



Community Solar Farms

An Online Continuing Education Course for Engineers

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Community Solar Farms

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Introduction

Community solar farms, also known as community-shared solar, are a form of solar energy deployment that allows multiple individuals or businesses to benefit from a single solar array. These projects are typically located in a centralized location and enable participants to purchase or lease a share of the solar panels' output.



Credit: United Power SOL Partners

Community solar projects may offer participants the opportunity to save on their electricity bills. By purchasing or leasing a share of the solar panels, participants receive credits on their utility bills for the electricity generated by their portion of the solar array. This credit, often referred to as virtual net metering or bill credit, reduces the participants' electricity costs, providing them with predictable energy expenses and, in some cases, saving them money over time.

A community solar power plant is shared by numerous users.

The economics of community solar projects often rely on the initial investment required to develop and construct the solar array. The cost of building the solar garden is divided among the participating members, which reduces the financial burden on everyone. This allows individuals

who may not be able to install solar panels on their property to access solar energy without having to invest in their own solar installation.

The economic viability of community solar projects can be influenced by various financial incentives and subsidies offered by governments or utility companies. These incentives might include tax credits, grants, rebates, or performance-based incentives that reduce the overall costs of setting up and operating the community solar project.

Larger community solar projects tend to be more economically efficient than smaller ones. Economies of scale come into play when larger installations can negotiate better deals on equipment and construction costs. Additionally, larger projects often have a more stable and consistent electricity output, making them more reliable for participants and potentially increasing savings.

The economics of community solar also heavily depend on the regulatory and policy environment at the local, state, and national levels. Policies that favor net metering tariffs and other solar-friendly regulations, can boost the economic feasibility of community solar projects.

Access to favorable financing options significantly impacts the economics of community solar. Lower interest rates or innovative financing models make it easier for community solar developers to secure the necessary capital and pass on savings to participants.

The economics can vary depending on whether the community solar project follows a third-party ownership model or if it is owned and operated by a cooperative or community-based organization. Each model has its own financial implications, such as tax implications and return on investment calculations.

A study by the National Renewable Energy Laboratory (NREL) found that only 27 percent of residential rooftop areas in the U.S. are suitable for hosting an on-site photovoltaic (PV) system. Community solar farms expand access to solar power for renters, condominium owners, those with shaded roofs, and those who choose not to install a residential system on their homes for financial or other reasons.

Another benefit of community solar is the unique opportunity to participate in solar energy without being directly involved in the purchase and installation of photovoltaic systems at the consumers' residences. Community solar has numerous benefits over rooftop solar including, no unsightly rooftop solar cells, no problems with neighborhood covenants that may prohibit rooftop solar, transferability, and lower cost than rooftop solar.

Table 1 is a comparison of the benefits of community solar versus rooftop solar.

Table 1 Comparison of Community Solar to Individual Ownership		
Attribute	Community Solar	Individual Ownership
Minimal upfront costs	✓	✗
Transferability	✓	✗
Use for backup power	✗	✓
Available for renters	✓	✗
Receive tax benefits	? ₁	✓
Lowest cost	✓	✗
Reduces carbon emissions	✓	✓
Note 1. Many factors influence tax benefits.		

Market Status

As of 2022, there were 1,253 community solar projects in the U.S. representing 3,200 MW_{AC} of installed capacity. The community solar projects were in 38 states, with Florida, Minnesota, New York, and Massachusetts having the largest amount of installed capacity. See Figure 1.

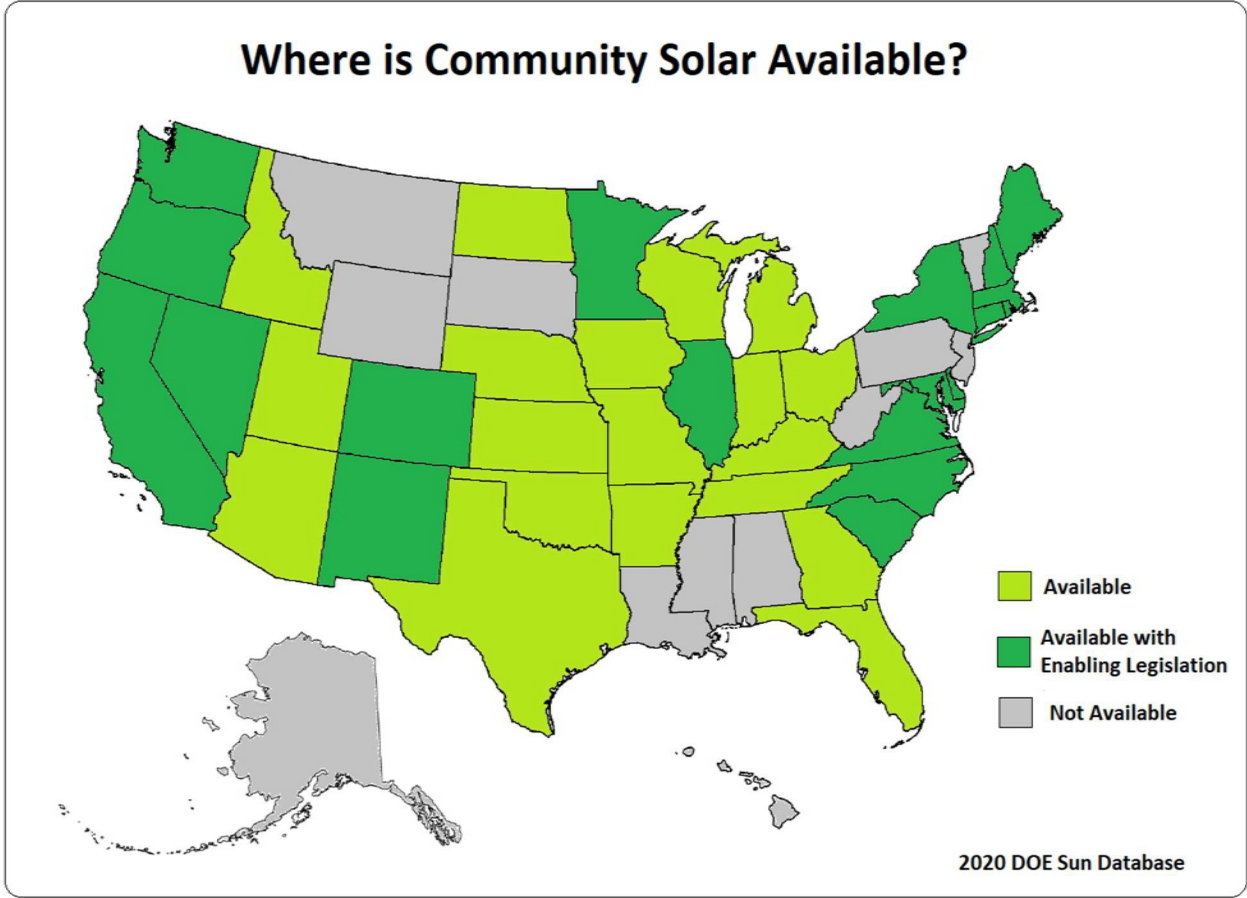


Figure 1

Community solar continues to grow. In fact, in 2020 alone over 1,100 MW of new community solar was added to the electric grid. See Figure 2.

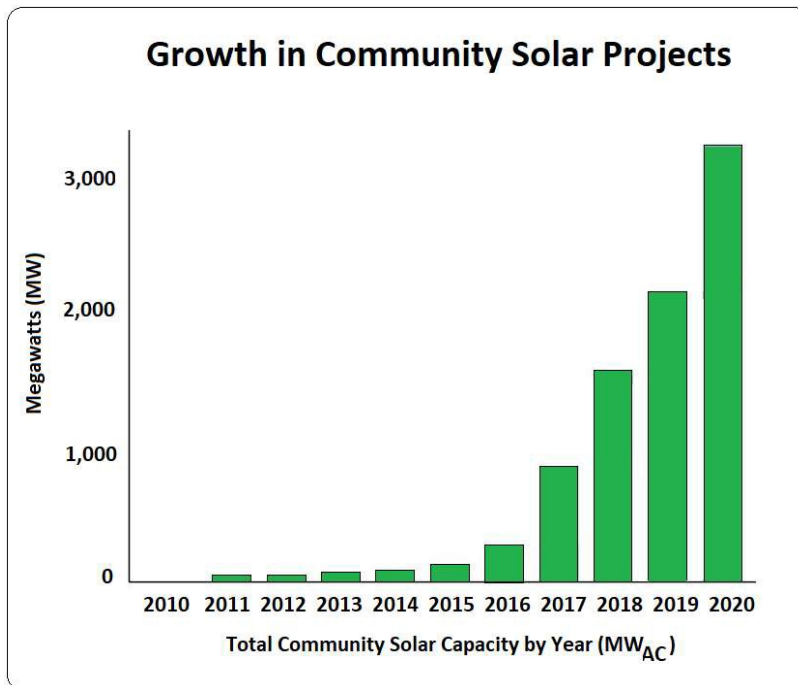


Figure 2

As shown in the figure above, community solar capacity has increased at an average of 120% annually since 2010.

Definition of Key Terms

The following terms are defined in the context of community solar.

Renewable Energy Certificate (REC)

A renewable energy facility produces two distinct products. The first is electricity. The second is a package of environmental benefits. The environmental benefits of renewable energy sources include avoiding mercury, carbon dioxide (CO₂), and other environmentally harmful pollutants, as a result of offsetting convention power sources. These environmental benefits can be packaged into a *Renewable Energy Certificate* (REC) and sold, separately from the electrical power, on a per megawatt-hour (MWh) renewable energy basis. In most cases, RECs are sold on a per MWh basis. Some project organizers choose to sell all future rights to RECs up front, on a per-installed-watt basis, effectively capturing an installation rebate and forgoing any future revenue from REC sales.

Tax appetite

Individuals and businesses can reduce the amount of taxes owed by using tax credits. For a tax credit to have any value, though, the individual or business must owe taxes. If the individual or business is tax-exempt or does not have sufficient income to need tax relief, the tax credits have no value. Individuals or businesses that can use tax credits to reduce the amount they owe in taxes are said to have a *tax appetite*. For example, public and nonprofit organizations are tax-exempt, and therefore, do not have a tax appetite. In addition, taxpaying entities might be eligible to use tax-based incentives but have insufficient tax appetite to make full use of them.

Investment Tax Credit (ITC)

The Internal Revenue Code allows businesses to take a one-time tax credit for the cost of certain property. This credit is called the *Investment Tax Credit (ITC)*. The ITC is generally only available to businesses that have a residence.

SECTION 1: Introduction

Power purchase

A *power purchase agreement* is an agreement under which the utility company provides electricity and the customer agrees to purchase power from the utility. In some states, it may be subject to regulation by a utility commission.

Solar Services Agreement

A *Solar Services Agreement* is an agreement between the system owner and the system site host, for the provision of solar power and associated services. The system owner designs, installs, and maintains the system and signs an agreement with the system site host to continue to provide maintenance and solar power. The agreement is sometimes referred to as a PPA, but in this course, the term SSA indicates that the agreement between the system owner and the system site host is more than a power purchase: it is an agreement that the system owner will provide specific services to ensure continued solar power.

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