ROCKY MOUNTAIN INSTITUTE

FINANCING COMMUNITY-SCALE SOLAR

HOW THE SOLAR FINANCING INDUSTRY CAN MEET $16 BILLION IN INVESTMENT DEMAND BY 2020

BY KIERAN COLEMAN, THOMAS KOCH BLANK, CURTIS PROBST, AND JEFF WALLER

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ABOUT US

ABOUT ROCKY MOUNTAIN INSTITUTE

Rocky Mountain Institute (RMI)—an independent nonprofit founded in 1982—transforms global energy use to create a clean, prosperous, and secure low-carbon future. It engages businesses, communities, institutions, and entrepreneurs to accelerate the adoption of market-based solutions that cost-effectively shift from fossil fuels to efficiency and renewables. RMI has offices in Basalt and Boulder, Colorado; New York City; Washington, D.C.; and Beijing.

TABLE OF CONTENTS

AB

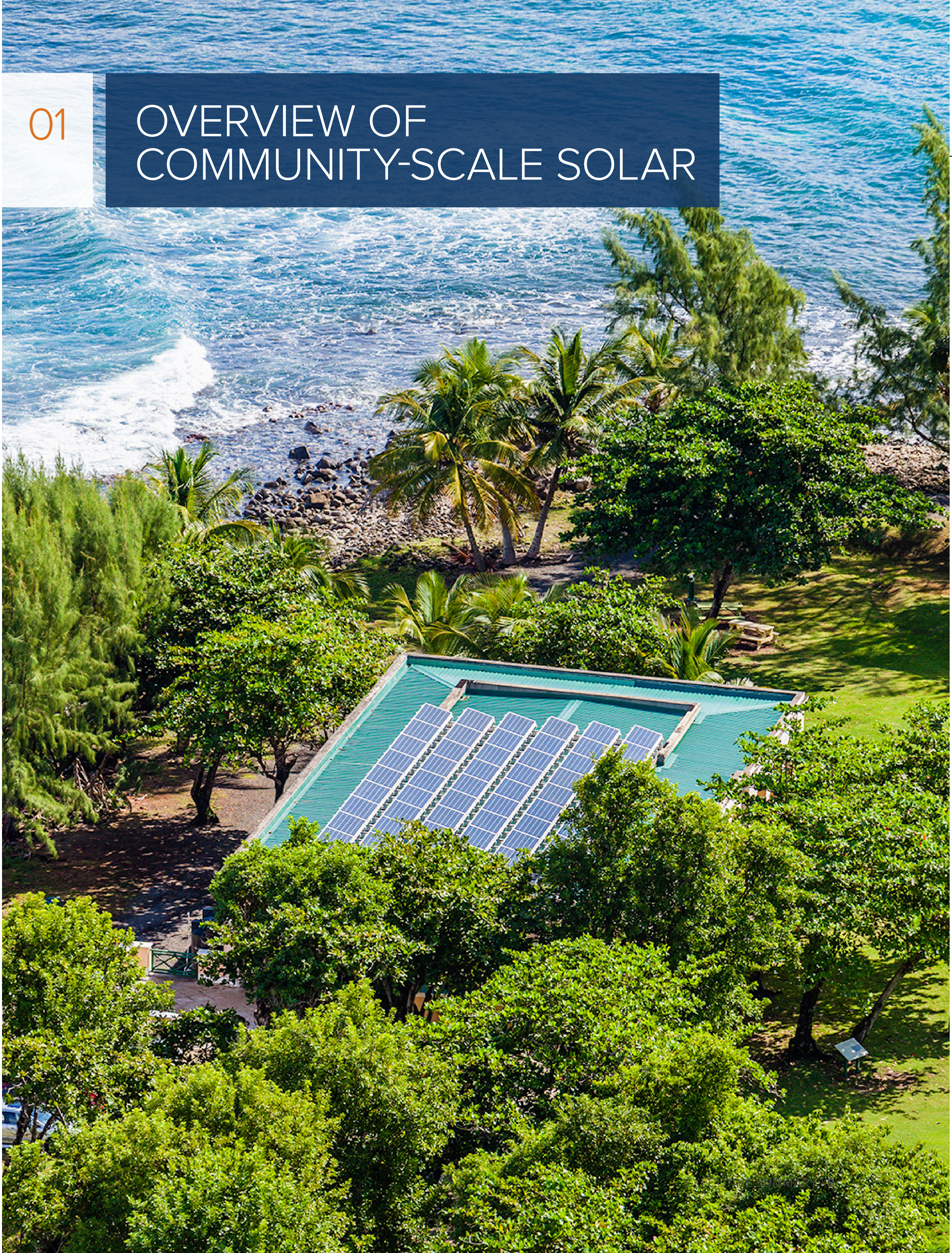
ABSTRACT

ABSTRACT

Community-scale solar has attracted particular interest in the rapidly growing renewables market across the United States. Whether driven by interest from distribution utilities and community groups, or via policies like virtual net metering enacted in individual states, the sector holds untapped potential for offering competitive distributed electricity generation to a broader array of customers than are currently being served. Still, many lenders and tax equity investors have difficulty understanding both the opportunities and the challenges this market presents, and some developers active in this sector have been slow to adequately address some of the concerns of potential financial partners. This dynamic has proven to be a barrier to financing community-scale solar projects, which, in turn, has inhibited broader consumer access to renewable energy. In this report, Rocky Mountain Institute's (RMI's) Shine community-scale solar program and Sustainable Finance practice area describe how established solar-financing models can be easily adapted to the community-scale solar market, and discuss key risks and mitigants, as a framework for financiers and project developers to use in order to rapidly grow this market.

01

OVERVIEW OF COMMUNITY-SCALE SOLAR



OVERVIEW OF COMMUNITY-SCALE SOLAR

DEFINITION OF COMMUNITY-SCALE SOLAR

Community-scale solar (CSS) is the middle ground for a solar market typically defined by two technology solutions. On one end, small-scale behind-the-meter residential solar is available as a retail product to end-users. On the other end, large utility-scale solar is sold directly to grid providers in wholesale electricity markets. CSS—typically sized between 0.5 and 5 megawatts (MW) in scale—can feed electricity directly onto local distribution grids, offering communities and utilities the benefits of reliable power generation sited near the load. It offers cost-effectiveness by providing economies of scale compared to residential solar, and avoiding transmission charges attached to utility-scale solar. It may also allow customers that lack the perceived creditworthiness to enter into conventional financing arrangements to participate in solar energy generation.

CSS can take different forms from one state to another, depending on the local regulatory environment. Those regulations create three broad types of electricity markets:

1. Wholly regulated electricity markets
2. Markets with deregulated generation and transmission
3. Deregulated electricity markets, which may offer virtual net metering (VNM) policies enabling "shared solar" (currently in 14 states and the District of Columbia)

TABLE 1

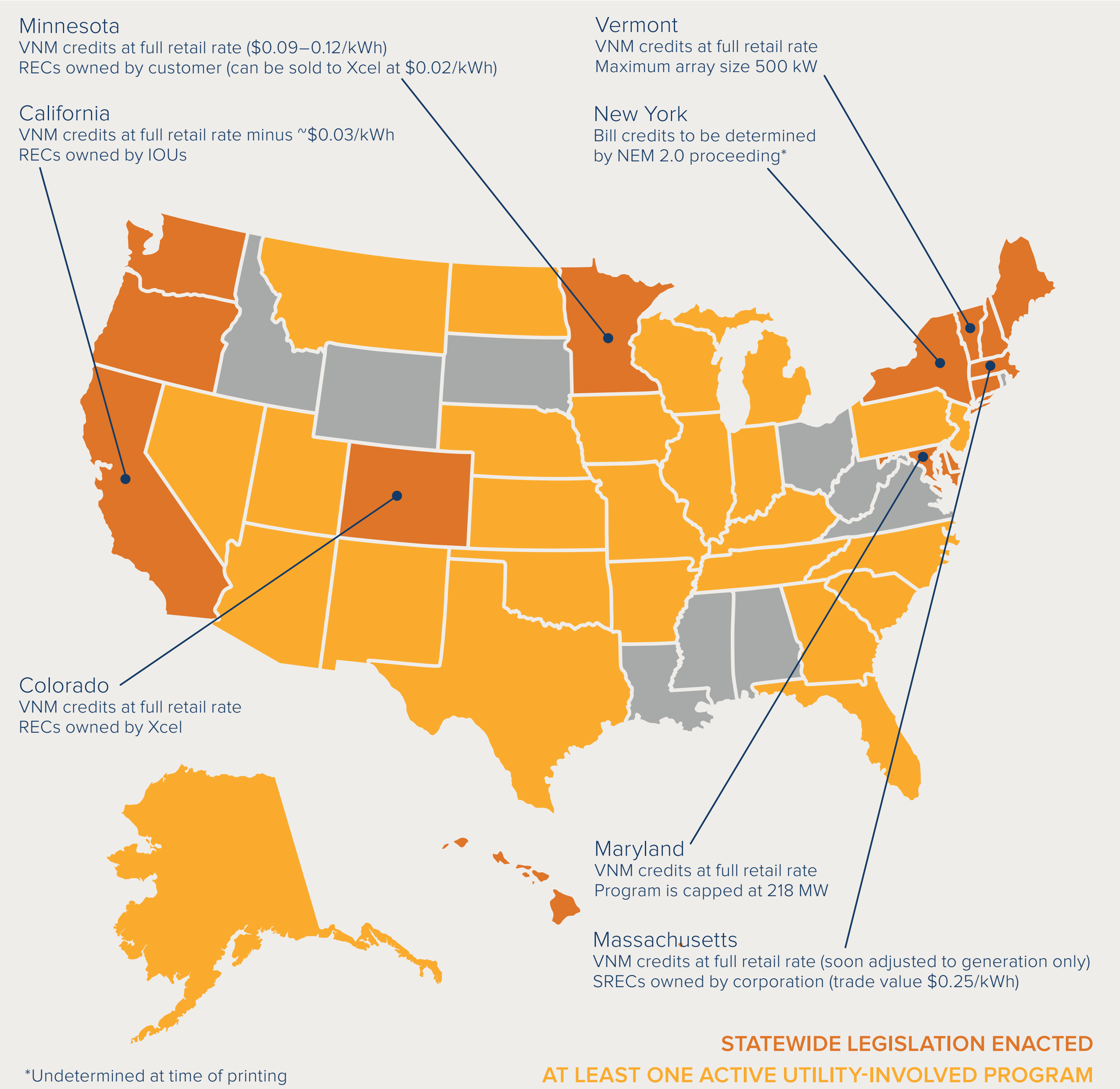
COMPARISON OF SOLAR TECHNOLOGY SOLUTIONS

	Behind-the-Meter	Community Scale	Utility Scale
Typical Size	5 KW–0.5 MW	0.5–5 MW	20–100 MW
Energy User	Households Businesses	Utility Customers (Co-ops, Munis, and IOUs) Residential Subscribers* Business Subscribers*	Utility Customers (Primarily IOUs)
Interconnection	Behind-the-Meter	Distribution Grid	Transmission Grid
Distributed Benefits	Yes	Yes	No

* Subscribers to shared solar receive bill credit from community solar production.

FIGURE 1

NATIONAL COMMUNITY-SCALE SOLAR REGULATION AND/OR ACTIVITY



Additionally, there is a combination of buyer-owned, seller-owned, and jointly owned "levers" that can be pulled in the CSS segment to help reduce cost, manage risk, and shorten development timelines.

Recent procurement efforts demonstrate that CSS can achieve cost reductions of up to 40 percent below recent distributed solar market rates—approaching utility-scale prices in some areas.

THE BENEFITS OF COMMUNITY-SCALE SOLAR

CSS creates opportunities for the established solar market to provide a lower-cost, more flexible, and economically efficient offering to customers of all types. Additionally, the opportunities it creates around cost and access can help address the slowing rates of growth in traditional solar market segments. Still, CSS growth will depend in large part on the rate at which investors, developers, and community offtakers gain experience, learn how to allocate and price risks among project stakeholders, and develop attractive value propositions in each subsegment capitalizing on the many benefits of this sector. These benefits include:

- **Low cost:** CSS is much more cost-effective than residential-scale systems—the 2015 median price of installed residential solar systems was nearly 60 percent more than large nonresidential systems (i.e., the size range of CSS).[1] CSS can drive down costs by way of its economies of scale, streamlined development processes, and systems designed for this market segment. Together, these attributes can achieve comparatively lower costs, making the CSS market attractive to utilities and various types of customers today.

- **New market segments:** CSS opens a diverse and deep market of potential offtakers, including municipalities, corporates, and residential customers. In particular, the size of CSS projects makes them uniquely appropriate to meet the demand profiles of municipal utilities and rural electric cooperatives. In retail markets, corporate buildings and college campuses can anchor arrays, providing the balance of energy not consumed on-site to their employees and students. Given the lower commercial interest rates these entities typically pay, strategic cost-reduction efforts and the communication of the nonfinancial value CSS provides can help bring such projects into the market.

- **Low technology risk:** Solar is increasingly seen as having a relatively low technology risk. As the market for distribution systems grows, improvements in system design and operational optimization will continue to decrease construction and performance risk.

- **Flexible customer arrangements:** In contrast to residential solar, if customers default, move, or change their minds, the CSS owner need only allocate the affected contract to new customers rather than being obligated to remove panels from the defaulting customers' rooftops. Establishing these mechanisms at the outset of the transaction to promptly transfer customer obligations mitigates the credit risk of any individual customer.

- **Beneficial distribution grid siting:** CSS also avoids transmission costs—estimated to be $0.011/kWh on average nationwide,[2] and likely rising with necessary grid investments—affording additional competitiveness and reliability vis-à-vis grid electricity.

THE COMMUNITY-SCALE SOLAR INVESTMENT OPPORTUNITY

According to a recent National Renewable Energy Laboratory (NREL) cost reduction and market growth projection, the shared solar segment within the CSS sector could contribute between 5.5 and 11 gigawatts (GW) to the distributed solar market by 2020,[3] representing up to 49 percent of the total market.[i] NREL estimates this investment opportunity has a value of between $8.2 and $16.3 billion.[ii] At the high end of this range, and depending on the local solar resource and other factors, this would

[i] NREL infers shared solar growth by applying historical growth rates to an expanded customer base. Further, it notes that its estimate does not take into account significant upside potential in this market relative to historical trends in the distributed solar market.
[ii] To calculate investment, NREL uses 2010 dollars and assumes a sliding system price scale between $2.40/watt and $1.25/watt from 2014–2020.

require up to $8 billion in tax equity, $6 billion in project debt, and the remainder in sponsor equity.

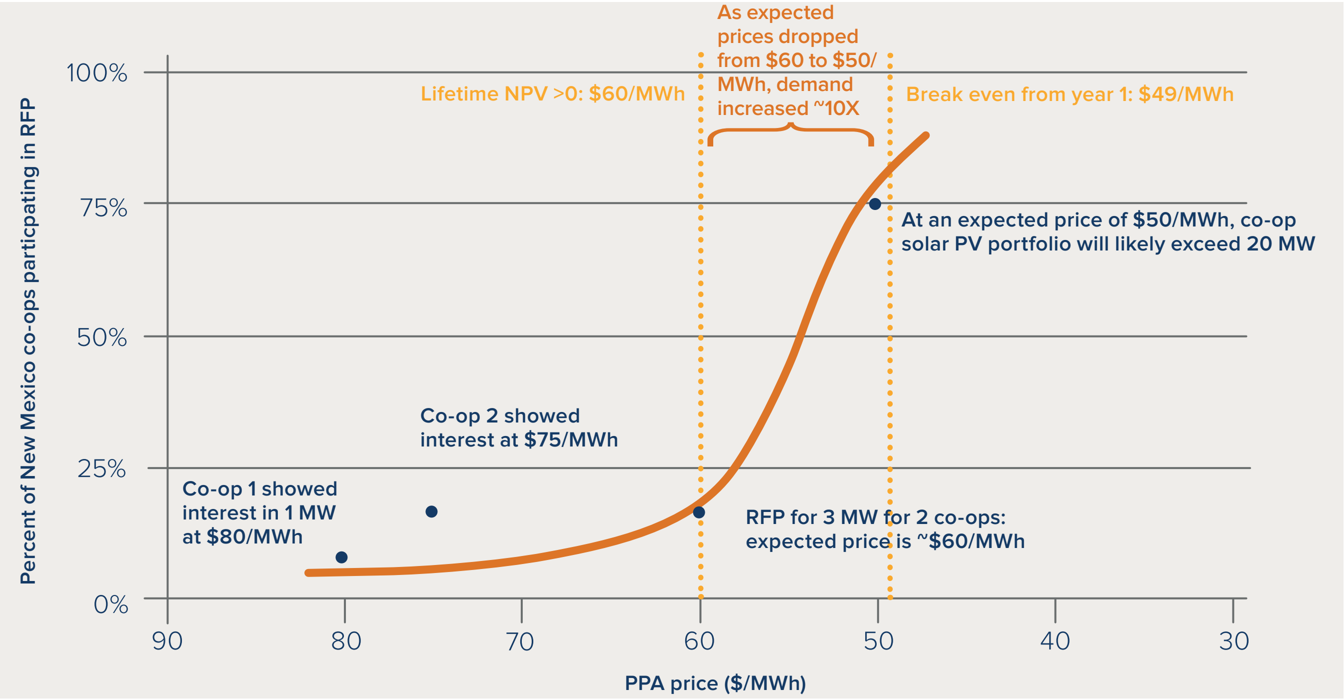
The investment opportunity may be significantly larger still: a broader market definition used by RMI might include utilities involved in wholly regulated electricity markets or markets with deregulated generation and transmission. Also, a focus on technical potential may exclude demand increase resulting from effective procurement, supply chain improvements, and substantially reduced soft costs from community or utility counterparties leveraging local resources and their respective advantages. Together, these may double or triple the effective market through 2020. From the perspective of invested capital, this would far outweigh the impact of projected cost declines on total investment required for this segment.

For example, in March 2016, RMI ran a procurement process on behalf of distribution cooperatives in New Mexico for community-scale solar. As demonstrated in Figure 2 below, the percent of in-state co-ops interested in procuring solar increased from 20 to 75 percent when the expected power purchase price declined to below $50 per megawatt-hour ($0.05/kWh) with a 0-percent escalator. As a result, the demand for community-scale solar soared from an initial 3 MW to 20 MW.

Based on these projections, we can identify questions at the heart of the continued development of the U.S. solar industry generally, and for CSS in particular: Will equity investors and debt providers recognize the opportunities in this market segment? How can this segment help developers structure projects and pipelines to reduce cost, effectively allocate or manage risk, and absorb ever-larger volumes of capital? Will the solar industry and its financial partners innovate to meet the latent demand of a broader pool of utilities and end-use customers, be they residential; commercial; and/or municipal, university, school, or hospital (MUSH)?

FIGURE 2

NEW MEXICO CO-OP INTEREST IN PROCURING SOLAR



02 FINANCE STRUCTURES

FINANCE STRUCTURES

Critical to achieving a competitive weighted-average cost of capital for CSS is securing a high proportion of low-cost debt financing for the project (in addition to competitive tax equity rates). Fortunately, the characteristics of CSS lend themselves to low-cost debt, with ready analogies in the project finance and structured finance markets. The appropriate framework, however, will depend largely on the perceived risk profile of the purchaser(s) of community-scale solar power.

TODAY'S FINANCE STRUCTURES

Today, there are two financing and delivery models that are most commonly used for solar:

POWER SOLD TO A LOCAL UTILITY COMPANY, A MUSH MARKET ENTITY, OR SIMILARLY CREDITWORTHY OFFTAKER. This structure has a similar credit profile to most project finance, securitization, and credit tenant lease transactions secured by lease or other contractual obligations of creditworthy counterparties (collectively, "credit pass-through transactions"). In these financings, the output of renewable generation assets is normally sold under a long-term, fixed-price power purchase agreement (PPA) to a creditworthy counterparty (typically investment-grade). High levels of debt financing are permitted, with debt capital providers attracted to the stable, predictable cash flows the project generates. Tax equity is typically incorporated into the financing plan to ensure that the tax attributes (e.g., the Investment Tax Credit (ITC) and accelerated depreciation) can be efficiently utilized. Performance risk is typically mitigated through the project sponsor (who retains the equity) being economically incented to ensure proper operation, plus structural features to provide additional assurances (e.g., O&M reserves, equipment warranties, etc.).

POWER SOLD TO RESIDENTIAL OR SMALL COMMERCIAL CUSTOMERS. Here, the structure will have a similar credit profile to most residential solar asset securitizations, where PPAs (or leases) for rooftop solar are bundled into investment-grade debt vehicles. In these financings, there are numerous generation assets, each deployed under a long-term arrangement to a residential or commercial customer with a minimum level of creditworthiness required. The long-term agreements, in the form of subscriptions (micro-PPAs) or leases, provide a certain level of cash-flow stability. However, because some portion of the contracted residential customers are unlikely to remain in place for the full 20-year contract (e.g., homeowners move and the new residents assume monthly payments for rooftop solar), debt capital and tax equity providers are likely to assume that the credit profile of the pool of customers changes over time. This risk is mitigated somewhat by the level of diversification in the customer base, with defaults likely spread out over the term of the transaction (and potentially addressed through various forms of credit enhancement). Although this risk is inherent in all residential solar pools, the data accumulated to date suggests that this risk has not yet had a materially adverse impact on performance under residential solar contracts. For example, the cumulative loss rates on billings of national solar installation companies such as SolarCity and Sunrun have been running at less than 1 percent.

In these structures, high levels of debt financing are common, with debt capital providers attracted to both the level of customer diversification and the stability of long-term cash flows. As with typical project finance transactions, performance risk is normally mitigated through the sponsor (retaining the first-loss equity) being economically incented to ensure proper operation and maintain full subscription levels, and providing structural features to ensure additional assurance (e.g., reserves, warranties, etc.). Tax equity is normally incorporated into these structures as well.

INNOVATIVE FINANCING

Beyond the traditional solar financing options described above, some in the CSS sector have focused on financing customer acquisition of shares in a CSS project, rather than financing the asset itself. This approach is relevant where individual community members make an initial investment in the CSS system and then go on to enjoy their portion of the revenues earned from selling solar power, until either the project ends its useful life or the community member sells his or her interest in the project.

While this model addresses the desire in some communities for local or shared ownership and helps capitalize smaller projects that may not otherwise attract third-party financing, its obvious detraction is that it can be accessed only by those community members with sufficient means to make the upfront investment and utilize the tax attributes of clean-energy investments. However, consumer financing of the upfront investment may be a way to broaden accessibility. Still, there are unresolved issues to manage, including complex U.S. Securities & Exchange Commission regulation (notwithstanding recent JOBS Act-enabling legislation for these types of investments) and a nascent market where the resale value of shares in CSS assets may be difficult for lenders to value.

CSS may offer a dividend to local, regional, and national investors interested in investing in local solar access and the job creation, possible economic savings, and environmental benefits that accompany it. By virtue of its ability to provide these benefits, CSS can offer unique benefits to investors with community-oriented investment appetites. These opportunities fall into roughly three buckets:

COMMUNITY REINVESTMENT ACT OBLIGATIONS

- Value: $0.10/w, or ~$0.0065/kWh
- For regulated banking institutions that provide low- and moderate-income access to economic savings and/or significant community benefits, in the form of neighborhood stabilization, revitalizing distressed neighborhoods, or stable long-term job creation

NEW MARKETS TAX CREDIT OPPORTUNITIES

- Value: $0.55/w, or ~$0.0325/kWh[iii]
- Projects must be located in distressed census tracts
- Investment receptacle must be a “solar energy manufacturing or installation company that is a qualified, active low-income community business”
- Bank must have invested sufficient capital in a qualified community development entity (CDE), such as a CDFI, in recent years eligible for use in these projects
- Industry contacts tell us this is increasingly oriented toward rural market opportunities

[iii]These values are based on assumed system prices of $1.75/watt and a 14.5% capacity factor.

NEW MARKETS TAX CREDITS CASE STUDY: MAIN STREET POWER AND DENVER PUBLIC HOUSING AUTHORITY[4]

In an innovative transaction with the City of Denver, Main Street Power used New Markets Tax Credits (NMTCs) to install 1 megawatt (MW) of solar PV on a number of city buildings. At the time, the city paid approximately $0.08–0.09/kWh for its electricity. As a result of this finance structure, the City could reduce its cost of electricity for low-income housing by more than 50 percent.

TABLE 2

DENVER'S NMTC PROJECT DETAILS

Number of Solar Installations	13 (11 Qualify for NMTC)
Total Installed Capacity	1 MW
Length of PPA	20 Years
PPA Price (Year 1)	<$0.045/kWh
Annual Rate That PPA Price Will Increase	<5%/yr
Upfront Capital Cost to the City	$0
Estimated Savings to Denver over a 20-Year Period	$400,000

Source: NREL

COMMUNITY DEVELOPMENT FINANCIAL INSTITUTIONS (CDFIs)

- CDFIs can play a critical role in providing financial and other services to low-income households, often providing financing under advantageous terms (i.e., despite high debt-to-income, mortgage loan-to-value ratios). CDFI participation can have two beneficial outcomes:

1. Helping the solar market get more accurate information on customer default risk

2. Designing more attractive offerings, such as the YourFirst mortgage offering, recently announced by Wells Fargo and developed alongside Fannie Mae and Self Help, to reduce down payments while using a broader pool of information to assess debtor risk

COMMUNITY OWNERSHIP

One dimension of the CSS opportunity is a community's desire to have not only CSS, but community-owned solar (i.e., interests held by local businesses and households, rather than by a commercial developer). This objective may be borne out of a desire to control generating assets, or to reinvest the economics of asset ownership into the local community. There are, however, a number of potential issues associated with community ownership that should be highlighted:

- **Tax ownership:** If community members own the solar installation, it is possible that the tax attributes (i.e., ITC and accelerated depreciation) may not be fully utilized by such owners. Without efficient monetization of these benefits, the economics of the project will be negatively impacted. This issue may be addressed by having local tax equity providers participate in the transaction, or, if necessary, engaging parties outside the local community to provide only that portion of the capital structure (see "Combining Tax Equity with Debt Financing of CSS Projects," on the next page).
- **Cost of capital:** Depending on the resources and creditworthiness of community members, they may need to borrow money in order to make their proportional investment in CSS. If their cost of capital is higher than is otherwise available from commercial solar developers or other market participants, the net cost of the solar energy will be higher (all else being equal).
- **Alignment of interests:** If community members own the equity of a CSS project, they may find that their interests are not fully aligned with potential third-party debt providers. For example, community members may seek to set a very low price for short-term subscription agreements to lower their prices as power consumers, while debt capital providers may seek to price subscription agreements at a higher level to ensure adequate cash flows available to service the debt. This risk may be eliminated in structures where the community provides the entire capital structure.
- **Investment risk:** All investments involve a level of risk, and community members that invest in CSS are taking certain risks. These include: return risk (receiving less money than originally expected), liquidity risk (inability to sell the investment when desired), and tax risk (realizing lower after-tax returns because of changes in tax law or the taxpayer's financial position).

If these concerns can be addressed, community-owned solar can be a very attractive method of financing, as it can create an even greater alignment of interests among stakeholders. In the near term, however, we believe that the economics of CSS will likely be more attractive when owned primarily by commercial solar developers and/or their financing partners.

Over time, hybrid ownership models may bring the best of both worlds. One example is a structure in which commercial solar developers fund projects, and community members have an opportunity to acquire an economic interest in the project over time (once projects have been successfully financed and tax attributes exhausted). As crowdfunding and SEC-approved retail investment platforms develop and the project development process evolves, community members may find more opportunities to contribute more cost-effective capital. This capital could come in the form of equity, for example, providing an opportunity to reduce the levelized cost while earning a return on the asset from which they buy electricity.

COMBINING TAX EQUITY WITH DEBT FINANCING OF CSS PROJECTS

The most efficient means of monetizing the tax benefits incident to CSS is to “sell” the tax benefits to third-party corporate tax equity investors with sufficient tax exposure to utilize the ITC and accelerated depreciation effectively. Tax equity has typically comprised 40–50 percent of the total capital structure of residential or commercial and industrial (C&I) solar portfolios, and the existence of tax equity has complicated the use of both conventional bank debt and securitization debt for solar assets.

The sources of friction between tax equity and debt holders are: (i) pledge of solar assets to secure debt can result in foreclosure upon default, resulting in recapture of the tax benefit; (ii) the solar developer is required to indemnify tax equity against certain tax risks, such as IRS challenge to basis used for computing ITC, resulting in (if enforced) loss of revenues otherwise available to pay debt service; and (iii) tax equity requires control rights over certain decisions relative to the solar fleet, and tax equity investors’ interests are not always aligned with debt holders’ interests.

An added friction point that tax equity creates in the context of CSS projects is that it further disperses the community of interests that is one of the benefits of CSS, by placing certain decisions outside the control of the solar users. However, thought should be given to legal structures that preserve some autonomy to the community of solar users while at the same time harmonizing the interest of debt holders and tax equity investors.

Some options worthy of consideration are: (i) inverted leases, or lease pass-through structures for bringing tax equity into the CSS projects, under which the tax equity investors participate only in a master lessee position and the solar project owners participate solely in the master lessor position, thus removing the tax equity investors from direct participation in the control of the solar assets and freeing the owner/master lessor side of the fence to adopt a governance system as well as a debt financing structure that meets their own needs; and (ii) use of a co-op structure that permits centralized management of the CSS project while preserving a stake for the community of customers who are using the solar power generated by the solar power systems.

It should also be noted that several of the residential solar securitizations have used a back-leverage structure as a workaround where tax equity is embedded in the entity owning the solar assets through a partnership flip structure. In a back-leverage structure, the only assets pledged to secure the securitization are the sponsor’s rights to receive cash distributions from the tax equity partnerships, thus leaving the solar assets themselves unencumbered by the debt. These structures have received investment grade ratings, thus suggesting that financings secured by interests in the entities owning the CSS assets as opposed to the CSS assets themselves should be viable, as long as adequate protections exist to prevent diversion or disruption of cash flows away from the ownership interests representing the collateral pool.

SCALING UP FOR SECURITIZATION

Since securitization offers the lowest cost of funding for solar projects, there is a strong incentive to access the asset-backed securities (ABS) market for CSS projects. However, to do so will require aggregation of a critical mass of CSS projects adequate to provide a sufficiently large and diverse pool of solar offtakers to support a statistical analysis that concludes that repayment of principal and interest are sufficiently likely to support an investment grade rating (unless a creditworthy offtaker is interposed into the structure) and to absorb the relatively high transaction cost of securitization. This requires the creation of cost-effective aggregation facilities, either in the form of bank-sponsored or government agency-sponsored warehouse facilities; collateralized loan obligation-like structures where single asset managers aggregate multiple CSS projects under the same fund structure; or multi-issuer ABS structures in which multiple CSS developers come together in a common form of financing, using a pass-through trust as the issuer, to achieve the required scale.

03 COMMUNITY-SCALE SOLAR RISK MANAGEMENT

COMMUNITY-SCALE SOLAR RISK MANAGEMENT

THE BENEFITS OF FINANCING CSS

It is important to highlight some of the key benefits of financing community-scale solar as compared with other solar-financing models. These include:

CUSTOMER RETENTION: The lower cost of solar installation and development can be an important risk mitigant to customer acquisition and long-term attrition. Should the market pass the value of improved cost-effectiveness to customers, it would reduce the likelihood that customers will fail to purchase the solar energy produced now or in the future (or will default on any long-term agreements in place).

DIVERSIFICATION OF CUSTOMER CREDIT RISK:
CSS may have multiple customer types (and many customers in each customer type), and may be structured from the outset (e.g., via virtual net metering) to accommodate a varied pool of offtakers. Prices may be categorically defined for different customer segments, balancing offtaker credit profile and the local electricity price to beat for each segment. Effective management of different offtakers would allow for the prompt transfer of power purchase obligations when necessary—an important mitigant to customer defaults.

STRONG ALIGNMENT OF LOCAL INTEREST:
By having the power produced and consumed in the same area, there may be a stronger alignment between parties. Customer defaults will impact the economics of the community generation assets, while performance issues will impact the local customers. Moreover, CSS assets may create workforce-training opportunities, offer resilience benefits where energy can be used locally, or minimize the adverse health consequences of polluting energy sources that would otherwise be used in the community. These factors may create an environment where local stakeholders are more likely to quickly resolve any issues that are mutually harmful (e.g., those caused by a force majeure event).

PROFESSIONAL MANAGEMENT: Compared to rooftop solar, the scale benefits of CSS allow for simplified and cost-effective professional management to ensure that the system is operated and maintained properly. This reduces the performance risk, which increases the reliability of the cash flows from the CSS project.

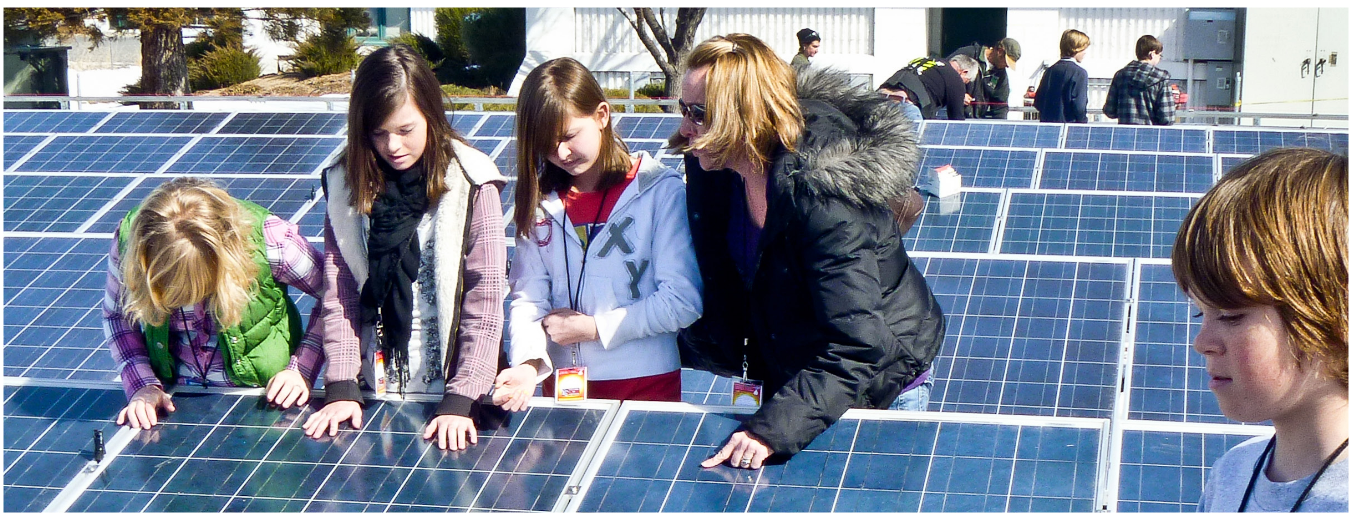


Image courtesy of Black Rock Solar. Field trip to The Children's Cabinet with Zephyr Cove Elementary

RISKS TO KEEP IN MIND

As noted, CSS projects can take many forms, with both short- and long-term offtake contracts. Where long-term, essentially fixed-price PPAs are in place with all customers, the financing will look similar to other credit pass-through transactions (if the customers are utilities or other large creditworthy entities) or residential solar asset securitizations (if the customers are small and diversified). However, there are important areas where the structures may differ:

CUSTOMER ACQUISITION: In retail electricity markets, customer acquisition adds complexity to CSS, especially as it relates to securing construction finance. Project sponsors who haven't already acquired significant numbers of residential customers may be required to phase the construction stages of a project in parallel with customer acquisition, drawing down on credit facilities only after sufficient levels of customers have been secured. This arrangement can add cost in the form of additional interest expense or rate volatility during construction.

SHORT-TERM SUBSCRIPTION AGREEMENTS: In some cases, CSS customers may enter into agreements to procure power over a shorter term (e.g., one to five years) than the term of the financing (up to 20 years). At the end of their contract term, customers may renew the contract at a similar rate (leaving debt capital providers in a similar position), or the contract may be renewed at a different rate (higher or lower, depending on prevailing market prices) with the same or a different customer. The potential to serve multiple customer profiles can create complexity and uncertainty for lenders and tax investors, as well as rating agencies for rated executions (i.e., securitizations).

Well-structured CSS arrangements should have "subscription agents" (or similar entities) in place with experience in marketing solar or other electricity projects, managing customer relationships, and handling these renewals. Subscription agents should have an economic incentive to manage the pool of contracts so as to maximize the cash flows available to the debt and tax equity capital providers (or should be directed by capital providers with such incentives).

One possible structural enhancement to address this issue is to create a subscription cushion. This can be achieved by requiring a minimum number of wait-listed customers who can replace subscribers who don't renew their contracts. Another approach is to initially grant subscribers a contractual amount less than their requested demand and revise that figure upward if there is a drop-off in subscribers at any point. These approaches can allow project sponsors or subscription agents to internalize the risk of customer default, up to a certain level, such that those defaults can be managed without interrupting cash flows.

Another strategy is to contract with a creditworthy anchor tenant under a long-term PPA for a meaningful percentage of the project's output. This arrangement helps secure a significant portion of the project's revenues for the entire financing period, leaving a more manageable price risk for any portion of the output that is subject to shorter-term contracts. A more robust alternative to this strategy is to enter a master lease/master PPA with a creditworthy counterparty (i.e., an electricity retailer) or anchor tenant that then enters subcontracts with individual customers and, depending on the anchor's incentives, charges a markup for taking the credit risk. (This structure has been used in dormitory financings and is, of course, the basic framework for multifamily housing finance.)

INTERFACE WITH DISTRIBUTION UTILITY: Customers should be able to smoothly transition their generation procurement to or from CSS assets. In order to ensure no delays in the collection of customer charges and to promptly transfer obligations in the event of a customer default, the CSS asset developer or subscription agent should have established protocols with the distribution utility. Additionally, the public utility commission in that jurisdiction should have well-designed rules governing the utility's role in these transactions. In partially or fully regulated markets, distribution utilities may serve as the counterparty to a PPA and feed solar generation into the overall supply mix.

ELECTRICITY PRICE/MARKET RISKS: Where customers procuring power from a CSS project enter into long-term fixed-price agreements, the risk associated with competing supply sources is no greater than with utility-scale or rooftop-solar financings with similar fixed-price PPAs. If, however, customers enter into short-term subscription agreements, there is a risk that prices from competitive supply sources decline significantly. This could make it difficult to renew existing customers or acquire new ones at then-current CSS rates, or require the asset developer or subscription agent to lower the price. Either of these effects could reduce returns to capital providers in CSS projects.

This risk will be highly dependent on competing electricity prices in their region. For CSS projects that are initially "in the money" (i.e., providing energy at lower costs than the local tariffed rates), the risk is that tariffed prices decline over time to a point where that is no longer the case, and CSS project owners are eventually forced to adjust their prices downward to remain competitive. While this is a risk, there are several mitigating factors:

- **Power prices are, over time, generally expected to increase.** While power prices may move up or down from year to year, several studies and forecasts have suggested that real power prices are likely to increase over the longer term.[iv] Electricity prices are a function of both the costs of generation and of transmission and distribution. Generation costs overall may decline given expected decreases in the cost of renewables, or if the cost of fossil-fuel generation (e.g., natural gas) declines further. However, transmission and distribution costs are likely to increase given the needed investments in aging infrastructure and modest or negative load growth that could increase costs on a per kilowatt-hour (kWh) basis.

- **CSS may also offer non-price benefits.** As noted above, CSS may offer a strong alignment with local interests. Accordingly, customers may be somewhat less sensitive to prices than might otherwise be the case. Nevertheless, the prices of CSS need to be relatively competitive with tariffed rates.

- **Rate decreases, if any, in tariffed electricity prices are likely to occur slowly.** Two of the objectives of rate design are to maintain stability and to practice gradualism. While generation prices may exhibit more dramatic changes (e.g., fuel price changes for conventional generation), transmission and distribution costs are largely fixed. Assuming, in the downside scenario for distribution-solar financiers, that tariffed electricity prices decline, CSS participants should have time to reformulate customer agreements, reduce servicing costs, or take other steps to ensure that returns to capital providers are not materially impacted.

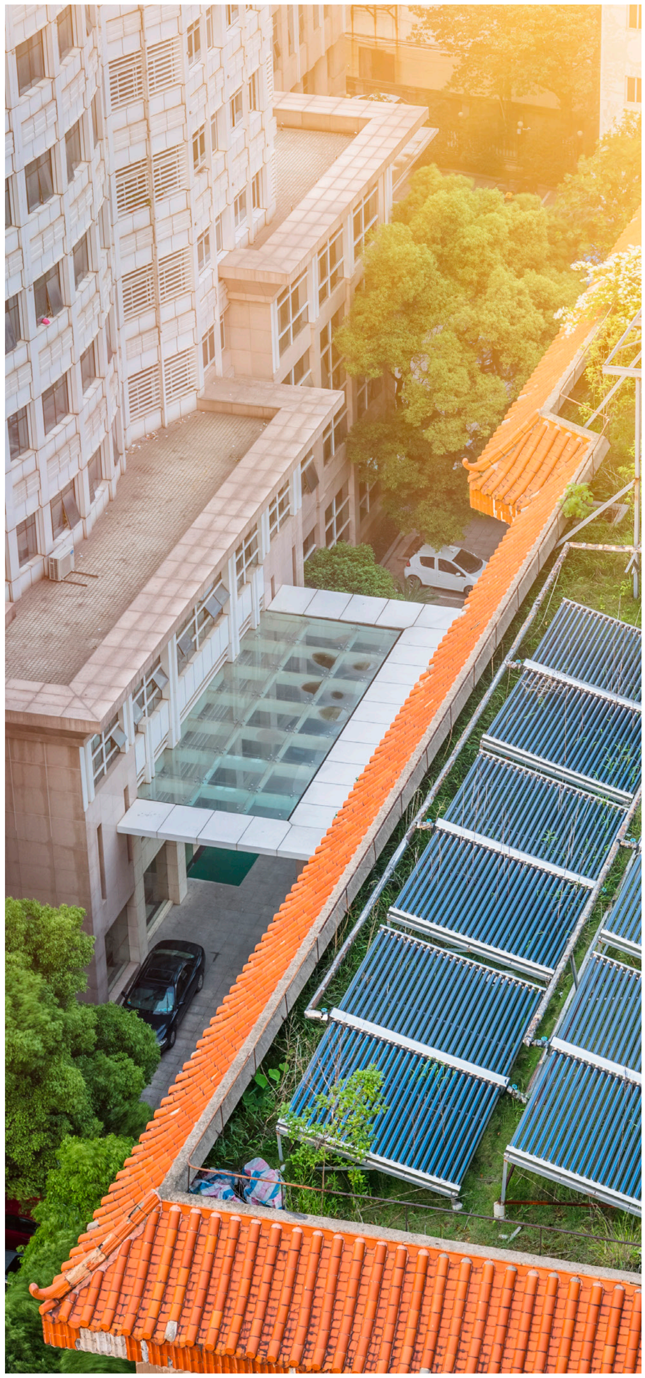
Well-structured CSS transactions will feature community asset solar developers or subscription agents that understand the pricing dynamics in the local market and can set prices under renewing subscription agreements at a level that minimizes attrition while ensuring sufficient cash flows to capital providers. Debt financings will likely include covenants that would allocate more of the available cash flow to creditors if cash flow deteriorates due to necessary price decreases. While each financing is unique, we believe that low-cost debt financing should

[iv] In its recent *Annual Energy Outlook 2016,* the Energy Information Administration forecasted that from 2015–2035 real average electricity rates will rise by 2.9%; residential rates by 6.5%; commercial rates by 1.9%; and industrial rates by 5.9%. **http://www.eia.gov/outlooks/aeo/pdf/0383(2016).pdf**

be available as financiers become increasingly familiar with this asset class. In the near term, CSS financings with a portion of the cash flows coming from long-term PPAs with creditworthy participants, and the balance from a revolving pool of shorter-term subscription agreements (or, as suggested above, the use of a master lease structure with a creditworthy master lessee), may reduce the level of credit risk perceived by financiers and rating agencies versus a structure backed entirely by short-term subscription agreements. This type of structure could accelerate further development of this market. However, it should be noted that a creditworthy offtaker is more likely to renegotiate rates (and to have leverage to do so) under a lease or PPA if grid rates reach parity or near-parity with solar rates than individual solar customers, and thus interposing creditworthy participants does not offer full protection against loss of the value proposition.[v]

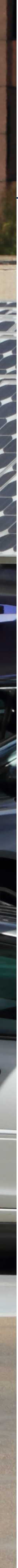
REGULATORY RISK: In many cases, CSS transactions rely on the continued existence of VNM in the relevant jurisdiction. Legal due diligence and appropriate documentation should help ensure that the risk of a regulatory change is minimal, and that it is appropriately mitigated.

While some states have enacted CSS-enabling legislation, recent regulatory actions in Arizona and Nevada, to name two prominent examples that negatively impacted net metering regimes, are likely to give potential CSS lenders and tax equity investors pause. Another risk comes in the form of net metering caps, which were recently reached in Massachusetts and which left many projects stranded in the development phase. In partially or fully regulated markets, where the power retailer purchases CSS power, investors may discount this risk entirely.



[v] In its "2016 Outlook—Solar Securitization Market to Grow in 2016 as Rooftop Solar Costs Continue to Drop," Moody's Investors Service stated, "Contract modification risk is greater for commercial solar contracts than residential solar contracts. Commercial customers, particularly medium-sized to large enterprises, have more resources than the average consumer, and their contracts typically involve larger dollar amounts. Therefore, these customers will often have more bargaining power to renegotiate or have greater incentive to litigate to change the contract terms, resulting in greater uncertainty."

04 PATHS TO GROWTH



PATHS TO GROWTH

CSS STAKEHOLDER OPPORTUNITIES

Capital providers who are already active in the solar sector are obvious financing parties for CSS projects given their existing comfort with the technology and ability to adequately assess the risk of offtake arrangements that are, in essence, a variation of what they are already financing. Such adaptation will be key to ensuring that such financing is readily available and sufficiently low cost so that this market can grow.

Following are areas CSS stakeholders should address in order to ensure sustained growth of this market:

COMMUNITY BUYERS:

- Develop a strong relationship with equity partners (developers and tax equity) in the local community.
- Involve local and regional banks that have demonstrated knowledge of, and comfort with, lending to members of the community.
- Adopt a realistic view of contracted power prices so that potential tax equity and debt providers can structure market-based financing packages.
- Partner with a creditworthy entity in the community (e.g., municipality, university, school, hospital) to be an anchor tenant for the project, which would mitigate some of the perceived offtake risk for financing parties.
- Identify impact investors or concessionary capital that may be interested in CSS not only for the clean-energy benefits, but also for other potential benefits (including workforce training, local health, and community resilience).

FINANCING PARTIES:

- Seek innovative financing solutions that may not be applicable in utility-scale or residential solar financings (e.g., Community Reinvestment Act, New Markets Tax Credits).
- Specify where additional credit enhancements are required, beyond effective offtaker profile structuring, to enhance customer access and ease customer acquisition costs.
- Create debt and/or tax equity funds that lend and invest in multiple CSS projects based on predetermined parameters. This approach would help reduce execution costs and speed up the flow of capital to such projects.
- Collaborate with government agencies (e.g., local development authorities, green banks) that may be interested in providing credit enhancement or a portion of the required financing given their mandates.

DEVELOPERS AND OTHER MARKET PARTICIPANTS:

- Understand the needs of financing partners when developing financing structures for CSS projects.
- Standardize financing models and documentation to reduce transaction costs and make such CSS financings more viable.
- Develop best practices for subscription management.
- Explore structuring blended offtaker profiles to both minimize revenue risk while selling power at attractive rates to different customer classes.
- Begin to accumulate data on subscription defaults and short-term contract renewal rates in order to better quantify such risks.
- Explore insurance or financial derivative solutions to address some of the risks particular to CSS that would then allow broader participation by capital providers.

REGULATION AND POLICY:

- Create and maintain a regulatory framework that supports at least (virtual) net metering, or at most, more progressive location-based distributed resource valuation efforts. Effective valuation of distributed resources, especially CSS, has proven critical to effective market operation.
- Utilities should recognize the price opportunity of CSS and work constructively with CSS projects on interconnection, billing, and other issues.
- Local policymakers may consider how traditional bill support (i.e., low-income home energy access program [LIHEAP] funding) may be made available to CSS customer bills to reduce the risk of payment default to developers.

JOIN US!

Rocky Mountain Institute's Shine program, with support of RMI's Sustainable Finance practice, is collaborating with all market participants to open up the CSS market. Our work includes:

- **Representing buyers:** We serve as a buyer's representative to rural electric cooperatives, as well as cities, counties, and municipalities, to strategically manage development risk and reduce soft costs to improve the attractiveness of projects.
- **Engaging market participants:** We identify the opportunities to refine innovative technical and financial offerings unique to this market segment in the following ways:
  - improve traditional investors' understanding of the segment through this report
  - refine offering provided by crowdfunding and retail investment platforms
  - support state green banks' objectives, such as market development
- **Gathering feedback from market participants:** We welcome your thoughts on the biggest barriers and opportunities to improve access to cost-effective finance in this segment.
  - Email our team at **Shine@rmi.org** to get in touch with thoughts, questions, and/or interest in collaboration!

AP

APPENDICES

APPENDIX A

SAMPLE PROJECT ECONOMICS

In this appendix, we provide an overview of how a term financing for a community-scale solar project might be structured.

Based on RMI's research, we have relied on the following parameters for our approach:

- System size: 15 MW
- System cost: $32.2 million ($1.87/watt)
- Capacity factor: 23%
- PPA rate: $0.08/kWh (with annual escalation)
- Tax equity model: partnership-flip

Based on a target return of around 8% (and, assuming no project-level debt), a tax equity investor would be willing to invest up to 50% of the project costs (~$16 million) in return for the Investment Tax Credit (equal to 30% of eligible project costs), accelerated depreciation benefits, and a share of the project's cash flows.

Of the remaining half of the project costs that are the developer's responsibility, between $8 million and $11 million (25% to 35% of total costs) could be financed through a back-levered loan, where the developer borrows a portion of its equity obligation against its right to distributions from the project company. The amount of the loan will vary depending on tenor, pricing, and other debt-sizing parameters. The balance of the project costs (between $5 million and $8 million) would come from developer equity.

Using these general parameters, an indicative summary of terms for debt financing is shown below. The exact terms will, of course, depend on the specific circumstances and will be subject to several factors, including market conditions.

APPENDIX B

SAMPLE COMMUNITY-SCALE SOLAR PROJECT TERM SHEET

Virtual Net Metered & "Shared Solar" Projects

TABLE 3, PART 1

INDICATIVE TERMS FOR PERMANENT FINANCING (DECEMBER 2016)

Borrower	A holding company owned (directly or indirectly) by Sponsor(s) that owns 100% of Project Company's Class B shares, established for the purpose of financing Community Distributed Generation ("**CDG**") solar arrays.
Project Company	A special-purpose entity established in connection with the development, financing, construction, acquisition, installation, ownership, operation, and/or maintenance of specified CDG solar array installations (each, an "**Eligible Project**"). Project Company's Class A shares are 100% owned by Tax Equity Investor, and its Class B shares are 100% owned by Borrower.
Revenue Contracts	The Project Company will enter into multiple Revenue Contracts, which may include: • One or more fixed-price, 20-year power purchase agreement(s) with a MUSH market entity and/or investment-grade corporate offtaker, for a portion of the Eligible Projects' aggregate output (the **"Anchor Revenue Contract(s)"**); and • Remote net metering credit agreements with Members (defined below), which may be of varying contractual periods, though not less that one (1) year (the "**Member Revenue Contracts**").
Members	The counterparties to the Member Revenue Contracts. Members (both residential and C&I) must satisfy the predetermined criteria agreed to by Sponsor(s), Tax Equity Investor, and Lender.
Term Loan	A senior secured term loan for financing or refinancing capital costs of Project Company.

TABLE 3, PART 2

INDICATIVE TERMS FOR PERMANENT FINANCING (DECEMBER 2016)

Eligible Project	Each Eligible Project shall satisfy certain criteria including: i. Located in the specified region and meets the requirements of being a CDG solar project; ii. Has completed construction, has been interconnected to the utility grid, and has commenced commercial operation; iii. Is subject to an operations and maintenance agreement reasonably satisfactory to the Lender; iv. Meets the criteria of the Tax Equity Investor and Lender, and has obtained all relevant permits; v. Has made arrangements with the applicable utility to administer and allocate utility billing credits; vi. Has executed the Anchor Revenue Contract(s) and Member Revenue Contracts that, in the aggregate, represent not less than [90]% of the Eligible Project's expected production in its first year of operations; and, on a continuing basis, not less than [90]% of the trailing 12 months of the Eligible Project's expected production; vii. Noninvestment grade or unrated C&I Members shall constitute no more than [20]% of Project Company's aggregate output; and viii. The residential Members of the Eligible Projects shall meet the reasonable predetermined criteria (e.g., no personal bankruptcies, no delinquent utility bills outstanding, appropriate disclosure of subscription agreement term and conditions) agreed to by Sponsor, Tax Equity Investor, and Lender.
Maturity Date	Up to 20 years, depending on the Borrower cash flow profile.
Sample Debt Sizing Parameters	• Projected cash flow of Borrower through the Maturity Date upstreamed from Project Company, including (i) cash flow from Revenue Contracts that are executed as of the Financial Close Date and (ii) estimated cash flow from Revenue Contracts that are to be signed or recontracted after the Financial Close Date based upon an agreed-upon conservative price methodology. • Term Loan to be fully amortized by the Maturity Date. • Servicing and interest costs as defined in the relevant agreements. • Minimum/Average Debt Service Coverage Ratios based upon Borrower cash flow profile and market conditions.
Security	The Term Loan shall be secured by the following: • A pledge and perfected first priority lien on 100% of Borrower's direct or indirect equity interest in Project Company; • A pledge by the Sponsor and perfected first priority lien on 100% of its equity interest in the Borrower; • Following exercise of a Tax Equity Investor buy-out with respect to the Borrower, a first priority lien in all assets of Project Company.

TABLE 3, PART 3

INDICATIVE TERMS FOR PERMANENT FINANCING (DECEMBER 2016)

Reserves	Including, but not limited to a debt service reserve, operations and maintenance reserve and inverter replacement reserve.
Credit Facility Covenants	The Term Loan will include usual and customary Borrower covenants, subject to customary cure periods.
Mandatory Prepayment	On each payment date, Borrower shall recalculate the Term Loan amount by re-running Project Company's base case projections, adhering to the Debt Sizing Parameters, and updating only the revenue figures associated with the cash flow from Revenue Contracts executed after the financial close date. To the extent the recalculated term loan amount is less than the Term Loan amount then outstanding, Borrower shall make a mandatory prepayment equal to the difference between the Term Loan amount then outstanding and the recalculated Term Loan amount. The loan documents will also contain mandatory prepayment provisions usual and customary for transactions of this type.
Distribution Conditions	Distributions conditions shall include, but are not limited to: • No event of default (as customarily defined); • A minimum DSCR (to be negotiated based upon Borrower cash flow profile); and • Project Company has executed Revenue Contracts with Members that represent not less than 90% of the Project Company's original base case revenue projections for the following 12 months (decreased by any reductions in required revenues due to any accelerated repayment of debt or related reductions in interest costs).
Events of Default	Usual and customary for a transaction of this type, including customary exceptions, cure periods, and materiality thresholds: (e.g., bankruptcy, breach of representations, warranties and covenants, etc.).

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ENDNOTES

ENDNOTES

[1] Galen L. Barbose and Naïm R. Darghouth, *Tracking the Sun IX: The Installed Price of Residential and Non-Residential Photovoltaic Systems in the United States* (Lawrence Berkeley National Laboratory, August 2016), LBNL-1006036, https://emp.lbl.gov/publications/tracking-sun-ix-installed-price.

[2] "Electricity Explained: Factors Affecting Electricity Prices," U.S. Energy Information Administration, last reviewed November 25, 2016, http://www.eia.gov/energyexplained/index.cfm?page=electricity_factors_affecting_prices.

[3] David Feldman, Anna M. Brockway, Elaine Ulrich, and Robert Margolis, *Shared Solar: Current Landscape, Market Potential, and the Impact of Federal Securities Regulation* (National Renewable Energy Laboratory, April 2015), NREL/TP-6A20-63892, http://www.nrel.gov/docs/fy15osti/63892.pdf

[4] NREL Energy Analysis, *Financing Solar Installations with New Markets Tax Credits: Denver, Colorado* (National Renewable Energy Laboratory, September 2010), NREL/FS-7A2-49056, http://www.nrel.gov/docs/fy10osti/49056.pdf.

[5] Hilary Burns, "Wells Fargo's New Mortgage Program Offers Low Down Payments, No Government Backing," *Charlotte Business Journal*, May 7, 2016, http://www.bizjournals.com/charlotte/news/2016/05/27/wells-fargos-new-mortgage-program-offers-low-down.html.

[6] James Sherwood et al., *A Review of Alternative Rate Designs: Industry experience with time-based and demand charge rates for mass-market customers* (Rocky Mountain Institute, May 2016), http://www.rmi.org/alternative_rate_designs.

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