave, 2021). For example, goals enumerated in CLCPA include an 85% reduction on greenhouse gas emissions below 1990 level and a 40% reduction overall by 2030. (Fave, 2021). Additionally, the law calls for 70% reliance on renewable energy

by 2030 and 6,000 MW of “photovoltaic” solar energy generation by 2025. (Fave, 2021). Clearly, with the enactment of this law, NYS hoped to usher in an era that emphasized a shift away from fossil fuels and towards renewable energy projects like solar and wind. In addition to the hardline goals laid out in the law, CLCPA also included some aspirational goals such as complete, 100%, zero-emissions electricity by the year 2040 - aspirational indeed. (Fave, 2021). As a result of this law, private firms have excitedly entered the sector to profit off of these energy targets.

### **The Accelerated Renewable Energy Growth and Community Benefit Act (ARGCBA)**

This unprecedented shift to renewable energy with such quick-approaching timelines proved that NYS would have to update the regulatory framework - which was more suited to the fossil fuel industry. To meet these new targets, NYS implemented the Accelerated Renewable Energy Growth and Community Benefit Act (ARGCBA) which was tasked with expediting the siting process for facilities over 25 MW. (Fave, 2021). Perhaps the most salient part of ARGCBA is that it set up the framework for the Office of Renewable Energy Siting (ORES). (Fave, 2021). ORES oversees the siting process of these proposed facilities and ensures that the public comment periods are held in a timely manner and properly considered. (Fave, 2021). Yet, the main goal of ORES is to ensure that the regulations for these large-scale renewable energy facilities are uniform and, if necessary, proper attention is given to any issues raised over the siting areas. (Fave, 2021).

### **94-c vs. Article 10**

Recently NYS passed a new siting law that would expedite the proposal and permitting process that was originally under Article 10. The argument was that Article 10 accounted for fossil fuel plants which require much more planning than siting for wind and solar plants.

A Columbia Law professor summarized the new NYS legal siting process in the *Minnesota Law Review*:

“Some states are moving toward one-stop shopping for renewable energy facilities. In 2020, New York enacted the Accelerated Renewable Energy Growth and Community Benefit Act. A new state agency established by this Act, the Office of Renewable Energy Siting (ORES), is in charge of issuing statewide regulations and then acting on all applications for renewable energy projects larger than twenty- five megawatts. ORES must make its final decision on a permit application within one year of receiving a complete application. Any judicial challenges must be filed within ninety days and go straight to the intermediate appellate court. Municipalities are consulted and have a right to a hearing, but they do not have permitting authority. Substantive municipal laws on these facilities are followed unless ORES finds them to be “unreasonably burdensome.”



Final permits must provide for host community benefits, such as utility bill discounts.” (Gerrad, 2022).

Below is the new timeline for the accelerated renewable siting law. However, from here, the team would like to explore the differences in the public comment process from Article 10 to Section 94-C, particularly what changes the proposed siting areas take on after the public comment period. Article 10 required two public comment periods but Section 94-C only requires one. The idea here was that it would make for a more engaging and useful public comment period. A measure of the effectiveness here would be how the proposals change during and after the public comment period and how Office of Renewable Energy Siting (ORES) finds “substantive and significant” under the new legal scheme.

### **Timeline of Section 94-C (taken from *Columbia Environmental Law Journal* article)**

“Section 94-C provides a centralized, uniform permitting regime overseen by ORES, “which is charged with accepting applications and evaluating, issuing, amending, [and] approving the assignment and/or transfer of siting permits.” Compared to Article 10, the new Section 94-C could substantially streamline the project approval process by imposing strict deadlines. Under Section 94-C, developers may be subject to less extensive pre-application procedures prior to submitting applications to ORES. Additionally, as under Article 10, the developer must set up an intervenor funding account, which will enable local agencies and community groups to participate in public comment periods and hearings.

Within 60 days of receiving an application, ORES must “determine whether the application is complete and must notify the [developer] of its determination.” To have a complete application, the developer must provide proof that it has consulted with the municipality where the project will be sited about its local laws. Within 60 days of deeming the application complete, and after the developer has consulted with any relevant NYS agencies, ORES must publish draft permit conditions for the project and provide a minimum 60-day notice- and-comment period. During this period, the municipality must submit a statement to ORES indicating whether the project complies with its local laws. If public comments, including those from the municipality, raise “*substantive and significant*” (emphasis added) issues, then ORES must hold an adjudicatory hearing and issue a final written hearing report. If the municipality indicates that the project does not comply with its local laws and ORES opts not to hold an adjudicatory hearing, then ORES must hold a non-adjudicatory public hearing. After the hearing has concluded and the comment period has ended, ORES must issue a summary of comments and an assessment of comments received.

Within one year from when the application was deemed complete, ORES must determine whether to grant a siting permit. For projects on “build-ready sites,” the determination must be made within six months. Section 94-C requires that a developer must receive a siting permit before preparing a site or beginning construction on a project. ORES can only issue a siting permit upon finding that the project will comply with all applicable uniform standards and site-specific conditions, as well as with all local laws that ORES

has not chosen to waive. If ORES has not made its determination by the relevant deadline, then the siting permit will be automatically issued.

Once the siting permit has been issued, the developer must comply with all relevant uniform standards or site-specific conditions, as well as provide a “host community benefit.” A party may seek judicial review of ORES’s determination to grant or to deny the issuance of a siting permit, subject to a relatively limited scope of review, in the Appellate Division of the NYS Supreme Court in the county where the project will be sited.” (Fields, 2020).

## Schedule

Attached is a schedule of the 94-C process taken from the South Ripley Solar Project homepage. This is the process governed by ORES and would cover all 25 megawatt or larger projects for renewable energy siting.

Pre-Application	<ul style="list-style-type: none"> <li>• Begin preparing draft reports and agency consultations 18 months to 1 year before filing application</li> <li>• Meet with Agencies</li> <li>• At least 60 days before filing Application meet with host municipalites and hold open house</li> </ul>
Completeness Review	<ul style="list-style-type: none"> <li>• 60 day completeness review period - can be extended by 30 days on consent</li> <li>• If incomplete applicant will submit a supplement</li> <li>• Another 60 day review period will follow after submission of supplement</li> </ul>
Draft Permit and Comment Period	<ul style="list-style-type: none"> <li>• 60 days after application deemed complete a draft permit will be issued which will be a combination of the USC and site-specific conditions</li> <li>• 60 days after application deemed complete the Office will issue a Combined Notice</li> <li>• 60 day public comment period from date of Combine Notice</li> <li>• No less than 60 days from Combine Notice a Public Comment Hearing will be held</li> <li>• 30 days after application deemed complete intervenor funding requests are due</li> </ul>
Issues/Party Status	<ul style="list-style-type: none"> <li>• The period for filing a petition for party status shall be a minimum of sixty (60) days from the date of issuance of the combined notice</li> <li>• The period for filing a statement of compliance with local laws shall be a minimum of sixty (60) days from the date of issuance of the combined notice</li> <li>• ALJ will set schedule for filing of statement of issues (may also set different dates for party requests and statement of compliance with local laws)</li> <li>• Applicant has 15 days to respond to party status and statement of compliance with local laws (unclear if applicants can respond to statement of issues)</li> </ul>
Issue Determination	<ul style="list-style-type: none"> <li>• 30 days after receipt of written submission of issues ALJ will decide party status, issues for adjudication, if any, rule on any issues of law (not requiring hearings), and decide any pending motions</li> </ul>
Adjudicatory Hearings/ Decision	<ul style="list-style-type: none"> <li>• No set deadline for when hearings must occur after issues determination</li> <li>• Parties are require to submit pre-filed testimony in advance of adjudicatory hearing</li> <li>• ALJ shall issue RD within 45 days of the close of the record</li> <li>• Parties have 14 days to submit comments on RD</li> <li>• The final decision of the Executive Director shall be issued within thirty (30) days after receipt of all comments on the recommended decision and hearing report (no later than one year after completeness)</li> <li>• Parties have 90 days to appeal final decision to Appellate Division</li> </ul>

(South Ripley Solar Project, 2022) See [hyperlink section-94-c](#) for enhanced image.

Since the process would be the same for Case 1 as it is in Case 2, it is not necessary to repeat for Moraine Solar but some things like the approval of the Point of Interconnection might arise later.

## Public Comments

Below is a selection of public comments gathered from multiple hearings on the South Ripley Solar Project. While the many comments reflect a broad array of concerns and support, for the purpose of condensing these into digestible documents, only comments used will reflect common concerns or questions regarding the South Ripley Solar Project or solar energy broadly. Access to these comments illustrates the views of the local residents. Highly technical comments were omitted. Comments may be shortened or taken from a broader multi-paragraph comment for a more cogent analysis. All comments are available publicly in their entirety through the New York State Department of Public Service.

A summary of the findings will follow this selection of comments. However, some themes of the questions and issues raised include safety of ion batteries, effect on local wildlife, and use after the leases are up, and solar efficiency in cloudy, rural New York, as well as concern the energy collected will end up benefiting NYC and not Western NY residents.

“I have great concern regarding what happens with all these panels at the end of their useful life. Will they be recycled properly and will this company spend the necessary amount of money to restore the land back to its original character? I would also like to know the country of origin where these panels and components are manufactured.” - Martin Proctor 8/26/22. (Department of Public Service, 2022).

“Having personally witnessed the destructive properties of a single lithium ion battery the size of your finger destroying the inside of a commercial vehicle. These batteries don't let up on planes due to their explosive nature. So I ask, why would anyone put a MASSIVE lithium Ion Battery Storage in a residential area?” - William Gutz Ripley Fire District Commissioner 8/26/22. (Department of Public Service, 2022).

“Realistically, we all know it's all about tax credits for business, there is absolutely no benefit to the residents in the surrounding area, it will increase our carbon footprint, kill wildlife, and be an eyesore.” - William Gutz Ripley Fire District Commissioner 8/26/22. (Department of Public Service, 2022).

“I support the South Ripley Solar Project for two primary reasons. First is that it will bring badly needed financial benefits through tax payments and local economic investment during and after construction. This is a revolutionary amount of money for the Town of Ripley and our local school districts. This project will double the current property tax revenue for the Town and provide much needed tax relief not only for the Town of Ripley but also for Chautauqua County and two school districts. We simply can't continue to support local government and school spending without this kind of investment in our area.” - Janet Lenichek & Drew W. Eaton 8/26/22. (Department of Public Service, 2022).

“This project should not be placed where you will be destroying homes, farm land and rural America. The grape industry for Chautauqua County and North East, Pa. Is a large industry. Water contamination run offs will harm the grape crop which in turn affects the country as these products are sent around the country. Ripley is a small community and the large amount of land the project wants takes away much of our land. Should a fire occur with this project it would affect residents from 5 communities and no one is telling how long the evacuation would be or the after affects of it. Our area does not get the sun needed to support this project. It is obvious this is only "a quota" project so the state (or whichever part of the government) meets its quota for "green projects". This is far from a green project when you are destroying land supporting ponds, bald eagles, rare birds, trees, wildlife, etc.” - Wanda Bently 8/26/22. (Department of Public Service, 2022).

“The health & environmental risks are not worth it. Land values will decrease and the people living by it will now have to worry EVERY DAY about something going wrong. These "green projects" can't move forward without government subsidies so they shouldn't be moving forward at all. Additionally, is there even enough sun for long enough times thru the year for this to even be worth the cost? NO PERMIT APPROVAL!” - James Watkins 8/24/22. (Department of Public Service, 2022).

“The project is wasting available farm land , for a project that is being built in the lowest solar light available in the state. The battery storage system is unsafe with lithium batteries, putting the residents in a harmful way . I'm the fire chief for the fire district, I requested a safety meeting with the people from conect-gen we had a preliminary meeting in June of 2021 with a list on questions that have yet to be answered,such as what materials are being used in the battery storage systems and many more, I believe we should take the time to make sure of the whole project and how it is going to impact everything.” - Mark Smith 3/19/22. (Department of Public Service, 2022).

“Several hundred-million-dollar economic opportunities like this don’t come around here very often, perhaps that’s why so many people have left the area to search for more opportunity. Ripley needs this project. The people of Ripley and South Ripley need this project. The town and school need the revenue, and the landowners need the lease payments. I would very much like to see the South Ripley Solar Project succeed, for our families and our business and for the greater Ripley community as a whole. Support Ripley and support the South Ripley Solar Project.” - Chris Cochran, Owner of Cochran and Zandi Land, LLC 8/24/22. (Department of Public Service, 2022).

With this selection of public comments from stakeholders in the South Ripley area, several major themes emerge. Supporters of the project point to the revenue that the project will

bring in as a necessary boon to the local economy. They argue that this revenue would reinvigorate local schools and local government - more importantly, it would go to landowners as well.

Environmentally conscious groups and individuals seem to be split on the project. Some argue that with climate change a serious and urgent concern, investment in 'green energy' is crucial. However, others see this as a possible environmental disaster since there is some concern regarding energy storage, battery safety, and risk of fires. Interestingly, many of the comments in opposition to the project were involved in local fire departments and expressed their concern that these small, local departments did not have the resources available to combat any possible fires. Some groups and individuals who expressed the need for green energy still opposed the project for what appeared to be the NIMBY principle.

Many who opposed the project did not think the possible risks outweigh the benefits. They argued that this, and similar projects, would not be efficient since NY does not have much sun for many parts of the year. Further, they pointed out how local wildlife might be affected. Others brought up concern over how the panels themselves might create more pollution (through ground water or in landfills) than would be saved from 'green energy.'

It should be noted that many of the comments reflected mistrust in the federal government. Many saw this project as a way for the federal government to meet 'green energy' quotas. While not often expressly stated, political ideologies seemed to indicate support or opposition to the project.

It was not the goal of this project to analyze the merit of the concerns and issues raised in support or in opposition to this project. Neither was it the goal of this team to argue or determine whether or not the South Ripley Solar Project was an overall net positive or not. The goal here was to determine the attitudes of the local stakeholders so that misconceptions can be corrected and information can be distributed to the right people. It was clear from the comments that some of the individuals misunderstood some of the facts so the challenge is to present information in a clear and cogent manner so that every party is as informed in their positions as possible.

## **Community Analysis**

In order to synthesize the stakeholder interests of each community, we consulted the U.S. Census to determine the demographics of Chautauqua County, where the South Ripley Solar Project will be built. Chautauqua is a rural community with a population of 126,807. Of that population, approximately 20% are below the age of 18 with another 21% over the age of 65. The county is overwhelmingly white with over 93% of the population being white - Hispanic/Latino makes up 8% and Black/African American makes up 3%. The median

household income level is \$50,408 and 14.8% of the population is below the poverty line. 89.3% of the population aged 25 and older has a high school education. However, only 23.3% of the same demographic has a bachelor's degree or higher. Approximately 87% of households have a computer and 81% of the population has access to broadband internet. (U.S. Census, 2021).

## **Technical Reports**

For the technical aspect, this report will not go deep into investigating how the facility system transmits high voltage current and connects with the National Grid. A list of names is under this section and each will be explained functionally.

*PV solar panels* are the most obvious and representative feature on the site standing on piles. Their function is to receive and capture sunlight which then produces direct current (DC). The top to bottom structure is PV solar panels connected with piles standing on base rocks no more than 12 feet tall in total from the base on the ground. (Environmental Design & Research, 2020).

*Inverters* and *medium voltage transformers* are critical stations on the site. Inverters convert DC electricity into AC electricity. Voltage transformers increase AC to a higher voltage of 34.5kV sending them to the collection system. With higher AC voltage, energy is less likely wasted in the transmitting process. (Environmental Design & Research, 2020).

*Collection systems* deliver electricity to facility substations. (Environmental Design & Research, 2020).

*Substations* on the site are a step-up transformer which transforms medium voltage to higher voltage of 115kV. Any 115kV current is ready to connect with the National Grid of 230kV via another step-up transformer. (Environmental Design & Research, 2020).

*Battery energy storage systems* are another potential tool on this facility site according to the latest disclosure of ConnectGen. They are composed of multiple container-type batteries connected in series with the substations via the 115kV transmission line. Battery energy storage systems will have a HVAC system to prevent extreme hot and cold weather conditions. (Environmental Design & Research, 2020)

## **Business & Opportunities**

ConnectGen is a Houston based energy company that focuses solely on renewable energy and energy storage projects. It has affiliations with two other organizations as its funding sources. 547 Energy LLC is one of the two companies that fund ConnectGen. 547 Energy is an investor in green energy, having a portfolio across North American and Europe. Another investor of ConnectGen is Quantum Energy Partners. It is a large private equity company managing over

\$19 billion assets with over 5,000 employees. For assets managing purposes, Quantum Energy Partners is not limited to investing in green energy. Traditional energy source productions take up a large chapter of the company's portfolio. (Environmental Design & Research, 2019).

The solar project will impact local communities from multiple socioeconomic perspectives starting with the construction phase. More than 180 short term job opportunities will be created including site workers, equipment and instrument operators, truck drivers, electricians, contractors, and site managers, which in return will incentivize local communities with increased business for restaurants, motels, gasoline stations, convenience stores, material suppliers, and housing services. For long-term site operations, a site manager and multiple technicians will be hired as full time employees. (Environmental Design & Research, 2019).

In order to construct the site, ConnectGen will lease or purchase land from local landowners who currently own the designated acres. For leasing agreements, ConnectGen will provide a stable and reasonable revenue stream for each landowner at a negotiated price for a fixed time period which in total will bring more than \$30 million through lease payments. Based on the estimation from ConnectGen, it will bring \$800,000 tax revenues every year to the Town of Ripley and \$26.8 million in total throughout site operational life. ConnectGen will bring \$389,000 tax revenues every year to local school districts and \$15.5 million in total throughout the lifetime. It will also bring additional \$190,000 for Chautauqua county property tax annually making \$7.8 million in total throughout the site lifetime. (Environmental Design & Research, 2019).

## **Case II - Moraine Solar**

### **Introduction**

The Moraine Solar Project is a development by EDF Renewables North America in the Town of Burns in Allegany County in New York State. To comply with the New York's climate targets of achieving 100% Zero-emission Electricity by 2040, and more specifically of 70% renewable energy by 2030 (Progress of New York State Climate Act), EDF Renewables as a market leading renewable energy company, leased 1,625-acres private rural lands and occupied 593.5 acres to develop the facility infrastructure of Moraine Solar Project. The project is composed of approximately 300,000 solar panels. With 37 years of experience creating a renewable energy economy, EDF Renewables has been reliable in developing large-scale projects like Moraine Solar Project. The facility site is designed to generate and transmit 94 megawatt photovoltaic solar energy generation (Moraine solar).

The Moraine Solar Project was originally hosted by Brownfield Group, and later acquired by EDF Renewables in 2017. Since then, EDF Renewables started commencing environmental field studies in the Town of Burns and Dansville (anticipated in the early stage), designing the

facility site and working on community engagement. Through mid 2023, EDF Renewables will complete a point of interconnection agreement with New York Independent System Operator (NYISO) to connect the New York State Electric and Gas Corporation (NYSEG) and Moraine Substation via POI, and obtain an ORES 94-C permit. After compliance fillings and facility design are approved in 2024, the project will start construction and is expected to be operate by the end of 2025. Eventually in 2042 or later, Moraine Solar Project is anticipated to be decommissioned as lease agreements with host-landowners will expire (Moraine solar).

There are essentially three major factors directing the location of Moraine Solar Energy Center in the Town of Burns. First, back to early 2017, the former developer, Brownfield, had been communicating with local communities and acquired support of the development of solar projects from private landowners and municipal leaders. Second, the proximity to the existing Moraine transmission station provided capacities to accommodate electricity generated by the Moraine Solar Energy Center without prohibitive cost, which is the major factor of project siting. Third, the proposed area is rural by nature (mostly wetland), which means it is already cleared for facility infrastructure. Thus, environmental impacts were reduced and facilitating permits are no longer required (Moraine Solar).

### **Government Regulation**

Refer to Case I since ORES and other state entities dictate the same processes for all siting proposals.

### **Public Comment**

Refer to Case I since public comments are not published for Moraine Solar which has not come to that process in the 94-C scheme.

### **Community Analysis**

In order to synthesize the stakeholder interests of each community, we consulted the U.S. Census to determine the demographics of Allegheny County, where the Moraine Solar Project will be built. Allegheny is a rural community with a population of 46,104. Of that population, approximately 20% are below the age of 18 with another 20% over the age of 65. The county is overwhelmingly white with over 95% of the population being white - no other racial or ethnic group makes up more than 2% of the overall population. The median household income level is \$54,375 and 15% of the population is below the poverty line. 91% of the population aged 25 and older has a high school education. However, only 22% of the same demographic has a bachelor's degree or higher. Approximately 87% of households have a computer and 80% of the population has access to broadband internet. (U.S. Census, 2021).



## **Technical Reports**

Very similar to any PV array systems in New York State, PV array at Moraine Solar will produce power as low voltage DC and use inverters to convert for low AC voltage of 640 volts (V). Using a medium voltage transformer, 640V will convert to 34.5 kV. Electricity will be sent to a site substation with a step-up transformer making 34.5kV to 115kV and is ready to connect with street stations associated with the National Grid. The interconnection system of Moraine Solar will be connected by underground cables with a minimum depth of 36 - 48 inches underground. (Moraine solar, 2022).

## **Business & Opportunities**

EDF Renewables North America is a leading renewable energy company that was founded in 1985 when the first project was erected in California. It is based in San Diego and provides origination, development, transaction and construction services for large-scale wind, solar power generation and storage projects across North America. Its parent company is EDF Renewables, a multinational renewable energy affiliate of the French utility EDF Group operating in 22 countries. EDF Renewable North America has 339 projects across North America including those in progress. Its portfolio includes 27 solar projects and 1 wind project in New York State and Moraine Solar Energy Center will be one of them (EDF Re, 2022).

As a global leader in sustainable energy production, EDF Renewables' 1,300 employees, affiliates (EDF Renouvelables, EDF Energy North America, EDF Group, EDF Trading, PowerFlex, and Dalkia), and long-standing relationship with government agencies, communities, utilities, etc., provide EDF Renewables with accesses to sufficient financial resources and technical expertise to ensure successful and proficient delivery of large-scale projects. Since 1985, EDF Renewables North America has led the solar energy charge and has developed more than 24 gigawatts of renewable energy projects (EDF Re, 2022).

Other than creating job opportunities and generating tax revenues, Moraine Solar Energy Center will provide a long-term stable revenue source to landowners and farmers in lease payments. A supplement of \$10,000 will be given to local community groups and projects annually for 10 years. NYSERDA will administrator \$93,550 to local government agencies and community intervenors (\$1,000/MW \* 93.55MW). Additionally, educational opportunities will be provided for local schools and communities. Annual \$2,000 scholarship will be granted to school districts for students who declared their interests in a renewable energy/trade (Moraine Solar).

## Findings and Analysis

New York Independent System Operator (NYISO) is a New York power system operator and its annual analysis heavily influences the New York State power grid and electricity market every year. Based on its report from 2021 predicting New York State clean energy reality in the future between 2020 until 2051, the predicted New York State electricity usage will be 70% more than 2020 under high-load scenario and 30% more than 2020 under baseline forecast. (See Figure 1.) (NYISO, 2021). According to the New York Times, New York State has a project called Clean Path New York aiming to build transmission lines of renewable energy sources in order to provide 70% of state electricity consumption by 2030. (Barnard, 2021). Although it is difficult to achieve with state political and economic challenges, it is where goals are. South Ripley Solar has 30 years of operational life starting 2023 and Moraine Solar is designed to work until 2042. (Environmental Design & Research, 2020). The Moraine Solar facility interconnects the NYS power grid via a point of interconnection. It is assured that both solar sites will provide essential services for the New York State grid system, so it is remarkable to consider what the alternatives sites are when both South Ripley Solar and Moraine Solar run out of service either from external reasons or the end of their life cycles. (NYISO, 2021).

In terms of community engagement, both South Ripley Solar and Moraine Solar have a Public Involvement Program Plan (PIPP) which is responsible for reaching out to local affected agencies, stakeholders, and the general public. PIPP also portrays participating opportunities of the solar program like Q&A sessions, education sessions, and online meetings. PIPP is not only a requirement for solar projects according to law, but also a platform connecting both relevant agencies and the general public and making communication efficient with less confusions. A typical PIPP helps official agencies identify public concerns and interests. Additionally, South Ripley Solar establishes mailing communications with landowners and adjacent landowners for various reasons including sending meeting invitations, useful local news reports, educational materials, contact information, and documents. (Environmental Design & Research, 2019). Comparatively, Moraine Solar intends to build strong relationships with stakeholders and the general public via more personalized experiences which is more targetable. Moraine Solar cooperates with the local school district promoting solar educations into classrooms and incentive qualified students with potential scholarships up to \$20,000 in ten years. Qualified students are considered as those who entered the renewable energy field studies post-secondary programs. Supporting education at this level is arguably the best way to gain support from local communities. (Moraine Solar, 2022).

When analyzing the demographics of Allegany and Chautauqua counties we noticed they are both very rural, homogenous areas, even if Chautauqua is about 3 times the size of Allegany regarding population. Since we do not have data on the specific attitudes of the people in these counties, we attempted to understand what would be important to those in these areas. One thing we found was that both counties were approximately 1/5th composed of individuals under 18,

meaning many of the population was school-aged. With high school graduation rates around 90%, we figured that schooling was important to both Chautauqua and Allegany counties. The reason that this is significant is that the solar projects present an opportunity here. As both South Ripley and Moraine have proffered to the local populations, there is a significant amount of tax that can be raised from these facilities which would in-turn fund the local school district. Here, the firms in charge of the facilities can either get that message directly to the community as seen in the example of South Ripley Solar sending out individual mailers advertising that the facility would raise up to \$350,000 a year for the Sherman School District (Sherman Benefits mailer, 2022) or appeal directly to the school districts who will then support the projects on a local level.

Further, both Allegany and Chautauqua counties are composed of about 1/5th of individuals above 65 which is the retirees age. In order to appeal to this group, the firms in charge of the facilities have gone a different route than advertising the influx of cash into the school system. Rather, South Ripley Solar sent out a mailer showing how the facility could double the amount of property taxes raised which would allow the town to spend more on public works projects, improve infrastructure, and even lower taxes. (Ripley Benefits Mailer, 2022)

Both of these examples in Chautauqua and Allegany show that demographics, even in rural Upstate NYS, matter because understanding the population means understanding what matters to them. And understanding what matters to them allows to best appeal to their interests. While it was not in our memorandum of understanding to be PR consultants for the solar companies, it is important to realize that the solar companies have already done that research to best achieve their goals within each community.

The South Ripley Solar site location and surrounding environments have the unique feature of very deep soils with various water conditions. Prior to turning into solar site facilities, South Ripley has a history of farming grapes and other crops. Growing grapes requires adequate sunshine, water, long warm summers, and freezing winters. For maximizing the use of land for South Ripley Solar site landowners and promoting local economy, constructing cohabitation of growing grapes under solar panels might be possible. (Environmental Design & Research, 2020) A Garden owner in Boulder County, Colorado has 4 out of 24 of his acres of land installed with solar panels and farmed crops like carrots, tomatoes, radishes, lettuce, and etc. The solar energy generated from his farm is able to power 300 homes and the cohabitation progress is remarkable, since crops also provide water evaporation to advance solar panel efficiency in extreme hot temperatures. (Simon, 2021). Comparatively, Moraine Solar intends to cultivate and raise sheep and bees on site under solar panels in order to contribute to the local economy. While the project is waiting for a license to start construction, Brownfield Group currently asks for professionals from agriculture to identify possible growing crops under the solar panels. Moraine Solar has considerations to avoid, minimize, and mitigate impacts on nature and wishes to maintain a biodiversity environment on and near the site location. Brownfield Group promised to return undamaged forested land and wetland after the project hit its designed serving age. (Moraine Solar, 2022).

While reviewing the government procedures and regulations, our team quickly realized that the public comments showed a gap of knowledge between those commenting - who are largely direct stakeholders - and the experts/solar companies. This was a surprising finding considering the websites for these projects have considerable FAQs that addressed nearly every issue brought up in the comment period. However, we found that about 15% of these populations do not have reliable internet according to the US Census. It was also interesting to note that all of these public comments came after South Ripley Solar had sent out mailers to the local community. Here, it is pretty clear that the mailers were not very effective in conveying information to many people. However, both the informational website and the mailer came from the solar company itself and there might have been a distrust of information conveyed by the stakeholder with the most to gain. If there was a way to convey accurate information from a neutral party or even from local government officials it is likely that the community members would be more informed on the specifics of solar energy. Many comments concerned the fire risk of solar, possible chemical contamination, effect on agriculture, other environmental concerns not rooted in factual information, and the possibility that the energy gathered would be sent to NYC with no cognizable benefit to the surrounding community. Yet, all of these issues are addressed in the FAQs section on the South Ripley Solar website.

While we did not conduct an analysis of the political ideologies of Allegany and Chautauqua counties, it was clear in the public comments that opinions on solar energy were split on an ideological divide rooted in national political attitudes towards green energy broadly. These people present a challenging demographic in a time of hyperpolarization in politics. However, the challenge becomes not trying to change an individual's politics to support or oppose renewable energy but to convey information in an accurate way that illustrates the pros and cons of solar energy in their community. Again, it becomes the responsibility of local governments and community leaders to accurately gather information and relay it to the local community. This would be an excellent place for a team to pick up should this project carry over into the future.

There is little doubt that both South Ripley Solar and Moraine Solar sites will bring tremendous economic benefits to both companies and local communities via tax revenues and direct lease payment. However, both companies' business plans are classified, which file is not shown on public domain or is blacklined on published files on state government websites. Business plans include many important features such as their budget, estimated revenues, and more. Making business plans publicly accessible would increase project credibility and transparency and encourage community supervision and oversight. Unfortunately, both companies' business plans are not designed for opening to the public and create difficulties for all stakeholders to access the core information regarding their projects.

## **Recommendations**

Based on the experience of currently operational solar projects and other state governments geographically near New York State, our team has identified several feasible actions and future plans for lessees/solar developers and regulators to promote local economies, improve efficient community engagement, and minimize potential impacts to the environment as they strive for a more clean, sustainable, renewable, environmentally friendly, socially responsible power generation achieving the NYS Clean Energy Standard of using 70% green energy by 2030. (Fave, 2021).

### **Agrivoltaics System**

To maximize land use, solar developers are recommended to create an agrivoltaic system by incorporating solar panels into farmland or rangeland, which can be used for both agriculture and solar energy generation. The agrivoltaic system can yield distinct environmental and economic benefits to solar sites. Plants growing underneath solar panels generally need less irrigation because the shade provided by solar panels allows soil to retain more water than soil without panels. In addition, photovoltaic panels could protect crops from extreme weather events such as storms, heat, cold, and strong wind. Theoretically, crops covered by solar panels grow more efficiently with less water consumption. Essentially, the power of the sun in agrivoltaic system can be utilized twice for energy generation and food production. Agrivoltaics of low impact solar development provides a synergy between energy and food with lower water demand that could benefit both solar developers and local communities (Proctor, 2020).

To enhance biodiversity of solar development, solar developers may curtail the use of herbicides and pesticides ensuring the safety of wildlife and removing mowing operations to conserve natural habitat of the land. Many solar developers in the Northeast US integrate livestock and pastures into solar sites. Livestock can be used for maintaining plant growth to eliminate maintenance costs for mowing operations. This concept of solar grazing can be employed in NYS solar development projects. Accordingly, EDF Renewables has considerable experience with agrivoltaics at Arnprior Solar site in Ontario, Canada by implementing sheep grazing and installing beehives. Besides vegetation management, solar grazing is mutually beneficial for developers and local farmers who could have access to additional lands to expand sheep flocks. Furthermore, EDF Renewables' installation of beehives helped to re-invigorate pollinators and provided a complete habitat for the monarch butterfly which is identified as an at-risk species. EDF Renewables contributed to the recovery of the monarch butterfly population and was awarded by the Government of Canada in the Habitat Stewardship Program for Species at Risk (Berntsen, 2022). The idea of implementing bees and sheep can be brought into South Ripley Solar and Moraine Solar. Clover, orchard grass, and other ground cover that can stimulate foraging of bees and butterflies and grazed by livestock can be planted at the solar site. Alternatively, vegetation on land beneath or amongst photovoltaic panels can be used to

accommodate interests of local farmers to promote interactions with stakeholders and communities. When examining public comments, many people were concerned if solar panels would harm the grape crop. The reality of growing grapes under solar panels is in fact the opposite. (Padilla et al., 2022) confirmed the viability of integrating vineyard structures into photovoltaic systems. Thus, constructing cohabitation of growing grapes under solar panels at South Riley Solar is a feasible agrivoltaic solution.

## **Educational fund**

Our team found that there is a gap of knowledge between the public and energy experts of government and solar companies. Although both solar companies ConnectGen and EDF Renewables conduct ongoing activities and mass mailing to educate the public, their target people are mostly stakeholders from local communities. We find that EDF Renewable Trades and Clean Energy Scholarship can be a leading example to expand state-wide with support of the NYS government. The scholarship provides \$2,000 to a student who intends to enter trades/renewable energy related post-secondary programs. It further provides another \$2,000 if the student finishes the first year and enrolls in the second year of the program. This scholarship enables young teenagers who plan to apply it to gain the knowledge of renewable energy. By establishing this scholarship state-wide, NYS can educate the public from young generations (Moraine Solar).

## **Improve Business Transparency**

Our team advocates that solar developers should improve business transparency to the public. As solar energy development is relatively new to New York State, the public is skeptical about solar proposals and if solar panels are low impact to lands as solar developers described. While reading through documents of solar developers, long paragraphs in company portfolios are black marked, which have given difficulties to the public who want to gain insights of their business plan. Although solar developers conduct periodic meetings, open houses, and mailing to stakeholders in local communities, it is important for solar developers to disclose complete development experience, site control, operation plan, business entity and financial plan, etc. to gain full trust from the public and stakeholders to strengthen the relationship, so long as trade secrets are not disclosed. Promoting transparency is essential to strengthen accountability and credibility for future developments.

## **Limitations**

Our team has encountered variant obstacles and dilemmas. First, since both cases will be fully operational in future years of either 2023 or 2025, our team cannot perform long-term data collection, analysis, and research throughout the project terms. This issue is caused by the nature

of our consulting team which is an academic-based environment with a limited time of only one semester. In this short time frame, our team did not have the opportunity to either send out the survey or interview stakeholders. Second, since solar energy leasing deals and its related policies prospered in recent years, our team struggled with finding the latest available resources from the public domain. For our South Ripley Solar project, documents and files from ConnectGen are classified (black marked) providing no value information, although these files are available to access. Third, our team observed bureaucracy in collecting project related data and information. We heavily focused on New York State government websites for data collecting purposes. However, there is an obvious gap from current time and the most up to date information. We doubt this is caused by the nature of government where a typical bureaucratic system operates..

## **Conclusion**

The Solar Leasing consulting team picked two cases from New York State renewable energy programs to draw comparison analysis, summarize findings, and make recommendations based on those observations. The first case is South Ripley Solar in Chautauqua county and the second case is Moraine Solar in Allegany county. Analysis was conducted from multiple perspectives including site location information, program plan, technology, government regulation, renewable energy policy, business, economy, local community background, and community engagement plan. The team found the importance of each solar energy program, potential economic benefits and business opportunities, and advantages of local community engagement. The team also advocates for a more detailed community engagement plan with more beneficiaries, more efficient use of solar farms, and more transparent business plans for better program understanding to the public.

# Appendix

Table 1. Original Land Use in Facility Area.

Community Type	Acres	Percent Cover (%)
Deciduous Forest	1994.99	44.2%
Pasture/Hay	1570.36	34.8%
Mixed Forest	355.19	7.9%
Woody Wetlands	197.64	4.4%
Evergreen Forest	109.88	2.4%
Developed/Disturbed	108.35	2.4%
Cultivated Crops	77.31	1.7%
Grassland/Herbaceous	51.55	1.1%
Emergent Herbaceous Wetlands	27.95	0.6%
Shrub/Scrub	11.81	0.3%
Open Water	5.74	0.1%
TOTAL	4,510.78	100

Source: 2016 National Land Cover Dataset.

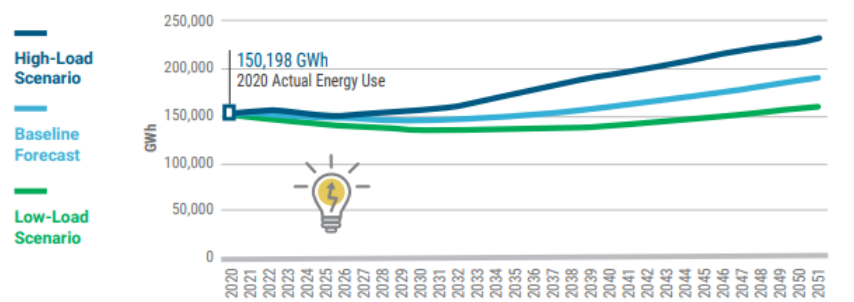


Figure 1. Electric Energy Usage - Actual & Forecast: 2000-2051 (GWh)

Source: The New York ISO Annual Grid & Markets Report 2021



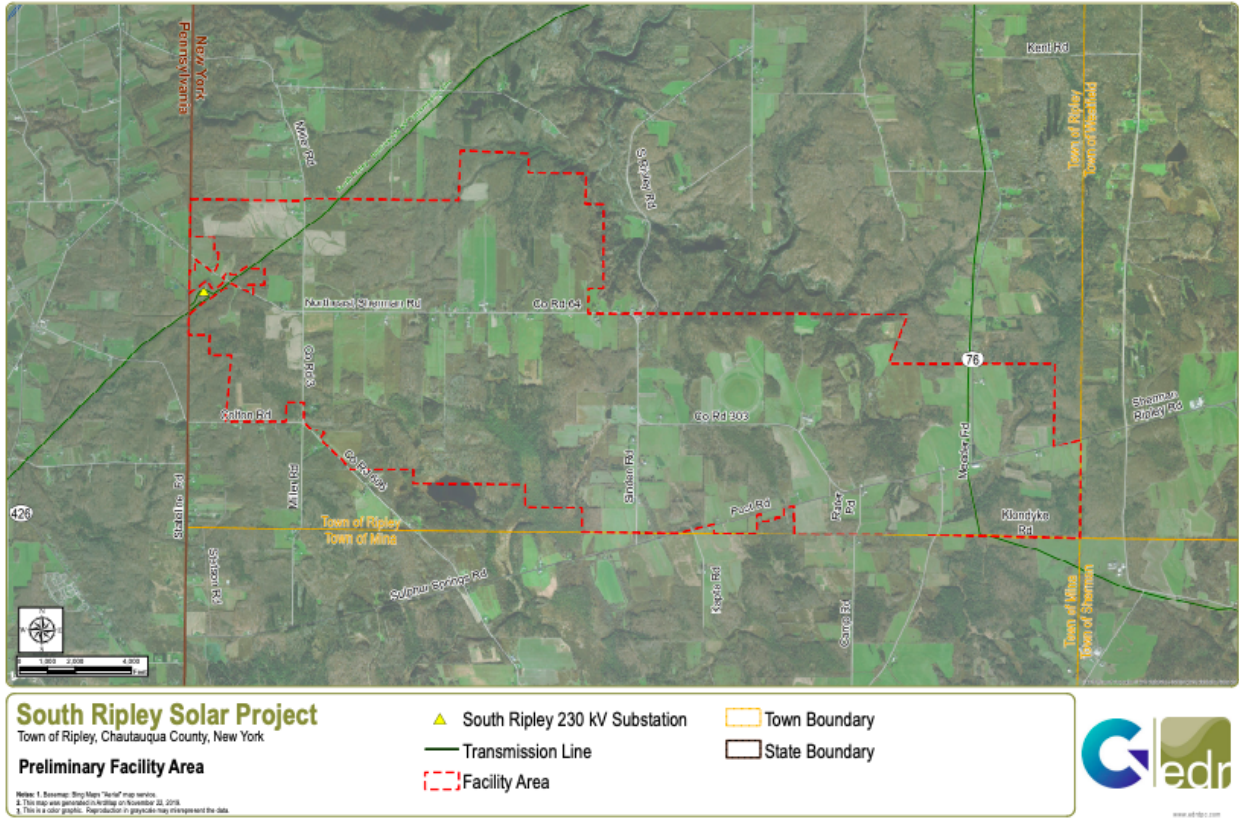


Figure 3. South Ripley Solar Project Facility Layout  
Source: South Ripley Solar Project

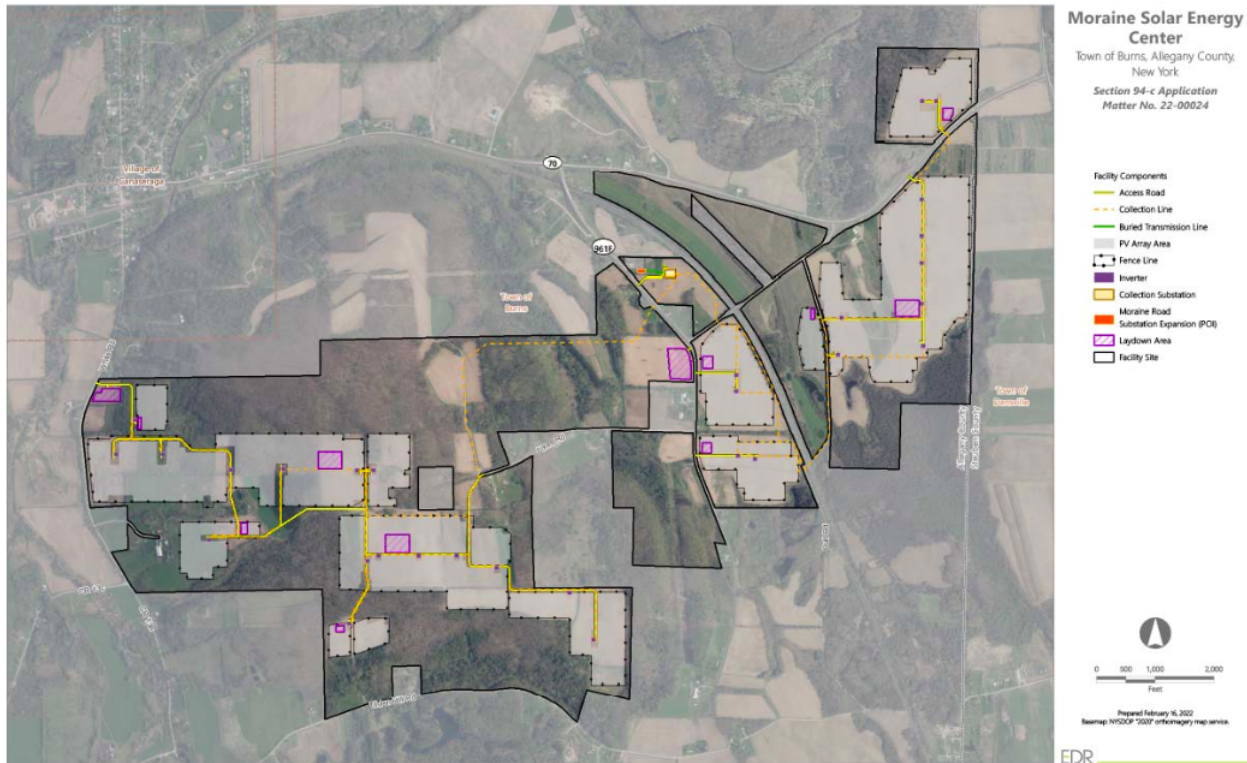


Figure 4. Moraine Solar Energy Center Facility Layout  
Source: Moraine Solar Project

## Propose Survey - Solar Energy Project with Better Community Engagement

1. Which best describes you?
  - I am a landowner, but not a farmer
  - I am a landowner, and also a farmer
  - I am not a landowner, but I have crop or livestock around facilities
  - I am a local resident
2. If you are a landowner, do you plan to lease your land for solar developments?
  - Yes
  - Yes, I already leased my land
  - No
  - No, I'm not a landowner.
3. How many years have you lived in Allegany County or Chautauqua County?
  - Never

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- Less than 1 year
- 1-10
- 10-20
- 20-30
- More than 30 years

4. Do you have any interest or concern about the ongoing Moraine Solar Energy Center or South Ripley Solar Program?

- Yes
- No

If Yes, please specify: \_\_\_\_\_

5. Please rate the following aspects according to your knowledge. How do you think each factor is important?

Factors	1 - Not At All Important	2 - Slightly Important	3 - Moderately Important	4 - Very Important	5 - Extremely Important
Site Location					
Project Timeline					
Program Transparency					
Tax Revenues					
Financial Benefits					
Jobs Opportunities					
Safety Concerns					
Environmental Friendly (during and after project lifetime)					
Impacts on Hunting					
Education/ School District					

<b>Benefits</b>					
<b>Visual &amp; Sound Impact</b>					

6. Have you attended or participated in a project open house tour or meeting?
  - Yes
  - No
  - Not yet, but I plan to.
  
7. Which is the best way to reach out to you?
  - Phone
  - Mobile
  - Text Message
  - Email
  - Mail
  - Newsletter
  
8. Do you have any interest in volunteering regarding solar energy programs?
  - Yes
  - No
  
9. On Scale 1-10, rate how likely you would plant vegetation, or feed livestock underneath solar panels?
  - Rate: \_\_\_\_\_
  
10. On Scale 1-10, rate how likely you would stand for natural habitat conservation in and near the facility site?
  - Rate: \_\_\_\_\_
  
11. On Scale 1-10, rate how likely you would love to learn about solar energy?
  - Rate: \_\_\_\_\_

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