Community Solar for Cook County

2017

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This work is based upon work supported by the U.S. Department of Energy SunShot Initiative, under Award Number **DE-EE0006916**

The U.S Department of Energy SunShot Initiative is a national effort to drive down the cost of solar electricity and support solar adoption. SunShot aims to make solar energy a low-cost electricity source for all Americans through research and development efforts in collaboration with public and private partners. Learn more at *energy.gov/sunshot*.

Letter from President Preckwinkle

Dear Cook County Resident:

An effective community solar program is critical to ensure that everyone in Cook County has the opportunity to realize the benefits of renewable solar energy, not just the small percentage that own their buildings and have the capital to pay for up-front investment. Community solar allows residents, businesses and institutions to save money on their electric bills – and if enough of it is built within Cook County, it also could provide up to 10,000 construction jobs and $1.39 billion in construction investment. While today there are no community solar installations in Cook County, this market can grow if we act now.

Thanks to the Illinois Future Energy Jobs Act, Illinois now has a strong legal framework to support community solar, and substantial incentives that will be available over the next three years. I applaud those who worked on this legislation that incorporated many of the early recommendations from our project. But more work is needed to make sure the programs created under the new law will allow community solar projects to be financially viable in Cook County.

This report, and its associated case studies and tools, presents a blueprint for moving the community solar market in Cook County forward. We show how community solar can be economically viable on sites ranging from schools and churches, to large commercial and government buildings, low-income housing, college campuses, landfills and other sites. In addition, the report provides direction for those implementing community solar programs at the state level to help ensure that those programs support community solar for diverse locations, owners and subscribers.

We are grateful to our project partners including Elevate Energy, Environmental Law and Policy Center, ComEd, the City of Chicago and West Monroe Partners. Thanks also to the hundreds of stakeholders and experts who gave their time and expertise as part of this work.

I remain committed to reducing harmful greenhouse gas emissions in Cook County by 80 percent by the year 2050. As I announced earlier this year, Cook County is firmly committed to the fight against climate change and we continue to support the goals of the Paris Accord. Community solar is an important component of making our communities sustainable while providing jobs and savings.

Let's get to work.

Sincerely,

Toni Preckwinkle
President
Cook County Board of Commissioners

Cook County Community Solar Project Products

The Cook County project team has developed several resources to address the knowledge gaps and policy barriers they identified. The table below lists the resources and corresponding barriers addressed.

These reports are available at *https://www.cookcountyil.gov/service/solar-energy*, except for the Case Study Overview and the Case Studies, which are available at *https://www.cookcountyil.gov/communitysolar/CaseStudies*.

Resource	Description
State of Community Solar in Cook County (June 2015)	Details the current state of community solar in Cook County - as of June 2015. This research found that despite growing interest in solar, there are no community solar projects installed in Cook County.
Opportunity Assessment (June 2015)	Quantifies shared solar market potential by site size and type (ground v. roof), and land use (commercial, industrial, nonprofit, government, school, etc.). Total community solar capacity in Cook County is over 9,000 megawatts, enough to power the annual energy consumption of more than 1.2 million single-family homes.
Best Practices Analysis (August 2015)	Compiled from leading experts on community solar, this analysis identifies model programs and provides a framework for accelerating community solar in Cook County.
Value Proposition – Part I (May 2016)	Contains an analysis of the value proposition for shared solar subscribers and system owners, finding a positive business case for both parties under the base case scenario.
Value Proposition – Part II (April 2017)	Building off the previous value proposition, this analysis includes utility impacts and incorporates provisions of the Future Energy Jobs Bill, which passed in December 2016. This analysis again found a positive business case for system owners and subscribers as long as federal tax credits, SRECs and utility rebates are available to developers. The analysis also found that as a wires-only utility, ComEd would not be able to realize the benefits of shared solar.
Utility Billing Impacts of Community Solar (May 2016)	Analyzes the potential bill crediting processes for subscriber management of a community solar project.
Economic and Policy Barriers Resolution Work Plan (May 2016)	Identifies economic and policy barriers as well as potential resolutions for developing community solar.
Community Solar Business Case Tool (March 2017)	Spreadsheet that allows users to calculate the costs and benefits of a community solar project for developers and subscribers.
Local Benefits Analysis Report (August 2017)	This analysis scaled up the simulated costs and benefits at a hypothetical community solar site to derive the total local net benefits, including job creation, economic activity and environmental impacts, of increased deployment of community solar projects within Cook County.
Case Study Overview (September 2017)	Lays out in detail the process for evaluating 15 case study sites proposed for community solar. Details the financial assumptions including the level of public incentives that were assumed.
Case Studies (September 2017)	Together, these case studies show that community solar can be economically and physically viable in a wide range of circumstances. For each of 15 potential community solar sites, several reports are available, including a synopsis, full case study, engineering report, solar design, and one or more financial models. The financial models can be downloaded, the assumptions changed, and used to help model other potential community solar sites.

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Definitions

Bill Crediting – Method by which utility customers receive credit on their electricity bills for their participation in a community solar project.

Co-Location – When two or more community solar projects are located adjacent to one another. Co-location can help achieve greater economies of scale but also result in projects that, in size, are effectively utility-scale projects (in Illinois, any solar project greater than 2 MW is considered utility-scale).

Community Solar – Solar facilities shared by residents, businesses, non-profits, and public facilities from the community who receive credit on their electricity bills for their portion of power produced by the facility.

Deregulated Market – Deregulated markets allow public utilities to own and charge customers a rate of return for the distribution and transmission facilities that deliver power, but disallow utilities from owning resources that generate electricity, such as solar projects. In regulated electricity markets – also known as "vertically integrated" -- public utilities may own and charge customers for both distributions/ transmission resources and generation resources.

Distributed Generation (DG) – In Illinois, solar projects less than 2 MW that are located on the customer's side of the electricity meter ("behind-the-meter").

Energy Supply Rate – The rate charged to utility customers to pay for the electricity bought from energy generators.

Delivery Service Rate – The rate charged to utility customers to pay for the delivery of electricity from the energy generation source to the customer's home or business.

Future Energy Jobs Act (FEJA) – Enacted in December of 2016, it strengthens and expands the Renewable Portfolio Standard to ensure stable, predictable funding for renewable energy development; enables a viable community solar program for the first time in Illinois. Programs also include funding for energy efficiency, new wind and solar, as well as the Illinois Solar For All program that provides solar incentives to low income households across the state.

Host Site – Property where the community solar array is installed; may not own the system. They also may or may not subscribe to shares of the energy produced from the community solar array.

Illinois Power Agency – An independent State agency established to ensure that the process of power procurement is conducted in an ethical and transparent fashion and to secure power at the best prices the market will bear. The IPA manages the procurement processes for the Renewable Portfolio Standard and will manage the Illinois Solar For All program.

Inverter / Smart Inverter – Solar arrays generate power in Direct Current (DC). An inverter converts that power to Alternating Current (AC). AC is what is used in buildings. A smart inverter does this conversion, but also operates as a communication device, sending and receiving signals between the system owner and the utility. This allows the solar system to be managed quickly and in an automated way for more efficient and safe grid management.

Kilowatt and Kilowatt Hour – A kilowatt (kW) can be considered the demand or the level of energy used. The kilowatt hour (kWh) can be considered the usage, the power or the rate at which the energy was used. Most electricity bills charge by the number of kilowatt hours used in a given period. A solar system can measure its anticipated energy in kW's. But the output it sends to the grid will be in kWh's.

Megawatt – A Megawatt (MW) is a measure of energy. It represents 1,000 kW. A one megawatt (1 MW) solar system will typically produce more than 700 megawatt hours (MWh's) per year. That's enough to power more than 150 Cook County homes.

Portability – The ability for community solar subscribers to take their subscription or shares of a community solar array with them when they move, if within the service territory of the utility where the solar array is installed.

Renewable Portfolio Standard – A regulation that requires the increased production of energy from renewable energy sources, such as wind, solar, biomass, and geothermal. The mechanism that usually ensures these requirements are met is a Renewable Energy Credit (REC).

Solar Developer Entity – Responsible for all aspects of solar energy project development, including: securing land or lease rights, interconnection rights, building permits, and property tax agreements; working closely with engineering, finance and commercial teams when a project moves successfully to the 'pre construction' phase; and acting as lead project sponsor for the successful financing and construction of the project.

Solar Renewable Energy Credits (SRECs) – Tradable, non-tangible energy commodities in the United States that represent proof that 1 megawatt-hour (MWh) of electricity was generated from an eligible renewable energy resource. Certificates can be sold and traded or bartered, and the owner of the REC can claim to have purchased renewable energy. RECs can incentivize carbon-neutral renewable energy by providing a production subsidy to electricity generated from renewable sources. The energy associated with a REC is sold separately and is used by another party.

Subscriber – An electric customer who owns a portion of a community solar project. The subscriber receives a credit on their electric bill for the power the panels produce.

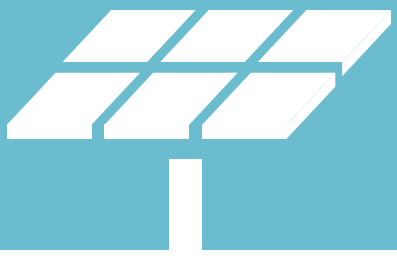
Transferability – The ability for shares of a community solar project to be transferred from one participant to another participant.

Transmission Services – A charge allowing the utility to recover costs associated with transmission service.

Virtual Net Metering – Net Metering is a billing mechanism that credits solar energy system owners for the electricity they add to the grid. "Virtual" refers to the ability to credit customers who are not physically connected to the PV system generating the electricity for which they are receiving credit.

How much power do solar panels produce?

- 12 solar panels would offset 100% of the average annual apartment's electricity consumption in Cook County
- 25 solar panels would offset 100% of the average annual single-family electricity consumption in Cook County
- A typical solar photo voltaic panel size is 3.5 ft. x 5 ft. and generates approximately 350 kWh each year.



Executive Summary

Community Solar for Cook County

An effective community solar program is critical to ensuring that everyone has access to the benefits of solar energy, not just those with the capital, buildings, and access to direct sunlight. Illinois now has a strong legal framework to support community solar, but work is needed to make sure the new law is implemented in a way to make community solar projects financially viable in Cook County.

The time to act is now, as the next three years provide a unique window of opportunity when strong state and federal financial incentives for community solar are available. This report provides information gained from case studies and financial modeling about how community solar can succeed in Cook County.

Community Solar projects allow anyone who pays an electric bill to access the benefits of solar without needing a direct physical connection to solar panels. A community solar project is a solar photovoltaic (PV) installation that provides energy benefits to multiple participants. Participants, also called subscribers, can buy or lease a share of the solar installation and receive credits on their electricity bill for their share of the power generated.

However, Illinois has not seen its share of the benefits of solar, such as savings on electric bills, and jobs associated with solar installation.

A successful community solar market in Cook County will bring economic and environmental benefits by addressing the barriers to solar that are particular to dense urban areas.

Only about 25% of Cook County households can install solar electric systems. 42% of Cook County households cannot invest directly in solar due to lack of roof ownership; of the owner-occupied units, over one-quarter share roof ownership in a condo. Many others cannot afford up-front investment. In addition, the lack of a statewide community solar policy has been a major hurdle to developing community solar projects.

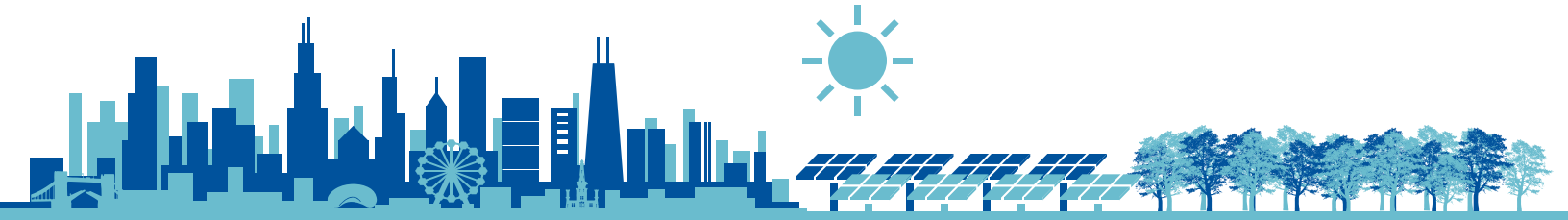
Jobs:
10,070 construction-period jobs
and 177 permanent jobs

Environment:
Reduction of 3.28 Million Metric Tons
of CO2 equivalent harmful greenhouse gases

Savings:
$1.01 Billion in electric bill savings to subscribers
(over 25 year project life, in 2016 dollars)

The Cook County Community Solar Project was launched through a grant from the U. S. Department of Energy's SunShot Initiative in December 2014. The goal is to establish a community solar market in the County that provides the economic and environmental benefits of solar to a dense urban area. The Project team produced a series of reports, analyses and tools that support stakeholders to grow the emerging community solar market in Cook County. The main products are fifteen detailed case studies outlining the physical and financial proposals for proposed sites that represent a diverse set of typical locations for the region.

Only two-tenths of one percent of the solar energy capacity in the United States is installed in Illinois.



Cook County Community Solar Project:

Over **200** *stakeholders involved from over* **100** *organizations*

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109 *sites submitted interest*

National and regional experts as advisors

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15 *detailed financial case studies completed*

Project Steering Committee:

Cook County
City of Chicago
ComEd
Elevate Energy
Environmental Law and Policy Center
West Monroe Partners

Goals:

- Unlock the potential of community solar in the Chicago region, with lessons that could be applied nationally.
- Create pathways for Cook County's urban population to participate in distributed solar generation, expanding the demographic participation to seniors, low income, and apartment and condominium residents.

Products:

A series of reports, analyses and tools that support growth of the emerging community solar market in our region:

- opportunity assessment
- policy analysis
- best practices
- value and impact analysis
- 15 financial case studies
- final report.

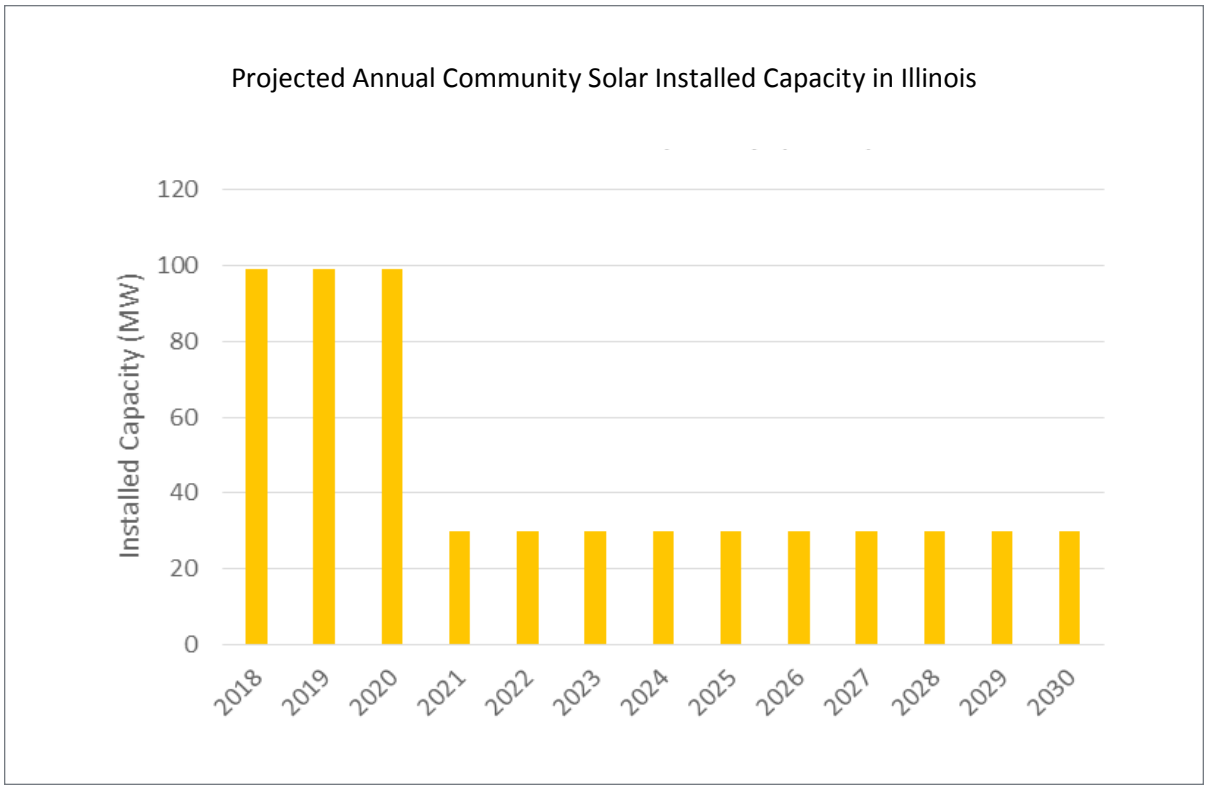
Benefits of Community Solar

Building community solar projects will create local jobs and Cook County can realize many of these jobs with the right planning. There is almost certain to be a boom in solar installation, including community solar, in Illinois in the next three years due to the timing of the incentives created by the recent state law called the Future Energy Jobs Act (FEJA). Because of this timing, it is important that sites within Cook County are positioned to move ahead with well-planned projects quickly. Developers will gravitate towards large, cheap, greenfield sites in rural settings unless specific actions are taken to make projects viable in dense urban settings.

Illinois is projected to see construction of 600 MW of community solar capacity between 2018 and 2030, which will produce nearly 6,000 Gigawatts (a Gigawatt is one Billion watts) of electricity. This represents $1.39 Billion in Construction Investment.

Physical Capacity

There is abundant space for community solar in Cook County. The project determined that there are roof and vacant land locations that can house at least 7,000 Megawatts of electricity generating capacity from solar installations of 100 kW or more and the available space is undoubtedly much greater. A map of solar capacity on roofs and vacant sites shows that potential capacity is located in almost every community. This map is intended to serve a variety of users. Property owners can research the solar potential of their properties. Community groups can discover the solar potential in their neighborhood. Local governments can target locations for solar development. The dataset for rooftops outside of the City of Chicago is not complete, and new data will be added over time, which will only increase the amount of known available space.



It's exciting to see the projected savings from community solar. For our OTR residents, most of whom are very low-income, reducing their energy bills by almost $200 annually is significant. It allows them to use this money toward other basic necessities such as food, medicine, and rent. When you live on a limited fixed income, every dollar matters and the research shows that living with physical disabilities costs more in terms of special equipment, transportation, and health care costs. As a nonprofit, we also appreciate the cost-savings that community solar might yield and would put that money into resident programs or building improvements.

Eric Huffman
Over the Rainbow Association, Executive Director

Policy

The FEJA set the stage for successful community solar by addressing the major economic and policy barriers to community solar that existed in Illinois. Many of the best practices identified by the policy working group were incorporated into the FEJA.

But there are several outstanding questions regarding community solar program design to be addressed through the planning process, in particular around consumer protections and ensuring robust participation from small customers. The annual community solar mandates prescribed by the FEJA are structured to spur the market over the next three years, with deployment levels leveling out between 2022 and 2030.

This project produced a scan of best practices in policy for community solar. This work proved timely and useful in the negotiations leading up to the drafting and passage of the FEJA. Most of this projects' recommendations were included in the final legislation.

The Illinois Power Agency is developing a Long Term Renewable Resources Plan that will fill in details left out of FEJA, including setting the levels of incentives and figuring out the extra program elements that need to be put in place to support solar for low income residents. A draft of that plan is expected to be available in Fall 2017, starting an adjudicated process through the Illinois Commerce Commission that should result in a final plan near the beginning of 2018, with the program going into effect that summer.

Community Solar Business Models

It is important to understand the components of community solar business models, including ownership structures, subscriber models, and financial models.

Components of Community Solar Business Models

Ownership:

- Solar developer-owned (most common - allows access to tax incentives)
- Utility-owned (limited by law in Illinois)
- Nonprofit, public or special entity-owned (cannot access tax incentives, but new incentives in FEJA may help make this a viable model)

The project must offer baseline value to the system owner. Our assumptions:

- Internal Rate of Return (IRR) of 10% or greater
- Positive Net Present Value (NPV)
- Simple payback within six years.

Subscribers:
Can be households, businesses or anyone with an electric bill in the same utility service territory where the community solar array is located. Models include:

- Purchasing panels up front (offers more value over time but requires upfront investment; also risks developers going absent after the first few years)
- Leasing panels monthly or purchasing blocks of electricity (more affordable for many subscribers)

The subscriber typically weighs up-front costs, their energy savings each year, and how long it will take them to recoup their investment.

Host sites:
Host sites typically receive a lease payment for use of space on their roof or grounds, and do not have any up-front costs. Host sites may, or may not, also subscribe to the energy produced.

Best Practice	Illinois Future Energy Jobs Act
Design and implement bill crediting for subscribers	Creates bill credits
Ensure transparent and stable incentive structure	Enacts robust incentives
Define system and subscriber characteristics	Provides clear guidelines around project subscriber characteristics
Enable subscription portability/transferability of subscriptions	Mandates transferability and portability
Enact necessary consumer protections	Determined in the regulatory process
Address barriers to specific customer classes	Addresses barriers to serving low-income subscribers

Summary of Findings for the Financial Viability of Community Solar

The findings about the economic viability of the 15 potential community solar sites that were studied are based on the *Value Proposition Report*, and on the outcome of developing and comparing financial models for numerous scenarios associated with the 15 proposed business cases.

More detail can be found in the Financial Viability of Community Solar section of this report, as well as the SREC Values, Incentives & Financial Assumptions for Business Cases and individual case studies in the *Community Solar Case Study Overview*. Here is a summary of financial viability findings and considerations:

1. Our fifteen case studies show that community solar projects can be financially viable in many typical settings within Cook County: with commercial, nonprofit, or government host sites, from 2 megawatt (the maximum allowed by law) down to as small as 100 kilowatt, and on settings as varied as open land, schools, churches, and even landfills.

2. Without specific legislative and regulatory requirements and incentives, equity and diverse access to community solar is far less likely and far more difficult to achieve.

3. Nonprofit or public sector system ownership for community solar and renewables is a challenge, largely because these entities cannot take advantage of tax benefits like the Investment Tax Credit (ITC) and Modified Accelerated Cost Recovery System (MACRs). In most scenarios, additional incentives are required to make these ownership models feasible. The Future Energy Jobs Act will provide incentives to nonprofits and public entities. But, these will need to be at a sufficient level to compensate for the inability to access tax benefits. In the modeling of the 15 case studies, we found that even with an Illinois Solar For All nonprofit/public sector incentive assumed at 30 percent, most nonprofit or public sector owned systems that we modeled were not financially viable. Self-funded or Tax Equity Investment models may be potential solutions to this gap.

4. The value of SRECs, in combination with other available incentives, is critical to the financial feasibility of community solar today. Analysis conducted by this project team in 2016 found that the community solar REC value needs to be at least $45 per megawatt hour (MWh) for most projects to make community solar economics attractive to both developers and subscribers. However, a number of project parameters can directly impact economic feasibility and should be offset by increased SREC or Adder values, like system size, subscriber type and inclusion of low-income subscribers.

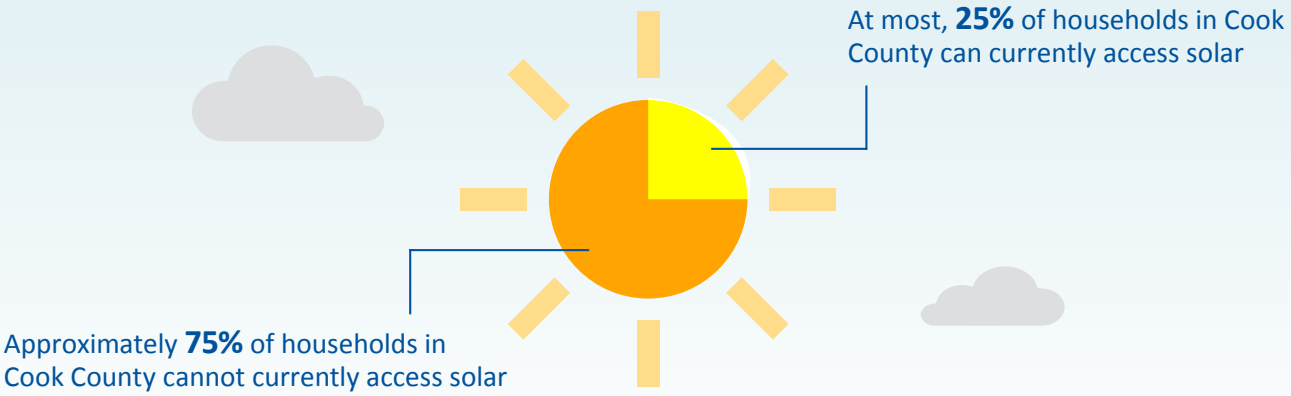
5. When the 5 percent net metering cap is reached, rebates are likely to change, as will installation costs for solar. SREC values will need to be reevaluated then, based on current market conditions.

6. Smaller projects typically see higher costs, and larger projects typically see economies of scale. There is a role for the regulatory framework to support a more even playing field. This is especially true because smaller projects will tend to be community driven and represent alternatives to the larger commercial, market rate projects that will likely make up the majority of the community solar market. These smaller projects are likely to include ownership or subscriber entities like low-income and diverse communities, nonprofits, affordable housing and multifamily housing, etc. We have assumed that through either a higher SREC value via dedicated blocks within the Adjustable Block Program (ABP) or via "Adders" (a dollar value added to the SREC value based on established criteria), that the effective value of the SREC will be greater than the baseline of $45 for these smaller community solar projects.

Based on the outcomes of initial sensitivity analysis and our case study models, we've determined that in order to achieve desirable financial metrics for system owners and subscribers, these effective SREC values are a good representation of a value scheme:

Minimum SREC Values for Financially Viable Systems

1,000 to 2,000 kW	$45
500 to 1,000 kW	$50
250 to 500 kW	$52
<250 kW	$73



7. Cost variances by size may not be universal. Developers with higher volumes may not see higher costs for smaller systems, because of their ability to leverage volume in the supply chain. Case studies developed for this project have included the cost variance by size of project to be conservative and to better represent a diversity of solar developers.

8. There are tradeoffs between various subscriber models for community solar. The panel purchase model provides a better return over the life of the system in our case studies, but requires an upfront investment that will be too burdensome for many potential subscribers. The lease and the subscription block models allow for no upfront investment and, while total returns may be less, subscribers can often realize a savings from the start. A risk with the panel purchase model in Illinois will be that after SRECs and asset depreciation is fully realized after year six, the developer will see only costs and no revenue. This could result in projects being left unmanaged through developers that struggle financially in later years or bad actors that pull out of the market after profits and incentives are realized.

An SREC of at least $45 per megawatt hour (MWh) is needed to make community solar economics attractive to both developers and subscribers.

9. Many system installation types can be part of successful community solar projects. There may be projects for which the additional solar energy created by adding carports to the design creates enough increased energy to outweigh the additional costs. For ground mount installations, costs have decreased significantly even since 2016. Single axis tracking systems were found to increase costs by about $0.20 per watt, but in our case studies the significantly increased output of power generated more than made up for the additional costs. For ground mount, fixed, ballasted racking systems and covering the parcel with gravel to mitigate potential erosion issues has been common. However, an emerging trend is to use single-axis tracking systems spaced further apart to allow grasses and native plants to grow. For some of our case studies, this created a more efficient system, because more of the site could be used for panels instead of for storm water management. In addition, the land and remediation costs can be less expensive and runoff is more effectively managed.

10. Community solar is neutral in terms of cost for distribution-only utilities such as ComEd, which do not generate electricity. However, community solar would help utilities meet their state-mandated requirements for renewable energy, and so could be viewed as a net positive.

11. If a particular site is not suited for the economics of community solar, it may still make for a successful distributed generation photovoltaic project, serving the energy needs of a particular facility and creating positive economies.

All case study materials, including the overview, the individual case studies and all background materials are available at:

https://www.cookcountyil.gov/communitysolar/CaseStudies

Next Steps

The project identified some next steps to support community solar in the region. There are roles for policymakers, owners of potential community solar sites, local governments, community solar advocates and others.

Create opportunities for diverse community solar sites in the region.

- Potential site owners and solar developers can use the case studies, solar capacity map and costing tool developed by this project to identify potentially successful sites in the region. As the case studies show, different types of sites with different solar arrays and different ownership and subscriber models can be successful.
- Planners and local officials can also use these tools to identify potential sites in their communities. These may be used to create beneficial community solar projects on sites that do not have other development potential.
- Local governments can identify municipally-owned sites, such as roofs and landfills that can lower community solar project costs because they are tax exempt.
- Local governments can also seek subscriptions to community solar projects, providing developers with anchor subscribers and long-term stability.
- Funders can help support technical assistance for local governments and potential site owners and subscribers.

Strengthen a policy framework that supports community solar.

- As the Long Term Renewable Resources Plan is finalized, it should include program designs and sufficient incentive levels to support community solar of diverse sizes, locations and subscriber mixes.
- Consumer safeguards for both site owners and subscribers should be developed and monitored for effectiveness.
- Local governments should continue to review and streamline building codes and permitting processes to make them more solar-friendly.

Conduct education on how diverse types of community solar projects can be successful.

- Educate communities on the benefits of community solar, how bill crediting works, and economics/decisions/tradeoffs of being a site owner or/and a subscriber
- Educate lenders on community solar finance models.

Monitor and respond to future issues.

- Work with utilities, the state and others to develop a mechanism to track community solar projects that are implemented.
- Convene solar advocates, the utility and other community solar stakeholders to assess progress of the community solar market and determine future needs.

Edith Makra and Van Vincent at a Cook County Community Solar Stakeholder Advisory Meeting

Community Solar for Cook County

Importance of Solar

Jobs

Renewable energy has grown dramatically in the U.S. in recent years and now comprises the largest source of new electric capacity installed each year. Solar energy in particular has increased year over year due to falling manufacturing and installation costs. As solar installations rise, so do solar industry jobs.

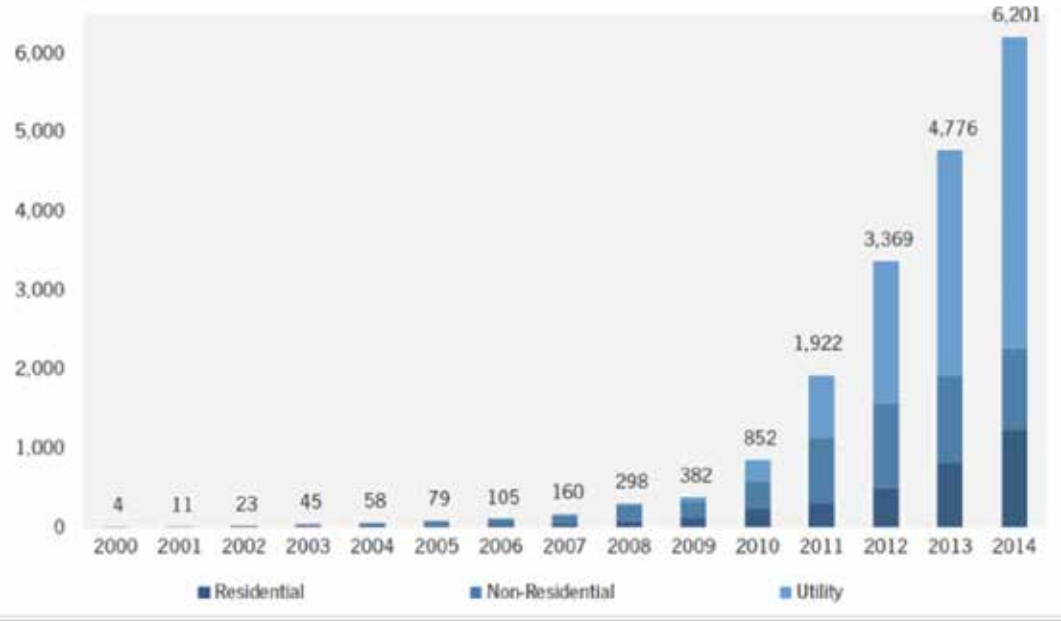
- 769,000 renewable energy sector jobs were recorded during the 2015 census; 208,000 of these or 27% were in solar-related fields.
- Solar and wind jobs have grown at rates of about 20% annually in recent years and are each creating jobs at a rate 12 times faster than the rest of the U.S. economy.
- Renewable energy jobs have gained steady traction, unlike those in the fossil fuel extraction industry which are subject to boom and bust cycles.

In the solar energy sector, 80% of jobs are demand-side services (e.g. installation, sales), most of which are local jobs that cannot be outsourced. Solar energy jobs include component manufacturing, project development, construction and installation, and operations and maintenance.

Savings

Solar energy provides direct savings to consumers on their energy bill by reducing the amount of energy they draw from the electric grid. In addition, solar installations bring valuable financial benefits not only to solar users, but to all ratepayers. Adding solar to an energy portfolio can reduce energy costs. Furthermore in a state like Illinois where solar market penetration is quite low, adding solar can help shave peak load on the electrical system, enhance reliability, and, if deployed strategically, defer or avoid investment in the grid.

Annual U.S. Photo Voltaic Installations 2000 to 2014



GTM Research/SEIA: U.S. Solar Market Insight®

As a carbon-free energy source, solar is vital to reducing greenhouse gas emissions in order to meet County and regional energy goals, and, ultimately, to protect residents and businesses from the most severe-impacts of climate change. According to the Energy Information Administration, over 40% of the energy produced in Illinois is from carbon-emitting, fossil fuels – mostly coal, but also natural gas. Adding solar power systems to the grid reduces reliance on these energy sources and helps the County decouple energy use from greenhouse gas emissions.

Because solar photovoltaics can be deployed on rooftops and do not produce emissions or noise, solar has the potential to be deployed in significant quantities in urban areas like Cook County. Such solar growth would bring jobs and business to the area as well as enable greater local control of energy generation and increase energy independence. Illinois imports the vast majority of the coal it burns from Wyoming. Reducing that dependence means reducing the amount of dollars flowing out-of-state.

And burning less coal means a reduction in the pollutants that typically are produced by coal-burning power plants. Besides greenhouse gases, these include Particulate Matter, sulfur dioxide, oxides of nitrogen, and toxics such as mercury and others. These can pollutants contribute to a wide range of health problems including asthma, lung cancer, congestive heart failure and strokes.

Only two-tenths of one percent of the solar energy capacity in the United States is installed in Illinois.

Barriers to Solar in Illinois and Cook County

Despite being the sixth most populous state and having the fifth-largest economy in the United States, Illinois ranks only 32nd nationally in solar penetration, according to the Solar Energy Industries Association. The U.S. has installed nearly 45 gigawatts of solar, however, only 74 megawatts of that, or less than two-tenths of one percent, is installed in Illinois according to the Solar Energy Industries Association. This means that Illinois has not seen its share of the benefits of solar, such as savings on electric bills, and jobs associated with solar installation.

Today, the state has strong prospects for solar growth, due to the recent passage of comprehensive energy legislation that will establish a community solar program and spur solar growth. However at the outset of the Cook County Community Solar project, the solar outlook was not so favorable.

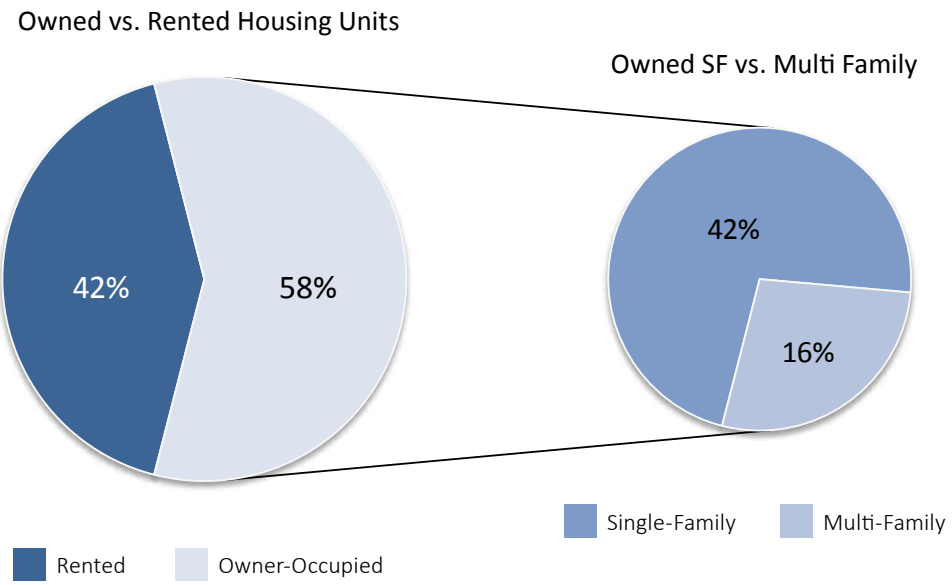
- Low energy prices made solar less competitive than elsewhere in the nation.
- A broken state Renewable Portfolio Standard – a policy requiring a certain portion of the state's energy to come from renewable resources – meant money intended to support the growth of renewables, including solar, was instead supporting the ongoing operation of existing renewable resources.
- In urban areas like Cook County, where many households and business rent space in apartment buildings or live in condos, a significant portion of energy users were unable to access the benefits of solar energy because they do not control roofs on which to install it.

42% of Cook County' 1.9 million occupied housing units cannot directly invest in solar photovoltaic systems because they are rental units. Of the owner-occupied units, over one-quarter cannot install solar systems because they share the roof in a multi-unit building. In addition, dense urban areas also have more issues with shading from nearby buildings.

At least 3 of every 4
Cook County Households
cannot install solar on their roofs

42% of Cook County households cannot invest directly in solar photovoltaic systems due to lack of roof ownership; of the owner-occupied units, over one-quarter share roof ownership. Many of the remainder cannot afford up-front investment.

Housing Units in Cook County



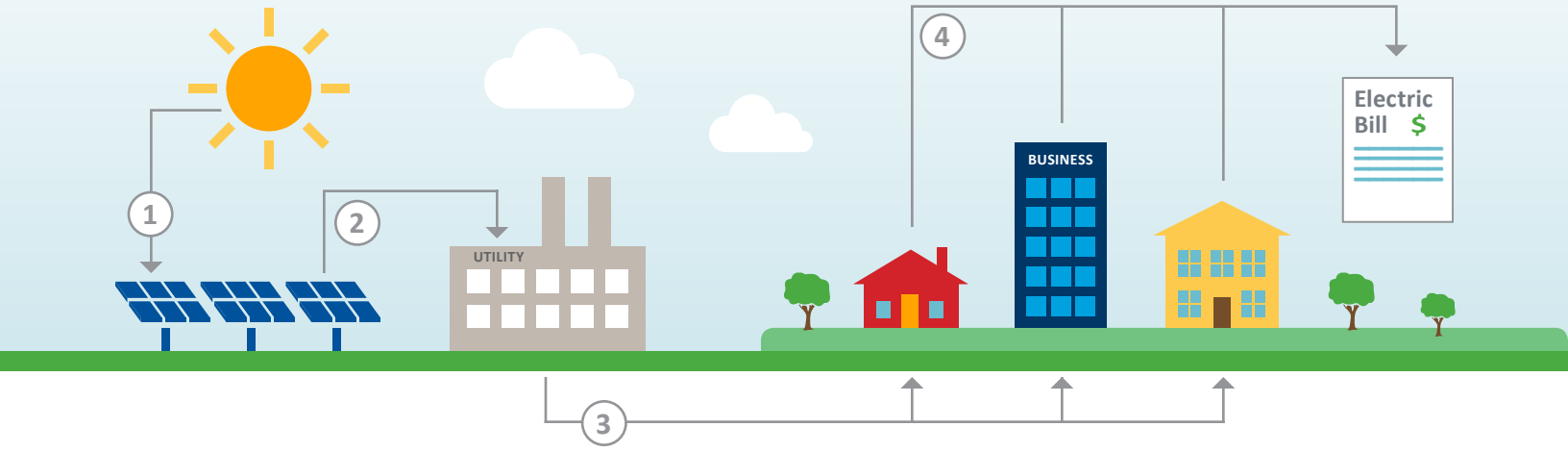
Community Solar Can Overcome Barriers

What is Community Solar

Community solar is a solar photovoltaic (PV) installation that provides energy benefits to multiple participants. Participants, also called subscribers, can buy or lease a share of the solar installation and receive credits on their electricity bill for their share of the power generated. Subscribers can be households, businesses or any entity with an electric bill. Community solar arrays can be installed where they make sense physically and economically– on rooftops, on the ground or over a parking lot. Illinois law does not require subscribers to be located in the same place as the solar panels, just in the same utility territory. However, it is possible that requirements for geographic proximity may be put in place in the future, to help ensure that job creation benefits as well as subscriber benefits occur in areas of larger population.

An effective community solar program is critical to ensuring that everyone can access the benefits of solar energy, not just those with the capital, building, and access to direct sunlight to put panels on their roofs. Increasing the portion of Cook County's energy that comes from solar is key to meeting the County's environmental and public health goals. The successful rollout of recently-passed State community solar programs and programs to incent solar serving low income residents will help ensure that the County can meet those goals equitably.

The Basics of Community Solar



1. Sunlight hits the solar panels in the community solar field, generating electricity.
2. The electricity generated flows through an on-site meter to the electrical utility grid.
3. The utility company measures the electricity generated, calculates a dollar value for the power, and distributes this dollar value proportionately to the members of the community solar program (residents, businesses, municipalities and institutions).
4. The value of the solar electricity produced from the array is applied as a monetary credit to each member's electric bill.

https://solect.com/solar-power-to-the-people-understanding-community-solar/

Why Hasn't Community Solar Been Implemented in Cook County

The lack of a statewide community solar policy has been a major hurdle to developing community solar projects. Barriers related to specific community solar provisions and policies in Illinois, included:

- Lack of a specific legislative requirement for utilities to allow community solar
- Challenges with designing and implementing bill crediting and lack of a specific tariff rate for crediting subscribers' bills
- Lack of transparent and predictable incentive structure
- Lack of defined subscriber/system characteristics
- Lack of definition around transferability and portability of community solar shares for participants
- Lack of defined consumer protections
- Complexity around tax incentives, regulations, and legal structures

In addition, there are many knowledge gaps that existed around community solar, including:

- What community solar is
- Its market potential in Cook County
- Costs and benefits for developers and subscribers
- Costs and benefits to the utility, other ratepayers, and the community as a whole

The Cook County Community Solar Project

Goal

The goal of the Cook County Community Solar project was to unlock the potential of community solar in the Chicago region, with lessons that could be applied nationally. An established community solar market will create pathways for Cook County's urban population to participate in distributed solar generation, expanding the demographic participation to seniors, low income, and apartment and condominium residents.

The Cook County Community Solar Project was launched in December 2014 with a grant from the U.S. Department of Energy's Solar Market Pathways Program. This project proposed that community solar is not only possible in our region, but has the potential to bring access and equity in renewable energy to the approximately 75% of our population currently left out of the benefits of solar energy because of technical, structural, control or financial barriers by

- identifying barriers and ways to overcome them,
- filling in the knowledge gaps, and
- providing specific case study models of how community solar can be economically viable, this project sets the stage for community solar to succeed in Cook County.

Discussion at Cook County Community Stakeholder Advisory Group Meeting

Process

Project team members Cook County, Elevate Energy, the Environmental Law & Policy Center, The City of Chicago, ComEd and West Monroe Partners, have produced a series of reports, analyses and tools that support growth of the emerging community solar market in our region. Project deliverables include an opportunity assessment, policy analysis, best practices, value and impact analysis and a series of fifteen site-specific project case studies, as well as this final report. Below are the steps that this project followed.

STEP 1: Conduct Opportunity Assessment
Key Deliverables: State of Community Solar in Cook County & Cook County Opportunity Assessment

STEP 2: Identify Stakeholders; Form Steering Committee & Working Groups
Key Deliverables: Create steering Committee & Working Groups; Define Scope of Work

STEP 3: Research Policy & Market Barriers
Key Deliverables: Best Practices Analysis

STEP 4: Design Pilot Demonstration Programs
Key Deliverables: Identify Potential Pilot Sites; Select Sites; Conduct Feasibility Assessments; Design Ownership and Subscriber Models

STEP 5: Document Outcomes & Benefits of Pilot Sites
Key Deliverables: Community Solar Local Benefits Analysis; Case Studies; Final Report

Stakeholder Engagement

Stakeholder engagement has been an integral part of the Cook County initiative. The Cook County project team identified appropriate stakeholders and formed a Steering Committee, as well as stakeholder advisory group, to inform the process. Stakeholders included over 200 individuals representing over 100 organizations, included nonprofits, community organizations, local developers, multifamily housing agencies, higher education institutions, utilities, businesses, potential community solar site owners, and others.

Stakeholder engagement was critical in moving Cook County towards an emerging market. Throughout the process, the project team has benefited from shared expertise and working to build common understanding by involving stakeholders in work to address barriers and identify solutions in the following areas: Business Case and Business Models; Policy & Regulatory Barriers; and Outreach and Communication. Additional work groups involving stakeholders and national experts helped to address topics such as financial models, and the value proposition of community solar to utilities and other stakeholders. Regular meetings have provided a forum for stakeholders to stay engaged and informed about not only the Cook County project, but also the legislative process that was ongoing during the first two years of the project that eventually led to the passing of a bill, the Future Energy Jobs Act, which included the creation of strong community solar policies.

The project received overwhelming interest from the community: 109 properties were submitted for consideration as pilot sites, and 75 of those were deemed suitable for community solar.

Technical Assistance

Technical assistance from our local and national stakeholders and other national experts was also critical to the success of this project. Among others, we would like to thank the U.S. Department of Energy and the National Renewable Energy Lab (NREL) for their assistance in vetting some of the tools and valuation studies produced as part of this project. The Smart Electric Power Alliance (SEPA), GTM Research, and the National Community Solar Partnership also provided assistance with this project. National community solar providers also graciously made time to review our products and assumptions. In particular, Microgrid Energy LLC graciously provided pro bono technical assistance.

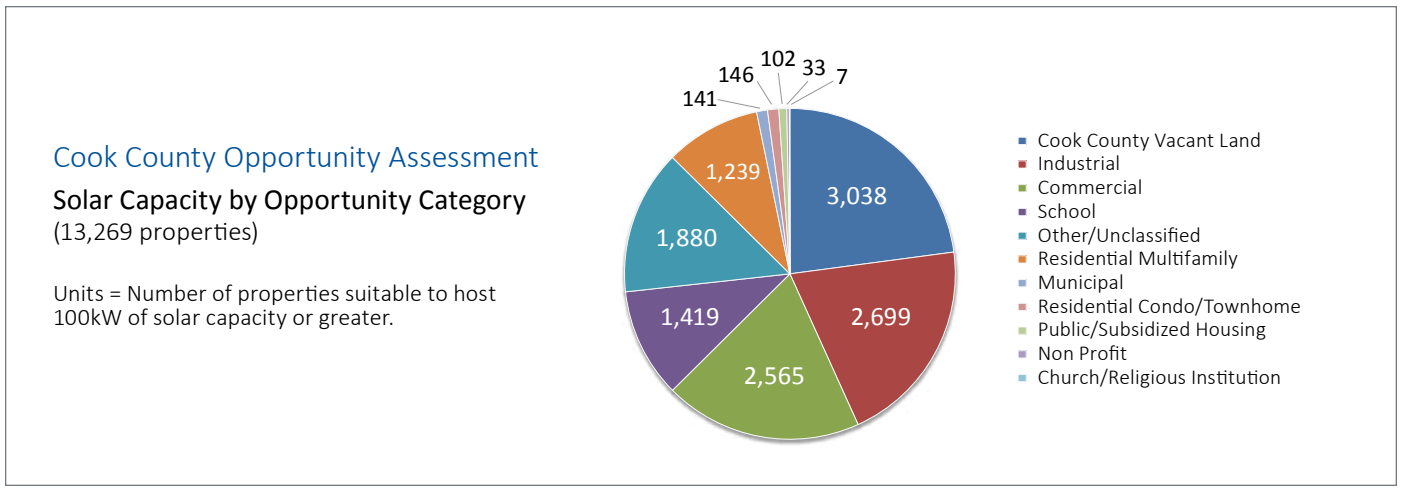
Pilot Site Selection

Pilot projects provide a more thorough understanding of the real challenges that need to be overcome to create a robust community solar market. Cook County kicked off the pilot site selection process at a stakeholder advisory group meeting, targeting Cook County property owners and encouraging them to consider hosting community solar. Many thousands of solicitations were sent out by team members and members of the Stakeholder Advisory Group to local governments, community groups, business associations and many others. The project t received overwhelming interest from the community: 109 properties were submitted for consideration and 75 of those were deemed suitable for community solar based on initial criteria such as site size, capacity for solar and condition of roof. The project team received both rooftop and ground mount submissions from across Cook County and from nonprofits, commercial and industrial properties, schools, churches, municipalities, park facilities, and even from a landfill.

The project team selected fifteen sites for further analysis based on criteria such as slope, obstructions, and roof life. The sites represent a diversity of uses, ground v. roof mount, size, and geographies in many parts of the County. The sites were first analyzed by ComEd to determine interconnection feasibility and then by an independent engineering firm, Primera Engineers, Ltd. to assess structural integrity and other issues, which informed solar design and financial modeling. Case studies integrating all of these inputs provide roadmaps for developers and site owners looking to begin the development process. A sample of the summaries of these case studies is included in the appendix; detailed versions are available on the *Cook County community solar website*.

Products

The pilot sites analyzed in this report and the more detailed case studies represent a broad cross-section of property types in Cook County and can help jump-start thinking about community solar on vacant land and rooftops, and on sites owned by businesses, government and non-profits. Pilot sites range in size from capacity for much more than 2 Megawatts (MW) of solar at the high end down to as small as about 100 kilowatts (kW). They include large industrial facilities, high schools, government facilities, a college, a church, several housing developments, and even a landfill. The case studies show that, depending on how it is structured, community solar can be financially viable in many types of settings. This report summarizes what we learned, and suggests next steps for various stakeholders interested in the success of community solar in Cook County.



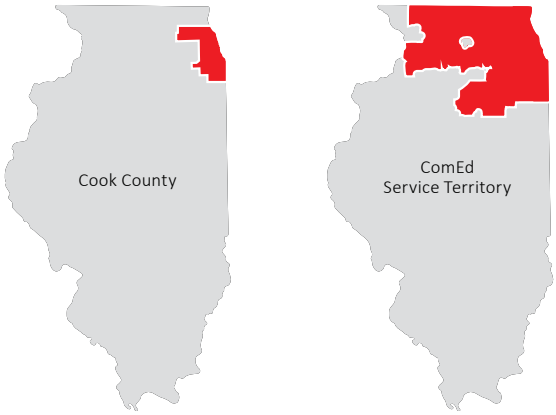
Site	Location	Estimated Solar Capacity	Site Ownership	Proposed System Ownership	Proposed Installation Type	Proposed Subscription Type
Prairie State College	Chicago Heights	2 MW	Public	Developer	Ground Tracking + Carports	Panel Lease
Altgeld Gardens	Chicago	2 MW	Public	Public (Host Owned)	Ground Tracking	Panel Lease
Markham Courthouse	Markham	2 MW	Public	Developer	Rooftop Ballasted + Carports	Panel Lease
CTA Maintenance Facility	Skokie	1,900 kW	Public	Developer	Rooftop Ballasted + Carports	Panel Lease
Rich East High School	Park Forest	1,640 kW	Public	Developer	Rooftop Ballasted + Carports	Panel Lease
DesPlaines-Lake Landfill	DesPlaines	1,420 kW	Nonprofit	Special Entify-Flip Structure (Host Owned)	Ground-Ballasted	Panel Lease
UAL Data Center	Mount Prospect	1,400 kW	Private	Developer	Roof Ballasted	Panel Lease
Taft High School	Chicago	579 kW	Public	Developer	Roof Ballasted	Panel Lease
Housing Authority of Cook County	Chicago Heights	562kW	Public	Developer	Ground Tracking	Panel Lease
Our Lady of Perpetual Help	Glenview	534 kW	Nonprofit	Developer	Rooftop Ballasted + Carports	Panel Lease - Donor
Warren Park Field House	Chicago	534 kW	Public	Developer	Rooftop Ballasted + Carports	Panel Lease
Rockwell Industrial Building	Chicago	470 kW	Private	Private (Host Owned)	Rooftop + Awning	Panel Lease
Knox Industrial Building	Chicago	279 kW	Private	Private (Host Owned)	Rooftop Ballasted	Panel Lease
Hill Arboretum Apartments	Evanston	127 kW	Nonprofit	Nonprofit (Host Owned)	Rooftop Ballasted	Panel Lease
Kimbark	Chicago	45 kW	Private	Private	Rooftop	Distributed Generation

Benefits of Community Solar

Building community solar projects creates local jobs and many of these jobs can be located in Cook County with the right planning. There is almost certain to be a boom in solar installation, including community solar, in Illinois in the next three years due to the timing of the incentives created by the FEJA, so it is important that sites within Cook County be positioned to move ahead with well-planned projects quickly.

Cook County's demographic and economic characteristics create an attractive market for developers seeking community solar subscribers for their project. FEJA requires that community solar subscribers be located in the same utility service territory as the project to which they subscribe. ComEd's service territory covers much of the northern part of Illinois, well beyond Cook County. However 5.2 million people (41% of the state's population) live in Cook County.

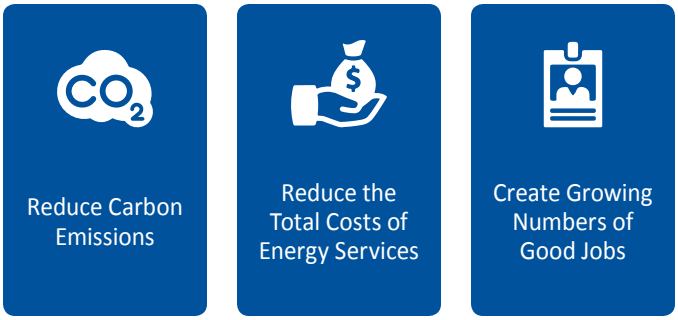
Cook County's population density of 5, 539 people per square mile is over 20 times the state average, meaning developers can market to more customers within a given area. And Cook County's per capita personal income of $54,714 exceeds the state average of $50,288, making it an attractive place to seek subscribers.



But the fact that Cook County is mostly developed, with high population density, may make siting projects more difficult than in other parts of the state. Cook County offers good paying jobs with construction workers earning more ($1,625 per week on average) than the statewide average of $1,451. Cook County also has more expensive land, and commercial and industrial properties are assessed at a higher market value percentage than residential. Although these factors are may not be as ideal for siting of solar within the County, the City of Chicago and some suburbs have established streamlined solar permitting through other SunShot initiatives that may make it more favorable.

Cook County is likely to have more subscribers than sites, as community solar developers seek subscribers in this population hub, but attempt to find the least expensive land on which to build projects.

One of the goals of this project was to demonstrate how large the economic benefits could be if more community solar projects are located in Cook County. Benefits modeling was done by West Monroe Partners, using the National Renewable Energy Laboratory's Jobs and Economic Indicator Solar PV Model.



Economy

The state minimum community solar deployment is prescribed by law to be 400 MW of installed capacity by 2030. The Future Energy Jobs Act created an Adjustable Block Program consisting of three buckets: small DG, large DG and community solar. Twenty-five percent of the total RECs are allocated to each bucket, with another 25% unallocated. For the purposes of this analysis, it is assumed that a portion of the unallocated RECs would be assigned to community solar. An Illinois projection of 600 MW of community solar constructed between 2018 and 2030 was assumed for scenario modeling.

For comparison, if all 75 of the projects that applied to be pilot sites in the Cook County Community Solar project and were deemed suitable for community solar based on initial criteria were built, it is estimated that they would supply 109MW of solar energy. This emphasizes the extent of the interest in community solar in Cook County found through this project. Construction of 600 MW of community solar could result in:

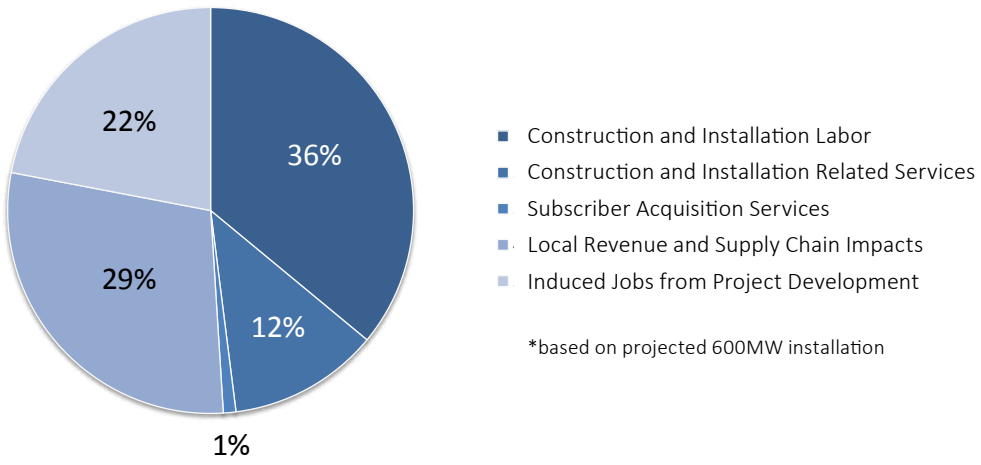
- Over 400 Projects
- $1.39 Billion in Construction Investment
- $133 Million in Developer Profit
- 120,000 or more subscribers
- $1.01 Billion in electric bill savings to subscribers (over 25 year project life, in 2016 dollars)
- 10,070 construction-period jobs
- 177 permanent jobs
- Over $650 Million in cumulative total earnings between 2018 and 2030

Nearly 50% of construction period jobs will be in the areas of installation labor and supporting services. 29% of jobs created are projected to be related to supply chain impacts, and 22% induced impacts.

The post-construction jobs created will be comprised primarily of onsite project maintenance related to equipment upkeep and replacement. Approximately one-third of the jobs will be administrative jobs to support subscriber maintenance, such as marketing and communications, customer service, and billing administration.

These projections assume that none of the solar components are manufactured in Cook County. Jobs and earnings in the County would obviously be greater if some of that manufacturing occurred here.

Cumulative Projected Construction Job Creation from Community Solar in Illinois (2018-2030)



Energy and Environment

Between 2018 and 2030, the estimated 600 MW of community solar capacity that will be built in Illinois will produce nearly 6,000 Gigawatts (a gigawatt is one Billion watts) of electricity. This will reduce the need to procure electricity from traditional generation sources, which may lead to a reduction in emissions of harmful air pollutants.

Between 2018 and 2030, the expected community deployment levels in Illinois of 600 MW are expected to reduce harmful greenhouse gas emissions by a cumulative total of 3.28 Million Metric Tons of CO_2 equivalent.

Greenhouse gas emissions are the major cause of climate change, which is leading to increased flooding in Cook County and other major weather events.

By 2030, 600 MW of community solar are also expected to

- Reduce sulfur dioxide(SO2) emissions in Illinois to a total of 1.125 Million pounds, and
- Reduce nitrogen oxide (NOX) emissions in Illinois by a total of 375,000 pounds.

According to the U.S. EPA, exposures to SO2 or NOX can harm the respiratory system and make breathing difficult, particularly for children, the elderly, and those who suffer from asthma. High concentrations of SO2 generally also lead to the formation of other sulfur oxides (SOX). SOX and NOX can react with other compounds in the atmosphere to form small particles. These particles may penetrate deeply into sensitive parts of the lungs and cause additional health problems. NOX can react with other chemicals in the air to form ozone, which is also harmful to the respiratory system.

At high concentrations, SOX can harm trees and plants by damaging foliage and decreasing growth. NOX contributes to haze in the atmosphere, such as reduces visibility around many of our national parks, and contributes to nutrient pollution in coastal waters. Both SOX and NOX can contribute to acid rain which can harm sensitive ecosystems.

Avoided Emissions Equivalencies: 2018 - 2030

Between 2018 and 2030, the community solar deployment levels in Illinois are expected to reduce emissions by 3,280,095 metrics tons of CO_2e. This is equivalent to:

7,861,258,086
passenger miles

346,367
homes' energy use for one year

3,104,952
acres of US forests in one year

TOP: Cook County Board President Preckwinkle greets attendees at a project stakeholder meeting

BOTTOM LEFT: Vito Greco of Elevate Energy presents one of the project's case studies

BOTTOM RIGHT: Anne Evens of Elevate Energy, MeLena Hessel of the Environmental Law and Policy Center, Lesley McCain of the Illinois Solar Energy Association, Juliana Pino of the Little Village Environmental Justice Organization, and Ellen Sargent of the Chicago Housing Authority discuss what's next for community solar in Cook County

Policy

This project produced a scan of best policy practices to support community solar. This work proved timely and useful in the negotiations leading up to the drafting and passage of Illinois' Future Energy Jobs Act.

Best Practices

Community solar is a relatively new way to buy and sell energy in an already complex and highly regulated market. Traditionally, customers buy energy from electric utilities or, in deregulated markets like Illinois, competitive electric suppliers. Community solar does not replace these arrangements since community solar customers will still need electricity from the grid.

Although community solar is new, if it is properly structured it has the potential to bring solar access and equity to all. Furthermore, the functional and financial structure of a community solar program is critical, to ensuring financial viability and execution of policy goals, such as reducing greenhouse gas emissions or enhancing equity.

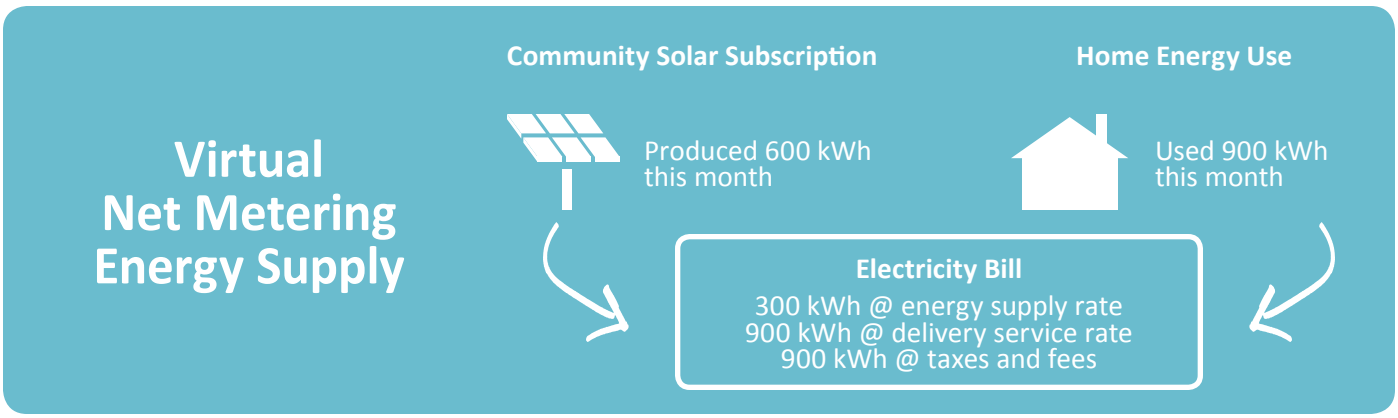
The Cook County team, along with members of the Stakeholder Advisory Group, analyzed major economic and policy barriers to community solar in Illinois. Since that analysis was undertaken, Illinois has made significant progress in enabling community solar: passing major energy legislation (the Future Energy Jobs Act) that establishes a community solar program for the state. Several members of the Cook County team participated in crafting that legislation (and are still involved in shaping regulations to implement the legislation), although that activity was not part of this project. Based on this analysis and experience, the team recommends the following important policy steps for any market working to establish a community solar program.

Design and implement bill crediting.

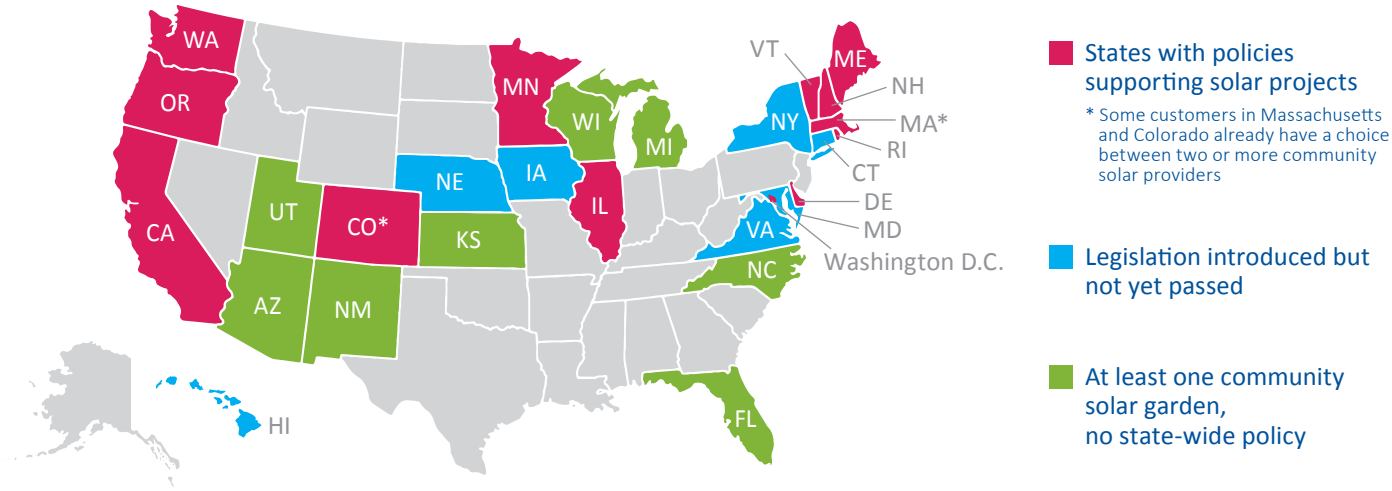
Enabling customers to receive credit for their community solar subscription or share on their electricity bill is a threshold policy required to enable a robust community solar program. There are a variety of ways to design the actual bill credit. One of the most common is virtual net metering –in which the solar share is credited on a customer's bill identically to how a customer would receive credit for a net metered solar system on their own property this credit could be for the entire cost of energy, including both supply and distribution/ transmission, or only for the supply portion. Another way to design bill credits is value of solar, in which the value of the energy, solar energy's benefit to the electrical grid, and societal benefits of solar energy produced by the customer's subscription is calculated and credited to a customer's bill.

Ensure transparent and stable incentive structure.

In markets where solar energy is not yet cost-competitive with historical energy sources incentives are required to lower the cost of solar energy and ensure adequate system paybacks and returns on investment to motivate development. State, utility and local incentives including rebates, grants, tax credits, feed-in-tariffs, value of solar tariffs, and payments for Solar Renewable Energy Credits (SRECs) – the environmental attributes of a solar renewable energy project, which can be sold separately from the actual electricity – are used fill in the gap between solar system cost and desired payback/required return in many markets. Incentives must be transparent and stable enough to provide developers certainty that they will be able to recoup investments made in coming to the market, in the first place.



Community Solar: States to Watch



http://news.energysage.com/community-solar-gardens-sharing-the-sun/

Define system and subscriber characteristics.

Structuring the community solar program is another important step to getting a program up and running. Issues to address here include guidelines around the system, subscriptions, and subscribers. It is common for community solar programs to limit system size and co-location (the number of discrete community solar projects that can be located in the same place), to set minimums and/or maximums to subscription sizes or guidelines around number of subscribers.

Enable subscription portability/transferability.

It is important that customers signing up for community solar shares have the ability to take those shares with them when they move, as well as to transfer those shares to other participants. Both policies are particularly important in as much as community solar is one way to expand solar access to households who rent, and therefore may move more frequently than those who own. Enabling portability and transferability involves not only ensuring community solar contracts take these issues into account, but working with utilities and competitive electric suppliers, as well to facilitate a smooth transition on customers' bills.

Enact necessary consumer protections.

As with any offering to consumers, ensuring adequate protection from information asymmetry and bad actors is important. Community solar typically involves longer-term contracts for solar energy – a product and market that is not always well-understood by consumers. Some potential consumer protection considerations include standard

disclosure of information related to contract terms, costs/benefits, maintenance/outage, and/or fees; minimum qualifications for providers and designated points of contact for consumers; and protection against excessive fees/rate escalation. In Illinois, consumer protection considerations are expected to be an important part of the program development process currently underway.

Address barriers to specific customer classes.

The cost of acquiring and managing a community solar project with many small customers – such as residents and small businesses that would subscribe to the energy output of several solar panels - is significantly higher than a project with a few large customers – such as large industrial users that could subscribe to the energy output of up to 40% of the an entire project. There may need to be extra actions taken to ensure small customer participation, or that market segment may be underserved. This result may be achieved through different bill credits or program incentives.

However, if the value proposition for the solar developer proves inadequate, additional program requirements such as mandates for small customer participation may need to be considered. Likewise, additional considerations are necessary if the program is to overcome barriers related to low-income participation in community solar. These barriers go beyond simply the higher cost of subscriber acquisition and maintenance and include educational and outreach barriers, policy goals around energy burden (the percentage of household income spent on energy bills), and financing barriers.

Finally, it is important for policymakers to be aware that community solar projects may be classified as securities under costly Security and Exchange Commission (SEC) and state regulations if they involve an investment with the expectation of return. The most common community solar models, in which subscribers pay for electricity produced, have generally avoided these concerns; however there are risks around other models. Potential complications related to securities law are worth monitoring.

The Future Energy Jobs Act (FEJA)

At the start of the Cook County Community Solar Project, almost none of the policy steps above had been taken. Illinois had a Renewable Portfolio Standard (RPS) – a policy requiring a certain portion of the state's energy to come from renewable resources – but it was not working to incentivize the development of new renewable resources; and while a token workaround to virtual net metering existed on the books to enable community solar, no project in the state had yet been able to successfully utilize it. However, that was about to change.

Over the course of the Cook County project, a legislative opportunity opened up to fix the problems stopping the state RPS from driving new renewables and, as part of that fix, to establish a community solar program. The fix, part of the Future Energy Jobs Act (FEJA) that passed in December 2016, established a clear and firm requirement for community solar bill crediting, fixed the RPS to establish a transparent and stable incentive structure, and laid out a basic structure for the program that includes portability and transferability.

Creates Bill Credits

Under the bill crediting scheme set up through FEJA, community solar subscribers will be able to virtually net meter the energy supply portion of their bill, getting a credit on their electric bills at the energy supply rate for each kWh their subscription produces. The energy supply portion of the customers' bill pays for electricity generation, as opposed to distribution, and usually accounts for about half of the electricity rate paid by residential customers in

Illinois. Community solar projects will still get paid for the grid benefits they bring, but this payment will occur via an upfront per/kW rebate rather than via virtually net metering the distribution portion of electricity bills.

Enacts Robust Incentives

Although the cost of solar energy has decreased significantly in recent years, solar development will still rely in incentives to make projects viable. FEJA fixed the state's RPS program, establishing clear and predictable incentives for community solar projects. The updated RPS requires the creation of an "Adjustable Block Program" with a carve-out for Renewable Energy Credits (RECs) from community solar projects. RECs are the environmental attributes of a renewable energy project, which can be sold separately from the actual electricity. Solar RECs are sometimes referred to as SRECs. The Adjustable Block Program will buy RECs from eligible community solar projects in order to meet the state's RPS requirements. Under FEJA, at minimum, the RPS will require an estimated 200 MW of community solar development in Illinois by 2020 and 400 MW, total, by 2030. As with the California Solar Initiative or the New York Sun program, Illinois' Adjustable Block Program will have clear REC prices for specific blocks of capacity, with prices adjusting according to a pre-determined schedule as blocks get used up.

FEJA also establishes a rebate for behind-the-meter (customer side) and community solar distributed generation (DG) projects that use a smart inverter. (Inverters convert DC power to AC; a smart inverter "talks" to the grid allowing it to automatically use the solar system to balance disturbances on the electrical grid). The preliminary value for the rebate is set to $250/kW, but the Illinois Commerce Commission must initiate a process to determine the value of the geographic, time, and performance-based values that distributed generation brings to the grid. This Commission-determined value will replace the preliminary $250/kW value once the load of net metering customers is equal to 5% of total peak load. While some behind-the-meter projects will be able to net meter the distribution side of their electric bill up until the 5% net metering cap is hit, community solar customers will only receive bill credits for the energy supply portion of their electricity bills. Thus, the DG rebate will be an important part of the value proposition for community solar in Illinois from the program outset.

Mandates Transferability and Portability

The basic program structure that is laid out in FEJA mandates transferability and portability.

Defines System and Subscriber Characteristics

The program structure also provides clear guidelines around project and subscriber characteristics:

- Subscribers must be located in the same utility territory as the project
- Maximum project size: 2 MW
- No subscriber may own or lease more than 40% of a single project
- Minimum subscription size: 200 W
- Utilities must purchase unsubscribed energy at avoided cost rate

Additional structure may be placed around the community solar program as the law gets implemented, but these requirements provide the framework around which the program will be developed.

Addresses Barriers to Serving Low-Income Subscribers

In addition to the Adjustable Block Program, FEJA allocates money for the Illinois Solar for All Program – a separate incentive pool that will buy SRECs from solar projects deployed in low-income communities. The Solar for All Program, itself, has four different sub-programs, two of which will buy RECs from community solar projects that serve low income subscribers. This effectively subsidizes the subscription costs for low income households. Together with the Adjustable Block Program, these programs are expected to drive significant community solar project deployment in Illinois over the next several years.

Next Steps to Implement FEJA

While passed in December 2016, the Future Energy Jobs Act did not formally take effect until June 2017. The agency responsible for the RPS, the Illinois Power Agency (IPA), must develop a Long-Term Renewable Resources Plan (LTRRP) that will sketch in the details left off the outline provided by FEJA, including setting the prices for the Adjustable Block Program and figuring out the extra requirements and program elements involved in the Illinois Solar for All Program.

The IPA has already begun gathering information, including stakeholder input, to inform the development of the LTRRP. A draft of the plan should be available by fall of 2017, starting an adjudicated process that should result in a finalized plan toward the beginning of 2018, with the program going into effect that summer.

There are several outstanding questions regarding community solar program design to be addressed through the planning process, in particular around consumer protections and ensuring robust participation from small customers. This "robust" participation is a requirement of FEJA and, given the cost differential between acquiring small and large customers, it is clear that IPA will have to take steps to structure the program to adequately incentivize or otherwise require community solar projects to serve small customers. Various parties may argue for additional structure around issues related to project location, size, or other program elements. The annual community solar mandates prescribed by FEJA are structured to spur the market over the next three years, with deployment levels leveling out between 2022 and 2030.

Brad Klein of ELPC presents on the Illinois Solar for All program at a Cook County Community Solar Project Stakeholder meeting.

Federal and State Community Solar Incentives in Illinois

The Investment Tax Credit (ITC)

30% federal tax credit on installation cost. The owner must 1) pay taxes, and 2) have a sufficient tax burden to enjoy this benefit. This tax credit is scheduled to sunset beginning in 2020, eventually dropping to 0% for residential and 10% for commercial systems.

Modified Accelerated Cost Recovery System (MACRS)

Federal tax benefit that allows up to 35% of the cost of solar assets to be depreciated over an accelerated period of six years. Only commercial entities can take advantage of this tax benefit.

Solar Renewable Energy Credits (SRECs)

Utilities are mandated to purchase SRECs from new community solar projects to meet the requirements of the Future Energy Jobs Act. Community solar SRECs in Illinois will be 15 year contracts paid over 5 years.

IL. Solar For All Nonprofit /Public Sector Incentive

A new Illinois incentive for Nonprofit and Public Facilities that serve low-income communities. Could be designed to fill the gap of ITC for tax-exempt entities. Will also be tied to SREC contracts.

Capacity Rebate

A new rebate offered in Illinois for distributed generation facilities that use smart inverters will pay $250/kW of solar capacity installed. This compensates for the energy-only bill crediting.

Physical Capacity

Large Capacity in Cook County

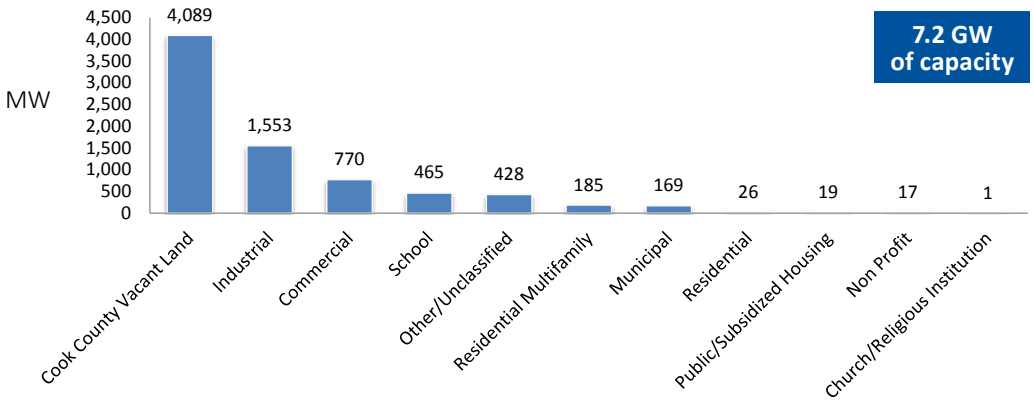
A Site Opportunity Analysis used to estimate the available space for community solar in Cook County determined that there are roof and vacant land locations that can house at least 7,000 megawatts of electricity generating capacity from solar installations of 100 kW or more. The site screening criteria were drawn from the National Renewable Energy Laboratory. This is a highly conservative analysis due to data limitations (for just one example, roof data was available only for the City of Chicago, not for suburban Cook County) and the available space is undoubtedly much greater.

- Over 7.7 Gigawatts worth of site capacity (100kW+) available for community solar projects in Cook County
- Nearly enough to offset all of Cook County's residential electricity use

As a result of this capacity analysis, a map showing potential community solar sites in Cook County was developed. It is available on Elevate Energy's website at: *http://www.elevateenergy.org/cc-solar-map/*.

1,419 schools appear to be good candidates for community solar with capacity for at least 25kW of solar.
63 school buildings could house rooftop solar arrays over 1 MW.
The majority of suitable school rooftop would be good-sized hosts for 100-250 kW projects.

Solar Capacity by Property Type for Properties with Capacity of At Least 100 kW



Site Screening Criteria	Vacant Land	Rooftop
Minimum Projected Generation	300kW	100kW
Size	.5 acres	1794 sq. ft.
Distance to Roads	< 1 mile	< 1 mile
Distance to Power Infrastructure	< 1/2 mile	< 1/2 mile
Slope	< 6 degrees	< 60 degrees and S, SW or SE
Obstructions	No major visible obstructions that cannot be removed	No major visible obstructions that cannot be removed
Shade	In sunlight > 3.7 hours	In sunlight > 3.7 hours

The Community Solar Map

This map is a public platform for municipal planners, property owners, and developers to identify rooftops and parcels of vacant land that can accommodate large solar arrays. While the map is geared to advancing community solar by including only sites with potential capacity of at least 25 kW (approximately 2,500 square feet), it can be used for all solar PV development. To create the map, hundreds of thousands of Cook County properties were analyzed using public data sets. With a minimum size of 25kW (smaller than the data cited above), some 3,000 parcels of land in Cook County were found to be suitable for community solar, along with 45,000 rooftops in the City of Chicago. The dataset for rooftops outside of the City of Chicago is included but not complete, although new data will be added over time.

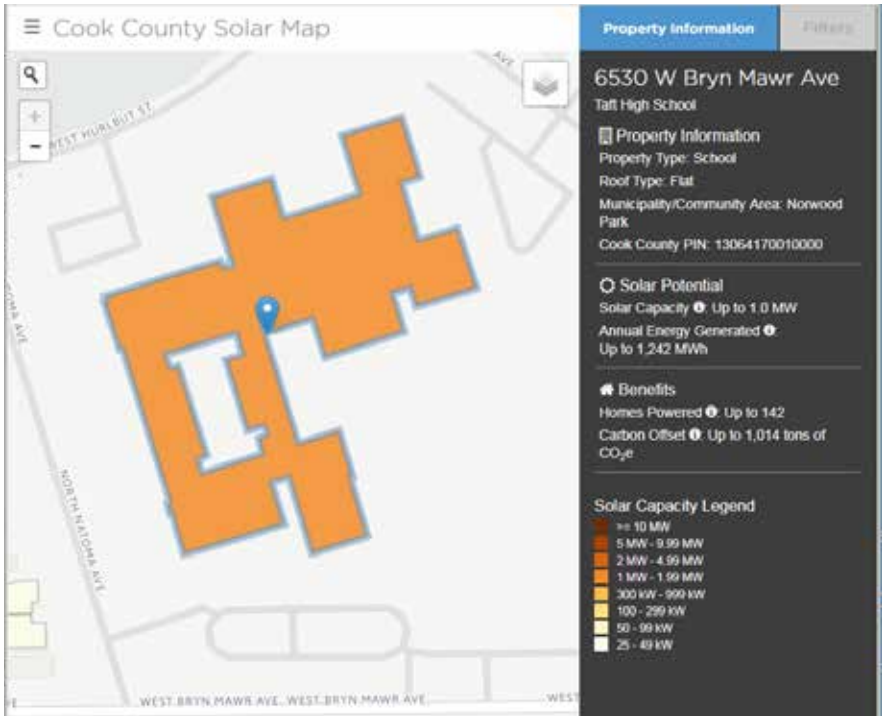
- *3,038 Vacant Parcels in Cook County ≥ 300 kW*
- *10,231 Building in City of Chicago ≥ 100 kW*

The map is intended to serve a variety of users. Homeowners and business owners can research the solar potential of their properties and discover how much solar capacity is available in their communities or neighborhoods. Municipal planners can target locations for solar development. Utilities can assess the distribution of solar projects in their territories to predict demand for traditional power source.

For each property on the map, data is shown on: property type (commercial, industrial, residential, school etc.), roof type (flat or pitched), community area, the Cook County Property Identification Number (PIN), and the estimated solar potential.

The map can be filtered a number of different ways, such as by property type, community area, roof type, or PV potential. A satellite image can be shown as background.

This community solar portal and map was made possible with funding from the Searle Funds at the Chicago Community Trust, in addition to the U.S. Department of Energy's SunShot Project.



Financial Viability And Equity

This chapter lays out the components of community solar business models, including ownership structures, subscriber models, and financial models. Then, in the context of the legal and incentive framework of the Illinois Future Energy Jobs Act, it lays out lessons learned about how individual community solar projects can be financially viable for all parties (solar developers, site owners, and subscribers). These conclusions are based on the case studies of pilot projects (presented in more detail in the Appendix), and on value proposition modeling done by West Monroe Partners. Additional conclusions touch on the conditions needed for there to be an equitable and diverse range of community solar projects in Cook County and Illinois. Finally, this chapter sets out conclusions from that modeling about how community solar can bring value to the larger community, including the utility and other electric rate-payers. The Community Solar Business Case Tool based on the value proposition modeling done by West Monroe Partners can be found at: *https://www.cookcountyil.gov/service/solar-energy*.

Components of Community Solar Business Models

Before discussing what can make individual projects financially viable, it is important to understand components of community solar business models, including ownership structures, subscriber models, and financial models.

Ownership Structures

Making a community solar project profitable, even within a good public policy framework, will depend largely on the ownership structure and the ability to maximize the incentives, rebates and tax benefits. Ownership structure usually determines how and whether incentives can be realized. More commonly, however, the ability to access incentives determines the financial feasibility of a project's ownership structure. Access to capital is also a key factor in determining ownership for community solar. Regardless of how rich incentives and tax benefits may be, the ability to finance the installation upfront is critical in making the project economically viable.

Common ownership structures include:

- solar developer-owned systems,
- utility-owned systems and
- nonprofit- or special entity-owned systems.

In Illinois, utilities have limited ability to own electricity generation. Nonprofit-owned systems, which includes government-owned, are at a disadvantage because they cannot access tax benefits. The new Illinois incentives for nonprofit/public sector entities could help make nonprofit ownership more viable for some projects. The regulatory process underway for the Illinois Solar For All program will determine whether this incentive can be used to help nonprofits and public agencies purchase community solar systems or subscriptions. It will also determine if the incentive will be available to all non-profits and public facilities, or only those that serve low income subscribers. It is anticipated that solar developer-owned systems are likely to be the most common.

Subscriber Models

The subscriber model refers to the way in which participants (or subscribers) access their share of the power generated from the system. Subscribers can be households, business or anyone with an electric bill in the same service territory of the utility where the community solar array is sited. The most common ways in which subscribers access benefits are by

- purchasing panels up front,
- leasing panels monthly or
- purchasing blocks of electricity (say 100 kWhs).

Subscribers then get credited for their share of the power on their electric bills monthly. Panel purchase models typically offer more value over time to subscribers, but they require upfront costs that can be a barrier to many.

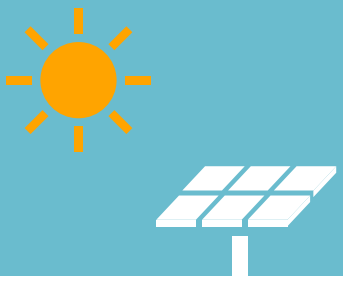
How much Electricity would a 1 MW Solar project Supply?

Community solar projects vary in size but a common system size is 1 Megawatt (1,000 kilowatts) and is composed of approximately 3,500 solar panels

A 1 Megawatt system would offset:

Single-Family
- 100% of electricity demand of about 140 households each year
- 10% of electricity demand of about 1,400 households each year

Multi-Family Apartments
- 100% of electricity demand of about 300 apartments each year
- 10% of electricity demand of about 3,000 apartments each year



Lease and block models can offer options with no upfront costs and easier access for most households and small businesses, especially low- and moderate-income households.

The Cook County Community Solar Project case studies recommended the panel lease model most often. Our modeling does not make a distinction between the lease model and subscription block model because the financial metrics are the same.

In Illinois, low-income households can qualify for incentives through the Illinois Solar For All program . To qualify, households must have an income of less than 80% of the Area Median Income (AMI). Further details will be developed in the Illinois Power Agency's Long-Term Renewable Resources Plan.

Financial Models

A healthy community solar project must offer value to all stakeholders, including the system owner, the subscriber and the host site.

System owners must see a return on their investment. The metrics for measuring this return can be complex and often balance a number of factors. These include internal rate of return (IRR), payback period, net benefits over the life of the system, net present value (NPV) and cumulative cash flow. Each of these financial metrics is calculated in financial models used in this project.

Subscribers typically measure benefits as upfront cost, the savings each year and the payback period; i.e. how long does it take for them to recoup their investment. Research from SEPA (the Smart Electric Power Alliance) and Shelton Research has shown that most subscribers will no longer pay a premium for solar or community solar, but need to see a clear financial benefit.

Host sites typically see value from lease payments for hosting the system, as well as energy savings as a subscriber.

Financial Viability of Community Solar

Key Financial Metrics

Business cases were developed to be financially viable for many community solar models, represented in fifteen case studies in the appendix to this report and in more detailed materials available online. While the SunShot award could not be used to install solar, this project aimed to jump-start the community solar market in the region by showing through business cases how community solar could work in a number of representative sites. In analyzing the fifteen case studies, the project team proposed a baseline for financial viability using several key financial metrics that came out of discussions with regional and national stakeholders, including solar developers, manufacturers, community organizations and national laboratories.

Baseline for Financial Viability

- *Internal Rate of Return of 10%*
- *Positive Net Present Value*
- *Simple payback within six years.*

Subscriber management costs for system owners can vary significantly based on project design, legislative framework and geography. Based on discussions with stakeholders, the targeted range for subscription management costs of between $.020 and $0.060 per watt was reasonable.

In our models and case studies we primarily used a panel lease option as opposed to panel purchase. This provides easier access for projects to a wider universe of subscribers, and it provides ongoing revenue to system owners. The target is to allow subscribers to save 10 percent on their current electricity rate through subscriptions.

Some of the financial models associated with business cases show better financial performance than others. In many instances, several scenarios were modeled to see the financial outcome, then final decisions were made that balance project goals with economic feasibility. For example, these included comparing developer versus nonprofit-ownership models, different subscriber types, balancing system size installation type versus overall capacity. In some instances, these key financial metrics fell below the baseline, but were accepted because of the ability to achieve other project goals. Posted *online* are all the case studies, the full financial models for each scenario tested to show the process and outcomes as best as possible.

We hope that these financial models provide a useful tool for others considering community solar projects. While inputs in the cost tool, which was the basis for analyzing the fifteen case studies, were prepopulated with industry averages, almost all inputs can be changed to reflect local conditions or the specifics of a particular project. The industry averages or other inputs allow for users to predict the outcomes of the project once it is online.

But a number of assumptions have been made in our models regarding the level of incentives. Changes in these assumptions based on actual market conditions or actions of the state regulators can significantly impact the outcomes. It is very important for those considering community solar projects to track what actually happens with the state incentive programs over time.

Here are some of the major conclusions of this project about community solar project economic viability. These findings are based on in-depth analysis of the fifteen case study sites. There may be exceptions to these findings but we believe the case studies are varied enough to provide a good initial overview of what it will take to make community solar projects financially viable in Cook County.

1. Our fifteen case studies show that community solar projects can be financially viable in many typical settings within Cook County: with commercial, nonprofit, or government host sites, from 2 MW (the maximum allowed by law) down to as small as just over 100 kW, and on settings as varied as open land, schools, churches, and even landfills. However, the value of SRECs and incentives may need to be adjusted to ensure a diversity of project types is feasible.

2. Without specific legislative and regulatory requirements, equity and diverse access to community solar is far less likely and far more difficult to achieve.

3. Nonprofit or public sector system ownership for community solar and renewables has been a challenge, largely because these entities cannot take advantage of tax benefits like the Investment Tax Credit (ITC) and Modified Accelerated Cost Recovery System (MACRs). In most scenarios, additional incentives are required to make these ownership models feasible. The Future Energy Jobs Act will provide incentives to nonprofits and public entities. But, these will need to be at a sufficient level to compensate for the inability to access tax benefits.

While ownership determines how incentives, tax benefits and revenue flow to various stakeholders, it may be likely that the impact of these factors determines which ownership structure is chosen for a project. In the modeling of the 15 case studies, we found that even with an Illinois Solar For All Nonprofit/ Public Sector incentive assumed at 30%, most nonprofit or public sector owned systems that we modeled were not financially viable. Self-funded or Tax Equity Investment models may be potential solutions to this gap.

4. The value of SRECs, in combination with other available incentives, is critical to the financial feasibility of community solar today. Analysis conducted by this project team in 2016 found that the community solar REC value needs to be at least $45 per megawatt hour (MWh) for most projects to make community solar economics attractive to both developers and subscribers. However, a number of project parameters can directly impact economic feasibility and should be offset by increased SREC or Adder values, like system size, subscriber type and inclusion of low-income subscribers.

An SREC of at least $45 per megawatt hour (MWh) is needed to make community solar economics attractive to both developers and subscribers.

5. When the 5 percent net metering cap is reached, rebates are likely to change, as will installation costs for solar. SREC values will need to be reevaluated then, based on current market conditions.

6. Smaller projects typically see higher costs, and larger projects typically see economies of scale. While the system owner will bear some of this as a cost of their market strategy, there is a role for the regulatory framework to support a more even playing field. This is especially true because smaller projects will tend to be community driven and represent alternatives to the larger commercial, market rate projects that will likely make up the majority of the community solar market. These smaller projects are likely to include ownership or subscriber entities like low-income and diverse communities, nonprofits, affordable housing and multifamily housing, etc. We have assumed that this could be accomplished through a higher SREC value via dedicated blocks within the Adjustable Block Program (ABP), or via "Adders" (a dollar value added to the SREC value based on established criteria) or Incentives. The effective value of the SREC will be greater than the baseline of $45 for these smaller community solar projects.

	Altgeld Gardens	Taft High School	HACC Parcel	Markham Courthouse	Des Plaines-Lake Landfill	Warren Park Field House	Prairie State College	7200 S. Kimbark
Site Details								
Site Owner:	Chicago Housing Authority	Chicago Public Schools	Housing Authority of Cook County	Cook County	Catholic Cemetaries	Chicago Park District	Illinois Community College District 515	Theaster Gates Studio
Town:	Chicago	Chicago	Chicago Heights	Markham	Des Plaines	Chicago	Chicago Heights	Chicago
Entity	Public Sector	Public Sector	Public Sector	Public Sector	Nonprofit	Public Sector	Public Sector	Private
Proposed System Details								
Solar Capacity:	2 MW	579 kW	562 kW	2 MW	1420 kW	534 kW	2 MW	45 kW
Price per installed kW	$2.12	$1.85	$2.23	$2.38	$1.92	$2.66	$2.39	$1.92
Installation Type:	Ground-Tracking	Roof-Ballasted	Ground-Tracking	Rooftop-Ballasted/Carport	Ground-Ballasted	Rooftop-Ballasted/Carport	Ground-Tracking/Carports	Rooftop-Ballasted
Proposed Business Model								
System Ownership:	Public Sector (Host Owned)	Developer	Developer	Developer	Special Entity-Flip Structure (Host Owned)	Developer	Developer	Developer
Subscriber Model	Panel Lease	Panel Lease	Panel lease	Panel lease	Panel Lease	Panel Lease	Panel lease	Power Purchase Agreement
Panel Lease Cost	$2.00	$1.56	$1.85	$1.68	$1.20	$1.64	$1.67	Tied to rate; 20% rate reduction
Residential Savings per kWh	50%	10% (60% for Low-income)	60%	50%	10% (60% for Low-income)	10% (60% for Low-income)	10% (60% for Low-income)	20% savings based on full Net Metering
Low-income Subscriber Subsidy	50%	50%	50%	50%	0%	50%	50%	NA
Assumed Incentive Values:								
SREC Value	$45.00	$50.00	$50.00	$45.00	$45.00	$50.00	$45.00	$40.00
Subscriber Type SREC Value	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	NA
Low Income SREC Value	$4.05	$0.00	$4.50	$4.05	$0.00	$4.50	$0.00	NA
Capacity Rebate per kW	$250.00	$250.00	$250.00	$250.00	$250.00	$250.00	$250.00	NA
ILSfA Nonprofit/Public Sector	30%	No	No	No	No	No	No	NA
ITC & MACRs	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Estimated Financial Metrics								
System Owner IRR	8.1%	13.8%	11.8%	8.5%	12.3% Equity Investor 13.0 % Nonprofit	8.3%	9.7%	25.8%
System Owner NPV	$13,419	$2,085	$101,142	$57,901	$647,124	$11,040	$182,338	$45,486
System Owner 25 Year Net Benefits	$1,865,240	$443,729	$429,347	$1,434,435	$647,124	$425,240	$1,579,866	$126,247
Host Site 25 Year Net Benefits	$1,865,240	$393,335	$335,153	$541,821	$142,082	$109,595	$581,225	$85,598

	Our Lady of Perpetual Help	UAL Data Center	Hill Arboretum Apartments	4150 N Knox	CTA Maintenance Facility	3057 N. Rockwell	Rich East High School
Site Details							
Site Owner:	Archdiocese of Chicago	United Airlines	Over the Rainbow Association	WBS Equities	Chicago Transit Authority	Rockwell Properties, LLC	Rich Township High School District 227
Town:	Glenview	Des Plaines	Evanston	Chicago	Skokie	Chicago	Park Forest
Entity	Nonprofit	Private	Nonprofit	Private	Public Sector	Private	Public Sector
Proposed System Details							
Solar Capacity:	534 kW	1400 kW	127 kW	279 kW	1900 kW	470 kW	1640 kW
Price per installed kW	$2.36	$1.78	$1.92	$1.92	$2.06	$1.99	$2.27
Installation Type:	Rooftop-Ballasted/Carports	Rootop-Ballasted	Rootop-Ballasted	Rootop-Ballasted	Rooftop-Ballasted/Carports	Rooftop/Awning	Rooftop-Ballasted/Carports
Proposed Business Model							
System Ownership:	Developer	Developer	Nonprofit (Host Owned)	Private (Host Owned)	Developer	Private (Host Owned)	Developer
Subscriber Model	Panel Lease-Donor	Panel Lease	Panel lease	Panel Lease	Panel Lease	Panel lease	Panel lease
Panel Lease Cost	$1.86	$1.36	$1.42	$1.12	$1.56	$1.16	$1.60
Subscriber Savings per kWh	5% (55% Low-income)	20% (70% Low-income)	70%	10% (60% Low-income)	10% (60% Low-income)	10%	5% (55% Low-income)
Low-income Subscriber Subsidy	50%	50%	50%	50%	50%	0%	50%
Assumed Incentive Values:							
SREC Value	$50.00	$45.00	$73.00	$52.00	$45.00	$52.00	$45.00
Subscriber Type SREC Value	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Low Income SREC Value	$0.00	$0.00	$6.57	$0.00	$0.00	$0.00	$0.00
Capacity Rebate per kW	$250.00	$250.00	$250.00	$250.00	$250.00	$250.00	$250.00
ILSfA Nonprofit/Public Sector	No	No	30%	No	No	No	No
ITC & MACRs	Yes	Yes	No	Yes	Yes	Yes	Yes
Estimated Financial Metrics							
System Owner IRR	8.9%	16.1%	14.5%	17.2%	9.9%	15.7%	8.9%
System Owner NPV	$27,273	$404,122	$39,231	$99,464	$180,194	$151,711	$75,105
System Owner 25 Year Net Benefits	$424,943	$1,166,203	$138,485	$276,162	$1,390,054	$460,283	$1,140,678
Host Site 25 Year Net Benefits	$370,261	$466,041	$138,485	$276,162	$477,395	$460,283	$417,227

Based on the outcomes of initial sensitivity analysis and our case study models, we've determined that in order to achieve desirable financial metrics for system owners and subscribers, these effective SREC values are a good representation of a value scheme:

Minimum SREC Values for Financially Viable Systems

1,000 to 2,000 kW	$45
500 to 1,000 kW	$50
250 to 500 kW	$55
<250 kW	$73

Outcomes of the sensitivity analysis for baseline SREC values, as well as system size blocks and adders for subscriber type and low-income projects, can be found in the Case Study Overview.

7. Cost variances by size may not be universal. Developers with higher volumes may not see higher costs for smaller systems, because of their ability to leverage volume in the supply chain. Case studies developed for this project have included the cost variance by size of project to be conservative and to better represent a diversity of solar developers.

8. There are tradeoffs between various subscriber models for community solar. The panel purchase model provides a better return over the life of the system in our case studies, but requires an upfront investment that will be too burdensome for many potential subscribers. The lease and the subscription block models allow for no upfront investment and, while total returns may be less, subscribers can often realize a savings from the start. A risk with the panel purchase model in Illinois will be that after SRECs and asset depreciation is fully realized after year six, the developer will see only costs and no revenue. This could result in projects being left unmanaged through developers that struggle financially in later years or bad actors that pull out of the market after profits and incentives are realized. The State should address this issue in its program design.

9. Many system installation types can be part of successful community solar projects.

Carports will generally be more expensive than rooftop and ground mount installations. However, there may be projects for which the additional solar energy created by adding carports to the design creates enough increased energy to outweigh the additional costs.

For ground mount installations, costs have decreased significantly even since 2016. Single axis tracking systems were found to increase costs by about $0.20 per Watt, but in our case studies the significantly increased output of power generated more than made up for the additional costs. The exception in our case studies is a landfill, which cannot use these systems because the ability to penetrate the ground is limited.

For ground mount, fixed, ballasted racking systems and covering the parcel with gravel to mitigate potential erosion issues has been common. This allows panels to be placed closer together but can create other environmental issues with increased stormwater runoff. However an emerging trend is to use single-axis tracking systems spaced further apart to allow grasses and native plants to grow. For some of our case studies, this created a more efficient system, because more of the site could be used for panels instead of for stormwater management. In addition, the land and remediation costs can be less expensive and runoff is more effectively managed. And it allows the project to contribute to habitat restoration and pollinator support.

10. Community solar is neutral in terms of cost for distribution-only utilities such as ComEd, which do not generate electricity. However, community solar would help utilities meet their state-mandated requirements for renewable energy, and so could be viewed as a net positive.

11. If a particular site is not suited for the economics of community solar, it may still make for a successful distributed generation PV project, serving the energy needs of a particular facility and creating positive economies.

Ground mounted solar panels with natural grass and native planting.

Next Steps

The project identified some next steps to support community solar in the region. There are roles for policymakers, owners of potential community solar sites, local governments, community solar advocates and others.

Create opportunities for diverse community solar sites in the region.

- Potential site owners and solar developers can use the case studies, solar capacity map and costing tool developed by this project to identify potentially successful sites in the region. As the case studies show, sites can be successful if they are small as well as large; use roof-mount, carport or awning configurations as well as ground mount; and with many different ownership and subscriber models.
- Planners and local officials can also use these tools to identify potential sites in their communities, and potentially create beneficial community solar projects on sites that do not have other development potential.
- Local governments can identify municipally-owned sites such as roofs, landfills, and others, that can lower community solar project costs because they are tax exempt.
- Local governments can also seek subscriptions to community solar projects, providing developers with anchor subscribers and long-term stability.
- Funders can help support technical assistance for local governments and potential site owners and subscribers.

Strengthen a policy framework that supports community solar.

- As the Long Term Renewable Resources Plan is finalized, it should include program designs and sufficient incentive levels to support community solar of diverse sizes, locations and subscriber mixes.
- Consumer safeguards for both site owners and subscribers should be developed and monitored for effectiveness.
- Local governments should continue to review and streamline building codes and permitting processes to make them more solar-friendly.

Conduct education on how diverse types of community solar projects can be successful.

- Educate communities on the benefits of community solar, how bill crediting works, and economics/decisions/ tradeoffs of being a site owner or/and a subscriber
- Educate lenders on community solar finance models.

Technical assistance

- Funders can help support technical assistance for local governments and potential site owners and subscribers.

Monitor and respond to future issues.

- Work with utilities, the State and others to develop a mechanism to track community solar projects that are implemented.
- Convene solar advocates, the utility, and other community solar stakeholders to assess progress of the community solar market and determine future needs.

Case Studies

I. Case Study Overview

The Case Study Overview describes the process of selecting and analyzing the case studies in detail, and sets forth the technical and financial assumptions made in the process.

II. Case Studies

Each case study produced:

- A synopsis
- A full case study
- An engineering report
- A solar design, and
- One or more financial models

All case study materials, including the overview, the individual case studies and all background materials are available at:

https://www.cookcountyil.gov/communitysolar/CaseStudies

A sample synopsis is on the following page.

Proposed Business Case: **Public College Model**

Prairie State College

Prairie State College is a community college serving more than 11,000 students in Chicago's south suburbs. This 130 acre campus includes 10 buildings, parking lots and more than 30 acres of undeveloped land. This proposed project would include both ground mount tracking arrays, along with canopies over parking lots to produce a system of nearly 2MW. This proposed system would provide electricity to the college, to students and their families, as well as to surrounding businesses and residents in the City of Chicago Heights. Many of the subscriber households in the immediate area would qualify for low-income subscription subsidies from the Illinois Solar for All program.

HOST SITE

Publicly Owned

Prairie State College, in Chicago's south suburbs, has a large campus with ample opportunity for solar. This proposed system would include installation on undeveloped land, as well as on portions of existing parking lots.

OWNERSHIP

Developer Owned

In this model, the solar developer would finance, build, own and maintain the array over the life of the system. The developer gets SRECs, ITC, MACRs and Capacity Rebate, passing on benefits to subscribers and the host site.

SUBSCRIPTION

Panel Lease

Subscribers lease panels for $1.67 per month. The college subscribes to 40 percent of the system, with the remaining 60 percent going to the community. All subscribers would save at least 10 percent off the cost of their electricity.

INSTALLATION

Mixed Installation

2,844 panels would be installed on unused land and 3,270 panels would be installed on carports. The ground mount system proposal includes natural pollinator habitat restoration to better manage storm water.

SYSTEM

1,987 kW
6,114 Panels

An 882 kW ground mount system would be installed using single-axis tracking. A 1,105 kW carport system would be installed. The total output would be more than 2.6 MWhs per year, enough to power nearly 350 homes.

To see the detailed report, financial models and all supporting case study material, visit the Cook County Community Solar Project:

- ***Case Study Home Page***

To access the modelling tool used for these case studies, download the Community Solar Business Case tool here:

- ***Business Case Tool***

Visit the Cook County Community Solar Map to search for properties that are suitable for community solar.

- ***Community Solar Map***

System Design

The design goal was to maximize the panel placement and balance costs. Initial siting on undeveloped land was prohibitively expensive because of site preparation and tree removal. Carports were added to maximize panels, but these were also expensive. The final design used ground-mounted panels only where trees and site preparation was minimal to balance the overall costs. This allowed the final design to achieve an overall cost per watt of $2.43 and maximum output of 2MW.

Community Solar

Community solar is a solar photovoltaic (PV) installation that provides energy, financial benefits, or both to multiple participants. Participants, also called subscribers, can buy or lease a share of the community solar installation and receive credits on their electricity bill for the power generated by that share. Subscribers can be households, businesses or anyone with an electric bill.

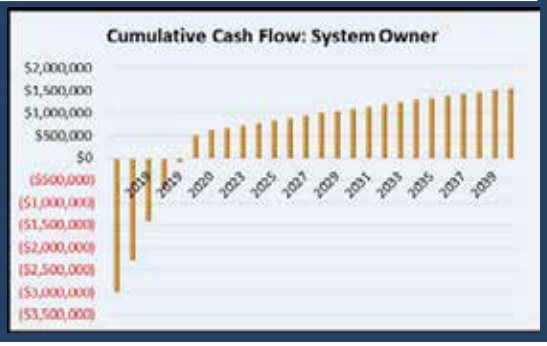
Business Model

This Proposed business model calls for a developer to build and maintain the system. While incentives are available for public entities through the Illinois Solar for All program, capital constraints make a college-owned system difficult and risky. This model would still provide the host site measureable benefits, with year-1 earnings of $10,909 and an average of more than $23,000 annually over 25 years. The developer in this model receives a 9.7 percent IRR (spell out) and a payback of 4.3 years through incentives and tax benefits.

Solar Developer/System Owner Metrics

25-Year Costs	($6,249,261)
25-Year Revenues	$7,829,127
25-Year Net Benefits	$1,579,866
25-Year Net Present Value (NPV)	$182,338
Return On Investment (ROI)	25.3%
Payback Period	4.3 years
Internal Rate f Return (IRR)	9.7%
SREC Value (1 MW – 2 MW Block)	$45.00/MWh
SREC Adder Value-Subscriber Type	$0
SREC Adder Value-100% Low-Income	$0

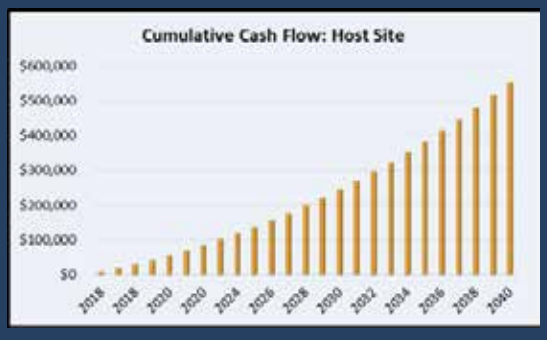
SREC Value: $47.7



Host Site Metrics: Leasing Site and Anchor Subscription

25-Year Costs	($873,057)
25-Year Revenues	$1,454,283
25-Year Net Benefits	$581,225
Upfront Investment/Financing	$0
Net Year 1 Earnings	$10,909
Average Annual Earnings (25 years)	$23,249
SREC Value (1 MW – 2 MW Block)	$45.00/MWh
SREC Adder Value-Subscriber Type	$0
SREC Adder Value-100% Low-Income	$0

**All SREC and SREC Adder values are assumptions. See Overview for more details.*



The Cook County Community Solar Project would like to thank the many stakeholders* who participated in the project by providing advice, input and assistance.

AECOM
Aerotek Energy Services
Ailey Solar
Alliance for Illinois Manufacturing
Archdiocese of Chicago
Azimuth Energy
Baker McKenzie
Beach Park, Village of
Bickerdike Redevelopment Corporation
Blacks in Green
Boston Community Capital
Bright Fields Development LLC
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Perk-Integra
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Prairie Management Development
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Schneider Electric
Seven Generations Ahead
Seventhwave
Siegel & Callahan
Smart Grid Cluster
SoCore Energy
Solar Micronics
Solar Service Inc.
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South Suburban Land Bank and Development Authority
South Suburban Mayors and Managers Association
Southeast Environmental Task Force
Southwest Conference of Mayors
Strategy Group/Energy Foundation
Sun City
Sun Edison
SunPower
Sunrun Inc.
The Accelerate Group
The Power Bureau
Theaster Gates and the Rebuild Foundation
Trajectory Energy
Triton College
U.S. Environmental Protection Agency
UI LABS
Union of Concerned Scientists
United Airlines
United States Department of Energy
University of Chicago
University of Illinois--Chicago
US Green Building Council
US Solar Network
VLV Development/VGI Energy
Vote Solar
WBS Equities
WCP Solar
West Central Municipal Conference
West Monroe Partners
Will County
Wilmette Sierra Club
Wind on the Wires
Wintrust Commercial Banking

*Being listed as a stakeholder does not imply endorsement or agreement on all findings and recommendations.

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