

**Emerging Solar Lending Opportunities for
Community Development Financial Institutions**

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INTRODUCTION

In 2012, Self-Help Credit Union and Ventures Fund, a national community development financial institution (CDFI) headquartered in Durham, North Carolina, faced an unusual opportunity in its commercial lending department. A young, small company requested financial assistance to build a biomass energy production facility in a rural, Western area of the state.¹ With a mission to create and protect ownership and economic opportunity for all, Self-Help focuses on low-wealth, minority and underserved communities and families.² Financing a biomass facility aligned with the organization's values based on its potential to create sustainable economic and employment growth in a rural, high-poverty area. The loan opportunity was likely to be denied by traditional lenders for its risk and complexity, and was unprecedented for Self-Help.

After months of due diligence, underwriting, and ultimate credit committee approval, permitting and technical challenges halted progress on the biomass facility. However, another project with the same rural developer grew from the ashes: a utility-scale solar photovoltaic (PV) installation. After the significant research and policy analysis Self-Help had completed on financing clean energy, the transition to different, simpler technology and the same borrower was manageable. The loan was completed, and a new sector of commercial lending began for the CDFI.³

Financing and investment structures in solar development are maturing. Community development financial institutions (CDFIs) and other mission-focused lenders have opportunities to fund solar photovoltaic (PV) projects with debt, but this lending can be challenging. A National Renewable Energy Laboratory (NREL) review found renewable energy lending to be limited due complexity.⁴ Loans are typically large, with unusual collateral valuation requirements, negotiation of intercreditor agreements, and new standard-setting required for assessing default risk.

Despite these obstacles, in 2013 and 2014, Self-Help Credit Union in Durham, North Carolina provided \$76 million in debt financing for solar electricity development.⁵ These installations occurred as the solar industry soared; with growth over five years from 1.2 gigawatts (GW) to

¹ Susan Andrew, "Vice Mayor's company receives \$5 million loan for bioenergy installation at poultry producer," *Asheville Mountain Express*, November 11, 2011, <https://mountainx.com/news/community-news/vice-mayors-company-receives-5-million-loan-for-bioenergy-installation-at-p/> (accessed April 19, 2015).

² Self-Help Credit Union, *Our Mission*, <http://www.self-help.org/about-us/about-us/our-mission.html> (accessed April 19, 2015).

³ Dale Neal, "Taking a bright idea and electrifying the world," *Asheville Citizen-Times*, March 10, 2013, <http://www.flsenergy.com/index.php/2013/138-taking-a-bright-idea-and-electrifying-the-world> (accessed April 19, 2015).

⁴ Claire Kreycik, "New Options Increase Capital for Community-based Renewable Energy," *NREL*, June 13, 2011, <https://financere.nrel.gov/finance/content/new-options-increase-capital-community-based-renewable-energy> (accessed April 19, 2015).

⁵ Email correspondence with Melissa Malkin-Weber, Self-Help Credit Union Sustainability Director, April 22, 2015.

18.3 GW of operational solar, the U.S. solar market value will exceed \$15 billion in 2015.⁶ Continued annual growth averaging 7.5% through 2040 is projected, setting the technology on track to become a primary generation source with 48 GW of capacity.⁷

State and federal incentives shape both utility-scale solar growth and financing models, which often include developer project equity, tax equity, and debt. In North Carolina, a corporate state tax credit for renewable generation expires at the end of 2015.⁸ A decrease in the federal solar Investment Tax Credit (ITC) from 30% to 10% also looms at the end of 2016.⁹ As the industry matures and subsidies decline, companies are exploring new financing solutions with different parallels to more familiar asset classes such as real estate, infrastructure, stocks, and esoteric asset-backed securities, prompting a wider range of investors to enter the field.¹⁰ Self-Help and other CDFIs are poised for impact due to familiarity with tax-credit incentivized deals with project-level finance; solar incentives are structurally similar to community development real estate transactions that utilize New Markets Tax Credits (NMTCs) and Low-Income Housing Tax Credits (LIHTCs).

Nationally, banks, CDFIs, and other mission-focused lenders are now beginning to provide both construction and term debt to solar developers as part of a project finance model for utility-scale projects large enough to warrant the complexity of these transactions or portfolios of smaller installations.¹¹ Participation is growing in both scale and scope.¹² In 2014, 94 banks engaged in some type of energy project finance, a 20% increase from 2013.¹³ Half of contributing banks were small players similar to Self-Help, with overall levels of activity less than \$200 million each.¹⁴ Some of the largest recent examples of project finance for solar development are Seminole Financial Services, Hannon Armstrong, National Cooperative Bank (NCB), and a variety of European and Japanese commercial banks.¹⁵ More providers are needed as the U.S. solar industry

⁶ Eric Wesoff, "Solar Summit Slide Show: The Evolution of Solar," *Greentech Media*, April 15, 2015,

<http://www.greentechmedia.com/articles/read/Solar-Summit-Slide-Show-The-Evolution-of-Solar> (accessed April 19, 2015).

⁷ U.S. Energy Information Administration, *Annual Energy Outlook 2015*, April 14, 2015, http://www.eia.gov/forecasts/aeo/MT_electric.cfm (accessed April 19, 2015).

⁸ North Carolina Department of Revenue, *Guidelines for Determining the Tax Credit For Investing in Renewable Energy Property*,

http://www.dor.state.nc.us/taxes/corporate/renewable_energy_credits.pdf (accessed April 19, 2015), page 4.

⁹ NC Clean Energy Technology Center, *Commercial Guide to the Federal Investment Tax Credit for Solar PV*, March 2015, http://solaroutreach.org/wp-content/uploads/2015/03/CommercialITC_Factsheet_Final.pdf (accessed April 19, 2015).

¹⁰ Stefan Linder and Michel Di Capua, "US Solar White Paper: Re-imagining US Solar Financing," *Bloomberg New Energy Finance*, June 4, 2012, page 13.

¹¹ Chris Groobey et al, "Project Finance Primer for Renewable Energy and Clean Tech Projects," *Wilson Sonsini Goodrich & Rosati*, August 2010,

https://www.wsgsr.com/PDFSearch/ctp_guide.pdf (accessed April 19, 2015), page 9.

¹² Chadbourne, *Project Finance NewsWire: Cost of Capital: 2015 Outlook*, February 2015, http://www.chadbourne.com/files/Publication/0642096e-a001-47d8-86d4-e08b5eaa1eb9/Presentation/PublicationAttachment/8368c0f0-1b12-4b01-8c03-e2beda6271f9/pfn_0215.pdf (accessed April 19, 2015), page 6.

¹³ *Ibid.*

¹⁴ *Ibid.*

¹⁵ Mohammed Alam, et al. "Advanced Renewable Energy Project Finance," *Ahya Renewable Energy Finance – Infocast Conference*, 2011, slide 2.

gears up to grow from 10 GW 2015 to more than 16 GW by 2017.^{16 17} Other community financial institutions and lenders may use Self-Help’s experience as a springboard for action and make real impact in the industry, as including debt in the financial structure for development can reduce leveled costs of solar electricity by 20% or more.¹⁸

In its first section, this report reviews CDFI missions and how partnership between these groups and the solar industry creates mutual benefit, including environmental health, economic growth, social good, CDFI returns, and sustainable investment influence. In its second section, the experience of both environmental justice and clean energy leadership in Warren County, North Carolina is noted as a case study of these current and potential impacts. In its third section, this report provides a solar finance primer for use by both community lenders and the solar industry, including project-level finance background, structures, sources, budget components, and projections. In its fourth section, the report describes the project-level risks a CDFI must mitigate in order to lend successfully. The accomplishments of Boston Community Capital, a Boston-based CDFI, are highlighted as a case study in the report’s fifth section. Next, the report describes collateral review for solar lending, including valuation, appraisals, intercreditor agreements, and other risk mitigation. In the seventh section, the report outlines the potential for solar development to benefit minority farm owners. Then, despite CDFI solar lending promise, barriers are reviewed in the report’s next section, including the current complexity of deal structure requiring industry-specific knowledge and human capital at CDFIs, collateral limitations, scale, and intercreditor agreements. The report concludes with information on the potential for future CDFI leadership with next steps including unconventional repayment terms, community solar models, loans with non-rated private off-takers, and other opportunities.

REPORT OBJECTIVE

This report assesses commercial solar lending impact, process, barriers, and promise, with focus on information relevant to CDFIs and other small institutions. Newly established practices are explained, including loan structures, underwriting approaches, collateral considerations, valuation methods, policy tools, risk mitigation, and credit enhancement opportunities. Next steps to overcome challenges and make successful partnerships are recommended.

¹⁶ Energy.gov, *Map: Watch 30 Years of U.S. Solar Industry Growth*, January 30, 2015, <http://energy.gov/articles/map-watch-30-years-us-solar-industry-growth> (accessed April 19, 2015).

¹⁷ Mohammed Alam, et al. “Solar Power Finance & Investment Summit,” *Alyra Renewable Energy Finance - Infocast Conference*, 2012, slide 7.

¹⁸ Michael Mendelsohn, et al. “The Impact of Financial Structure on the Cost of Solar Energy,” *NREL*, March 2012, <http://www.nrel.gov/docs/fy12osti/53086.pdf> (accessed April 19, 2015), page iv.

MISSION IMPACT

CDFIs are not-for-profit financial institutions formed to open capital markets to underserved communities.¹⁹ A board of directors composed of community members controls a CDFI, as opposed to stockholders seeking a return on investment, and makes decisions for the benefit of the community being served.²⁰ CDFI status was officially established in 1994 when the Clinton administration created the Community Development Financial Institutions Fund (CDFI Fund) as a division of the Treasury Department and charged it with supporting the industry.²¹ As can be seen below, a number of CDFI entity types exist, with the most popular being a loan fund.

	CDFIs	All in Industry
Loan Funds	572	?
Credit Unions	~ 197	7,503
Banks	~ 72	6,838
Bank Holding Companies	~ 46	3,984
Venture Funds	25	462
Total	~ 912	

By definition, a CDFI takes into account mission impact in all of its actions, whether underwriting a single loan or considering entering a new lending sector. Opportunity Finance Network (OFN), the leading network of CDFIs, refers to this approach as performance-oriented, responsible investing focused on benefiting low-income, low-wealth, and other disadvantaged communities.²³ Combined, CDFI impact is large; OFN members directed more than \$30 billion to these communities through 2011.²⁴ By OFN's analysis, lending to underserved groups often overlooked by conventional banks is smart both in terms of economic justice and financial return. OFN members report cumulative net charge-off rates of less than 1.7%.²⁵

¹⁹ Jessica Gordon Dembhard, "Community Based Asset Building: the Role Played by Credit Unions, Cooperatives, and other Community-Owned Businesses," *Howard University*, 2013, <http://www.coas.howard.edu/centeronraceandwealth/reports&publications/0413-community-based-asset-building.pdf> (accessed April 19, 2015), page 8.

²⁰ *Ibid.*

²¹ Sarah Wolff and Janneke Ratcliffe, "The Role of Community Development Financial Institutions in Home Ownership Finance," *The CDFI Fund*, October 2008, http://www.cdfifund.gov/impact_we_make/research/subprime-mortgage-market/reports/The%20Role%20of%20Community%20Development%20Financial.pdf (accessed April 19, 2015), page 3.

²² Michael Swack, et al, "CDFI industry analysis," *The Carsey Institute at the Scholars' Repository*, 2012, <http://scholars.unh.edu/carsey/166> (accessed April 19, 2015).

²³ Opportunity Finance Network, *About Opportunity Finance Network*, <http://ofn.org/about-opportunity-finance-network> (accessed April 19, 2015).

²⁴ *Ibid.*

²⁵ *Ibid.*

Three separate but complementary views exist as to why CDFIs should enter new financing sectors.²⁶ One is to supplement traditional banks, thereby enhancing access to other capital.²⁷ Another is to innovate new market mechanisms, test them, and persuade traditional lenders to adopt these solutions.²⁸ A third argument is that CDFIs should be a competitive alternative to traditional banks, coexisting and gaining market share in traditionally underserved areas over the long term.²⁹ All three approaches are relevant and possible in the future of solar finance, as CDFIs may supplement, influence, and coexist with traditional financing.

Lending for solar development benefits low-wealth communities in different ways than other traditional CDFI lending sectors. These benefits include environmental health, economic growth, and social benefits. Loans for solar development are also a responsible way for CDFIs to put their capital to work.

A. Environmental Health Benefits

Historically, environmental health disparities exist between low-income communities and wealthier ones.³⁰ The Center for Disease Control defines these health disparities as the preventable differences in opportunities to gain optimal health that socially disadvantaged populations experience.³¹ Pollutant emissions from electricity production contribute to these health disparities, as they affect both localized air quality and the global climate.³² Nationally, the monetary value of these adverse effects of pollution from electric power generation surpasses \$74 billion per year.³³ Coal-fired power plants cause the majority of these damages by emitting \$35.9 in damages for every megawatt-hour (MWh) generated.³⁴ When cleaner technologies, including utility-scale solar generation, displace conventional sources, a regionally varying reduction in emissions occurs that ranges from \$10/MWh in the Southwest up to 100/MWh along the East Coast.³⁵ Though the public health benefits of solar development depend on what type and quantity

²⁶ Sarah Wolff and Janneke Ratcliff, "The Role of Community Development Financial Institutions in Home Ownership Finance," *The CDFI Fund*, October 2008, http://www.cdfifund.gov/impact_we_make/research/subprime-mortgage-market/reports/The%20Role%20of%20Community%20Development%20Financial.pdf (accessed April 19, 2015), page 3.

²⁷ *Ibid.*

²⁸ *Ibid.*

²⁹ *Ibid.*

³⁰ Laura Dalemarre, "Summary on the First Annual Symposium on Environmental Justice and Environmental Health Disparities in Maryland and DC," *Environmental Justice*, Volume 7, Number 2, 2014, page 1.

³¹ CDC.gov, *CDC Health Disparities and Inequalities Report – U.S. 2013*, <http://www.cdc.gov/minorityhealth/CHDIRreport.html#Factsheet> (accessed April 19, 2015).

³² U.S. Environmental Protection Agency, *National Emissions Inventory (NEI) Air Pollutant Emissions Trends Data*, <http://www.epa.gov/ttnchie1/trends/> (accessed April 19, 2015).

³³ Nicholas Z. Muller, et al, "Environmental Accounting for Pollution in the United States Economy," *The American Economic Review*, Vol. 101, No. 5, August 2011, <http://www.jstor.org/stable/23045618> (accessed April 19, 2015), page 1670.

³⁴ *Ibid.*

³⁵ Kyle Siler-Evans, et al, "Regional variations in the health, environmental and climate benefits of wind and solar generation," *PNAS*, July 2013, <http://www.pnas.org/content/110/29/11768.short> (accessed April 19, 2015), page 2.

of generation the solar displaces, renewable energy generation reduces the need to build new fossil-fuel generation facilities and aggregate impacts are growing as the industry matures and competes with other generation sources.³⁶

Some have claimed that cheap electricity from coal benefits to poor communities who are most sensitive to the cost of electricity, but solar electric generation costs have declined 50% since 2010 and have the potential to bring significant benefits to these communities.^{37 38 39} According to a 2014 Deutsche Bank report, solar costs after the federal ITC are expected to reach parity with other generation sources in 36 states by 2016.⁴⁰ Another Stanford study found that commercial solar is already at parity with many retail rates and utility-scale solar will reach party by end of the decade.⁴¹ After analysis of the benefits that increased renewable electricity brings to low-income consumers, the National Association for the Advancement of Colored People (NAACP) advocates for the deployment of clean energy sources, specifically solar and wind power.⁴² Displacing fossil fuel production with solar electricity benefits the nation as a whole and disadvantaged communities in particular.⁴³ Moreover, solar development can be developed in rural low-wealth areas, brownfields, and affordable unused land. Unlike “not in my backyard” (NIMBY) responses to polluting generation that influences placement where health burdens are borne by poorer communities, solar brings economic and job benefits to these communities, as will be discussed below. CDFIs have the opportunity to take part in this transition and place low-wealth communities at the forefront of leadership in environmental health.

B. Economic Growth Benefits

Economic benefits from solar development include both tax base increases and job growth. Increased taxes are paid at the state level and, in certain geographies, to the local jurisdiction either based on a millage rate or via a payment in lieu of tax agreement. According to one study

³⁶ Alice Kaswan, “Greening the Grid and Climate Justice,” *Environmental Law*, Vol. 39:1143, 2009, page 1148.

³⁷ AmericaSupportsSolar.org, “America Supports Solar,” <http://www.americasupportssolar.org/> (accessed April 19, 2015).

³⁸ FreedomWorks.org, “NYTimes Surprised War on Coal Hurts Low Income Families,” <http://www.freedomworks.org/content/nytimes-surprised-war-coal-hurts-low-income-families> (accessed April 19, 2015).

³⁹ Katharine McCormick, “Clean Energy Brings Savings and Jobs to Rural, Low-Income America,” *NRDC Fact Sheet*, February 2015, <http://www.nrdc.org/energy/files/clean-energy-benefits-FS-rural.pdf> (accessed April 19, 2015).

⁴⁰ Tom Randall, “While You Were Getting Worked Up Over Oil Prices, This Just Happened to Solar,” *Bloomberg*, October 29, 2014, <http://www.bloomberg.com/news/articles/2014-10-29/while-you-were-getting-worked-up-over-oil-prices-this-just-happened-to-solar> (accessed April 19, 2015).

⁴¹ Stefan Reichelstein and Michael Yorston, “The Prospects for Cost Competitive Solar PV Power,” *Stanford University*, August 2012, <http://zicklin.baruch.cuny.edu/faculty/accountancy/Downloads/Reichelstein-Stefan.pdf> (accessed April 19, 2015), page 4.

⁴² NAACP, *Promoting Equitable Access to Clean Energy Alternatives*, February 20, 2015, <http://action.naacp.org/page/-/RESOLUTION--Promoting%20Equitable%20Access%20to%20Clean%20Energy%20%20Alternatives%20FINAL%20February%2021%202015.pdf> (accessed April 19, 2015).

⁴³ Robert Sanders and Lewis Milford, “Clean Energy for Resilient Communities: Expanding Solar Generation in Baltimore’s Low-Income Neighborhoods,” *Clean Energy Group*, February 2014, <http://www.cleanenergygroup.org/assets/Uploads/2014-Files/Clean-Energy-for-Resilient-Communities-Report-Feb2014.pdf> (accessed April 19, 2015), page 2.

in Massachusetts, average annual local revenues are \$6,500 per MW.⁴⁴ Some jurisdictions choose to encourage solar development with property tax incentives. At least 36 states offer tax credits or incentives to decrease renewable energy costs.⁴⁵ Even after these incentives, increases to the local tax base provide valuable financial support when utility-scale solar is installed in low-wealth rural communities.⁴⁶

Employment opportunities in the solar industry also provide living wages in a variety of careers. These include electricians and construction contractors as well as salaried sales, engineering and finance positions at solar installation companies. A Berkeley review of three recent studies shows that the solar industry creates jobs at a rate of 7.58 annual person jobs per average MW installed.⁴⁷ In contrast to stagnation in the construction industry during the recession, an industry census found that solar is one of the fastest-growing industries in the country, employing 174,000 individuals and contributing more than \$15 billion to the U.S. economy.⁴⁸ Renewable energy sources generate more jobs per unit of delivered energy than generation from fossil fuels.⁴⁹ Solar jobs are distributed across regions, cannot be sent abroad, and create new opportunities for technical, applied, scientific, and professional positions, many of which do not require graduate degrees.⁵⁰

Energy spending by low-income households is more than four times the median national household energy cost burden; low-income homes have a median of 13.3% compared to 3.3% overall.⁵¹ In states with high retail electricity costs, access to solar power through an individual rooftop installation or a community solar program can significantly reduce the monthly energy cost burden and remove future electricity cost increases for these low-income families, farms, and small businesses.^{52 53}

⁴⁴ SEIA, *Massachusetts PILOTS*, <http://www.seia.org/research-resources/massachusetts-pilots> (accessed April 19, 2015).

⁴⁵ Justin Barnes, et al., "The Cost of Value: PV and Property Taxes," *NC Solar Center - World Renewable Energy Forum*, May 2012, <http://www.dsireusa.org/the-cost-of-value-pv-and-property-taxes/> (accessed April 19, 2015).

⁴⁶ Emily Miller, et al., "White Paper: Market Barriers to Solar in Michigan," *NREL*, January 23, 2012, http://www.michigan.gov/documents/mpsc/marketbarriersolarinmi_394662_7.pdf (accessed April 19, 2015).

⁴⁷ Max Wei, et al., "Putting Renewables and Energy Efficiency To Work: How Many Jobs Can The Clean Energy Industry Generate in the U.S.?" *University of California, Berkeley*, 2009, http://rael.berkeley.edu/old_drupal/sites/default/files/old-site-files/green_jobs_paper_Oct1809.pdf (accessed April 19, 2015).

⁴⁸ AmericaSupportsSolar.org, "America Supports Solar," <http://www.americasupportssolar.org/> (accessed April 19, 2015).

⁴⁹ Max Wei, et al., "Putting Renewables and Energy Efficiency To Work: How Many Jobs Can The Clean Energy Industry Generate in the U.S.?" *University of California, Berkeley*, 2009, http://rael.berkeley.edu/old_drupal/sites/default/files/old-site-files/green_jobs_paper_Oct1809.pdf (accessed April 19, 2015).

⁵⁰ *Ibid.*

⁵¹ Ben Bovarnick and Darryl Banks, "State Policies to Increase Low-Income Communities' Access to Solar Power," *Center for American Progress*, September 23, 2014, <https://cdn.americanprogress.org/wp-content/uploads/2014/09/LowIncomeSolar-brief.pdf> (accessed April 19, 2015).

⁵² Katharine McCormick, "Clean Energy Brings Savings and Jobs to Rural, Low-Income America," *NRDC Fact Sheet*, February 2015, <http://www.nrdc.org/energy/files/clean-energy-benefits-FS-rural.pdf> (accessed April 19, 2015).

⁵³ Natalie van Hoose, "Chances of saving with solar energy greater for Indiana farms than homes," *Purdue*, February 5, 2015, <http://www.purdue.edu/newsroom/releases/2015/Q1/chances-of-saving-with-solar-energy-greater-for-indiana-farms-than-homes.html> (accessed April 19, 2015).

C. Social Benefits

The solar industry's positive impact on communities is not only measured in quantitative units of avoided pollutants and dollars. Installations spark local pride, education, and positive morale, all of which are important social benefits in rural areas where farming jobs are diminishing, other opportunities are scarce, and population growth is in decline.⁵⁴ For example, in 2014, Self-Help proudly partnered with a range of local businesses for an event referred to as Growing Henderson County Strong, a celebration of sustainable economic development in Western North Carolina.⁵⁵

In parallel, urban areas historically burdened with high rates of asthma-inducing air pollution, proximity to landfills, polluted waterways, and other environmental injustice also welcome solar employment and development as a source of community pride and symbolic shift of power resources due to distributed generation. In Richmond, California, non-profit Solar Richmond has led job training, environmental education programs, and hands-on solar internships since 2006 in what is now considered a national model.⁵⁶ In Los Angeles, Homeboy Industries has offered a similar four-month solar installation training program for 1,000 clients, with a 95% graduation rate and 70% placement rate within 90 days of graduation.⁵⁷ A cooperative placement program between Homeboy Industries and the International Brotherhood of Electrical Workers union (IBEW 569) has supported placements, setting up these workers to take part in leading utility-scale installations throughout Southern California including Kern County.⁵⁸ Other cities less known for solar leadership also have high-profile solar installations that benefit low-income communities, including New York City and even Memphis.^{59 60}

D. Sustainable Investment Leadership Benefits

Another perspective on the mission impact of CDFI financing for the solar industry is that this lending is an opportunity for CDFIs to be at the forefront of sustainable investment as a

⁵⁴ Jed Kolko, "Millennials Are Suburbanizing, While Big Cities Are Having a Baby Boom," *Forbes*, June 27, 2014,

<http://www.forbes.com/sites/trulia/2014/06/27/millennials-are-suburbanizing-while-big-cities-are-having-a-baby-boom/> (accessed April 19, 2015).

⁵⁵ Self-Help Credit Union, *Growing Henderson County Strong*, 2014, <https://www.self-help.org/custom/fi/self-help/fb/disclosure/Growing-Henderson-County-Strong-Celebration.pdf> (accessed April 19, 2015).

⁵⁶ Solar Richmond, *Solar Richmond*, <http://solarrichmond.net/> (accessed April 19, 2015).

⁵⁷ Homeboy Industries, *Solar Panel Installation Training and Certification Program*, <http://www.homeboyindustries.org/what-we-do/solar-panel-installation-training-certification-program/> (accessed April 19, 2015).

⁵⁸ Edgar Meza, "Homeboy Industries to help build 73 MW Redwood Solar Farms project in California," *PV Magazine*, January 29, 2015, http://www.pv-magazine.com/news/details/beitrag/homeboy-industries-to-help-build-73-mw-redwood-solar-farms-project-in-california_100017975/#ixzz3Y5rcRNtj (accessed April 19, 2015).

⁵⁹ Christophe Jospé, et al, "Ensuring New York Solar Programs Reach Low Income Residents,"

Columbia School of International and Public Affairs, Spring 2014,

http://mpaenvironment.ei.columbia.edu/files/2014/06/GRIDAlternativesProject.Final_.pdf (accessed April 19, 2014), page 43.

⁶⁰ Angela Garrone, "Solar for All: Memphis Solar Shines On African American Communities," Southern Alliance for Clean Energy, November 7, 2014, <http://blog.cleaneenergy.org/2014/11/07/solar-for-all-memphis-solar-shines-on-african-american-communities/> (accessed April 19, 2015).

counterpart to divestment from fossil fuels.⁶¹ In short, investing in solar development often makes good business sense.⁶² For CDFIs in particular, revenues from loan repayment that are tied to the energy industry provide a diversified place to deploy capital and help put cash to work during an economic period of low interest rates.⁶³

CDFIs also create models for other banking institutions to follow once the financial strength of these loans is quantified over time. As noted by a Federal Reserve Bank of New York staff report, CDFIs are accustomed to lending to populations and sectors that are underserved by traditional financial services and thus have incomplete data on default rates.⁶⁴ Once financing in an area begins, the hurdle rate for future investment from other sources may be lowered due to decreased perceived risk or ability to replicate project structures first underwritten by the CDFIs due to knowledge spillovers.⁶⁵ These spillovers have the potential to both spur more solar growth and pass on more benefits to consumers in the form of more affordable levelized costs of electricity.⁶⁶ A draft global comparative study found that variations in levelized cost of solar electricity are almost as sensitive to differences in cost of capital as they are to the regional differences in solar resource availability.⁶⁷ Lazard, a U.S. financial advisory and asset management firm, published a report asserting that financing influences levelized costs of solar electricity by 25 to 27%.⁶⁸

CASE STUDY: Environmental Justice and Climate Leadership in Warren County, NC

Environmental justice is the movement for equitable distribution of environmental risks and governmental protection from these risks, especially for low-income areas and communities of color.⁶⁹ It has grown into a more recent movement for climate justice. As described in a 2004 report by the Congressional Black Caucus, climate change risks and health effects disproportionately burden African-Americans.⁷⁰

⁶¹ Joshua Humphreys, et al, "Fossil-Free Investment for a Just Appalachian Transition," *Croatan Institute*, November 2014, <http://www.croataninstitute.org/publications/publication/fossil-free-investment-for-a-just-appalachian-transition> (accessed April 19, 2015), page 11.

⁶² Ian Clover, "US: Solar better investment than stocks, study finds," *PV Magazine*, January 14, 2015, http://www.pv-magazine.com/news/details/beitrag/us--solar-better-investment-than-stocks--study-finds_100017770/#axzz3Y5nR8v8z (accessed April 19, 2015).

⁶³ Peter Thompson, et al, "Selling an Energy Efficiency Loan Portfolio in Oregon," *Lawrence Berkeley National Laboratory*, July 2014, <http://escholarship.org/uc/item/43m3c605> (accessed April 19, 2015).

⁶⁴ Anna Kovner and Josh Lerner, "Doing well by doing good? Community development venture capital - Staff Report," *Federal Reserve Bank of New York*, No. 572. September 2012, <http://hdl.handle.net/10419/93635> (accessed April 19, 2015), page 18.

⁶⁵ Ibid.

⁶⁶ Morgan Baziliana, et al, "Re-considering the Economics of Photovoltaic Power," *Renewable Energy*, Volume 53, May 2013, Pages 329–338, <http://www.sciencedirect.com/science/article/pii/S0960148112007641> (accessed April 19, 2015).

⁶⁷ Janosch Ondraczek, et al, "Working Paper: WACC the Dog: The Effect of Financing Costs on the Levelized Cost of Solar PV Power," 2013, <https://ideas.repec.org/p/sgc/wpaper/201.html> (accessed April 19, 2015).

⁶⁸ Lazard, *Lazard's Levelized Cost of Energy Analysis – Version 8.0*, 2014, <http://www.lazard.com/PDF/Levelized%20Cost%20of%20Energy%20-%20Version%208.0.pdf> (accessed April 19, 2015), page 12.

⁶⁹ U.S. Environmental Protection Agency, *Environmental Justice*, April 2015, <http://www.epa.gov/environmentaljustice/> (accessed April 19, 2015).

⁷⁰ William Jefferson, et al, "African Americans and Climate Change: An Unequal Burden," *Congressional Black Caucus Foundation*, July 21, 2004, http://rprogress.org/publications/2004/CBCF_REPORT_F.pdf (accessed April 19, 2015).

The roots the environmental justice movement can be traced back to several protests including a watershed moment in Warren County, North Carolina in 1982.⁷¹ ⁷² There, the low-income, majority African-American community in Warren County resisted the disposal of highly-toxic PCB-laden soil at a landfill near their homes, leading to weeks of non-violent protests and arrests considered the largest in the South since Dr. Martin Luther King, Jr.'s march through Alabama.⁷³ The PCB landfill prompted the first major study by the US General Accounting Office (GAO) on the correlation between race and toxic waste sites.⁷⁴

More than thirty years later, Warren County is home to fewer than 21,000 residents but more than 15 MW of solar projects covering more than 100 acres.⁷⁵ ⁷⁶ ⁷⁷ At a 2013 forum on solar development and siting in North Carolina, Warren County Planning Director Ken Krulik noted that the county benefited socially and economically while maintaining environmental health due to thoughtful, safe zoning.⁷⁸ One solar project, Warrenton Farm, is sited on a property previously farmed by J.B. Davis, who inherited the tobacco and cattle land from his father.⁷⁹ While earlier activity on the land brought in only marginal income, the solar installation increased the property tax base of Warren County by approximately \$15 million over the lifetime of the project without new county services costs. The installation brought over \$250,000 in direct expenditures and 80 temporary jobs to Warren County during construction.⁸⁰

Although CDFI financing was not used in the major installations that have been completed in Warren County to date, the contrast between historical inequity and current opportunity is significant for CDFIs to keep in perspective when considering entry into solar lending. Warren County is not unique in its attractiveness for clean energy installations; CDFIs may find that the communities they have historically served in other capacities would also meaningfully benefit from solar development.

⁷¹ David Schlosberg and Lisette Collins, "From environmental to climate justice: climate change and the discourse of environmental justice," *WIREs Climate Change*, 2014, 5:359–374. doi: 10.1002/wcc.275, page 360.

⁷² U.S. Environmental Protection Agency, *Region 4: Superfund – Roadside PCB Spills*, <http://www.epa.gov/region4/superfund/sites/npl/northcarolina/pcbspnc.html> (accessed April 19, 2015).

⁷³ Learn NC, *North Carolina Digital History: The Environmental Justice Movement*, <http://www.learnnc.org/lp/editions/nchist-recent/6173> (accessed April 19, 2015).

⁷⁴ General Accounting Office, *Siting of Hazardous Waste Landfills and Their Correlation With Racial and Economic Status of Surrounding Communities*, June 1, 1983, <http://archive.gao.gov/d48t13/121648.pdf> (accessed April 19, 2015).

⁷⁵ Carolina Solar Energy, *Developed Projects: Warrenton Farm / Bolton Farm*, <http://carolinasolarenergy.com/category/developed/> (accessed April 19, 2015).

⁷⁶ Coronal Development Services, *Red Hill Solar Center*, <http://coronaldevelopment.com/projects/> (accessed April 19, 2015).

⁷⁷ North Carolina Sustainable Energy Association, *North Carolina Installed Solar Systems*, <http://energyncmaps.org/gis/solar/index.html> (accessed April 19, 2015).

⁷⁸ North Carolina Sustainable Energy Association, *Forum on Solar Energy Siting and Permitting in NC*, January 2013, <http://www.slideshare.net/NCsustainableEnergyAssoc/forum-on-solar-energy-siting-and-permitting-in-nc> (accessed April 19, 2015).

⁷⁹ Strata Solar, *Warrenton Farm*, <http://www.stratasolar.com/spotlight/warrenton6-4mw/> (accessed April 19, 2015).

⁸⁰ *Ibid.*

SOLAR FINANCE PRIMER

A. CDFI Project Debt Background

After establishing an interest in lending to support clean energy growth, a CDFI must understand how its lending capabilities fit with the industry's needs. In solar development, project-level debt, also often referred to as non-recourse debt, is a loan secured by the solar installation as collateral.⁸¹ This type of loan, common in real estate, differs from a company-level loan to a developer, building owner or individual and is separate from the world of venture capital or private equity in clean energy.⁸² The expected cash flows of the project, which might include property and/or a going concern, must be strong enough to cover the debt. This requires detailed financial modeling and understanding of the solar industry in order to be underwritten by a CDFI. Loans are subject to specific repayment terms and are a strong fit for mature clean energy technology and experienced developers.⁸³ Including debt in a solar development's capital stack can reduce the resultant cost of electricity generated at that solar site by more than 20 percent.⁸⁴

According to Mercom Capital Group, an industry consulting group, global publicly announced solar debt financing in 2014 was almost \$20 billion, more than triple the \$6.2 billion announced in 2013. About 75% of this debt activity in 2014 was in China, but U.S. activity was also strong.⁸⁵ This analysis aligns with that of Thomas Emmons, the head of renewable energy finance for the Americas at Dutch bank Rabobank, who notes that, based on data from Infrastructure Journal, the 2014 North American project finance bank market for renewables was almost \$8 billion.⁸⁶

CDFIs exist to lend debt in traditionally underserved communities and market segments, and do so with a mission to support the public good.⁸⁷ With this value in mind, CDFI project debt is appropriate for smaller deals with higher transaction costs, to work in atypical structures or new industries, and to build partnerships for impact with a wide range of developers and investors.⁸⁸ At

⁸¹ Michael Mendelsohn, et al. "The Impact of Financial Structure on the Cost of Solar Energy," *NREL*, March 2012, <http://www.nrel.gov/docs/fy12osti/53086.pdf> (accessed April 19, 2015), page 4.

⁸² *Ibid.*, page 12.

⁸³ *Ibid.*, page 11.

⁸⁴ Michael Mendelsohn, et al. "The Impact of Financial Structure on the Cost of Solar Energy," *NREL*, March 2012, <http://www.nrel.gov/docs/fy12osti/53086.pdf> (accessed April 19, 2015), page iv.

⁸⁵ Mercom Capital Group, *2014 Q1 Solar Funding Report*, <http://bit.ly/MercomQ4SR> (accessed April 19, 2015).

⁸⁶ Chadbourne, *Project Finance NewsWire: Cost of Capital: 2015 Outlook*, February 2015, http://www.chadbourne.com/files/Publication/0642096e-a001-47d8-86d4-e08b5eaa1eb9/Presentation/PublicationAttachment/8368c0f0-1b12-4b01-8c03-e2beda6271f9/pfn_0215.pdf (accessed April 19, 2015), page 6.

⁸⁷ Anna Kovner and Josh Lerner, "Doing well by doing good? Community development venture capital - Staff Report," *Federal Reserve Bank of New York*, No. 572, September 2012, <http://hdl.handle.net/10419/93635> (accessed April 19, 2015).

⁸⁸ Michael Swack, et al, "CDFIs Stepping into the Breach: An Impact Evaluation—Summary Report," *The Carsey School of Public Policy at the Scholars' Repository*, Paper 236, 2014, <http://scholars.unh.edu/carsey/236> (accessed April 19, 2015), page 5.

Self-Help, for example, the commercial lending team funds a portion of its projects with New Markets Tax Credits (NMTC) allocations.⁸⁹ Then, for a wide variety of projects, these benefits can be passed on to borrowers in the form of lower interest rates.⁹⁰

B. Solar Finance Structures and Sources

Debt, whether from CDFIs or other lenders, is not the only source of capital behind a large-scale solar project. In clean energy development, a typical structure often includes developer equity, tax equity, and project debt.⁹¹ The developer equity is the developer's own cash, or "skin in the game", used for the project.⁹² Tax equity is investment in the solar exchanged in return for tax credits, depreciation benefits, and/or future project revenues, typically from a large investor such as a bank or an insurance company with the tax appetite to benefits from these aspects of a project.⁹³ Due to the scale of tax appetite and financial savvy required to profitably complete transactions, few companies have engaged in these transactions.⁹⁴ Only roughly 25 tax equity investors were active in the solar sector in 2014, according to John Eber, managing director and head of energy investments at JPMorgan Capital Corporation.⁹⁵ As the cheapest form of capital, debt is included in a project to lever or, in other words, increase returns for equity investors taking on more relative risk than the CDFI, or to decrease the overall cost of capital.⁹⁶

Several financial models are used in solar development, some of which use project-level debt in different ways. A National Renewable Energy Laboratory (NREL) summary of key elements of different financing structures is included in Appendix A. For small and mid-sized commercial solar projects, debt transaction costs limit its use on individual projects, though debt is a growing capital source for portfolios of these smaller projects.⁹⁷

⁸⁹ Self Help Credit Union, *New Markets Tax Credits*, <http://www.self-help.org/building-communities/new-markets-tax-credits.html> (accessed April 19, 2015).

⁹⁰ New Markets Tax Credit Coalition, *50 Projects 50 States*, December 2008, <http://nmtccoalition.org/wp-content/uploads/2009/10/50-Projects-50-States-Report.pdf> (accessed April 19, 2015).

⁹¹ Mohammed Alam, et al. "Solar Power Finance & Investment Summit," *Alyra Renewable Energy Finance - Infocast Conference*, 2012, slide 6.

⁹² Joe Ritter, "Securing Project-Based Financing for Solar PV Projects," *Natural Gas & Electricity*, Volume 31, Number 10, May 2015, page 14.

⁹³ Mohammed Alam, et al. "Solar Power Finance & Investment Summit," *Alyra Renewable Energy Finance - Infocast Conference*, 2012, slide 6.

⁹⁴ Joe Ritter, "Securing Project-Based Financing for Solar PV Projects," *Natural Gas & Electricity*, Volume 31, Number 10, May 2015, page 1.

⁹⁵ Chadbourne, *Project Finance NewsWire: Cost of Capital: 2015 Outlook*, February 2015, http://www.chadbourne.com/files/Publication/0642096e-a001-47d8-86d4-e08b5eaa1eb9/Presentation/PublicationAttachment/8368c0f0-1b12-4b01-8c03-e2beda6271f9/pfn_0215.pdf (accessed April 19, 2015), page 4.

⁹⁶ Michael Mendelsohn, et al. "The Impact of Financial Structure on the Cost of Solar Energy," *NREL*, March 2012, <http://www.nrel.gov/docs/fy12osti/53086.pdf> (accessed April 19, 2015), page iv.

⁹⁷ David Feldman and Travis Lowder, "Banking on Solar: An Analysis of Banking Opportunities in the U.S. Distributed Photovoltaic Market," *NREL*, Nov 2014, <http://www.nrel.gov/docs/fy15osti/62605.pdf> (accessed April 19, 2015), page 19.

Many developers simply self-finance smaller projects and are paid cash by a buyer or are repaid over time as power purchase agreement (PPA) or lease revenues from generation accrue.⁹⁸ Other developers seek what is referred to as take-out financing, which occurs when a developer sells a project to an investor just before commissioning and the investor purchases the asset, all assigned contracts and tax benefits in full.⁹⁹ In these cases, project-level debt with the developer is uncommon, though the investor purchasing the asset may leverage its equity.¹⁰⁰ A sale leaseback model is used if the tax equity investor who buys the asset then leases it back to the developer, who maintains a sublease with the off-taker.¹⁰¹ This model is common in residential solar electricity development.¹⁰²

In larger utility-scale solar installations, a category often described as projects larger than 1 to 5 MW, installations are often owned by project-level limited liability corporations (LLCs) formed by the developer and tax investor.^{103 104} The installation is then master-leased to a master tenant who runs the project and whose operating subsidiaries work with the buyers of electricity, or off-takers.¹⁰⁵ In the case of solar development in regulated territories, where Self-Help focuses its lending, the off-taker is a regulated utility such as Duke Energy Carolinas, Duke Energy Progress or Dominion Energy, a municipal utility, or rural electricity cooperative.¹⁰⁶ This model is used by several developers in the industry and referred to interchangeably as an inverted lease, lease pass through or master tenant lease structure.¹⁰⁷ In this structure, project-level debt can be used.¹⁰⁸

Another common structure for utility-scale solar is a partnership flip, a method whereby the developer and investor form a joint venture with one partner receiving the majority of tax benefits until a flip occurs in a predetermined year.¹⁰⁹ This flip allows the tax equity investor to receive tax benefits but then transfer back all ownership at a reasonable cost after a period of five years or more, when tax benefits are distributed.¹¹⁰ Leveraged partnership flips can include debt provided

⁹⁸ Michael Mendelsohn, et al. "The Impact of Financial Structure on the Cost of Solar Energy," *NREL*, March 2012, <http://www.nrel.gov/docs/fy12osti/53086.pdf> (accessed April 19, 2015), page 5.

⁹⁹ Michael Mendelsohn and David Feldman, "Financing U.S. Renewable Energy Projects Through Public Capital Vehicles: Qualitative and Quantitative Benefits," *NREL*, April 2013, <http://www.nrel.gov/docs/fy13osti/58315.pdf> (accessed April 19, 2015), page 15.

¹⁰⁰ *Ibid.*, page 4.

¹⁰¹ *Ibid.*, page 26.

¹⁰² *Ibid.*

¹⁰³ Patrick Donnelly-Shores, "What does Utility Scale Solar Really Mean?" *Greentech Media*, July 30, 2013, <http://www.greentechmedia.com/articles/read/what-does-utility-scale-solar-really-mean> (accessed April 19, 2015).

¹⁰⁴ Travis Lowder and Michael Mendelsohn, "The Potential of securitization in Solar PV Finance," *NREL*, December 2013, <http://www.nrel.gov/docs/fy14osti/60230.pdf> (accessed April 19, 2015).

¹⁰⁵ Michael Mendelsohn and Claire Kreycik, "Federal and State Structures to Support Financing Utility-Scale Solar Projects and the Business Models Designed to Utilize Them," *NREL*, April 2012, <http://www.nrel.gov/docs/fy12osti/48685.pdf> (accessed April 19, 2015), page 30.

¹⁰⁶ *Ibid.*

¹⁰⁷ *Ibid.*

¹⁰⁸ *Ibid.*

¹⁰⁹ Michael Mendelsohn, et al. "The Impact of Financial Structure on the Cost of Solar Energy," *NREL*, March 2012, <http://www.nrel.gov/docs/fy12osti/53086.pdf> (accessed April 19, 2015), page 8.

¹¹⁰ Josh Lutton, "Tax Equity 101: Structures," *Woodlawn Associates Management Consulting*, March 8, 2013, <http://www.woodlawnassociates.com/tax-equity-101/> (accessed April 19, 2015).

by the same entity that provides tax equity or debt from a third-party such as a CDFI.¹¹¹ Partnership flip structures are considered complex, sensitive to specific project variables, and expensive to build on a one-off basis, but developers who expect a pipeline of similar utility-scale solar work can use them profitably.¹¹²

The tax equity investor that monetizes the ITC typically also receives project depreciation, but terms and structures vary by project depending on an investor's specific interests.¹¹³ Modified Accelerated Cost Recovery System (MACRS) depreciation, which is not unique to solar, allows an investor to depreciate the value of the asset on its books at a rate faster than the length of the useful life of that asset.¹¹⁴ A solar asset is considered 5-year property for MACRS depreciation purposes, the same term as automobiles or office machinery, which means benefits occur over five years of project life, or six tax years.¹¹⁵ For example, if a business owns a solar asset but that asset depreciates, the amount of taxes owed by that businesses decreases by a specified amount of benefit. In order to take advantage of this depreciation, a business must have tax liability to offset.¹¹⁶

When a CDFI completes due diligence on a potential loan opportunity, it is imperative not only that the loan officer understand the legal structure through which all parties are involved, but also when and how funding sources are expected to contribute to development.¹¹⁷ This due diligence process can vary in difficulty depending not only on project structure complexity but also on the quality of loan application submitted and the stage of development completed at the time financing is requested.¹¹⁸ Debt may be needed for equipment, for construction, for the term of the project, or for both the construction and the permanent periods.¹¹⁹ Construction is considered higher risk, as there is a chance that project operations many never commence.¹²⁰ A loan officer must also understand which funding sources have priority in terms of access to the revenues of

¹¹¹ Michael Mendelsohn and Claire Kreycik, "Federal and State Structures to Support Financing Utility-Scale Solar Projects and the Business Models Designed to Utilize Them," *NREL*, April 2012, <http://www.nrel.gov/docs/fy12osti/48685.pdf> (accessed April 19, 2015), page 28.

¹¹² Chris Groobey et al, "Project Finance Primer for Renewable Energy and Clean Tech Projects," *Wilson Sonsini Goodrich & Rosati*, August 2010, https://www.wsgr.com/PDFSearch/ctp_guide.pdf (accessed April 19, 2015), page 15.

¹¹³ *Ibid*, page 16.

¹¹⁴ U.S. Internal Revenue Service, *The Modified Accelerated Cost Recovery System (MACRS)*, <http://www.irs.gov/publications/p946/ch04.html> (accessed April 19, 2015).

¹¹⁵ Michael Mendelsohn and Claire Kreycik, "Federal and State Structures to Support Financing Utility-Scale Solar Projects and the Business Models Designed to Utilize Them," *NREL*, April 2012, <http://www.nrel.gov/docs/fy12osti/48685.pdf> (accessed April 19, 2015), page 28.

¹¹⁶ *Ibid*, page 11.

¹¹⁷ Joe Ritter, "Securing Project-Based Financing for Solar PV Projects," *Natural Gas & Electricity*, Volume 31, Number 10, May 2015, page 3.

¹¹⁸ *Ibid*.

¹¹⁹ Mohammed Alam, et al. "Solar Power Finance & Investment Summit," *Alyra Renewable Energy Finance - Infocast Conference*, 2012, slide 2.

¹²⁰ Joe Ritter, "Securing Project-Based Financing for Solar PV Projects," *Natural Gas & Electricity*, Volume 31, Number 10, May 2015, page 4.

the project once development is completed, an element of loan analysis discussed in more depth in the *Intercreditor Agreements* section.¹²¹

C. Budget Components

When a CDFI loan is made for solar, uses of project funds are straightforward in comparison to real estate development, in large part due to the minimal number of equipment parts in a solar installation, the absence of ongoing fuel costs, and the minimal amount of ongoing maintenance required.¹²² The main components of a project are equipment, including modules, inverter, racking, design, engineering, permitting, construction and interconnection.¹²³ Budgets also typically include contingency funds.¹²⁴

D. Revenue and Expense Projections

Self-Help's experience has included both construction and permanent debt.¹²⁵ For the permanent period, Self-Help is repaid over as much as a 20-year term and amortization, which is possible in large part due to (1) 10- to 15-year utility contracts called power purchase agreements (PPAs); (2) expectation of future wholesale electricity rate increases; and (3) USDA loan guarantees.¹²⁶ This is an unusually long term for the solar industry, where other bank participants typically only offer loan terms up to 15-17 years.¹²⁷ Payments at any given time during this term are supported by the revenues from these PPAs. In some cases, the value of the electricity generated, measured in dollars per kilowatt-hour (\$/kWh), is separated from the value associated with the fact that these kilowatt-hours are from a renewable energy source and provide environmental benefits.¹²⁸ The environmental benefits are measured in solar renewable energy credits (SRECs or RECs) and can be bought by utilities and other entities, often to meet a state renewable portfolio standard (RPS).¹²⁹ An RPS, which is a regulatory mandate for increased production of renewable electricity, is the most common method by which states have passed renewable energy support

¹²¹ Michael Mendelsohn and Claire Kreycik, "Federal and State Structures to Support Financing Utility-Scale Solar Projects and the Business Models Designed to Utilize Them," *NREL*, April 2012, <http://www.nrel.gov/docs/fy12osti/48685.pdf> (accessed April 19, 2015), page 12.

¹²² Black and Veatch, *Cost and Performance Data for Power Generation Technologies: Prepared for the National Renewable Energy Laboratory*, February 2012, <http://bv.com/docs/reports-studies/nrel-cost-report.pdf%E2%80%8E> (accessed April 19, 2015), page 42.

¹²³ *Ibid.*

¹²⁴ *Ibid.*, page 8.

¹²⁵ Discussion with Rebecca Rogers, Assistant General Counsel at Self-Help Credit Union and Ventures Fund, February 2015.

¹²⁶ *Ibid.*

¹²⁷ Mohammed Alam, et al. "Solar Power Finance & Investment Summit," *Alyra Renewable Energy Finance - Infocast Conference*, 2012, slide 2.

¹²⁸ John Edward Burns and Jin-Su Kang, "Comparative Economic Analysis of Supporting Policies for Residential Solar PV in the US: Solar Renewable Energy Credit (SREC) Potential," *Energy Policy*, 44, 2012, page 219.

¹²⁹ *Ibid.*, page 217.

policies.¹³⁰ Many standards have specific carve-outs for certain technologies including solar photovoltaics.¹³¹ Depending on geography and policy, the PPA contract and SREC contract for a solar development may be bundled or negotiated separately.¹³²

Typical PPAs have a fixed price for the term of the contract either at a specific rate or a specific rate with an annual escalator.¹³³ This provides a strong revenue certainty when the purchaser is a creditworthy company such as an electricity utility, but requires a high degree of accuracy in predicting generation from the solar installation.¹³⁴ In general, lenders trust the engineering reports created by third-party engineering firms with highly sophisticated models that take into account a systems specific design, location-specific weather, and historical performance of other solar installations. These projections are statistically reliable but, for increased underwriting comfort, some lenders take into account both “P50 data,” which is the expected level of generation, and “P99 data,” which is a more conservative projection reflecting numbers that are likely to be exceeded 99% of the time.¹³⁵ ¹³⁶ The expected useful life of a solar installation is 25-30 years or more.¹³⁷ Although production degrades over time at an average of 0.5% annually and varies by season, monthly revenues from the installation are highly predictable even in the later years of the loan, decreasing risk.¹³⁸

Ongoing expense projections are similarly clear-cut in solar lending. Expenses include operations and maintenance, insurance, site leases, property taxes and a small but ongoing administrative overhead burden.¹³⁹ A lender checks all revenue and expense projections in a project pro forma model in order to ensure that future cash flows will always be able to support debt payments.¹⁴⁰ This analysis is measured by calculating debt service coverage ratios (DSCRs), or a ratio of cash available for debt payment to the cost of the debt payment. According to Emmons of Rabobank, DSCRs on solar project debt typically exceed 1.35x using P50 data, though Self-Help’s projects often exceed 1.85x, depending on assumptions, and are also compared against P99 data for

¹³⁰ NREL, *Technology Deployment - State and Local Governments: Renewable Portfolio Standards*, http://www.nrel.gov/tech_deployment/state_local_governments/basics_portfolio_standards.html (accessed April 19, 2015).

¹³¹ *Ibid.*

¹³² *Ibid.*, page 219.

¹³³ Michael Mendelsohn, et al, “Utility-Scale Concentrating Solar Power and Photovoltaics Projects: A Technology and Market Overview,” *NREL*, April 2012, <http://www.nrel.gov/docs/fy12osti/51137.pdf> (accessed April 19, 2015), page 53.

¹³⁴ *Ibid.*

¹³⁵ Mohammed Alam, et al. “Solar Power Finance & Investment Summit,” *Alyra Renewable Energy Finance - Infocast Conference*, 2012, slide 2.

¹³⁶ Frank Vignola, et al, “Building a Bankable Solar Radiation Dataset,” *University of Oregon Solar Monitoring Laboratory*, 2012,

<http://solar.dat.uoregon.edu/download/Papers/BuildingaBankableSolarRadiationDataset.pdf> (accessed April 19, 2015), page 6.

¹³⁷ Stegan Reichelstein and Michael Yorston, “The Prospects for Cost Competitive Solar PV Power,” *Stanford University*, August 2012,

<http://zicklin.baruch.cuny.edu/faculty/accountancy/Downloads/Reichelstein-Stefan.pdf> (accessed April 19, 2015), page 30.

¹³⁸ Michael Mendelsohn, et al, “Utility-Scale Concentrating Solar Power and Photovoltaics Projects: A Technology and Market Overview,” *NREL*, April 2012, <http://www.nrel.gov/docs/fy12osti/51137.pdf> (accessed April 19, 2015), page 53.

¹³⁹ Black and Veatch, *Cost and Performance Data for Power Generation Technologies: Prepared for the National Renewable Energy Laboratory*, February 2012, <http://bv.com/docs/reports-studies/nrel-cost-report.pdf%E2%80%8E> (accessed April 19, 2015), page 42.

¹⁴⁰ Joe Ritter, “Securing Project-Based Financing for Solar PV Projects,” *Natural Gas & Electricity*, Volume 31, Number 10, May 2015, page 4.

reference.¹⁴¹ ¹⁴² These ratios may shift in future years as more solar installations with debt have longer operating history and lenders can more confidence regarding the accuracy of projections.¹⁴³

SOLAR LENDING RISKS

In addition to careful analysis of mission fit, project structure, budget and financial projections, a loan underwriter at a CDFI must become an expert in a variety of lending risks, many of which can be partially mitigated with careful loan structuring and diligence.¹⁴⁴

A. Technology Risk

Solar electricity as a technology is now generally considered low risk throughout the finance industry, with decades of historical production data from thousands of different solar installations that can be used to gauge expected generation and to improve design.¹⁴⁵ Although production variance and degradation occur, revenues are remarkably consistent by year and season. The solar development funded by Self-Help's lending has either met or exceeded production expectations to date.¹⁴⁶

Despite this confidence in the technology, careful due diligence is required before a loan is approved for solar development. Of particular concern to most lenders is that equipment used is from Tier 1 manufacturers.¹⁴⁷ The market for solar photovoltaic (PV) modules is volatile, with uncertainty about manufacturing company futures as many consolidate and some fail.¹⁴⁸ While there is no definitive list of these Tier 1 providers, Bloomberg NEF provides a quarterly analysis and list, both of which are commonly referenced in the industry.¹⁴⁹ Consensus is that Tier 1 module makers, for example, are bankable companies that are able to manufacture products to exacting standards with third-party performance ratings and transparency into raw material sourcing; Bloomberg also tracks that these modules have been used on a required number of

¹⁴¹ Marie Schnitzer, et al, "Reducing Uncertainty in Solar Energy Estimates: Mitigating Energy Risk through On-Site Monitoring," *AWS TruePower*, July 3, 2012, <https://www.awstruepower.com/assets/Reducing-Uncertainty-in-Solar-Energy-Estimates1.pdf> (accessed April 19, 2015).

¹⁴² Email correspondence with Melissa Malkin-Weber, Self-Help Credit Union Sustainability Director, April 22, 2015.

¹⁴³ Chadbourne, *Project Finance NewsWire: Cost of Capital: 2015 Outlook*, February 2015, http://www.chadbourne.com/files/Publication/0642096e-a001-47d8-86d4-e08b5eaa1eb9/Presentation/PublicationAttachment/8368c0f0-1b12-4b01-8c03-e2beda6271f9/pfn_0215.pdf (accessed April 19, 2015), page 4.

¹⁴⁴ Joe Ritter, "Securing Project-Based Financing for Solar PV Projects," *Natural Gas & Electricity*, Volume 31, Number 10, May 2015, page 3.

¹⁴⁵ Dirk C. Jordan and Sarah R. Kurtz, "Photovoltaic Degradation Rates — An Analytical Review," NREL, June 2012, <http://www.nrel.gov/docs/fy12osti/51664.pdf> (accessed April 19, 2015), page 7.

¹⁴⁶ Discussion with Rebecca Rogers, Assistant General Counsel at Self-Help Credit Union and Ventures Fund, February 2015.

¹⁴⁷ Bloomberg New Energy Finance, *Bloomberg New Energy Finance PV Module Making Tiering System*, July 7, 2014, http://about.bnef.com/content/uploads/sites/4/2012/12/bnef_2012-12-03_PVModuleTiering.pdf (accessed April 19, 2015).

¹⁴⁸ Morgan Baziliana, et al, "Re-considering the Economics of Photovoltaic Power," *Renewable Energy*, Volume 53, May 2013, Pages 329–338, <http://www.sciencedirect.com/science/article/pii/S0960148112007641> (accessed April 19, 2015), page 14.

¹⁴⁹ Bloomberg New Energy Finance, *Bloomberg New Energy Finance PV Module Making Tiering System*, July 7, 2014, http://about.bnef.com/content/uploads/sites/4/2012/12/bnef_2012-12-03_PVModuleTiering.pdf (accessed April 19, 2015).

projects with non-recourse financing.¹⁵⁰ ¹⁵¹ These companies are expected to have long-term product warranties, and should be in strong enough financial health to be able to honor these warranties if module failure or excessive degradation occurs.¹⁵² Reinsurance on some module manufacturer product warranties exists with A-rated insurance companies, providing additional risk mitigation and lender confidence, though this is not found across the industry.¹⁵³

Technology risk also pertains to design and construction risk. No matter how exceptional equipment may be, if the development is not designed with proper engineering expertise, it may underperform. Errors include unanticipated shading or ground faults. Systems could also be at risk of failure in unusual circumstances such as high wind, which could pull whole rows of modules out of the ground in a disaster if poles are not anchored deeply enough with withstand upward force.¹⁵⁴ In order to mitigate design risk, lenders prefer to work with solar developers who have an experienced engineering team on hand either in-house or as part of a subcontract with an engineering, procurement and construction (EPC) partner and prefer short, standardized construction periods with closely-monitored installation teams.¹⁵⁵ Some EPC contractors also provide performance guarantees on their work, though industry-standard for these guarantees is for five years or less.¹⁵⁶

B. Policy Risk

In parallel with a range of renewable energies that are sensitive to policy change, policy risk is significant for the solar industry.¹⁵⁷ However, this risk is more limited and mitigable when a lender is assessing the potential for repayment of a loan for a specific solar project, as that project is likely to already have site-specific contracts and agreements completed or in process, and these agreements should be assignable if development parties shift.¹⁵⁸ Once a solar installation is operational, it is even less likely that a policy change would affect the revenues of that project in particular, as these contracts are executed and in use. By focusing lending at a specific project and

¹⁵⁰ Solarbuzz, *Tier 1 Polysilicon Producers Rationalize Supply to Photovoltaic Industry*, January 30, 2013, <http://www.solarbuzz.com/news/recent-findings/tier-1-polysilicon-producers-rationalize-supply-photovoltaic-industry-according> (accessed April 19, 2015).

¹⁵¹ Bloomberg New Energy Finance, *Bloomberg New Energy Finance PV Module Making Tiering System*, July 7, 2014, http://about.bnef.com/content/uploads/sites/4/2012/12/bnef_2012-12-03_PVModuleTiering.pdf (accessed April 19, 2015).

¹⁵² *Ibid.*

¹⁵³ Bethany Speer, et al., “Insuring Solar Photovoltaics: Challenges and Possible Solutions,” *NREL*, February 2010, <http://www.nrel.gov/docs/fy10osti/46932.pdf> (accessed April 19, 2015).

¹⁵⁴ MunichRE, *Focus On: Solar Photovoltaic Energy*, <http://www.munichre.com/us/property-casualty/publications-expertise/research-spotlight/solar-energy/index.html> (accessed April 19, 2015).

¹⁵⁵ Jenya Meydbray, et al., “Hot Issues in PV Performance and Solar Project Finance Webinar Series: PV Project Performance Guarantees,” *Wilson Sonsini Goodrich & Rosati*, October 31, 2012, <https://www.wsgr.com/publications/PDFSearch/braff-103112.pdf> (accessed April 19, 2015), page 7.

¹⁵⁶ *Ibid.*, page 6

¹⁵⁷ William White, et al., “The role of governments in renewable energy: The importance of policy consistency,” *Biomass and Bioenergy*, 2013, page 10.

¹⁵⁸ Joe Ritter, “Securing Project-Based Financing for Solar PV Projects,” *Natural Gas & Electricity*, Volume 31, Number 10, May 2015, page 6.

requiring contracted revenue, a CDFI reduces its exposure to policy uncertainty. Within this approach, policy risks are most significant during the development and construction phases of an installation, when timelines are at risk and deadlines may not be met. For example, if a project is expected to be interconnected in North Carolina in 2015 but misses this end of year deadline, it may become ineligible for state tax credits required for profitability. The CDFI would then be left with the option either to pull out financing, which may trigger the collapse of the project, or the option to move forward with a loan with lower than expected cash flows, increasing risk of future default. Another possible risk is a change in a renewable portfolio standard that would cause project RECs to become less valuable, endangering project revenues as these contracts do not typically extend as long as the loan term.¹⁵⁹

Developers, whom lenders depend on to manage solar installations after they are operational, are also threatened by policy risk. Energy policy changes have the capacity to put developers out of business or cause the whole industry's success to be threatened, making it necessary for the lender to work with other investors to find a replacement company to provide operations and maintenance and potentially triggering expensive staff time needs at the CDFI. While these risks are difficult to mitigate on a project-specific basis, CDFIs can measure their exposure based on industry concentration risk.¹⁶⁰ Many lenders prefer not to have a certain percentage of outstanding loans at any given time be concentrated in any one industry or type of business, much less a new and policy-vulnerable industry such as solar.¹⁶¹

Contracted revenue from a solar PPA is available in the industry due to the Public Utility Regulatory Policies Act (PURPA) enacted in 1978, which requires regulated utilities to purchase electricity generation from qualifying small power producing facilities based on minimum rates referred to as avoided cost rates.¹⁶² These lowest avoided cost rates are required to be just, reasonable, and non-discriminatory.¹⁶³ Moreover, even if the avoided cost rates set by utility commissions in accordance with PURPA change or PURPA itself is amended, the PPA for commissioned solar projects, as with other any other generation type, remain enforceable contracts with set rates for all present and future generation from those specific developments.¹⁶⁴

¹⁵⁹ Email correspondence with Melissa Malkin-Weber, Self-Help Credit Union Sustainability Director, April 22, 2015.

¹⁶⁰ The CDFI Fund, *CDFI Loan Policies and Procedures – Portfolio Management Series Webinar*, 2012, http://www.cdfifund.gov/what_we_do/resources/Loan%20Policies%20CDFI%20Fund%20Final.ppt (accessed April 19, 2015), slide 42.

¹⁶¹ *Ibid.*

¹⁶² The Public Utility Regulatory Policies Act of 1978, *18 CFR Part 292, Subpart C*, <http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&sid=e219160c29f831f2dd7bd934e5a98cf9&rgn=div5&view=text&node=18:1.0.1.11.58&idno=18#18:1.0.1.11.58.2.27.6> (accessed April 23, 2015).

¹⁶³ *Ibid.*

¹⁶⁴ Makena Coffman, et al, "PURPA and the Impact of Existing Avoided Cost Contracts on Hawai'i's Electricity Sector," *University of Hawaii Economic Research Organization*, March 13, 2014, <http://www.uhero.hawaii.edu/assets/PURPA4.pdf> (accessed April 19, 2015), page 3.

C. Off-taker Risk

The off-taker is the user of electricity that agrees to buy what is generated by the solar installation.¹⁶⁵ Off-taker type ranges from a single homeowner to a bundle of many homeowners and businesses, a large big box store, or a utility.¹⁶⁶ Utilities in certain states are mandated to generate portion of their electricity from renewables to meet an RPS, as described earlier in this report. The remarkable cost decline of solar technology has also prompted utilities to build or buy solar generation voluntarily; one industry research group calculates that 5.7 gigawatts (GW) of solar electricity have been procured by utilities since the start of 2014 for reasons other than meeting RPS, though a significant piece of this growth is due to PURPA.¹⁶⁷

The risk of an off-taker is often measured by the credit rating of that off-taker based upon a personal credit score or corporate credit rating from Moody's, Standard & Poor's or Fitch Ratings. If a company is unrated, lenders may be able to understand off-taker risk based on a shadow rating.¹⁶⁸ A shadow rating is an assessment performed without public announcements of results, or by independent analysis of the off-taker's financials, such as Moody's *RiskCalc*.¹⁶⁹ For example, if a CDFI has the opportunity to finance a mid-sized solar installation with an agricultural farm as the off-taker, that farm is the primary source of revenue for that project. The farm is likely to be unrated, so the CDFI must carefully review the farm's financial history and projections in order to understand if that farm will be able to pay for the electricity generated from the solar installation over the duration of the loan. In this case, underwriting the solar installation requires similar due diligence to underwriting a loan to the farm itself. For this reason, it is significantly easier and more standardized to underwrite solar development with rated off-takers.

For private, unrated off-takers, a CDFI can also take into account circumstantial variables that go beyond an off-taker's financial strength when assessing off-taker risk. This assessment might include the likelihood of site vacancy, solar electricity purchase prices required for loan repayment compared to retail grid electricity prices, and an estimation of the avoided cost rate

¹⁶⁵ John Joshi, "Creating a Market for Solar Securitization," *Journal of Structured Finance*, 2012, Volume 18:2, page 82.

¹⁶⁶ *Ibid.*

¹⁶⁷ Mike Munsell, "Numerical highlights from Solar Analyst Cory Honeyman's Solar Summit presentation," *Greentech Media*, April 20, 2015, <http://www.greentechmedia.com/articles/read/5-Numbers-That-Will-Shape-the-Future-of-US-Solar-in-2015-and-2016> (accessed April 21, 2015).

¹⁶⁸ Moody's Analytics, *RiskCalc™ Plus*, <http://www.moodyanalytics.com/Products-and-Solutions/Enterprise-Risk-Solutions/Credit-Assessment-and-Originiation/RiskCalc-Plus> (accessed April 19, 2015).

¹⁶⁹ *Ibid.*

that the solar would receive if a private off-taker disappeared.¹⁷⁰ Even if a private buyer of the electricity moves or dissolves, if the site where the solar is installed is unlikely to be vacant and another potential off-taker would arrive and want to buy the solar electricity, the CDFI would be more likely to have its loan repaid.¹⁷¹ A recent NREL study on solar and vacancy rates found that commercial real estate vacancy rates are improving throughout the country, with growing markets on the coasts around cities such as New York, San Francisco, New Haven, Washington, D.C., and Miami.¹⁷² In these areas, where solar is often also experiencing strong growth, default rates are less than 10%.¹⁷³

Although a transition period might mean lost production, it is unlikely that solar generation would not have a buyer for an extended period of time unless a building remained vacant. A concern, however, is that if grid electricity rates are lower than the solar rates, a new off-taker would decide against buying the solar generation at rates estimated during development; this situation has occurred for other technologies including oil-based electricity generation in Hawaii.¹⁷⁴ A related risk, expressed well in a recent SolarCity note offering ratings report, is that solar rates in the future will be so much lower than rates now that an off-taker would want to renegotiate compared to other users of more advanced versions of the same technology.¹⁷⁵

CDFIs are capable of this off-taker and industry analysis due to their lending to many small businesses in other sectors, but it is difficult to automate. Self-Help's approach is relationship-based and hands-on, whereas other big banks are focused on underwriting algorithms and scalability of these processes.¹⁷⁶ For example, Wunder Capital, a start-up that aims to provide debt for solar with crowdsourced capital from accredited investors, has developed an underwriting algorithm that makes the process more automated.¹⁷⁷ SunEdison and SolarCity have overcome off-taker risk with scale and securitization, but to date the CDFI world has provided more relationship-based services and less automation.¹⁷⁸

¹⁷⁰ Discussion with Rebecca Rogers, Assistant General Counsel at Self-Help Credit Union and Ventures Fund, February 2015.

¹⁷¹ *Ibid.*

¹⁷² Michael Mendelsohn, "Tapping Underserved Solar Markets: Can We Extend Solar Deployment into Customer Sectors with Lower or No Credit?" *NREL*, April 8, 2014, <https://financere.nrel.gov/finance/content/tapping-underserved-solar-markets-can-we-extend-solar-deployment-customer-sectors-lower-or-n> (accessed April 19, 2015).

¹⁷³ *Ibid.*

¹⁷⁴ Makena Coffman, et al., "PURPA and the Impact of Existing Avoided Cost Contracts on Hawaii's Electricity Sector," *University of Hawaii Economic Research Organization*, March 13, 2014, <http://www.uhero.hawaii.edu/assets/PURPA4.pdf> (accessed April 19, 2015), page 3.

¹⁷⁵ Standard&Poor's. *RatingsDirect: Presale: SolarCity LMC Series I LLC (Series 2013-1)*, November 11, 2013, <http://greenbankacademy.com/wp-content/uploads/SP-Rating-of-SolarCity-Solar-Back-Bonds.pdf> (accessed April 19, 2015).

¹⁷⁶ Michael Swack, et al., "CDFI industry analysis," *The Carsey Institute at the Scholars' Repository*, 2012, <http://scholars.unh.edu/carsey/166> (accessed April 19, 2015), page 9.

¹⁷⁷ Wunder Capital, *How it Works*, <https://www.wundercapital.com/how-it-works> (accessed April 19, 2015).

¹⁷⁸ Michael Swack, et al., "CDFI industry analysis," *The Carsey Institute at the Scholars' Repository*, 2012, <http://scholars.unh.edu/carsey/166> (accessed April 19, 2015), page 9.

D. Other Risks

A solar lending underwriter should consider a variety of other risks, including developer risk. If the developer behind a solar installation struggles or dissolves, the CDFI may need to step in and take over the operations and maintenance of a project, which would occur by subcontracting with another provider.¹⁷⁹ While the developer typically maintains a share of ownership of the solar installation and is responsible for operations, maintenance and debt repayment, this transition to another subcontractor would not necessarily be disruptive or expensive.¹⁸⁰ Solar installation operations are minimal after interconnection and are transferred regularly; however, a CDFI is more likely to work to create a shared vision with the developer in order to avoid this possibility and ensure that projects are completed successfully.¹⁸¹

CASE STUDY: BOSTON COMMUNITY CAPITAL

CDFIs may find unique ways to merge solar financing with other community development project financing in order to decrease risk and maximize mission impact. Boston Community Capital in Boston, Massachusetts is an example of a CDFI that has incorporated clean energy and energy efficiency into affordable housing and low-income community development initiatives.¹⁸²

In 2008, Boston Community Capital make the decision not just to lend, but to move the market forward and lead solar development focused on non-profit and housing sites in Massachusetts.¹⁸³ The CDFI formed BCC Solar Energy Advantage, an affiliate non-profit entity that develops solar electricity projects.¹⁸⁴ BCC Solar Energy Advantage structures the financing, subcontracts the EPC, and ultimately maintains ownership of the solar projects. Customer utility costs are then reduced with fixed-price PPAs.¹⁸⁵

¹⁷⁹ Joe Ritter, "Securing Project-Based Financing for Solar PV Projects," *Natural Gas & Electricity*, Volume 31, Number 10, May 2015, page 6.

¹⁸⁰ Discussion with Rebecca Rogers, Assistant General Counsel at Self-Help Credit Union and Ventures Fund, February 2015.

¹⁸¹ Joe Ritter, "Securing Project-Based Financing for Solar PV Projects," *Natural Gas & Electricity*, Volume 31, Number 10, May 2015, page 6.

¹⁸² Boston Community Capital, *Sustainability Initiatives*, <http://www.bostoncommunitycapital.org/programs-services/sustainability-initiatives> (accessed April 19, 2015).

¹⁸³ Boston Community Capital, *Innovative Model Brings Solar Power to Non-Profits*, December 11, 2013, <http://www.bostoncommunitycapital.org/sites/default/files/12%2011%2013%20BCC%20solar%20release%20-%20FINAL.pdf> (accessed April 19, 2015).

¹⁸⁴ Robert Sanders and Lewis Milford, "Clean Energy for Resilient Communities: Expanding Solar Generation in Baltimore's Low-Income Neighborhoods," *Clean Energy Group*, February 2014, <http://www.cleanenergygroup.org/assets/Uploads/2014-Files/Clean-Energy-for-Resilient-Communities-Report-Feb2014.pdf> (accessed April 19, 2015), page 2.

¹⁸⁵ Boston Community Capital, *Innovative Model Brings Solar Power to Non-Profits*, December 11, 2013, <http://www.bostoncommunitycapital.org/sites/default/files/12%2011%2013%20BCC%20solar%20release%20-%20FINAL.pdf> (accessed April 19, 2015).

By installing solar on community sites that are local for the CDFI, Boston Community Capital maintains control of project financial elements, minimizes uncertainty, and ensures that the installations maximize benefit to low-wealth individuals. The CDFI financed a solar installation and other energy improvements at a South Boston public housing site, Old Colony Development, where some residents previously paid more than \$4,000 per unit per year on utility bills.¹⁸⁶ These bills were reduced to a fraction of their earlier costs.¹⁸⁷

Another Boston Community Capital affiliate, the Boston Community Loan Fund, provides debt for the solar development and passes on benefits from an allocation of New Markets Tax Credits (NMTC). Overall, Boston Community Capital has developed 30 solar projects for an accumulated 4 MW of solar capacity. A third of these projects were installed on neighborhood non-profits; the other two thirds were built on multifamily housing, including some affordable multifamily sites with 100% of common area electricity needs met by the solar installations.¹⁸⁸ Boston Community Capital estimates that, in total, their solar projects will provide more than \$4.6 million in savings to customers over the installation lifetime.¹⁸⁹ In May 2014, President Barack Obama recognized Boston Community Capital as a leading financial institution and celebrated the CDFI's programmatic success as an example for other private lenders to replicate.¹⁹⁰

COLLATERAL

At CDFIs as in the rest of the lending industry, identifying and analyzing collateral is a critical component of due diligence for any secured loan.¹⁹¹ For solar project debt, this analysis is unique and particularly complex.¹⁹² Collateral, which is what a borrower pledges as security for loan repayment, is the primary protection that a lender has to avoid and mitigate losses in the event of a default.¹⁹³ The collateral that backs a secured loan is typically real property, such as real estate.¹⁹⁴ In solar development, the value of a project's hard equipment collateral is frequently insufficient to cover a loan; the going concern value of the solar installation once it is running, including

¹⁸⁶ Boston Community Capital, *Tracking of energy consumption where it's needed most: in affordable housing developments*, <http://www.bostoncommunitycapital.org/impact/impact-story-old-colony-public-housing-development> (accessed April 19, 2015).

¹⁸⁷ Ibid.

¹⁸⁸ Boston Community Capital, *Innovative Model Brings Solar Power to Non-Profits*, December 11, 2013, <http://www.bostoncommunitycapital.org/sites/default/files/12%2011%2013%20BCC%20solar%20release%20-%20FINAL.pdf> (accessed April 19, 2015).

¹⁸⁹ Boston Community Capital, *Sustainability Initiatives*, <http://www.bostoncommunitycapital.org/programs-services/sustainability-initiatives> (accessed April 19, 2015).

¹⁹⁰ The White House, *Fact Sheet: President Obama Announces Commitments and Executive Actions to Advance Solar Deployment and Energy Efficiency*, May 9, 2014, <https://www.whitehouse.gov/the-press-office/2014/05/09/fact-sheet-president-obama-announces-commitments-and-executive-actions-a> (accessed April 19, 2015).

¹⁹¹ Joe Ritter, "Securing Project-Based Financing for Solar PV Projects," *Natural Gas & Electricity*, Volume 31, Number 10, May 2015, page 1.

¹⁹² Chris Groobey et al, "Project Finance Primer for Renewable Energy and Clean Tech Projects," *Wilson Sonsini Goodrich & Rosati*, August 2010, https://www.wsgr.com/PDFSearch/ctp_guide.pdf (accessed April 19, 2015), page 10.

¹⁹³ Ibid.

¹⁹⁴ Ibid.

contractual rights and intellectual property, is important for a CDFI to consider in addition to the liquidation value of hard collateral.¹⁹⁵ This approach to collateral is akin to considering a machine to have a higher collateral value than the sum of its parts individually, especially if that machine has contracted purchase agreements for the widgets it produces. Lender risk is highest if the development is never completed, and also requires that a lender be prepared to take over operations and maintenance of the going concern, or subcontract this work, in the event of default. Lenders may request a collateral assignment of all contracts, agreements, and a landlord's release, giving the CDFI a right to enter the sites and either remove collateral or continue to operate the projects as desired.¹⁹⁶

It is of note that IRS regulation recategorizing solar as real property in certain circumstances is possible.¹⁹⁷ If the IRS changes its regulatory stance on the definition of real property to explicitly include or exclude solar modules in certain circumstances, CDFIs will need to take this into account during collateral valuation, which could have both positive and negative effects for the industry depending on which project finance structures are used.¹⁹⁸

A. Approaches to Valuation

To assess the value of solar collateral, a lender can take into account analysis from three different valuation approaches: cost, market, or income.¹⁹⁹ After the three approaches are conducted, the lender compares results and triangulates a weighted average expected value for the solar project that will serve to value the collateral that secure the loan.²⁰⁰

Cost Approach

The cost method is the simplest but often the least detailed approach to valuation, as it is difficult to value intangible agreements.²⁰¹ It is based on total project costs, including all equipment orders, design, permitting, installation subcontracting, a reasonable profit margin and reasonable

¹⁹⁵ Ibid.

¹⁹⁶ Joe Ritter, "Securing Project-Based Financing for Solar PV Projects," *Natural Gas & Electricity*, Volume 31, Number 10, May 2015, page 6.

¹⁹⁷ Wilson Sonsini Goodrich & Rosati, *Proposed IRS Regulations Would Qualify PV Modules as Real Property under REIT Rules in Certain Circumstances*, May 12, 2014, <https://www.wsgr.com/publications/PDFSearch/wsgralert-pv-modules.pdf> (accessed April 19, 2015).

¹⁹⁸ Ibid.

¹⁹⁹ SEIA and CohnReznick, *Valuation of Solar Generation Assets*, August 26, 2013,

<https://www.cohnreznick.com/sites/default/files/CohnReznickSEIASolarValuations.pdf> (accessed April 23, 2015).

²⁰⁰ Ibid.

²⁰¹ Ibid.

developer fees.²⁰² The cost approach often serves as an upper bound in the range of solar asset valuations.²⁰³

Market Approach

In contrast, no matter how much or little a solar project costs to build, the market approach values it based on what it would be likely to sell for on the open market.²⁰⁴ This price is found by researching comparable property sales in similar locations. This approach is useful but difficult to complete accurately due to the limited number of sales of solar projects on the secondary market.²⁰⁵ As the industry matures and more transfers of assets take place, the market approach may grow in weight.

Income Approach

The final method to valuation is the income approach. This approach is based on the value of expected future cash flows.²⁰⁶ In this valuation method, a lender can reference the contracts for revenue that a solar project has secured and may also take into account some potential for uncontracted but likely revenue.²⁰⁷ This approach requires certain assumptions that are difficult to verify and standardize, such as appropriate discount rates, project life and future market conditions.²⁰⁸ Even so, when the lender and borrower communicate regarding these expectations in a cautious and transparent way and complete an income-based analysis carefully, this approach is typically the most accurate, and has been defended as such in case law and by tax authority.²⁰⁹

B. Appraisals and Credit Union Regulation

In many cases, an independently completed appraisal of the development covering the different approaches outlined above is by a lender during due diligence.²¹⁰ In lending for real estate assets, independent appraisals are a required standard.²¹¹ Third-party fair market value (FMV) appraisals such as those conducted by Novogradac & Company and CohnReznick establish the fair market

²⁰² Ibid.

²⁰³ Ibid.

²⁰⁴ Ibid.

²⁰⁵ Ibid.

²⁰⁵ Geoffrey T. Klise, et al, "Standardizing Appraisals for PV Installations," *Sandia National Laboratories*, <http://energy.sandia.gov/wp/wp-content/gallery/uploads/SAND2013-5239C.pdf> (accessed April 19, 2015), page 1.

²⁰⁶ SEIA and CohnReznick, *Valuation of Solar Generation Assets*, August 26, 2013.

²⁰⁶ <https://www.cohnreznick.com/sites/default/files/CohnReznickSEIASolarValuations.pdf> (accessed April 23, 2015).

²⁰⁷ Ibid.

²⁰⁸ Ibid.

²⁰⁹ Ibid.

²¹⁰ Geoffrey T. Klise, et al, "Standardizing Appraisals for PV Installations," *Sandia National Laboratories*, <http://energy.sandia.gov/wp/wp-content/gallery/uploads/SAND2013-5239C.pdf> (accessed April 19, 2015), page 1.

²¹¹ National Credit Union Administration, *Regulation, Part 722, Appraisals*, Sec. 722.3(a)(7), <http://www.ncua.gov/legal/reghistory/pages/part722.aspx> (accessed April 19, 2015).

value of a solar installation and support the financial and structural analyses performed by the project developer and CDFI lender during development even when the solar development is not secured by real estate.²¹² While appraisals are not completed for all solar development, they are most commonly used to establish fair market value to establish the basis on which federal renewable energy investment tax credits (ITCs) are calculated and allocated to investors who own the solar installation, and to help establish standard valuations in the market.²¹³ In order to be used for these purposes, the appraiser must follow uniform reporting requirements.²¹⁴

FMV appraisals are challenging for CDFIs to depend on from a collateral perspective. Due in part to the youth of solar industry lending, no examples of lenders that experienced a default on a solar loan could be found for reference and comparison to appraisal value during the completion of this report. FMV is a critical and sometimes contentious issue because developers have an incentive to claim the highest FMV achievable in order to maximize tax credits. A lender might decide that it is more appropriate to use a more conservative or risk-weighted number for its own internal valuation of the solar project as collateral.

C. Intercreditor Agreements

Coordination between a lender and other investors regarding appraisal valuation is not the only area where it is necessary to confirm that interests are aligned and to negotiate certain decisions. Intercreditor agreements are important to bring up early with a potential borrower, as certain lenders and investors may not be able to compromise on issues in a mutually agreeable way.²¹⁵ Intercreditor agreements can be one of the most significant challenges to success in CDFI lending for solar development, as is discussed in the *Barriers* section of this report.

The primary contractual intercreditor agreement considered in solar development is a subordination, nondisturbance, and attornment agreement (SNDA).²¹⁶ This is an agreement provided by the lender which states that the lender will honor certain other investor relationships and circumstances in the event that the developer defaults on the lease and the lender takes over

²¹² SEIA and CohnReznick, *Valuation of Solar Generation Assets*, August 26, 2013, <https://www.cohnreznick.com/sites/default/files/CohnReznickSEIASolarValuations.pdf> (accessed April 23, 2015).

²¹³ Geoffrey T. Klise, et al, "Standardizing Appraisals for PV Installations," *Sandia National Laboratories*, <http://energy.sandia.gov/wp/wp-content/gallery/uploads/SAND2013-5239C.pdf> (accessed April 19, 2015), page 1.

²¹⁴ National Credit Union Administration, *Regulation, Part 722, Appraisals*, Sec. 722.3(a)(7), <http://www.ncua.gov/legal/reghistory/pages/part722.aspx> (accessed April 19, 2015).

²¹⁵ Chadbourne, *Project Finance NewsWire: Cost of Capital: 2015 Outlook*, February 2015, http://www.chadbourne.com/files/Publication/0642096e-a001-47d8-86d4-e08b5eaa1eb9/Presentation/PublicationAttachment/8368c0f0-1b12-4b01-8c03-e2beda6271f9/pfn_0215.pdf (accessed April 19, 2015), page 4.

²¹⁶ Jack Fersko, "Solar Generation: The Development of the Next Real Estate Frontier," *Greenbaum Rowe Smith & Davis*, http://www.greenbaumlaw.com/media/publication/9_ACREL%20Solar%20Article.pdf (accessed April 19, 2015), page 31.

operation of the solar asset.²¹⁷ The details within an SNDA matter to investors because tax benefits may be jeopardized or recaptured by the government if a lender takes over the operation of a solar asset during the period that another investor is receiving tax benefits on the project.²¹⁸ According to Eber at JPMorgan, tax equity investors participating in leveraged projects want forbearance through the five-year recapture period for the ITC at minimum.²¹⁹ This requirement means that a lender can take steps to remedy a payment default from the developer but could not take over the solar asset altogether and dissolve the ownership structure.²²⁰

The specific steps available to a lender vary by agreement. One example compromise is the ability to foreclose on equipment collateral and sell it as long as an underlying master lease is not disturbed. In all likelihood, repayment of a loan is most likely if the tax credit and operational structures are kept in place even if a developer defaults, as the lender can take over project management to ensure continued repayment through contracts with the electricity off-taker.²²¹ Even so, a CDFI lender may be hesitant or unable to agree to the provisions in intercreditor agreements, and crafting an SNDA that satisfied all parties required focused discussion.²²²

D. Risk Mitigation

Several types of agreements and credit enhancements protect lenders and mitigate risk when loan repayment is jeopardized while still staying within the limitations of an SNDA.²²³ These include pledges of interest and control, guarantees and insurance.²²⁴

Pledges of Interest and Control

A lender may require a solar developer and all of the separate entities formed within the solar project development structure to contractually pledge their membership interests to the lender so that, in the event of nonpayment, the lender has recourse to the solar asset.²²⁵

Guarantees

²¹⁷ Ibid.

²¹⁸ Chadbourne, *Project Finance NewsWire: Cost of Capital: 2015 Outlook*, February 2015, http://www.chadbourne.com/files/Publication/0642096e-a001-47d8-86d4-e08b5eaa1eb9/Presentation/PublicationAttachment/8368c0f0-1b12-4b01-8c03-e2beda6271f9/pfn_0215.pdf (accessed April 19, 2015), page 4.

²¹⁹ Ibid.

²²⁰ Ibid.

²²¹ Discussion with Rebecca Rogers, Assistant General Counsel at Self-Help Credit Union and Ventures Fund, February 2015.

²²² Ibid.

²²³ Joe Ritter, "Securing Project-Based Financing for Solar PV Projects," *Natural Gas & Electricity*, Volume 31, Number 10, May 2015, page 6.

²²⁴ Bethany Speer, et al, "Insuring Solar Photovoltaics: Challenges and Possible Solutions," *NREL*, February 2010, <http://www.nrel.gov/docs/fy10osti/46932.pdf> (accessed April 19, 2015), page 11.

²²⁵ Ibid.

Particularly when working with small solar developers that lack balance sheet strength or long-term operating history, a CDFI may insist that the potential borrower provide a personal or corporate guarantee.²²⁶ These guarantees indicate a high level of commitment to the project and mean that the parent company is responsible for repayment even if the project revenues do not support repayment at some point during the life of the loan. In many instances, a CDFI may ask for corporate or personal guarantees as an indication of the borrower's "skin in the game" on a project even if the borrower's assets are small relative to loan size.²²⁷ If a borrower is hesitant to provide a guarantee, this may be due to concern that future financial opportunities may be more difficult to secure if the borrower has these obligations.

Third-party guarantees may also provide the credit enhancement necessary for a lender to move forward with a potential borrower.²²⁸ The most significant third-party guarantee available in solar project finance is a United States Department of Agriculture (USDA) Rural Energy for America Program (REAP) Loan Guarantee.²²⁹ First established in the 2008 Farm Bill, REAP loan guarantees encourage rural solar industry growth by guaranteeing 75% or 80% of a loan.²³⁰ Over \$228 million in loans for over 9,000 renewable energy projects have used this REAP guarantee.²³¹

Insurance Requirements

Understanding and approving a borrower's insurance coverage requires early conversation with both the borrower and the insurance company, as it is difficult to separate a technology failure from a workmanship or circumstantial failure after an extreme event.²³² The understanding should include how a developer's corporate insurance may differ from the policy taken out to cover a specific solar project entity.²³³ Different geographies may require different coverage; some installations may require insurance that costs up to 25% of total ongoing operating expenses or more.²³⁴ Extreme weather damage in certain locations may not be practical to insure against, such as earthquake insurance in California or wind damage along the North Carolina coast. In these

²²⁶ Chris Groobey et al, "Project Finance Primer for Renewable Energy and Clean Tech Projects," *Wilson Sonsini Goodrich & Rosati*, August 2010, https://www.wsgr.com/PDFSearch/ctp_guide.pdf (accessed April 19, 2015), page 8.

²²⁷ *Ibid.*

²²⁸ *Ibid.*

²²⁹ United States Department of Agriculture, *Rural Energy for America Program Renewable Energy Systems & Energy Efficiency Improvement Loans & Grants*, <http://www.rd.usda.gov/programs-services/rural-energy-america-program-renewable-energy-systems-energy-efficiency> (accessed April 19, 2015).

²³⁰ *Ibid.*

²³¹ *Ibid.*

²³² Bethany Speer, et al, "Insuring Solar Photovoltaics: Challenges and Possible Solutions," *NREL*, February 2010, <http://www.nrel.gov/docs/fy10osti/46932.pdf> (accessed April 19, 2015), page 13.

²³³ *Ibid.*

²³⁴ *Ibid.*, page iv.

cases where extreme weather risk is practically uninsurable, the developer may be expected to set aside extra reserves.²³⁵

CASE STUDY: SOLAR FOR MINORITY FARM OWNERS

Beyond developing expertise in the mechanics of solar lending, CDFIs can increase impact by proactively researching how a loan can make a pointed impact for an underserved portion of the population. One such opportunity for CDFIs is to develop loan products for minority farm owners. In 1920, the number of farms operated by African-American peaked at 926,000, roughly 14.5% of farms nationally and 30-40% of farms in North Carolina specifically.^{236 237} Since that time, black farmers have declined by more than 98%, to 30,500 in 2007, a faster rate than other farm declines even after controlling for farm size.^{238 239} In 2007, African Americans owned only 3.2 million acres of farmland.²⁴⁰ As agricultural producers consolidated and farm income declined throughout the 20th century, African American farmers faced the worst of this shift. This is in part due to documented historical civil rights violations by the USDA, including unequal access to farm financing and unequal rates of foreclosure on distressed farms, brought to light in a successful class action lawsuit in 1999 resulting in the largest civil rights settlement in U.S. history at the time.²⁴¹

While few African-Americans still own farms, CDFIs have the opportunity to assist those that do in order to help them maintain their lands and thrive.²⁴² This opportunity also extends to women, Hispanic, and other minority farmers. Several potential borrowers have reached out to Self-Help for assistance to integrate solar development with farm operations.²⁴³ While many potential projects face challenges due to lack of information and difficulty securing investors with adequate tax appetite, the potential for impact is large.²⁴⁴ Agricultural operations, especially those with

²³⁵ Ibid, page 11.

²³⁶ Spencer Wood and Jess Gilbert, "Returning African American Farmers to the Land: Recent Trends and a Policy Rationale," *The Review of Black Political Economy*, Spring 2000, page 44.

²³⁷ Loren A. Schwenger, Loren. A Vanishing Breed: Black Farm Owners in the South, 1651-1982. *Agricultural History* 63:3 (1989). Page 51

²³⁸ Spencer Wood and Jess Gilbert, "Returning African American Farmers to the Land: Recent Trends and a Policy Rationale," *The Review of Black Political Economy*, Spring 2000, page 52.

²³⁹ Shakara Tyler and Eddie Moore, "Plight of Black Farmers in the Context of USDA Farm Loan Programs: A Research Agenda for the Future," *Professional Agricultural Workers Journal*, 2013, page 1.

²⁴⁰ Ibid.

²⁴¹ Spencer Wood and Jess Gilbert, "Returning African American Farmers to the Land: Recent Trends and a Policy Rationale," *The Review of Black Political Economy*, Spring 2000, page 60.

²⁴² Shakara Tyler and Eddie Moore, "Plight of Black Farmers in the Context of USDA Farm Loan Programs: A Research Agenda for the Future," *Professional Agricultural Workers Journal*, 2013, page 9.

²⁴³ Discussion with Rebecca Rogers, Assistant General Counsel at Self-Help Credit Union and Ventures Fund, February 2015.

²⁴⁴ Ibid.

electricity needs for irrigation or livestock management, spend 2-5% of average total expenditures on energy, though this varies by farm type.²⁴⁵

BARRIERS

CDFIs face a variety of barriers to success upon entry into the solar industry. Lack of knowledge, scale, collateral, or intercreditor agreement can each cause a project to stall even when mission alignment is clear.²⁴⁶ For some lenders, all challenges are surmountable. For others, structural or regulatory limitations related to these barriers are impossible to renegotiate or overcome. Early and thorough research is recommended when considering solar lending.

A. Knowledge Barriers

Knowledge barriers are familiar to CDFIs faced with a wide variety of lending opportunities. No matter how promising a loan may be, the sector knowledge and human capital required by a commercial lending group to complete due diligence may not be commensurate with the benefits of the prospect. Taking on a project is a leap of faith that requires significant time, leadership, and advocacy within the organization. The capacity to put organizational resources toward a new lending sector may not make strategic sense for a CDFI faced with limited bandwidth, or in an area without volume of similar projects. This is particularly true if a CDFI cannot identify an employee to champion solar development loans and lead research in the area. Success despite knowledge barriers is most likely if a CDFI can devote staff time to research and can develop a pipeline of solar lending opportunities so that expertise can be built up over time and processes become more efficient through standardization.

B. Scale Barriers

Even when a lender is committed to building sector expertise in the solar industry, aligning the scale of debt needs with lender capital availability is challenging. Some CDFIs simply do not make loans large enough for utility-scale solar projects; as the solar industry matures, larger traditional banks may win project portfolios instead of smaller community lenders. Even CDFIs

²⁴⁵ Shellye Suttles, "Agricultural Energy Use and the Proposed Clean Power Plan," *USDA Economic Research Service*, September 8, 2014, <http://www.ers.usda.gov/amber-waves/2014-september/agricultural-energy-use-and-the-proposed-clean-power-plan.aspx#.VTpls1Viko> (accessed April 23, 2015).

²⁴⁶ Chadbourne, *Project Finance NewsWire: Cost of Capital: 2015 Outlook*, February 2015, http://www.chadbourne.com/files/Publication/0642096e-a001-47d8-86d4-e08b5eaa1eb9/Presentation/PublicationAttachment/8368c0f0-1b12-4b01-8c03-e2beda6271f9/pfn_0215.pdf (accessed April 19, 2015), page 4.

with deep lending resources are understandably averse to the risk of concentrating too large a proportion of their resources into a single sector over a short period of time. CDFIs can overcome this barrier by focusing on specific geographies or lending niches, such as solar for multifamily housing, that are underserved by traditional banks.

C. Collateral Barriers

CDFI lending is subject to government regulation. Individual lenders also have established loan policies to guide decisions and control risk.²⁴⁷ Collateral guidelines are a fundamental component of lending policy; they outline how the assets securing a loan are valued.²⁴⁸ In the case of solar lending, a CDFI must come to an organizational decision about how to value collateral. Typically, this valuation must be as a going concern and the equipment value is not likely to be sufficient to reach a desired loan-to-value ratio.²⁴⁹ Lenders may decide that Board of Director approval is needed due to the unique nature of the loans or if this approach to collateral is ambiguous in institutional policy. This challenge is one that a CDFI should research early while considering entry into solar lending, as agreement on approach to collateral valuation is a foundational aspect of the lending process.

D. Intercreditor Agreements

As described earlier in the report, forging an approach to intercreditor agreements is another of the most significant challenges to solar lending. Certain CDFIs may not be able to gain comfort with modified subordination, nondisturbance, and attornment agreements (SNDAs) that decrease the lender's ability to secure repayment in the event of default.²⁵⁰ Intercreditor dynamics that come into play while negotiating these agreements may change after 2016 if federal incentives for clean energy decrease and lenders take on a larger piece of the capital stack than tax equity investors.²⁵¹ Certain CDFIs may not be able to find common ground until that time if, institutionally, they are

²⁴⁷ The CDFI Fund, *CDFI Loan Policies and Procedures – Portfolio Management Series Webinar*, 2012, [http://www.cdfifund.gov/what we do/resources/Loan%20Policies%20CDFI%20Fund%20Final.ppt](http://www.cdfifund.gov/what_we_do/resources/Loan%20Policies%20CDFI%20Fund%20Final.ppt) (accessed April 19, 2015), page 4.

²⁴⁸ *Ibid*, page 31.

²⁴⁹ Ken Dicks and Charles Bissell, "Going Concern Forum: Valuation Issues in Appraising Realty and Non-Realty Components," *Appraisal Institute*, August 17, 2011, http://www.appraisalinstitute.org/assets/1/7/GoingConcern_Presentation_8_17_2011.pdf (accessed April 19, 2015).

²⁵⁰ Chadbourne, *Project Finance NewsWire: Cost of Capital: 2015 Outlook*, February 2015, http://www.chadbourne.com/files/Publication/0642096e-a001-47d8-86d4-e08b5eaa1eb9/Presentation/PublicationAttachment/8368c0f0-1b12-4b01-8c03-e2beda6271f9/pfn_0215.pdf (accessed April 19, 2015), page 4.

²⁵¹ Michael Mendelsohn and Claire Kreycik, "Federal and State Structures to Support Financing Utility-Scale Solar Projects and the Business Models Designed to Utilize Them," *NREL*, April 2012, <http://www.nrel.gov/docs/fy12osti/48685.pdf> (accessed April 19, 2015), page 12.

unwilling to give up their power to take over operational control of the solar asset to remedy payment default and to provide provisions favorable to tax equity investors.²⁵²

NEXT STEPS FOR CDFIs

CDFIs may continue providing basic term debt to utility-scale solar developers, as their successes in this approach are clear. Alternatively, in keeping with the CDFI philosophy of directing capital to underserved markets, working with unprecedented models and eventually sparking other support from more traditional sources, project debt for solar development may quickly be established enough that CDFI action is better suited toward the next frontiers in lending. At the same time, CDFIs that cannot overcome the barriers described above may seek other paths to provide financial support to the solar industry. CDFIs can succeed in providing innovative financial support by taking next steps including unconventional repayment terms, community solar models, products for non-rated private solar off-takers, and other opportunities.

A. Unconventional Repayment Terms

One area of opportunity for CDFIs is to work with borrowers who request unconventional repayment terms. To date, CDFI lending for utility-scale solar installation has largely adhered to mortgage-style amortization, meaning that every loan payment is equal over the term of the loan.²⁵³ Throughout the loan life, the ratio of principal to interest paid shifts, with a higher percentage of payments made earlier in the life of the loan going to pay off interest. Solar installation revenue typically tracks generation, which varies seasonally and degrades by an average of 0.5% annually.²⁵⁴ Additionally, tax benefits from accelerated depreciation and the federal ITC occur during the first five years of a solar project's operations. This results in revenue streams that are highest early in the loan life but decline slightly over time unless a power purchase agreement has a price escalator.

For a borrower to fully take advantage of CDFI debt leverage without taking on undue risk with low DSCR in winter months late in the term of the loan, reamortization and sculpted debt options are attractive. Reamortization is a type of loan modification where a borrower makes a larger than

²⁵² Chadbourne, *Project Finance NewsWire: Cost of Capital: 2015 Outlook*, February 2015, http://www.chadbourne.com/files/Publication/0642096e-a001-47d8-86d4-e08b5eaa1eb9/Presentation/PublicationAttachment/8368c0f0-1b12-4b01-8c03-e2beda6271f9/pfn_0215.pdf (accessed April 19, 2015), page 4.

²⁵³ Discussion with Rebecca Rogers, Assistant General Counsel at Self-Help Credit Union and Ventures Fund, February 2015.

²⁵⁴ David Feldman and Travis Lowder, "Banking on Solar: An Analysis of Banking Opportunities in the U.S. Distributed Photovoltaic Market," *NREL*, Nov 2014, <http://www.nrel.gov/docs/fy15osti/62605.pdf> (accessed April 19, 2015), page 40.

usual one-time payment and then resets future payments based on new outstanding principal amount.²⁵⁵ While reamortization is typically associated with borrowers in distress, it could be used so that lenders can better match revenues to loan payments. Banks that cater to residential solar customers with loan products, including Admirals Bank, offer flexibility including prepayment opportunities.²⁵⁶

A related opportunity is sculpted debt. Sculpted debt is a commonly used financial instrument in large-scale institutional project finance including debt for fossil-fuel power generation facilities.²⁵⁷ It allows for loan payments to vary within certain parameters by period based on a predetermined target debt service coverage ratio, with calculations completed before the loan is made to ensure that the repayment obligation can be completed over a desired term.²⁵⁸ In some cases, each month, the cash flow available for debt service (CFADS) is matched to the desired coverage ratio to determine a payment. Interest due is repaid, and then the remaining payment draws down the principal balance.²⁵⁹ CDFIs unused to sculpted debt may find both underwriting this approach and planning loan servicing are too challenging to undertake, particularly since many CDFIs are better suited to make smaller loans with lower transactional overhead. Even so, larger institutions have gained comfort in this approach for wind project development.²⁶⁰ It would be of assistance for similarly structured solar projects if loan payments better matched revenue seasonality, and would provide confidence to CDFIs that loans have a high likelihood of being repaid.

B. Community Solar Models

Another opportunity for CDFIs to help lead solar industry growth with strong social impact is to finance community shared solar opportunities. The term “community solar” has taken on specific meaning in the industry.²⁶¹ It is a model whereby one centralized solar installation is connected to a set of dispersed off-takers, owners, investors, or other beneficiaries in some way, allowing a group to be connected to and benefit from solar development without completing an installation

²⁵⁵ Mark J. Garmaise, “The Attractions and Perils of Flexible Mortgage Lending,” *Review of Financial Studies*, Vol. 26, Issue 10, <http://w4.stern.nyu.edu/finance/docs/pdfs/Seminars/1301w-garmaise.pdf> (accessed April 23, 2015), page 6.

²⁵⁶ Admirals Bank, *Admirals Bank's Solar Loans*, <https://www.admiralsbank.com/renewable-energy-lending/loan-programs/solar-step-down> (accessed April 23, 2015).

²⁵⁷ Michael Mendelsohn, et al. “The Impact of Financial Structure on the Cost of Solar Energy,” *NREL*, March 2012, <http://www.nrel.gov/docs/fy12osti/53086.pdf> (accessed April 19, 2015), page 16.

²⁵⁸ *Ibid.*

²⁵⁹ *Ibid.*

²⁶⁰ Uday Varadajan, et al, “The Impacts of Policy on the Financing of Renewable Projects: A Case Study Analysis,” *Climate Policy Initiative*, October 3, 2011, <http://climatepolicyinitiative.org/wp-content/uploads/2011/12/Policy-Impacts-on-Financing-of-Renewables.pdf> (accessed April 23, 2015), page 17.

²⁶¹ Jason Coughlin, et al, “A Guide to Community Solar: Utility, Private, and Non-profit Project Development,” U.S. Department of Energy, November 2010, <http://www.nrel.gov/docs/fy11osti/49930.pdf> (accessed April 19, 2015), page 2.

on their own rooftops.²⁶² CDFIs may find mission alignment with community solar developers that focus on widening the realm of those who can benefit from solar installations to those without site availability for solar. This increased market includes both residential and commercial renters and building owners with shaded or otherwise unsuitable roofs.²⁶³ Community shared solar installations can often be built more efficiently than distributed generation due to economies of scale and optimal siting.²⁶⁴ As this market grows, particularly in states with favorable including Massachusetts, Minnesota, and Colorado, CDFIs have the opportunity to influence how community solar models develop.²⁶⁵ For example, a lender might finance a project with the requirement that a portion of off-takers are low-income and are included in such a way that electricity costs decrease. While it is difficult for a CDFI to underwrite a loan to a developer with repayment contingent upon revenue from a large pool of disparate off-takers, one or a handful of anchor off-takers might provide a foundation that secures the loan. Room in the market for a variety of structures are possible if the model matures as quickly as expected; Minh Le, the US Department of Energy SunShot Director, recently announced that between \$6 billion and \$12 billion will be invested in community shared solar from 2015 to 2020, making the sector the fastest-growing portion of the solar industry.²⁶⁶

C. Products for Non-Rated Private Off-takers

CDFIs may also find a niche serving non-rated private solar off-takers. Many lenders, such as Self-Help, Summit Credit Union in Milwaukee, Wisconsin, and Velocity Credit Union in Austin, Texas, provide low-interest loans for solar installations.²⁶⁷ ²⁶⁸ However, these loan products are often focused on homeowners installing residential solar electricity only, with some CDFIs capping loan amounts at \$20,000.²⁶⁹ The small commercial sector has not kept pace with residential growth, in part because of the difficulty of providing financing for small businesses.²⁷⁰ With analysis of credit strength, vacancy risk, and electricity rates, CDFIs may be able to take

²⁶² Ibid.

²⁶³ Elana Bulman, "Community Solar Models Nationwide and Possibilities for New York City," *The New School University*, May 2012, <http://solargardens.org/CommunitySolarModels.pdf> (accessed April 19, 2015), page 22.

²⁶⁴ Ibid.

²⁶⁵ Favorable policy may incent community shared solar with financial carve-outs specifically for this type of development and/or with rate tariff options such as virtual net metering. See NREL, *Community Shared Solar: Policy and Regulatory Considerations*, <http://www.nrel.gov/docs/fy14osti/62367.pdf> (accessed April 19, 2015), page 3.

²⁶⁶ Herman K. Trabish, "Why Dept of Energy is going big on community shared solar," *UtilityDive*, February 12, 2015, <http://www.utilitydive.com/news/why-dept-of-energy-is-going-big-on-community-shared-solar/361716/> (accessed April 19, 2015).

²⁶⁷ Judee Burr, et al, "Shining Cities at the Forefront of America's Solar Energy Revolution," *Environment America*, April 2014, http://www.environmentamerica.org/sites/environment/files/reports/EA_shining_cities_scrn_0.pdf (accessed April 19, 2015), page 25.

²⁶⁸ Bethany K. Speer, "Community Development Financial Institutions – Providing Clean Energy Capital," *NREL*, July 30, 2012, <https://financere.nrel.gov/finance/content/community-development-financial-institutions-providing-clean-energy-capital> (accessed April 19, 2015).

²⁶⁹ Judee Burr, et al, "Shining Cities at the Forefront of America's Solar Energy Revolution," *Environment America*, April 2014, http://www.environmentamerica.org/sites/environment/files/reports/EA_shining_cities_scrn_0.pdf (accessed April 19, 2015), page 25.

²⁷⁰ Mike Munsell, "Here's How US Commercial Solar Can Bounce Back in 2015," *Greentech Media*, April 1, 2015, <http://www.greentechmedia.com/articles/read/heres-how-u.s.-commercial-solar-can-bounce-back-in-2015> (accessed April 19, 2015).

part in shifting this trend and meeting the needs of this group, and to strengthen opportunity by incorporating Small Business Association (SBA) 7(a) or 504 loan funding for eligible projects.²⁷¹²⁷² NeighborWorks Capital in Silver Spring, Maryland is a CDFI leading the way in this area, with both pre-development and mini-permanent loans that can be used for small commercial solar installations.²⁷³ These loans are attractive for their low, fixed interest rates over a 7-year period and for their flexibility, as they have high maximum loan-to-value ratios of 95% and can be made in a subordinate position to a first mortgage.²⁷⁴

D. Secondary Markets

In 2014, Self-Help worked with Craft3, a CDFI in Oregon, to purchase a portfolio of loans made to fund energy efficiency upgrades.²⁷⁵ Other CDFIs can learn from the way that this transaction overcame perceived risks and shifted market dynamics; the success became the subject of a Lawrence Berkeley National Laboratory Policy Brief.²⁷⁶ The transaction was valued at approximately \$15.7 million.²⁷⁷ It broke new ground as the first market-rate secondary markets transaction of energy efficiency loans of this type, as the lack of project seasoning, unusual program design and lack of property valuation data made the transaction complicated. Craft3 publicly states that it would not have been able to complete the transaction with a lender that was not mission-oriented, as setting up a process required patience and commitment to impact.²⁷⁸

Another replicable secondary markets opportunity occurred in early 2015 when Self-Help took part in a secondary markets transaction from a different perspective. A portfolio of FLS Energy solar projects financed in part with Self-Help debt were purchased by sPower on the secondary market, a move considered one of the industry's largest and most complex sales of operating projects.²⁷⁹ ²⁸⁰ As more solar assets mature, more secondary markets transactions will occur. The ability for CDFIs to take part in this growth depends on their ability to better underwrite risk where other institutions and yieldcos overlook value and to work with smaller projects.

²⁷¹ U.S. Small Business Administration, *Small Loan Advantage and Community Advantage 7(a) Loan Initiatives*, <http://www.cdfifund.gov/docs/2010/cdfi/CommunityAdvantageandSmallLoanAdvantageFactSheet.pdf> (accessed April 19, 2015).

²⁷² *Ibid.*

²⁷³ Bethany K. Speer, "Community Development Financial Institutions – Providing Clean Energy Capital," *NREL*, July 30, 2012, <https://financere.nrel.gov/finance/content/community-development-financial-institutions-providing-clean-energy-capital> (accessed April 19, 2015).

²⁷⁴ NeighborWorks Capital, *Loan Products*, <http://neighborworkscapital.org/lending/loan-products> (accessed April 19, 2015).

²⁷⁵ Peter Thompson, et al., "Selling an Energy Efficiency Loan Portfolio in Oregon," *Lawrence Berkeley National Laboratory*, July 2014, <http://escholarship.org/uc/item/43m3c605> (accessed April 19, 2015), page 1.

²⁷⁶ *Ibid.*

²⁷⁷ *Ibid.*

²⁷⁸ *Ibid.*, page 4.

²⁷⁹ John Downey, "FLS sells 16 solar farms to Utah-based renewable power provider," *Charlotte Business Journal*, March 12, 2015, <http://www.bizjournals.com/charlotte/blog/energy/2015/03/fls-sells-16-solar-farms-to-utah-based-renewable.html?page=all> (accessed April 19, 2015).

²⁸⁰ CohnReznick Capital Markets Securities, *CohnReznick Capital Markets Advises sPower and FLS Energy on 63.1MW Solar Portfolio*, March 11, 2015, <http://www.reznickcapitalmarkets.com/press-releases/2015/spower-fls-energy-solar-portfolio> (accessed April 19, 2015).

E. Development Roles

Perhaps the clearest path to increased impact for some CDFIs is to shift from focusing solely on lending products for solar development toward a more comprehensive approach in a community that includes pre-development assistance or a full development role. CDFIs such as Boston Community Capital have used this approach to heighten influence in certain geographies and bring energy benefits to underserved members of their communities.²⁸¹ Creating a community development corporation (CDC) is one way to separate and grow a CDFI's development work with a separate non-profit entity partner defined by goals such as job creation, access to affordable housing, and provision of other development-related social services.²⁸² This allows for more time and focus on proactively structuring solar development that best serves a certain community's needs instead of limiting impact to debt finance.²⁸³

F. Other Opportunities

Several other opportunities for unprecedented and impactful CDFI lending include activity in shared profits partnerships and loans for aggregators of renewable energy credits (RECs). Criteria for assessing whether any of these options are a good fit for a specific CDFI include the scale of lending required, appetite for risk, and whether any staff at the CDFI have experience with parallel asset classes. Structuring projects with shared profits partnerships, for example, might include a CDFI helping a landowner negotiate more benefit from a utility-scale solar installation than a small site lease payment. Agreements to share profits may have parallels to mineral rights in fossil fuel exploration. However, since photovoltaic generation is highly predictable, with less upside than mineral rights contracts, the transaction costs of shared profits partnerships may be less beneficial to landowners than stronger negotiation in standard site lease contracts. A CDFI may help navigate this with developer parties to ensure that both project financials and social benefits are maximized.

²⁸¹ Boston Community Capital, *Sustainability Initiatives*, <http://www.bostoncommunitycapital.org/programs-services/sustainability-initiatives> (accessed April 19, 2015).

²⁸² Stephen Morris, "CDCs and CDCs: Community Development Corporations and SBA Certified Development Companies," SBA, June 23, 2011, <https://www.sba.gov/blogs/cdcs-and-cdcs-community-development-corporations-and-sba-certified-development-companies> (accessed April 19, 2015).

²⁸³ *Ibid.*

CONCLUSION

In conclusion, CDFI financing and investment structures for solar development are maturing. CDFIs and other mission-focused lenders have opportunities to fund solar projects with term debt, and to go beyond existing debt models with a variety of innovative next steps. If common barriers to solar lending can be overcome, the potential mission impact of environmental health, economic growth, social, and sustainable investment leadership benefits is strong.

APPENDICES

APPENDIX A: SAMPLE LEVERAGED PROJECT STRUCTURES

NREL Solar Financing Structure Summary

Table 1. Summary of Key Elements of Financing Structures (as modeled for analysis)⁶

	Single Owner	All-Equity Partnership Flip	Leveraged Partnership Flip	Sale Leaseback
Equity Owners	Developer (third party if sold)	Tax investor; developer	Tax investor; developer	Tax investor (lessor)
Project Debt	Yes (owner choice)	None	Yes	None
Return Target	Owner After-Tax IRR	Tax investor after-tax IRR (flip target)	Tax investor after-tax IRR (Flip Target)	Lessor after-tax IRR
Cash Sharing	Owner: 100% of project cash	Pre-Flip: all to tax investor after developer cost recovery; Post-Flip: primarily to developer	Pre-Flip: Proportional to investment after developer cost recovery; Post-Flip: Primarily Developer	Lessor: Receives lease payment; Lessee: Receives operating budget, project margin
Tax Benefit Sharing	Owner: 100% of project tax benefits	Pre-Flip: primarily tax investor; Post-Flip: primarily developer	Pre-Flip: primarily tax investor; Post-Flip: primarily developer	Lessor and lessee different taxable incomes; ITC & depreciation to lessor

Sources: Karcher et al. 2010; SAM User Guide 2011

⁶ This table does not represent all of the projects using financial structure in today's market. Actual market projects may have very unique features.

²⁸⁴ Michael Mendelsohn, et al. "The Impact of Financial Structure on the Cost of Solar Energy," *NREL*, March 2012, <http://www.nrel.gov/docs/fy12osti/53086.pdf> (accessed April 19, 2015), page 4.

APPENDIX B: SAMPLE PRO FORMA

Sample Pro Forma: Solar for a Farmowner to Offset an Existing \$3,000/mo Average Electricity Bill Term Debt for a Small Commercial Solar PV Installation		
PV System Assumptions		
System Size (kW DC)		200
Capacity Factor		16.00%
Initial Annual Production (kWh)		280,320
Degradation		-0.50%
Utility Electricity Price Assumptions		
Current Price (\$ / kWh)		0.11
Price Escalation		2.00%
REC Payment Assumptions		
REC Price (\$ / kWh)		0.10
Loan Assumptions		
Interest Rate		5.00%
Term (Years)		20
Payment / Month		\$2,805
Payment / Year		\$33,657.74
CDFI Origination Fee		1.00%
USDA Guarantee Origination Fee		3.00%
Annual Cost Assumptions		
	<i>escalator</i>	
O&M (\$ / kW DC)	3.0%	\$8.00
Property Tax (\$ / kW DC)	-5.0%	\$4.00
Insurance (\$ / kW DC)	-5.0%	\$4.00
Accounting & Prof (\$ / kW DC)	3.0%	\$2.50
USDA Annual Servicing Fee	0.0%	0.50%
Uses of Cash		
	<i>per watt</i>	
Solar Capital Cost	\$2.60	\$520,000
Financing Costs	\$0.07	\$14,450
Total Costs	\$2.67	\$534,450
Sources of Cash		
	%	
USDA Grant / Other Incentive	7.5%	\$40,000
USDA Guaranteed CDFI Loan	79.5%	\$425,000
Borrower Equity	13.0%	\$69,450
Total	100%	\$534,450
Tax Credit Assumptions		
Solar ITC (% of Capital Costs)		30.00%

Annual Pro Forma	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Revenues																						
Offset Utility Costs	30,835	31,298	31,767	32,244	32,727	33,218	33,717	34,222	34,736	35,257	35,786	36,322	36,867	37,420	37,981	38,551	38,551	39,129	39,716	40,312	40,917	41,532
REC Payments	28,032	27,892	27,752	27,614	27,476	27,338	27,201	27,065	26,930	26,795	26,662	26,528	26,396	26,264	26,132	26,002	25,872	25,742	25,614	25,485	25,357	25,229
Total Operating Revenues	58,867	59,190	59,520	59,857	60,203	60,556	60,918	61,288	61,666	62,052	62,447	62,851	63,263	63,684	64,114	64,553	65,001	65,459	65,926	66,402	66,887	67,381
Expenses																						
Operations & Maintenance	1,600	1,648	1,697	1,748	1,801	1,855	1,910	1,968	2,027	2,088	2,150	2,215	2,281	2,350	2,420	2,493	2,568	2,645	2,724	2,806	2,891	2,977
Increased Property Taxes	800	700	722	686	652	619	588	559	531	504	479	455	432	411	390	371	352	334	318	302	287	272
Increased Insurance	800	760	722	686	652	619	588	559	531	504	479	455	432	411	390	371	352	334	318	302	287	272
Accounting & Professional Fees	500	515	530	546	563	580	597	615	633	652	672	692	713	734	756	779	802	826	851	877	903	930
USDA Fee	1700	1650	1598	1544	1486	1426	1362	1296	1226	1153	1076	995	910	821	727	629	527	422	314	203	90	-121
Total Operating Expenses	5,400	5,333	5,270	5,210	5,153	5,098	5,046	4,996	4,948	4,901	4,856	4,812	4,769	4,726	4,684	4,643	4,603	4,564	4,526	4,489	4,453	4,417
Net Operating Income	53,467	53,856	54,249	54,647	55,050	55,458	55,872	56,292	56,718	57,151	57,591	58,039	58,494	58,958	59,430	60,540	60,927	61,319	61,715	62,116	62,521	62,931
Debt Service	33,658	33,658	33,658	33,658	33,658	33,658	33,658	33,658	33,658	33,658	33,658	33,658	33,658	33,658	33,658	33,658	33,658	33,658	33,658	33,658	33,658	33,658
Cash Flow After Debt Service	19,809	20,198	20,592	20,990	21,392	21,800	22,214	22,634	23,060	23,493	23,933	24,381	24,836	25,300	25,772	26,882	27,269	27,661	28,057	28,458	28,863	29,272
DCR with P90 Data	1.59	1.60	1.61	1.62	1.64	1.65	1.66	1.67	1.69	1.70	1.71	1.72	1.74	1.75	1.77	1.80	1.81	1.82	1.83	1.85	1.86	1.88
DCR with P99 Data	1.33	1.34	1.35	1.36	1.37	1.38	1.39	1.40	1.41	1.42	1.43	1.44	1.46	1.47	1.48	1.51	1.52	1.53	1.54	1.55	1.56	1.58
Federal Tax Credit	31,200	31,200	31,200	31,200	31,200	31,200	31,200	31,200	31,200	31,200	31,200	31,200	31,200	31,200	31,200	31,200	31,200	31,200	31,200	31,200	31,200	31,200
Cash Flow After Debt & Tax Benefits	(69,450)	51,009	51,398	51,792	52,190	52,592	52,992	53,394	53,798	54,204	54,612	55,022	55,434	55,848	56,264	57,082	57,902	58,724	59,548	60,374	61,202	62,031
Borrower's Cumulative Cash Flow	(18,441)	84,750	136,939	189,531	241,332	292,346	342,574	391,916	440,374	487,948	534,630	580,422	625,324	669,336	712,458	754,690	796,032	836,484	876,046	914,718	952,500	989,392

Debt Service Coverage Ratios		P90 Data		P99 Data	
Average DSCR	1.67	1.40	1.40	1.67	1.40
Min DSCR	1.59	1.33	1.33	1.59	1.33
Max DSCR	1.77	1.48	1.48	1.77	1.48

Borrower NPV Analysis		15Yr NPV		20Yr NPV	
4% Discount Rate	306,089	306,089	371,773	306,089	371,773
5% Discount Rate	283,059	283,059	337,854	283,059	337,854
6% Discount Rate	262,230	262,230	308,029	262,230	308,029

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