

Research Insight Report

# The Future of Solar Finance in the US

Opportunities and Challenges for Small & Medium-Scale Businesses



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## Executive Summary

In the dynamic narrative of the U.S. solar energy sector, small and medium-scale businesses are the protagonists, navigating a landscape shaped by technological progress, cost efficiencies, and government support. Their journey is marked by the pursuit of cost reduction and the exploration of financial incentives, while also harnessing the power of storage solutions. Regulatory policies and sustainability are the compass guiding their path. The plot thickens with the introduction of the Inflation Reduction Act, a potential game-changer that could further shape the financial and accounting aspects of their operations, ultimately enhancing the economic benefits of solar energy.

## Introduction

The U.S. solar energy sector has emerged as a key player in the transition to a low-carbon economy, with solar capacity reaching over 100 GW in 2021. In 2022, this growth continued, with the solar industry installing an impressive 24.4 GW of new capacity, bringing the total installed capacity to approximately 125 GW according to SEIA (Solar Energy Industries Association). Small and medium-scale businesses (SMBs) play a crucial role in this growth, contributing to job creation, innovation, and local economic development. In fact, the solar industry employed over 250,000 people in the U.S. in 2022, with a sizable portion of these jobs being created by SMBs according to Solar Foundation.

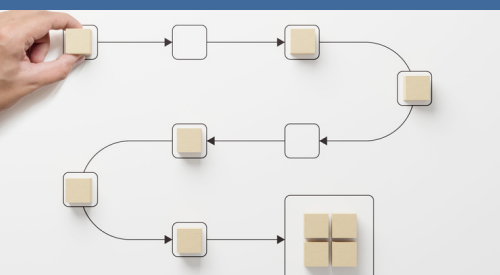


This report aims to provide SMBs with a comprehensive understanding of the finance landscape, enabling them to make informed decisions and capitalize on the opportunities presented by the solar energy sector. As the demand for clean energy continues to rise, SMBs have the potential to benefit from various financing options, such as loans, leases, power purchase agreements (PPAs), and tax incentives.

## Cost Reduction and Competitiveness

The cost of solar energy has declined significantly over the past decade, with the levelized cost of electricity (LCOE) for utility-scale solar projects dropping by more than 80% since 2010. In 2022, the LCOE for utility-scale solar projects ranged from \$29 to \$42 per MWh, making solar energy increasingly competitive with traditional energy sources as reported by Lazard. However, soft costs, such as permitting, installation, and customer acquisition, remain a challenge for small and medium-scale businesses (SMBs). These soft costs can account for up to 64% of the total cost of residential solar installations as reported by the National Renewable energy Laboratory. Strategies to reduce these costs include:

### Streamlined permitting processes



Standardizing and simplifying permitting processes can reduce administrative costs and project delays. In 2022, the U.S. Department of Energy launched the Solar Automated Permit Processing (SolarAPP+) platform, which aims to streamline permitting processes for residential solar installations, potentially saving SMBs thousands of dollars per project.

### Standardized installation practices



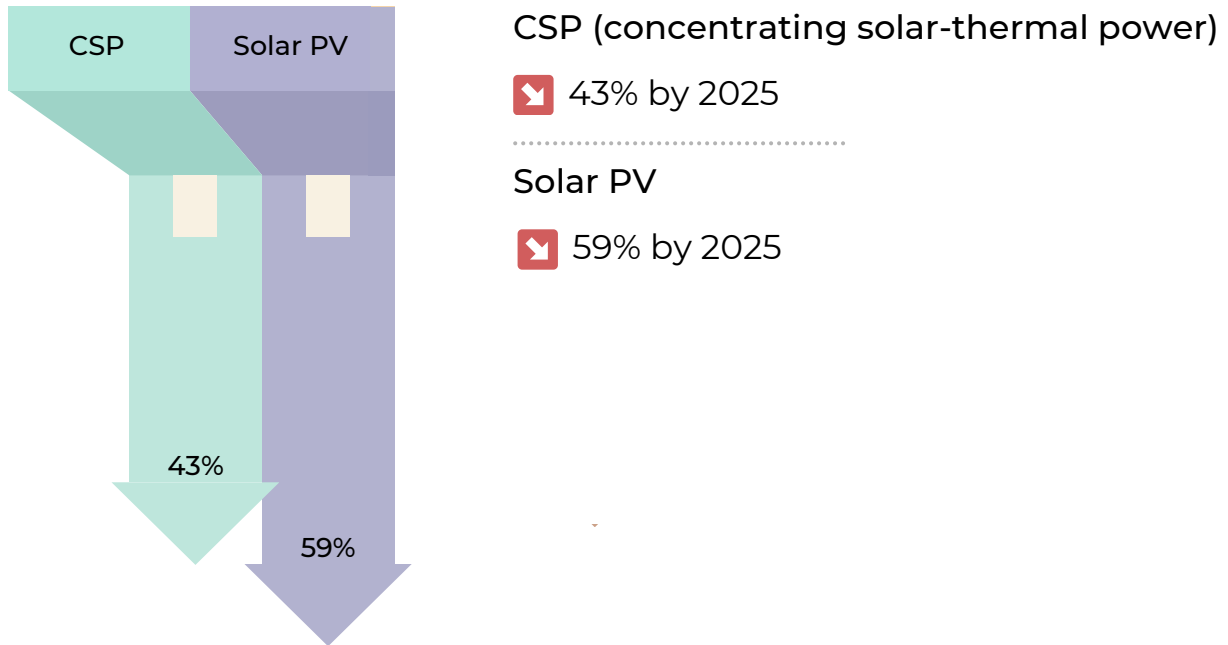
Adopting best practices and standardized installation techniques can lower labor costs and improve efficiency. The Solar Training and Education for Professionals (STEP) is a program funded by the U.S. Department of Energy, that provides training resources for solar installers, helping to ensure consistent, high-quality installations across the industry.

### Targeted marketing efforts



Focusing on targeted marketing strategies can help businesses reduce customer acquisition costs and improve conversion rates. In 2022, the average customer acquisition cost for residential solar installations was estimated to be around \$3,000 per customer as reported by Wood Mackenzie. By leveraging data-driven marketing techniques, such as geotargeting and customer segmentation, SMBs can more effectively reach their target audience and reduce marketing expenses.

The International Renewable Energy Agency recently conducted a survey that revealed utility companies worldwide believe that the cost of solar power may decrease in the near future



*Source: International Renewable Energy Agency*

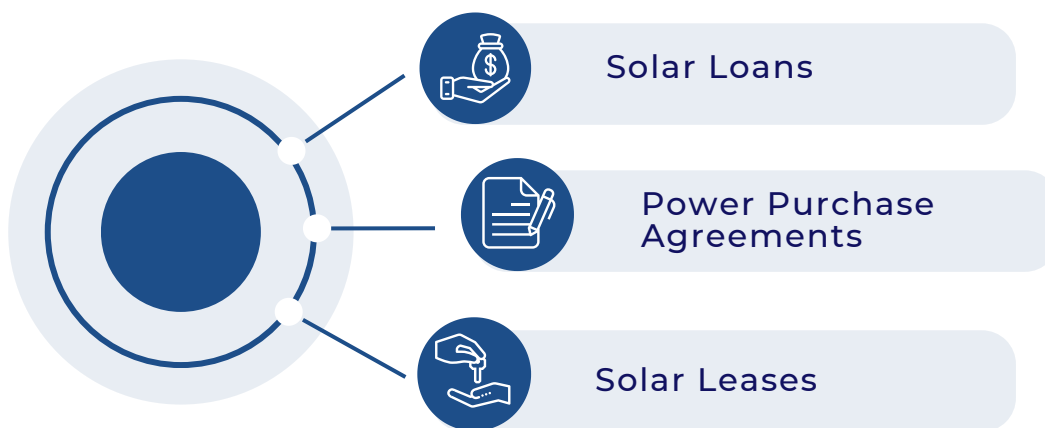
In the context of the solar industry, cost accounting practices such as activity-based costing (ABC) and lifecycle costing can provide valuable insights into the true costs associated with solar energy projects.

- ABC allocates indirect costs to specific activities, enabling companies to identify cost drivers and areas for potential cost reduction. This approach can help solar energy companies better understand the costs associated with various stages of a solar project, from design and permitting to installation and maintenance.
- Lifecycle costing, on the other hand, considers the total cost of ownership for a solar asset over its entire life, including acquisition, operation, maintenance, and disposal costs.

## Financial Incentives and Financing Options

In the US Solar industry, nuances of Financial Analysis are particularly important due to the reliance on tax incentives, such as the Investment Tax Credit (ITC), which can significantly impact project financing and cash flow timing. The Investment Tax Credit (ITC), for example, offers a 26% tax credit for solar projects installed before 2023. This incentive has been instrumental in the growth of the solar industry, with the Solar Energy Industries Association (SEIA) estimating that the ITC helped the industry grow by more than 25 times in terms of volume of installations since its inception in 2006. In addition to the ITC, many states and local governments offer their own incentives, such as rebates, grants, and property tax exemptions, further supporting solar adoption among SMBs.

Financing options for SMBs in the solar industry include:



### Solar loans



These loans offer competitive interest rates and flexible repayment terms, allowing businesses to Finance solar projects without upfront capital. Solar loan depends on factors such as credit score, loan term, and project size. Solar loans can be obtained from various sources, including banks, credit unions, and specialized solar financing companies, in 2022, the US solar loan market reached a record 70% share in residential solar financing, with top players like GoodLeap, Sunrun, and Sunnova leading the industry.

## Leases



Solar leases enable businesses to use solar energy systems without owning them, with the leasing company responsible for installation, maintenance, and repairs. Solar leases typically have terms of 15 to 25 years and often include options to purchase the system at the end of the lease term as reported by EnergySage. This financing option allows SMBs to benefit from solar energy without the responsibility of system ownership and maintenance.

## Power Purchase Agreements (PPAs)



PPAs allow businesses to purchase solar-generated electricity at a fixed rate, providing long-term price stability and reducing exposure to volatile energy prices. Under a PPA (Power Purchase Agreement), a third-party developer installs, owns, and operates the solar energy system, while the business agrees to purchase the generated electricity for a predetermined period, usually 10 to 25 years according to SEIA. PPAs can be particularly attractive for SMBs looking to lock in energy costs and hedge against future price increases.

## Sustainability and ESG Considerations

Adopting sustainable practices and adhering to environmental, social, and governance (ESG) standards can enhance a business's reputation and attract environmentally conscious customers. This is particularly important for small and medium-scale businesses (SMBs) in the solar industry, as consumers increasingly prioritize sustainability and corporate responsibility. Key certifications and labels in the solar industry include:

### Cradle to Cradle Certified



This certification evaluates products based on material health, material reutilization, renewable energy use, water stewardship, and social fairness. In 2022, several solar panel manufacturers have achieved Cradle to Cradle Certified® status for their products. By choosing Cradle to Cradle Certified® solar panels, SMBs can demonstrate their commitment to sustainability and differentiate themselves from competitors.

## Cradle to Cradle Certification

Cradle to Cradle Certified® certification is based on five categories



Source: Cradle to Cradle Products Innovation Institute

### Declare Label



This label provides transparency about the materials used in solar products, helping consumers make informed decisions about their environmental impact. The Declare Label is issued by the International Living Future Institute (ILFI) and requires manufacturers to disclose the ingredients in their products, as well as information about their sourcing and end-of-life disposal. In 2022, several solar panel manufacturers, have obtained Declare Labels for their products. By selecting solar panels with Declare Labels, SMBs can showcase their dedication to transparency and responsible sourcing, further enhancing their reputation among environmentally conscious customers.

## Policy and Regulation

Policies such as net metering regulations, renewable portfolio standards, and interconnection requirements play a significant role in shaping the solar industry. Small and medium-scale businesses (SMBs) should stay informed about current and proposed policies and their potential implications on project economics and market dynamics. Key policies affecting the solar industry in 2022 include:

### Net metering regulations



Net metering allows solar energy system owners to receive credit for excess electricity generated and fed back into the grid. As of 2022, 38 states and the District of Columbia have mandatory net metering policies in place, while several other states have voluntary utility programs according to Database of State Incentives for Renewables & Efficiency. Net metering policies can significantly impact the financial viability of solar projects for SMBs, as they can offset electricity costs and provide a return on investment.

### Renewable portfolio standards (RPS)



RPS policies require utilities to source a certain percentage of their electricity from renewable energy sources. In 2022, 30 states and the District of Columbia had enforceable RPS policies, with varying targets and timelines as reported by National Conference of State Legislatures (NCSL). RPS policies can drive demand for solar energy and create market opportunities for SMBs in the solar industry.

### Interconnection requirements



Interconnection standards govern the process of connecting solar energy systems to the grid. These standards can impact the ease and cost of connecting solar projects, affecting the overall project economics for SMBs. In 2022, the Interstate Renewable Energy Council (IREC) released its updated Model Interconnection Procedures, which aim to streamline the interconnection process and reduce barriers for solar energy system owners.

## Accounting and Financial Considerations

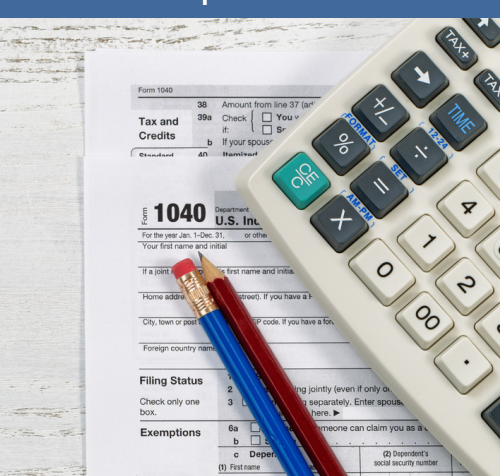
In the solar energy industry, revenue recognition is guided by accounting principles such as the Financial Accounting Standards Board's (FASB) Accounting Standards Codification (ASC) 606, which outlines the criteria for recognizing revenue from contracts with customers. Key considerations in revenue recognition for solar projects include project completion milestones, performance obligations, and long-term service agreements. For instance, revenue may be recognized upon meeting specific milestones, such as the installation of solar panels or the achievement of a particular energy output. Additionally, performance obligations, such as warranties and maintenance services, must be accounted for separately, with revenue recognized over the service period. Long-term service agreements further complicate revenue recognition, as they often involve multiple performance obligations and variable consideration, requiring careful allocation of the transaction price. Key aspects include:

### Return on Investment calculation



Assessing the return on investment (ROI) of solar projects helps businesses evaluate the financial benefits of solar adoption. In 2022, the average payback period for commercial solar installations in the United States ranged from 3 to 7 years, depending on factors such as system size, location, and available incentives [source: EnergySage]. By calculating the ROI, SMBs can determine the potential profitability of solar projects and make informed decisions about whether to invest in solar energy.

### Interconnection requirements



Properly depreciating solar assets can optimize tax deductions and improve project economics. Under the Modified Accelerated Cost Recovery System (MACRS), businesses in the United States can depreciate solar assets over a five-year period, allowing them to recover a sizable portion of their investment through tax deductions. In 2022, the bonus depreciation rate was 100%, enabling businesses to deduct the entire cost of eligible solar assets in the first year as stated by Internal Revenue Service (IRS). By understanding and applying depreciation rules, SMBs can maximize tax benefits and enhance the financial viability of their solar projects.

## Financial modeling



Developing accurate financial models can help businesses forecast cash flows, assess risks, and make informed investment decisions. Financial models for solar projects typically include variables such as system costs, energy production, electricity rates, incentives, and financing options. In 2022, tools such as the National Renewable Energy Laboratory's (NREL) System Advisor Model (SAM) were available to help SMBs create detailed financial models for their solar projects. By leveraging financial modeling tools and techniques, SMBs can better understand the financial implications of their solar investments and make data-driven decisions. For example, by analyzing generation and storage data, companies can identify patterns and trends that may impact the financial performance of their solar installations, such as fluctuations in energy production or storage capacity. New-age analytics and low-code no-code tools can further complement conventional modelling approaches resulting in quicker analysis and reporting.

## Optimizing Solar Energy: Efficiency, Cost, Data, & Pricing

### Energy Efficiency Accounting



Energy efficiency accounting methods provide a systematic approach for businesses and organizations to track energy savings and environmental impact. The Department of Energy's methods provide a comprehensive approach to evaluating energy efficiency in the solar industry.

- **Baseline Method:** This method compares the energy use of energy-efficient solar products/services to their non-energy-efficient counterparts. For instance, the average efficiency of solar panels has increased from around 15% in 2010 to about 20% in 2023, demonstrating the effectiveness of energy-efficient upgrades.

- **Normalized Method:** This method offers a broader perspective on energy savings by comparing the energy use of energy-efficient solar products/services to the market's average energy use. The average American home uses about 10,649 kilowatt-hours (kWh) per year. With the normalized method, we can see that energy-efficient solar panels can cover a significant portion of this usage, leading to substantial energy savings.
- **Embodied Energy Method:** This method estimates the total energy consumed during the production, transportation, and installation of energy-efficient solar products/services. It's important to note that the embodied energy of solar panels has been decreasing due to improvements in manufacturing processes and increased efficiency of panels, making solar energy an increasingly sustainable choice.

### Energy efficiency accounting tools and resources provided by the U.S. Department of Energy (DOE):

[Energy Efficiency Accounting Guide: Offers step-by-step implementation guidance](#)

[Energy Efficiency Accounting Calculator: Assists in calculating energy savings](#)

[Energy Efficiency Accounting Software: Aids in project tracking and management](#)

#### Cost Analysis



Cost analysis plays a vital role in assessing the financial viability of solar power plants. Key measures used in cost analysis tool 'Solar Power Cost Analysis Tool' by Department of Energy include:

- **Levelized Cost of Energy (LCOE):** The Levelized Cost of Energy (LCOE) is a metric that averages the cost of electricity generated by a solar power plant over its lifetime. It is calculated by dividing the total plant cost by the total electricity generated. In the US, the LCOE for solar power has experienced a significant decline, dropping from \$25/MWh in 2010 to \$5/MWh in 2020. This decline is attributed to technological advancements, economies of scale, and increased competition in the solar industry. According to Lazard's Levelized Cost of Energy Analysis - Version 16.0, utility-scale solar LCOE ranges from \$29 to \$42/MWh in 2023, making it one of the most cost-competitive sources of electricity generation.

- **Net Present Value (NPV):** Net Present Value (NPV) is a financial metric that measures the present value of future cash flows generated by a solar power plant. It is calculated by discounting future cash flows by a specified rate, which accounts for the time value of money. A positive NPV indicates that the solar power plant investment is expected to generate more value than its cost, making it a profitable venture.
- **Internal Rate of Return (IRR):** The Internal Rate of Return (IRR) is a financial metric that indicates the rate of return on solar power plant investments. It is calculated by finding the discount rate that makes the NPV zero. A higher IRR signifies a more attractive investment opportunity. In the US solar industry, IRRs can vary depending on factors such as project size, location, and financing structure. However, solar investments have become increasingly attractive due to declining costs and supportive policies, leading to higher IRRs and driving growth in the sector.

### Tools and resources provided by the U.S. Department of Energy (DOE) for cost analysis:

Solar Power Cost Analysis Tool: Calculates LCOE, NPV, and IRR of solar power plants

Solar Power Project Financial Analysis Guide: Offers step-by-step guidance for cost analysis

Solar Power Project Financial Analysis Software: Facilitates financial tracking and management of solar projects

### Data Management in the Solar Energy Industry



- **Asset Data Management :** Asset data encompasses the location, type, size, and performance information of solar assets. It aids in tracking performance, identifying issues, and scheduling maintenance. SunPower utilized data management to enhance solar panel performance by proactively monitoring and identifying problems as reported by Solar Energy Industries Association (SEIA).

- **Maintenance Data Management** : Maintenance data comprises details of activities performed on solar assets, such as cleaning, repairs, and replacements. It helps track costs, identify trends, and optimize maintenance schedules. Tesla utilized data management to optimize maintenance schedules and forecast the financial performance of its solar roof tiles. (SEIA)
- **Financial Forecasting Data Management**: Financial forecasting data encompasses information about the cost of solar energy, maintenance cost, and revenue generated from solar assets. It aids in forecasting financial performance, making informed investment decisions, and enhancing pricing and marketing strategies. The city of San Diego utilized data management to track the performance of its solar program and improve financial decision-making. (SEIA)

### Pricing of Electricity Generated from Solar Sources & Benefits of Interconnections



- The pricing of electricity generated from solar sources has seen a significant decrease over the past decade, making it increasingly competitive with traditional energy sources. As of 2023, the cost of utility-scale solar photovoltaic power in the U.S. has dropped to an average of around \$20-\$60 per megawatt-hour, making it one of the cheapest sources of electricity.
- Interconnections, or the linking of solar power systems to the grid, provide numerous benefits. They allow excess power to be sold back to the grid, reducing energy costs for solar power producers. They also enhance grid resilience and reliability, as the distributed nature of solar power can help mitigate the impact of power outages. Furthermore, interconnections facilitate the integration of renewable energy into the grid, supporting the U.S.'s transition towards a more sustainable energy system.

## Economic Benefits and Job Creation

The solar industry offers significant economic benefits, including long-term cost savings, return on investment, and job creation. For small and medium-scale businesses (SMBs), these benefits can contribute to financial stability and growth.

### Long-term cost savings



Solar energy can provide long-term cost savings for SMBs by reducing their reliance on grid electricity and protecting them from volatile energy prices. In 2022, the average commercial electricity rate in the United States was approximately \$0.11 per kilowatt-hour (kWh) as reported by Energy Information Administration. By generating their own solar power, SMBs can offset these costs and achieve substantial savings over the lifetime of their solar energy systems, which typically last 25 to 30 years.

### Return on investment



Solar projects can offer attractive returns on investment for SMBs, with payback periods ranging from 3 to 7 years, depending on factors such as system size, location, and available incentives as reported by EnergySage. After the payback period, SMBs can continue to benefit from solar-generated electricity at little to no additional cost, further enhancing the financial attractiveness of solar adoption.

### Job creation



The solar industry in the United States employed 255,037 people in 2021, according to the 12th annual National Solar Jobs Census. This represents an increase of 9.2% from the previous year. For SMBs in the solar industry, this growth presents opportunities to create new jobs and contribute to local economic development. In 2022, solar installer and solar sales representative were among the fastest-growing occupations in the United States, with projected growth rates of 52% and 45%, respectively, between 2020 and 2030 according to BLS (Bureau of Labor Statistics).

## In Summary

The U.S. solar energy sector presents numerous opportunities for small and medium-scale businesses, with financing options, incentives, and supportive policies driving growth. By addressing the challenges outlined in this report and capitalizing on the opportunities, these businesses can contribute to the transition to a low-carbon economy and benefit from the economic growth associated with the solar industry.

For more information on business partnering, please connect with us at [info@valuexpa.com](mailto:info@valuexpa.com)!

*ValueXPA is a Global technology-enabled Finance-as-a-Service Partner for Small and Mid-sized Businesses and Institutions. We help organizations with critical Management Decisions, Financial operational reporting and insights, Advanced Analytics & Automation and Finance Processes Managed Services.*



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**Founding Partner**

### **About the Author:**

Karthikeyan V Raaj has over 18 years of experience as a Senior Finance Executive and as a CFO business partner. He has championed strategic projects and helped transform finance functions to enable growth of his client organizations. Currently, he is the Founding Partner of ValueXPA, a Global technology-enabled Finance-as-a-Service Partner for Small and Mid-sized Businesses and Institutions. As a CFO Partner, he has advised and helped over 50 small and mid-sized businesses, start-ups and Not-for-profit Institutions - across areas like financial planning, tracking and managing their financial performance through systems, optimizing finance processes through automation and outsourcing.

His specialties include CFO Partnering on Strategic and Business Financial Advisory, Finance Transformation, Financial Modelling, Financial Planning and Analysis, Performance Management Reporting & Decision-support, Development of KPIs and Management Dashboards, Valuation and Analytical Process Automation using Low code/ No code tools. Earlier, he held leadership roles at Barclays and S&P Global. For Global Business Leaders/companies & Financial Institutions, he offered Financial Decision and Controller Solutions and also built & led Investment Research teams globally. He holds an MBA degree specializing in Finance and is also a qualified Engineer.

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