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Applying the PAYS® System to On-Site Solar to Expand Access for All

LIFT Solar

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CONTENTS OF FULL REPORT

This complete report on the first phase of research into Solar PAYS for the LIFT Solar project consists of:

Table of Contents for Overview

List of Acronyms

ARRA	American Recovery and Reinvestment Act
DER	Distributed energy resources
DG	Distributed generation
DNP	Disconnection for non-payment
DOE	U.S. Department of Energy
DSM	Demand side management
EE	Energy efficiency
EECLP	USDA's Energy Efficiency Conservation Loan Program
EEI	Energy Efficiency Institute, Inc.
EIA	U.S. Energy Information Administration
FASB	Financial Accounting Standards Board
FERC	Federal Energy Regulatory Commission
FICO	A type of credit score created by the Fair Isaac Corporation
FMV	Fair market value
GAAP	Generally Accepted Accounting Principles
GMP	Green Mountain Power
GW	Gigawatt
GWdc	Gigawatts direct current
HELOC	Home equity line of credit
IOU	Investor owned utility
IRC	Internal Revenue Code
IRS	Internal Revenue Service
ITC	Investment Tax Credit
kW	Kilowatt
LMI	Low- and moderate-income
LPT	Lease Pass-through
MACRS	Modified Accelerated Cost Recovery System
NARUC	National Association of Regulatory Utility Commissions
NASUCA	National Association of State Utility Consumer Advocates
NRRI	National Regulatory Research Institute
OBF	On-bill financing
OBLR	On-bill loan repayment
PACE	Property assessed clean energy
PAYS®	Pay As You Save®
PF	Partnership flip
PPA	Power purchase agreement
PSC/PUC	Public Service Commission, Public Utility Commission (state utility regulatory body)
PV	Photovoltaic
REC	Renewable energy certificate
RESP	Rural Energy Savings Program
RFP	Request for proposal
ROI	Return on Investment

RPS	Renewable Portfolio Standard
RUS	Rural Utility Service
SBIR	Small Business Innovation Research
SLB	Sale Leaseback
SPE	Special purpose entity
SUN	Solar United Neighbors
T&D	Transmission and distribution
TDUs	Transmission and distribution utilities
TILA	Truth in Lending Act
TPO	Third party ownership
TVA	Tennessee Valley Authority
USDA	U.S. Department of Agriculture
USoA	Uniform System of Accounts
WAP	Weatherization Assistance Program

Executive Summary

The purpose of this three-part paper is to determine whether and how the PAYS® system for tariffed on-bill investment could make on-site solar systems available to low- and moderate-income customers and renters. The PAYS system is designed to facilitate site-specific utility investment in a cost-effective energy upgrade under terms for site specific cost recovery that are defined in a tariff. Solar PAYS is a program design based on the PAYS system that can capitalize an on-site solar installation that generates positive cash flow for a household starting in the first year. Solar PAYS is feasible for low-income households when the transaction involves no upfront copayment requirement from the participating customer.

This research is supported by the LIFT Solar Everywhere research project and provides a distinct potential financing solution increasing clean energy access for low- and moderate-income households.

The initial phase of research in the LIFT Solar project resulted in the following findings:

Attributes of the PAYS system provide unique consumer protections that assign risk to the parties best positioned to bear it, opening pathways to broad participation and benefit. In the field of energy efficiency, utilities with PAYS experience have reported high offer acceptance rates (i.e. as high as 80%) regardless of income, credit score, or renter status when little to no upfront cost component is required from participants. With those field observations in mind, elimination of an upfront copayment is a key threshold for financial feasibility for low- and moderate-income customers to be able to benefit from the PAYS system applied to on-site solar power.

Multiple precedents for regulatory approval of a PAYS tariff suggest potential for expanding application to on-site solar power. Research into regulatory precedents for approval of a Solar PAYS investment program found that utility regulators and oversight boards have used multiple rationales to reach approval for tariffed on-bill programs based on the PAYS system, with most focused on energy efficiency upgrades. The attributes of the PAYS system make tariffed on-bill investments in on-site solar more accessible to low-income households than operating leases or power purchase agreements, which have fewer consumer protections and depend critically on qualifying criteria such as credit-worthy counterparties with property ownership.

Solar PAYS would be feasible for more customers in contexts with a lower cost of on-site solar - OR - higher value of on-site solar. Examples of no regrets options to improve the value proposition of on-site solar include research and development to improve technology cost and performance metrics as well as pursuit of business innovations like bulk procurement to reduce the soft cost of installation. In addition, net metering policies that compensate surplus solar production at retail rates have produced the best market environments in the U.S. for on-site solar installations.

The federal investment tax credit is a major policy determinant of the value of solar power in the United States, and the value of this policy is not accessible to low-income households. The

federal tax credit is challenging for most low-income households to monetize without elaborate transaction structures that add cost and affect the path to ownership of the solar assets. The same observation holds for tax-exempt utilities that rely on a combination of tax equity investors and blocker entities to monetize the federal tax credit. Unless the tax credit policy is reformed to offer cash in lieu of credit, this disadvantage to low-income households and tax-exempt utilities will persist as long as a tax credit is structured in this way.[1] Without a pathway through a transaction structure to monetize the credit, low-income households would effectively need to pay more for on-site solar than more affluent homeowners with good credit, who can use other financial instruments, like leases, loans, and power purchase agreements. In addition, federal tax policy has an accelerated schedule of depreciation for solar assets, a policy that generates an additional value stream for taxable entities that can monetize the deduction. This advantages commercial entities and affects the pathway to ownership for low-income households.

Two types of transaction structures are the most promising for monetizing the tax credit and developing Solar PAYS as a tariffed on-bill investment program. The first type of transaction is a tax efficient structure for a for-profit utility, and the second is a sale-leaseback transaction, which would be suitable for either utilities that are not tax efficient or those that are tax-exempt, such as electric cooperatives. These transaction structures also help capture the value of accelerated depreciation and the related matter of assuring a pathway to ownership for the site owner.

One key to monetizing the federal tax credit is accessing financial equity from a business with sufficiently large tax liability (i.e. tax equity) to absorb the value of the credit as well as the cost of arranging the transaction. To attract tax equity at that scale, very large solar installations are needed. In the context of distributed residential solar, this potentially means hundreds to thousands of on-site solar systems installed contemporaneously, depending on the transaction structure. With scale as a critical factor, the first phase of research found that either of the two most promising transaction structures for initial application of PAYS to on-site solar could work, and the best choice for which to pursue first depends on which can obtain the lowest level of scale required to complete an initial transaction.

The research team concluded that both of the two transaction structures above should be further refined and vetted for the potential to support on-site solar installations in specific utility and market contexts.

Recommendations for next steps include:

Analyze the financial cash flows for Solar PAYS transaction structures in market conditions applicable to potential early adopters. Each of the prior recommendations involve financial analysis that describes the cash flows between parties over time. The results are essential to being able to test which scenarios can achieve a Solar PAYS offer that is free from a customer copayment for a given set of market conditions. The financial models that produce such results are also useful tools for exploring the sensitivity of key inputs (e.g. initial scale of number of

[1] The commercial solar tax credit that can be used to aggregate on-site solar installations is currently set to be 10% permanently.

installations) in order to prioritize attention to inputs that could have the largest effect on the outcomes.

Explore the potential impact of a direct payment option for the federal investment tax credit to remove barriers that low- and moderate-income households face to on-site solar with a path to ownership. The challenge of monetizing the solar tax credit could be largely resolved if Congress chooses to authorize the investment tax credit for solar assets to be converted to a cash grant similar to Section 1603 of the American Recovery and Reinvestment Act (ARRA) of 2009.[2] This would also vastly simplify the path to ownership for participating customers, especially low- and moderate-income households. Congress is currently debating a return to such a policy as part of economic recovery packages that could be passed in response to the recession precipitated by the COVID-19 pandemic.[3] Analyzing the cash flows associated with these scenarios could also illuminate the opportunity cost of the federal tax credit policy for solar power in terms of capital either blocked or absorbed in specific types of transaction structures developed to monetize the tax credit.

Because market and policy conditions will continue to change over time and across geographies, the development of a tool to facilitate exploratory financial analysis has more value than the production of results for a fixed set of scenarios.

Clarify and quantify options for assuring a pathway to ownership for Solar PAYS customers. The path to ownership for low-income households is complicated by the current need to monetize the federal investment tax credit. NextResource Advisors, a research partner for Clean Energy Works in this study, has identified at least two potential options for facilitating a path to ownership for a customer in the context of Solar PAYS coupled with a sale-leaseback option to monetize the tax credit. Further investigation is needed to identify which of these options would be most viable from the vantage points of both a customer and a utility.

Vet and refine the legal and accounting aspects of transaction structures for Solar PAYS through which solar tax credits can be monetized. As noted above, these include (1) the Tax Efficient Structure for for-profit utilities with tax capacity and (2) the Sale Leaseback Structure for either for-profit utilities that are not tax efficient or for tax-exempt electric cooperatives that would require a blocker entity as discussed in Part 3. Financial analysis and further vetting with subject matter experts in law and accounting is needed to assure that transaction structures would be acceptable to prospective parties seeking to offer Solar PAYS. This due diligence is a prerequisite for interested parties that would want to develop the set of agreements that would be needed to execute the transaction.

The recommended next steps and recommendations for future research are well aligned, and they are consistent with the purposes of the LIFT Solar research project. This includes the development of resources for a toolkit that would enable a broad field of interested stakeholders

[2] American Recovery and Reinvestment Act of 2009, H.R.1, 111th Cong. (2009) https://www.congress.gov/bill/111th-congress/house-bill/1
[3] HR 2. The Moving Forward Act, passed by the House of Representatives, July 1, 2020. https://transportation.house.gov/imo/media/doc/BILLS-116HR2-RCP116-54.pdf

to access and build upon the gains made toward an inclusive solution for on-site solar with Solar PAYS.

1 Introduction

1.1 Facing an imperative for inclusion in the clean energy economy

Pathways to acquire solar power assets are marked by a gauntlet of qualifying financial tests intended to protect both financial institutions from risk and consumers from predatory practices. Altogether these filters produce a picture of participation in the clean energy economy that reflects growing disparities in wealth and income in the United States, where economic opportunity is also stratified by race. Over the past three decades, lower income households have seen their total wealth decline 7% from $12,300 to $11,400,[4] and even before the coronavirus pandemic, 40% of adults attested to the Federal Reserve that in their current financial standing, they could not meet an emergency expenditure of $400.[5]

In this context, the benefits of on-site solar power – including a pathway to ownership that supports wealth building – have been largely inaccessible to lower income households without steep subsidies.[6] Most financial institutions that underwrite companies marketing on-site solar find they are restricted from serving lower income households due to low credit scores, renter status, poor building quality, and a lack of sufficient income to monetize a federal income tax credit for solar power. These powerful filters have the effect of systematically excluding low-income households from the economic opportunity to benefit from the very same type of on-site solar systems benefiting wealthier households. Income and wealth are determinants that affect which households are able to acquire solar assets. Despite all households paying taxes that flow into the associated government energy subsidies, only wealthy households are able to take advantage of those subsidies. Plus, only households with sufficient wealth can invest in an asset such as solar power, with long term life cycle savings but immediate financial outlays. The impacts of these economic disparities create an imperative for finding solutions to assure inclusion in the clean energy economy.

1.2 Exploring the potential for Pay As You Save® (PAYS®) for on-site solar power

Similar barriers have affected for decades the development of energy efficiency resources, effectively stranding the utility industry's most lucrative investment opportunities – especially in the Southeast region where the majority of persistent poverty counties are found.[7] Lessons

[4] Horowicz, R. et al. *Trends in Income and Wealth Inequality*. 2020. Pew Research Center. https://www.pewsocialtrends.org/2020/01/09/trends-in-income-and-wealth-inequality/

[5] U.S. Federal Reserve. *Report on the Economic Well-Being of U.S. Households in 2018 - May 2019* https://www.federalreserve.gov/publications/2019-economic-well-being-of-us-households-in-2018-dealing-with-unexpected-expenses.htm

[6] Paulos, Bentham. *Bringing the Benefits of Solar Energy to Low-Income Consumers A Guide for States & Municipalities.* May 2017. Clean Energy States Alliance (CESA). https://www.cesa.org/wp-content/uploads/Bringing-the-Benefits-of-Solar-to-Low-Income-Consumers.pdf

[7] Brown, Marilyn A. et al. *Energy Efficiency in the South.* 2010. Southeast Energy Efficiency Alliance. *https://www.scribd.com/document/29932567/Full-Report-Efficiency-in-the-South*

learned in overcoming these barriers for energy efficiency investments may illuminate similar solutions to increase LMI access to on-site solar power.

Over the past two decades, 18 utilities in 8 states have applied the PAYS system to help customers overcome financial barriers to cost effective energy efficiency upgrades – regardless of their income, credit score or renter status.[8] In short, these utilities have offered to capitalize site-specific investments in energy upgrades on conditions for site-specific cost recovery that are defined in a utility tariff. A more detailed explanation of the PAYS system is presented in Part 1 of this report.

Altogether, the features of the PAYS system are designed to assure net positive cash flow from the start for each participant, and they also provide a pathway to ownership of the upgrades once the utility's cost recovery is complete. The programs have demonstrated that tariffed on-bill investment based on the PAYS system can produce a larger addressable market, higher rate of acceptance among customers considering whether to proceed with an upgrade, and a deeper level of investment at sites where customers do proceed. These indicators have remained positive even in areas of persistent poverty, suggesting that the PAYS system could potentially deliver similar benefits if used to capitalize on-site solar power for households with lower income.

1.3 Introduction to the LIFT Solar project

Supported by funding from the U.S. Department of Energy, the Accelerating Low-Income Financing and Transactions for Solar Access Everywhere project (LIFT Solar) seeks to advance low- and moderate-income (LMI) clean energy and resource efficiency delivery and financing models through research and the development of tools and resources for program administrators and stakeholders. LIFT Solar has conducted benchmarking research of existing LMI clean energy and resource efficiency programs to assess customer experience and financial performance at the program or project level. This benchmarking research will inform and guide primary research in the latter stages of the LIFT Solar project through customer experience survey and program or project financial performance research of participating programs across the country, culminating in the delivery of the LIFT Solar Toolkit.

With this toolkit, the LIFT Solar project team seeks to enable rapid scaling and adoption of solar power, both distributed generation (on-site) and community solar, for LMI customers nationwide. LIFT's research may also provide insights and recommendations that will help clean energy and resource efficiency program administrators who serve LMI households to design and measure meaningful customer experiences that will enhance the programs and financial products being offered.

McKinsey&Company. *Unlocking Energy Efficiency in the U.S. Economy*. 2009. https://www.mckinsey.com/client_service/electric_power_and_natural_gas/latest_thinking/~/media/204463A4D27A419BA8D05A6C280A97DC.ashx

Economic Research Service. United States Department of Agriculture. *County Policy Types, 2015 Edition.* https://www.ers.usda.gov/data-products/county-typology-codes/descriptions-and-maps/#ppov

[8] Hummel, H., Harlan Lachman. *What is inclusive financing for energy efficiency, and why are some of the largest states in the country calling for it now?* ACEEE Summer Study on Energy Efficiency in Buildings. August 2018. https://www.aceee.org/files/proceedings/2018/assets/attachments/0194_0286_000158.pdf

LIFT Solar research may encompass multiple solar services, including community solar, residential rooftop solar, and bundled energy efficiency/solar programming. It will assess the financial performance of participating delivery programs, including innovative financial customer delivery models. Where possible, LIFT's research will also consider diverse state regulatory environments, housing status (renters and homeowners in multifamily and single-family housing), and utility business models (investor-owned, municipally owned, and rural cooperative).

1.4 LIFT Solar research team for Solar PAYS®

The purpose of this three-part paper is to determine whether and how the PAYS system could make on-site solar systems available to LMI customers and renters. To pursue this line of inquiry, Clean Energy Works turned first to the creators of the PAYS system, Energy Efficiency Institute, Inc., to explore whether it would be possible to apply the PAYS system to on-site solar power as a site-specific energy upgrade. This investigation also required further research into the regulatory context in which utility tariffs are considered and approved. Nancy Brockway, one of the first utility regulators in the country to order approval of a program that meets the criteria of the PAYS system, joined the project to research the regulatory precedents that could illuminate a path forward for on-site solar.

Based on their findings, it became clear that, at least in the short term, before other recommendations in Part 1 could be effected, monetizing the value of the federal investment tax credit for solar power would be vital, yet it was not clear which transaction structures could best facilitate both the monetization of the tax credit and provide a pathway to ownership of the solar installation for LMI customers or renters. For this third line of inquiry, the research team sought analysis from NextResource Advisors, which has expertise in transaction types used to monetize tax credits in the solar industry.

The authors of each of the three parts of this paper have contributed new insight to the LIFT Solar project by exploring and documenting lines of inquiry designed to test whether PAYS could be applied successfully to on-site solar.

1.5 Overview of the report structure

This complete report consists of this preamble overview prepared by LIFT Solar partners - Clean Energy Works and Southface Institute; and then three distinct chapters:

- **Part 1 –** *The Potential for the PAYS® System to Make On-Site Solar Photovoltaic Systems Accessible to Low- and Moderate-Income Customers and Renters* authored by Energy Efficiency Institute, Inc.
- **Part 2 –** *Precedents for the Regulatory Treatment of PAYS® for On-site Solar* authored by Nancy Brockway
- **Part 3 –** *Limited Technical Review of Tax Structuring for PAYS® for On-site Solar* authored by NextResource Advisors

2 Framing Context

2.1 How PAYS® Works:

An example of a tariffed on-bill investment in energy efficiency based on the PAYS® system

The Smiths are struggling with high electricity bills that average $200 per month. Their utility has identified that the load profile of their home indicates that improvements to their building envelope – like insulation and air sealing – and their heating and cooling system should yield cost-effective savings. The Smiths agree to an on-site assessment of the home to identify cost-effective energy upgrades.

As a result of the assessment, the program operator running the program for the utility presents the Smiths with a PAYS offer for the utility to pay for $5,783 in efficiency upgrades. The Smiths do not need to pay anything upfront for the upgrades and are not required to share credit scores, take out a loan, accept a lien on their home, or increase their debt to participate in the program.

In order to recover its costs for installing upgrades at the Smith's home, the utility requires the Smiths to agree to a fixed charge to be added to their monthly bill. Under the terms of the PAYS program for efficiency upgrades, the estimated annual savings must equal or exceed the annual charges by 25 percent. In this example, the Smiths are estimated to save $50 per month on average, have a fixed charge of $40 per month, and realize cash savings of $120 every year during the cost-recovery period compared to their previous utility bills. The Smith's net savings increase anytime the utility raises its rates, causing the value of the energy savings to grow without increasing their monthly cost-recovery charge.

If the Smiths move during the term of utility cost recovery and have fulfilled their obligations to that point, their obligations end. The next customer who occupies their home will benefit from the upgrades and assumes the obligation to pay the charges left in the cost-recovery period.

The utility is assured that its costs will be recovered while also benefiting from lower demand during periods of extreme weather, when the utility incurs its highest costs for delivering service. If the upgrades stop working at any point during the period of cost recovery, the utility will suspend the monthly charges until it can determine the cause of the problem and arrange for replacement, repair, or other remedy.

At the end of the 12-year cost-recovery period, the homeowner at that time will own the upgrades, and the monthly charge on their utility bill will end.

Table 1:
Example PAYS transaction for the Smiths

Data for this example comes from a PAYS program as evaluated by LibertyHomes.

	During Cost Recovery Period	After Cost Recovery Period
Avg Monthly Bill without Upgrades	$200	$200
Avg Monthly Energy Savings	$50	$50
Monthly Cost Recovery Charge	$40	$0
Monthly Bill after Upgrades	$190	$150
Net Monthly Savings	$10	$50
% of Savings Staying with Customer	20%	100%

2.2 Policies affecting market conditions vary by jurisdiction

To deliver immediate benefits to the customer, the PAYS system depends on the value stream produced by the upgrades, whether the upgrades are energy efficiency or on-site solar or another cost-effective improvement. The size and duration of these value streams for the same upgrades vary across different utility service areas due to the varying policy contexts in each jurisdiction. For that reason, the value proposition for Solar PAYS will also vary by geography, and as with the pace of solar sales to households who already have access to capital, it will be stronger in some places sooner than others.

2.3 Low-income households require options without upfront copayments

The feasibility of expanding access to low-income households through a Solar PAYS program depends on finding a transaction path that can eliminate the upfront cost barrier entirely. This high bar for the definition of financial feasibility is anchored to the mission of LIFT Solar.

Utilities with an existing tariffed on-bill program based on the PAYS system may already include both energy efficiency and renewable energy in the eligible upgrades. Although the warranty on solar panels and the estimated useful life of an on-site solar system may be 20 years or more, the terms of these tariffs may cap the cost recovery period at 16 years or less as a consumer protection. Using these conditions, a utility's offer to capitalize an investment in the cost-effective portion of an on-site solar power system (i.e. at the customer's home) would reduce the upfront cost of that installation, but in the near term, it would not likely eliminate all upfront costs. Because the cost recovery period for the solar investment takes longer, the investment would require a upfront copayment from the customer. Therefore, applying existing tariffed on-bill terms for energy efficiency to on-site solar with a cost recovery period of 12 years or less would likely require high upfront copayments that are not compatible with participation by low-income households.

Applying existing tariffed on-bill terms for energy efficiency to on-site solar with a cost recovery period of 12 years or less would likely require high upfront copayments that are not compatible with participation by low-income households

2.4 Copayments in a PAYS® program depend on factors affecting project cost effectiveness

For a utility to capitalize a site-specific energy upgrade (e.g. installing insulation or a new boiler) under the terms of a tariff for essential utility services, the upgrade measures must be cost effective - even after assuring a portion of the estimated savings from the efficiency improvement will be reserved to benefit each program participant right from the start. Cost effectiveness depends on the:

- cost of the upgrade, including both hardware and soft costs (e.g. customer acquisition, installation labor, wiring and connection to the grid, etc.);
- value streams that the upgrade can generate, including estimated savings based on current energy rates and market conditions over the estimated useful life of the upgrade; and

- a tariff that defines the minimum portion of estimated savings generated by the upgrade that must benefit the participant during the utility's cost recovery period.

Market conditions are powerfully framed by policies, and that is especially true in the markets for on-site solar power. Examples include federal and state tax credits, net metering or virtual net metering, interconnection policies, and renewable portfolio standards, state or local available subsidies, and associated markets for renewable energy credits. Changes to any of these policies in any jurisdiction can affect the value proposition for on-site solar, which would affect whether it would be possible to capitalize the upgrade through a Solar PAYS without a customer copayment.

2.3 Federal tax credits for solar are difficult to monetize for low-income households

The federal tax credit for solar power systems is most valuable to taxable entities that have a substantial tax liability. As a policy, it favors customers whose taxable income is high enough to create a tax liability that is larger than the value of the credit. Because low-income households rarely have thousands of dollars in savings sitting around to cover upfront costs, and the cash flow to wait months or years to recoup tax credits, the federal investment tax credit does not convey value to them unless a commercial partner is involved in the transaction.

In some arrangements with a commercial partner, a third party can provide capital upfront to pay for a new solar power system through a transaction structure that conveys to that third party the right to claim the value of the federal tax credit. Because these tax equity arrangements are costly to make at a small scale, financiers require larger projects, or many smaller projects aggregated together to reach the financially attractive economies of scale. Individual households could never reach this scale alone. In fact, even commercial-scale solar installations are usually too small to justify the costs of the professional services required to arrange the aggregation and monetization of tax credits, because the financial servicing costs reduce the net value of the tax credit to the seller so dramatically.

Tax exempt utilities, such as rural cooperatives, are similarly disadvantaged because they have no tax liabilities to which the tax credits can be applied. Electric cooperatives are 501(c)12 organizations that have excelled in the use of tariffed on-bill investment programs for building energy upgrades, yet the cost to those utilities of arranging tax equity to monetize the value of solar investment tax credits could add prohibitive transaction costs to their investment portfolio.

2.4 Financial benefits of accelerated depreciation favor commercial interests

In the United States, the tax depreciation system is called Modified Accelerated Cost Recovery System (MACRS), which allows an asset owner to make annual deductions for depreciation of the asset over a period of time defined broadly in federal policy as its useful life. The useful life of a solar power system is typically 20 years or more. However, federal policy allows solar power asset owners to apply the tax deduction on an accelerated schedule that exhausts its value after six years. This accelerated depreciation schedule is a form of financial support for owners of solar assets that is paid for by the federal government in the form of foregone tax revenues, and in effect, it conveys value to solar asset owners from all federal taxpayers who share in the cost of carrying the national debt.

The tax benefits of depreciating assets are primarily realized by businesses or landlords with rental properties. Holding all other actors equal, the financial value of a given solar power system in a given set of market conditions is higher for a profitable commercial entity than a residential customer, and the difference would be the value of the MACRS tax deduction. While that statement is a simplification of the wide range of circumstances and conditions in the field, it underscores that, due to the additional benefit of the federal subsidy in the accelerated depreciation policy, the participation of a commercial entity in the capitalization of an on-site solar system may actually improve the cost-effectiveness of the system for residents where the system is installed.

Because taxable commercial entities that own on-site solar assets are advantaged by the accelerated depreciation policy, residential customers may benefit from allowing commercial entities to capitalize their system (usually as part of a pool of aggregated residential systems) and own it for at least the first six years. The taxable commercial entity would also be in a position to collect the value of the commercial solar tax credit. The commercial tax credit for solar power is currently set to be 10% permanently after 2022, whereas the residential tax credit is currently set to fall to zero. The combination of the accelerated depreciation and the commercial tax credit have the effect of advantaging taxable commercial entities financially in the development and initial ownership of solar power assets.

3 Summary of Findings and Recommendations

Taking into account framing considerations in the prior section, LIFT Solar investigated the applicability of the PAYS system to on-site solar by exploring:

- Ways to improve the cost effectiveness of on-site solar to improve the value proposition a utility PAYS program could offer
- Conditions under which PAYS could apply to on-site solar
- Legal and regulatory precedents for use of the PAYS system
- Exploration of transaction structures for PAYS through which the federal tax credit for solar could be monetized

3.1 Recommendations to improve the cost-effectiveness of on-site solar for a PAYS offer

The creators of the PAYS system found that the cost effectiveness of on-site solar power affects whether a utility would be able to make an offer of investment to a customer that is free from an upfront payment requirement. The elimination of a customer copayment requirement is an essential characteristic a value proposition that can work for LMI income households and yield high acceptance rates from households at all income levels. Energy Efficiency Institute, Inc., identified four recommendations that could improve the cost effectiveness of on-site solar for all customers, thus also improving the prospects that a PAYS offer for on-site solar without a customer co-payment requirement would be feasible. (See also: Part 1.)

*Changing a tax credit … to an instant rebate or an advance on a refundable tax credit that would benefit LMI customers and renters would be the **single biggest policy initiative** our country could take to make on-site solar accessible to these customers before the residential ITC policy expires in 2022*

- ***Reforming the investment tax credit to be a grant or direct payment would enable lower upfront capital requirements for on-site solar.*** Extending the residential and commercial solar tax credits and reforming the terms to include cash in lieu of credit would remove one significant barrier to capitalizing on-site solar systems, especially in places recognized by the federal government for persistent poverty. More than 90% of counties recognized for "persistent poverty" are served by tax-exempt electric cooperatives[9], which incur additional transaction costs to monetize the solar tax credit.

  Section 1603 of the American Recovery and Reinvestment Act (ARRA) of 2009 provided a cash grant in lieu of a tax credit for solar power installations, including on-site solar power systems.[10] Reinstatement of this policy would resolve the most complex aspects of the Solar PAYS transaction structure for utilities that are either not tax efficient or exempt from taxes entirely. Leading firms in the solar industry have called for the reinstatement of the ARRA Section 1603 policy in response to the 2020 recession.[11] If implemented, this policy alone could spark a surge in deployment of on-site solar.

- ***Policies that accelerate reduction in hardware costs and soft costs for installation will expand the areas in which a PAYS investment in on-site solar could be made with no copayment required.*** The value proposition for on-site solar power is affected by local and state policies as well as the cost to procure and deliver hardware and components. Utility investments in on-site solar using the PAYS system will reach the threshold of no customer copayment faster when there are policies in place that promote research and development in equipment and business solutions that reduce the upfront capital requirement. Further reduction in soft costs for on-site solar, including the cost of customer acquisition, can also improve the cost effectiveness of an on-site solar investment.

- ***Similarly, economies of scale can reduce the capital requirements for on-site solar systems, further reducing potential customer copayments.*** The cost differences between on-site solar systems and utility-scale solar systems in the same vicinity provides a glimpse of the potential to improve affordability by harnessing the benefits of aggregation and bulk procurement in association with a utility investment program.

- ***Ensure net metering rates and utility subsidies reflect the real value of solar to the grid.*** The role of Public Utility Commissions is to develop rate schedules and policies that produce sufficient energy at rates that are fair, just and reasonable for all customers. Utilities of any type (e.g. investor-owned, cooperative, or municipal utilities) may face regulatory frameworks that give them an incentive to promote low net-metering rates and reduce incentives for customers to

[9] National Rural Electric Cooperative Association (NRECA). *Electric Cooperatives Serving Persistent Poverty Counties.* https://www.cooperative.com/content/public/maps/persistent-poverty/index.html

[10] American Recovery and Reinvestment Act of 2009, H.R.1, 111th Cong. (2009) https://www.congress.gov/bill/111th-congress/house-bill/1

[11] Cypress Creek Renewables, First Solar, et al. *Letter to U.S. Department of Treasury.* Tax Notes. *Energy Companies Call for Solar Incentives in Future COVID-19 Legislation.* June 1, 2020. https://www.taxnotes.com/tax-notes-today-federal/credits/energy-companies-call-solar-incentives-future-covid-19-legislation/2020/06/24/2cn8b

deploy on-site solar systems. Commissions and oversight boards should approve regulatory frameworks that assure utility grid operators are able to realize the full value of on-site solar and offer commensurate incentives to develop it.

3.2 Findings and recommendations related to PAYS for on-site solar power

The creators of the PAYS system also found that PAYS has characteristics that are promising for developing a value proposition for on-site solar that would be free from an upfront payment requirement. That condition is an essential characteristic of a value proposition that can work for LMI households and yield high acceptance rates from households at all income levels.

- ***Compared to financial instruments like loans, operating leases, or power purchase agreements, the PAYS system has more inclusive eligibility criteria.*** Because the PAYS system allows participation from all customers regardless of income, credit score, or renter status, the addressable market that could be reached with a utility investment program based on the PAYS system would be larger than loans, leases, lien-backed loans, and power purchase agreements. The difference in the size of the addressable market is significant, especially in lower income market segments where the difference could span from nearly 0% for a loan instrument to 100% for a tariffed on-bill investment. This feature is particularly important for being able to reach underserved market segments, which include low- and moderate-income households.

Engagement with commercial tax equity markets is necessary to monetize the federal investment tax credit (ITC) for on-site solar systems at locations with low-income households. The ITC cannot be used by renters or most LMI customers directly. As stated by Energy Efficiency Institute, Inc. in Part 1 of this paper:

> "Changing a tax credit that disproportionately benefits upper income citizens to an instant rebate or an advance on a refundable tax credit that would benefit LMI customers and renters would be the single biggest policy initiative our country could take to make on-site solar accessible to these customers before the residential ITC policy expires in 2022."

- ***For utilities that are not tax efficient, PAYS should be introduced in conjunction with a commercial operating lease between a utility and a third-party capital provider in order to capitalize the federal investment tax credit.*** At current rates, the federal tax credit is too valuable to ignore, and persistent proposals to extend the tax credit add to the imperative to find a path to monetizing its benefits. The solar tax credit for commercial development is set to be 10% permanently after 2022, at which point the federal government's policy will systematically advantage commercial solar over residential solar. Therefore, utility aggregation of investment in residential solar via the PAYS system could yield a commercial portfolio of on-site solar that is systematically advantaged over residential solar. Next Resource Advisors concluded that the use of a sale-leaseback provision, using a commercial operating lease between a utility and tax advantaged investor, could attain the goal of monetizing the federal investment tax credit at a lower minimum threshold of aggregation than other options considered. LIFT will further explore this research during 2020-2021.

- ***The Initial cost recovery for on-site solar through the PAYS system should be 20 years based on an expected useful life of 25 years.*** Investments made with the PAYS system typically cap the cost recovery period at 80% of the estimated useful life of the equipment. For some energy

efficiency programs, the maximum cost recovery period is 12 years, which is 80% of 15 years. By contrast, a Solar PAYS program could have a 20 year cost recovery period, which would leave a sufficient amount of time (5 years) for the utility to recover unexpected costs requiring extension of the term such as repair costs, missed billing cycles due to extended vacancies, and costs for a utility to acquire a leased system at a fair market value at the end of the lease period. Cost recovery for PAYS programs should always be as short as possible while requiring no copayments. Shorter cost recovery terms reduce risks for implementing utilities and reduce total costs for participants.

- ***Outreach to LMI households should be prioritized, and it should be conducted by vicinity and not by household income verification.*** Investments made using the PAYS system are based on the cost effectiveness of the upgrade rather than the creditworthiness of an individual in a household. For that reason, outreach should prioritize attention to locations with a high concentration of lower income households where the opportunity to reach underserved customers would be higher than the general population. Based on field experience with energy efficiency investment programs based on the PAYS system, adequate funds would need to be available to address structural deficiencies found in some homes – especially repairs to the roof or the electrical system – prior to installation.

3.3 Findings of a review of legal precedents for applying PAYS® to on-site solar power

The PAYS system has been used successfully for two decades by utilities in expanding the access of residential customers to energy efficiency and solar water heating upgrades. A review of precedents set by regulatory decisions approving the application of PAYS to energy efficiency upgrades provides insights into the applicability of the PAYS system to on-site solar power.

A review of legal and regulatory precedents conducted in Part 2 of this three-part paper produced the following findings:

- Regulators have used a variety of sources of regulatory authority to approve PAYS tariffs.

- Loan programs offered by utilities as On-Bill Financing and On-Bill Loan Repayment are distinctly different from PAYS, which facilitates site-specific utility investments in upgrades with cost recovery on the bill for services at that location. PAYS does not create consumer debt. For this reason, PAYS transactions are not covered by the Truth in Lending Act and other statutes that apply to transactions that create indebtedness.

- The PAYS system has unique features that were developed specifically to enable customers to overcome market barriers that remain despite incentives and processes available in traditional utility programs. Because these features are necessary to overcome those market barriers, they must be present in systems for capitalizing residential solar in order to achieve the same results as PAYS energy efficiency programs. Financing systems such as on-bill-financing with loans, operating leases, and purchased power agreements lack a number of these features. As a result, they cannot be adapted to serve as vehicles for PAYS transactions applied directly to residential customers seeking on-site solar systems.

- Utility investment programs based on the PAYS system have been offered by investor-owned, municipal, and cooperative utilities. The legal bases and precedents for implementing a tariffed on-bill program based on the PAYS system are different depending on the ownership structure of

the utility and the particular aspect of service they provide. Utility accounting treatment for assets capitalized using the PAYS system has varied based on the source of capital (e.g. ratepayer capital or shareholder capital).

- A Program Operator is a vital component of the system, and the utility can either perform those functions internally or hire a third-party entity to run the program as the Program Operator. In a state with retail choice, one way that PAYS could be offered to all residential customers would be through a statewide program operator, though this would need to be explored further in the context of a specific restructured market.

3.4 Findings & recommendations regarding transaction structures for Solar PAYS

In an exploration led by tax equity experts at Next Resource Advisors, the authors arrived at three broad conclusions related to the application of PAYS to on-site solar and the quest for a Solar PAYS transaction structure to introduce in the field.

- **To minimize upfront copayments by participating Solar PAYS customers, it is essential to monetize the solar tax benefits through an outlet that is not the customer.** Most customers are unable to monetize residential solar tax credits in a timeframe that would allow them to apply such benefits to offset a Solar PAYS copayment. Additionally, residential solar tax credits for individual taxpayers will be eliminated entirely after 2021, but investment tax credits for businesses will remain at 10%.[12] Furthermore, while the residential customer would not be able to utilize any benefits associated with accelerated depreciation, its use would be possible by other parties.

  There are at least four prospective financing structures for Solar PAYS that would allow parties other than the customer to benefit from solar tax credit benefits, thereby reducing the amount of customer copayment required. (LIFT will explore this in more detail in 2020-'21)

- **Utilities using Solar PAYS must be able to monetize the associated tax benefits either internally or eternally.** For-profit utilities with sufficient tax capacity participating in Solar PAYS structures should be able to internally monetize the tax benefits from portfolios of on-site residential solar. Tax-exempt electric cooperatives or for-profit utilities without sufficient tax capacity should be able to externally monetize these tax benefits through addition of existing commercial tax-equity structures broadly employed across the U.S. solar financing markets (e.g. Sale Leaseback, Partnership Flip, and Lease Pass-through structures), provided that such arrangements follow existing tax guidance and are structured such that Tax Investors are motivated to participate.

- **For Solar PAYS transactions that require externally sourced Tax Investors, considerations of project scale and transaction efficiency should drive structuring decisions.** Closing transactions for new products is challenging, and the pool and appetite of Tax Investors is limited. As a result, deference should be given to investors based on their constraints and preferences. While the Sale Leaseback structure has advantages over other structure options (e.g. Partnership-Flip, Lease Pass-through) due to lower minimum scale requirements and simplicity, the structure selection should ultimately depend on the preference of available Tax Investors. This is most

[12] Under IRC Section 25D, the solar tax credit available to individuals is scheduled to drop from 22% to zero after December 31, 2021, while under IRC Section 48, solar tax credits for businesses will reduce from 22% down to 10% after December 31, 2021, would allow businesses such as Tax Investors or Utilities to continue claiming tax credits for residential systems owned by these third-party businesses.

likely to result in an initial preference for Sale Leaseback structures, but all structures should be considered if willing counterparties preferring other structures present themselves. Even more importantly, finding scale partners with their own tax capacity or existing tax-equity relationships would obviate the need to separately structure tax credit transactions and allow for faster implementation.

4 Additional Considerations

4.1 Could a utility offer Solar PAYS even if the market conditions are not favorable?

Where market conditions are not favorable, Solar PAYS may still be offered, though customer copayments would be likely. In these circumstances, the program may facilitate deployment of capital for on-site solar upgrades, but the upfront copayment may effectively preclude participation by low-income households without some form of supplemental support. In Kansas, half of the participants in the PAYS program for energy efficiency upgrades have faced copayments and have chosen to make them. The utility, Midwest Energy, has reported that for those locations where a copayment is needed in the utility's energy efficiency program, the average customer copayment is near $1,000.[13] This payment brings down the cost of the upgrades to a level that would meet the threshold for cost effectiveness in the utility tariff. Midwest Energy has reported that the copayment unlocks utility investment that averages $5,500 per location.[14]

4.2 Could the barrier of an upfront copayment be reduced or eliminated?

Although the initial phase of research did not identify complementary policies that could be used to reduce copayments, future research will explore options to combine multiple value streams. For example, it is possible that some income-eligible energy assistance programs could sponsor copayments, which are a fraction of the cost of the whole system installation costs. For example, the federal Weatherization Assistance Program (WAP) allows states to approve the use of funds for solar power installations provided that they can show the cost effectiveness of using WAP funds for an expenditure that results in net savings for the program participant.[15]

4.3 Could changes to policy adversely affect the value proposition of Solar PAYS?

In the context of the PAYS system, a utility offer of investment in site-specific upgrades is always framed by market conditions that affect the cost of the upgrades as well as the estimated savings they will produce. For example, as a consumer protection measure, a utility using the PAYS system calculates estimated savings with an assumption that the current rates will remain constant over the cost recovery period. This assumption typically produces surplus benefits from energy efficiency upgrades when electricity rates rise over time, as they typically do.

[13] This data is presented in Part 1 – Appendix A: 2019 PAYS® Status Update.
[14] This data is presented in Part 1 – Appendix A: 2019 PAYS® Status Update.
[15] Clean Energy States Alliance (CESA). *Using Weatherization Assistance Program (WAP) Funds for Low-Income Solar*.
2018. https://www.cesa.org/event/using-weatherization-assistance-program-wap-funds-for-low-income-solar/

The value proposition for solar power is predicated on similar assumptions about future prices as well as policies such as the:

- availability of *state and federal investment tax credits* for solar power
- value of solar power based on current *net metering* policies and whether they will persist
- level of ambition in *renewable portfolio standards* that produce additional value in the renewable energy credit market
- cost of solar power equipment and *U.S. trade policies* that affect imported products

Market conditions for on-site solar vary across the country in part due to variation in the underlying state and local policies that create fragmented, location-specific solar power markets.[16] For example, when North Carolina and Louisiana awarded state tax credits for solar power, those policies created very different market conditions between them and their neighboring states, and those market conditions changed again after the state tax credits expired.

In another example, net metering rules across the country vary by state or by utility service area, and they determine the value of solar electricity produced at a customer's site in excess of the amount of electricity service needed at that site. In 2020, net metering as a policy was recently challenged before the Federal Energy Regulatory Commission, which voted unanimously to deny the challenge.[17] The sweeping implications of this challenge to long-accepted "net metering" policies could have devastated all grid-connected solar customers without on-site storage that currently enjoy net metering at retail rates, and it would have substantially diminished the value proposition of on-site solar for prospective customers in markets that currently have net metering at retail rates.

In Washington, D.C., residents are currently experiencing highly favorable conditions for on-site solar due to an ambitious renewable energy standard that causes utilities to pay local owners of solar power assets for renewable energy credits if they are not able to meet the standard required on their own.[18] The value stream of renewable energy credits can improve the value proposition of a Solar PAYS investment for both a utility and a customer seeking a path to ownership without facing a steep upfront cost obligation.

While policy changes are continuously shifting the map of market opportunity, the value proposition for on-site solar is likely to remain attractive even if some policy changes adversely affect market conditions overall. As a case in point, wildfire risk in California is expected to pose risks to energy security due to seasonal public safety outages every summer for the next decade. The result is a surge of interest in on-site solar power with storage because the value of energy assurance is extremely high in a context where the power can be cut off for weeks at a time. For property owners with taxable income, the acquisition of on-site solar and storage systems is

[16] Database of State Incentives for Renewables & Efficiency® (DSIRE®). https://www.dsireusa.org/

[17] United States Of America Before The Federal Energy Regulatory Commission, Docket No. EL20-42. *Petition For Declaratory Order Of New England Ratepayers Association Concerning Unlawful Pricing Of Certain Wholesale Sales.* April 14, 2020. https://elibrary.ferc.gov/idmws/file_list.asp?document_id=14851599

[18] Clean Energy Omnibus Amendment Act of 2018 (the CEDC Act). D.C. Act 22-583, January 18, 2019. https://doee.dc.gov/service/clean-energy-dc-act

attainable, but this surge is also accompanied by a rising apprehension about exacerbated burden on households for whom obtaining on-site generation with storage is financially out of reach.

Even assuming that the value proposition for on-site solar will continue to improve with prevailing reductions in installed costs, it is possible that changes to policies that affect the value of on-site power could change dramatically. These changes could undermine the value streams estimated to be produced from an investment based on the PAYS system unless participants are able to also obtain cost effective on-site storage through a similar tariffed on-bill program. On the other hand, a deep economic recession precipitated by the coronavirus pandemic could be met with a federal policy prescription for countercyclical spending on deployment of clean energy solutions or authorization by utility regulators for a surge of investment by utilities accelerating their existing plans for clean energy deployment.[19]

4.4 Could non-utility entities offer Solar PAYS?

The simple answer is 'no.' PAYS is a system for implementing a tariffed on-bill investment program that by definition requires a tariff for delivery of essential utility services. Tariffs are distinctly different financial instruments from loans and leases, and they are subject to economic regulation by utility regulators and oversight boards in every utility service area in the United States. For this reason, non-utility entities cannot offer a tariffed on-bill investment program, and therefore, Solar PAYS cannot be implemented without a utility that has an approved tariff for site specific investment and cost recovery for cost effective energy upgrades.

5 Recommended Next Steps

The biggest barrier to a Solar PAYS investment program that produces offers to customers with no upfront copayment is monetization of the federal investment tax credit. The tax credit provides a value to commercial investors or affluent residential owners that is otherwise inaccessible to low-income households. Unless the tax credit policy is reformed to offer cash in lieu of credit, this disadvantage to low-income households will persist as long as a residential tax credit is available. Availability of a commercial tax credit on better terms than a residential tax credit would continue to advantage households that can qualify as customers for commercial aggregators that only do business with qualified counterparties based on income and credit score among other factors.[20] Without a pathway through a transaction structure to monetize the credit, low-income households would effectively need to pay more for on-site solar than homeowners with good credit who can use other financial instruments, like leases, loans, and power purchase agreements.

5.1 Recommendations

[19] The Moving Forward Act, H.R.2, RULES COMMITTEE PRINT 116–54 , 116th Cong. (JUNE 22, 2020). https://transportation.house.gov/imo/media/doc/BILLS-116HR2-RCP116-54.pdf

[20] The federal tax credit policy in effect in 2020 is structured in a way that eliminates the residential solar tax credit in the future but allows a commercial tax credit of 10% to permanently persist, which permanently advantages households eligible to do business with commercial entities that can monetize the tax credit.

Building on findings by expert authors of the three parts of this report, the following recommendations would advance research to characterize feasible transaction paths for Solar PAYS with no customer copayment needed. This would be the threshold at which Solar PAYS would be more likely to achieve inclusive participation in on-site solar for households at any income level, especially low- and moderate-income households.

1. Analyze the financial cash flows for Solar PAYS transaction structures in market conditions applicable to potential early adopters.

Each of the prior recommendations involve financial analysis that describes the cash flows between parties over time. Based on the findings of the initial research, the most likely transaction structures that can address these two challenges for early adopters of Solar PAYS are (1) the Tax Efficient Structure for for-profit utilities with tax capacity and (2) the Sale Leaseback Structure for either for-profit utilities that are not tax efficient or tax exempt electric cooperatives that would require a blocker entity as discussed in Part 3. Financial analysis is essential to being able to test which scenarios could produce a Solar PAYS offer that is free from a customer copayment for a given set of market conditions. The financial models that produce such results are also useful tools for exploring the sensitivity of key inputs (e.g. initial scale of number of installations) in order to prioritize attention to those that could have the largest impact and benefit consumers and the climate most.

2. Describe and quantify cash flows for a Solar PAYS transaction structure that integrates direct payments in lieu of tax credits.

Reform of the solar tax credit to assure a direct payment option would obviate the need for Solar PAYS transaction structures that are solely serving the purpose of monetizing the federal tax credit. To explore the significant implications of this scenario, the next phase of research should produce financial analysis for a simplified transaction structure using an instructive proxy: the American Recovery & Reinvestment Act of 2009 (Section 1603).[21] The results of that financial analysis for the market conditions of potential early adopters would determine whether a transaction structure free from the distortions of the tax credit policy would also yield a value proposition for on-site solar that would be free of a customer copayment. These results would provide a contrast with further research on transaction structures that facilitate monetization of the tax credit, and the differences between them would also illuminate the value of resolving the powerful effects of the tax credit on determining who can access a pathway to ownership for on-site solar.

Members of Congress are currently considering economic recovery policy proposals that include whether to offer direct payments in lieu of investment tax credits for solar power developments.[22] Of note, the bill passed in the house excludes electric cooperatives from eligibility for the direct payment option. This exclusion is significant because more than 90% of the counties recognized by the federal government for persistent poverty are served by electric

[21] American Recovery and Reinvestment Act of 2009, H.R.1, 111th Cong. (2009) https://www.congress.gov/bill/111th-congress/house-bill/1

[22] The Moving Forward Act, H.R.2, RULES COMMITTEE PRINT 116–54 , 116th Cong. (JUNE 22, 2020). https://transportation.house.gov/imo/media/doc/BILLS-116HR2-RCP116-54.pdf

cooperatives. On the path to passage there are at least two points at which this omission could be remedied, first during deliberation in the Senate and second during a conference of the comparable bills passed by the two chambers. Without attention to this issue, the tax credit reform would exacerbate equity concerns about economic inclusion in renewable energy policies.

3. Explore two options for assuring a pathway to ownership for Solar PAYS customers.

The path to ownership for low-income households is complicated by the pathways for monetizing the federal investment tax credit. For example, one of the two most promising options for monetizing the federal investment tax credit in a Solar PAYS program is a sale-leaseback structure, and the path to ownership can be described as follows. After the term of the operating lease through which the federal investment tax credit for solar would be monetized, the utility (lessee) will incur costs to acquire the system from the tax investor (lessor) at either a pre-determined price or at fair market value at that time. The utility must then recover these acquisition costs from the Solar PAYS participant for the utility's costs to be fully recovered, at which point ownership of the system can be conveyed from the utility to the property owner at the location where it is installed. Next Resource Advisors has identified at least two options for facilitating a path to ownership for a customer in the context of Solar PAYS coupled with a sale-leaseback option to monetize the tax credit. Further investigation is needed to identify which of these options would be best from the vantage points of both a customer and a utility.

4. Vet transaction structures for PAYS through which solar tax credits can be monetized.

Attention from domain experts in law and accounting is needed to vet and refine the transaction terms and agreements for both of the most promising transaction structures identified in the initial phase of research. These include the Tax Efficient Structure for for-profit utilities with tax capacity and (2) the Sale Leaseback Structure for either for-profit utilities that are not tax efficient or tax-exempt electric cooperatives, which would require a blocker entity as discussed in Part 3. Both should be further refined and vetted for the potential to aggregate the financial terms for on-site solar installations, possibly reaching hundreds or thousands of households within a specific window of time (e.g. 6 months).

Taking these recommendations into account, future research should include the following activities:

- Conduct financial modeling to characterize the value streams and cash flows for the two most promising transaction structure options in the policy context of specific markets.
    - Development of an accessible, adaptable financial model that can vary inputs to create scenarios and explore summary financial metrics for a sample portfolio of Solar PAYS investments as well as average metrics for a single participant within such a portfolio.

- Applying input assumptions for two different types of utilities in two different markets (e.g. electric cooperative and for-profit utility)
- Using the two most promising transaction structures as appropriate (i.e. Tax Efficient Structure, and Sale-Leaseback with and without a blocker entity)
- Exploring the solar tax credit policy - both with an extension, and with a direct pay option; or with solar tax credit policy unchanged from current terms as of June 2020.
- Exploring two potential pathways to ownership for site owners at the end of a utility's operating lease as discussed in Part 3.[23]
- Documentation of the model and results from an illustrative set of defined scenarios along with a glossary and a list of the transaction agreements required for each transaction structure.

This analytic work above would provide qualified responses to a host of questions that remain threshold issues in the structure of a Solar PAYS transaction. Some of these include:

- Is a cap on the monthly cost recovery payments made by participants (based on 87% of the estimated 20-year production of the solar system) sufficient to complete cost recovery for the utility without a customer copayment?
- How much would a non-profit utility (or for-profit yet tax inefficient utility) need to pay a tax advantaged investor to gain ownership of on-site solar assets?
- In the sequence of ownership, what are the risk mitigation practices for managing the cost of future acquisition for the utility and ultimately for the customer?
- In the absence of solar tax credit reform, can non-taxable electric cooperatives engage blocker entities (see Part 3) in order to make a Solar PAYS investment?
- Might concurrent investments such as energy efficiency upgrades improve the value proposition for an on-site solar system?

- Vet and refine the two most promising transaction structures with entities that could be key actors in such a transaction:
  - Identify potentially interested utilities and financial participants to vet the transaction structures and associated stages of scaling up a Solar PAYS investment program;
  - Vet the transaction structures with potential tax investors, especially sale lease-back providers with experience in distributed generation solar or working with electric cooperatives.
  - Refine transaction structures in consultation with prospective scaling partners, including solar aggregators, generation & transmission cooperatives, and others

[23] In short, the two options include (1) reserving a portion of each cost recovery charge during operating lease, or (2) continuing cost recovery after operating lease to cover the fair market value of the system.

able to efficiently offer Solar PAYS programs within a single utility service area, across a state, or nationally.

- For regulated utilities, engage with Commissions to evaluate their interest in approving the PAYS system to effect site-specific investment and cost recovery for on-site solar systems, including at the homes of low- and moderate-income customers and renters.

- Confirm the appropriate Solar PAYS structure(s) to pursue based on willing participants and the likely stages for scale and further vet the structures
  - Conduct detailed transaction structure review with accountants or legal counsel
  - Engage with legal counsel to draft contracts required to pilot, including any required structure documents, the Participant Agreement, and the Installer Agreement (or amendments to existing Participant and Installer Agreements); and,
  - As a pilot becomes viable, engage with appraisers, independent engineers, and others, as may be required by tax investors or other parties to conduct due diligence on the transaction.

This line of inquiry for future research is designed to illuminate critical threshold decision points for the key actors that would be participants in a Solar PAYS transaction. In any aspect of the transaction where a party's financial position would be worse as a result of participation, the transaction structure would fail. Pressure testing prospective solutions in a research environment is prudent and necessary for the next phase of research, and any scenarios that indicate promising results should help inform and accelerate the development of initial approaches to implementation in the field.

The recommended next steps and recommendations for future research are well aligned, and they are consistent with the purposes of the LIFT Solar research project. This includes the development of resources for the LIFT toolkit that would enable a broad field of interested stakeholders to access and build upon the gains made toward an inclusive solution for on-site solar with Solar PAYS.