

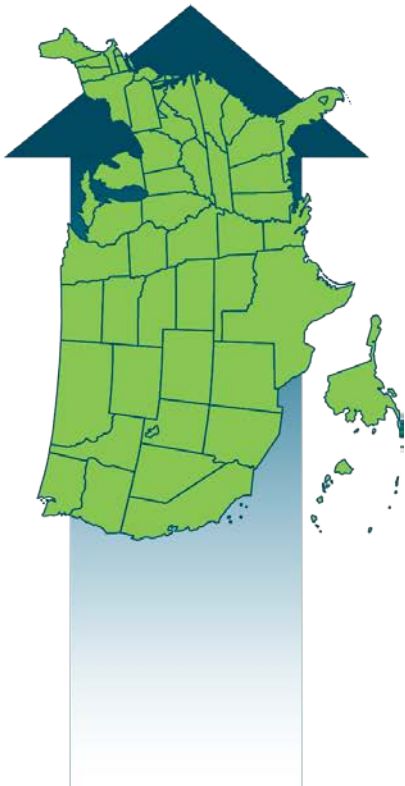
# SEE Action

STATE & LOCAL ENERGY EFFICIENCY ACTION NETWORK

## Energy Efficiency Finance Programs: Use Case Analysis to Define Data Needs and Guidelines

Financing Solutions Working Group

July 2014



The State and Local Energy Efficiency Action Network is a state and local effort facilitated by the federal government that helps states, utilities, and other local stakeholders take energy efficiency to scale and achieve all cost-effective energy efficiency by 2020.

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*Energy Efficiency Finance Programs: Use Case Analysis to Define Data Needs and Guidelines* was developed as a product of the State and Local Energy Efficiency Action Network (SEE Action), facilitated by the U.S. Department of Energy/U.S. Environmental Protection Agency. Content does not imply an endorsement by the individuals or organizations that are part of SEE Action working groups, or reflect the views, policies, or otherwise of the federal government.

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## Acronyms

BEDES	Building Energy Data Exchange Specification
CDFI	community development financial institution
CEFC	Clean Energy Finance Center
CEWO	Clean Energy Works Oregon (CEWO)
EDF	Environmental Defense Fund
EE	energy efficiency
ESCO	energy service company
GHG	greenhouse gas savings
ICP	Investor Confidence Project
IEA	International Energy Agency
OBR	on-bill repayment
PACE	property assessed clean energy
PII	personally identifiable information
PV	photovoltaic
SEE Action	State & Local Energy Efficiency Action Network



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## Executive Summary

There are over 200 energy efficiency loan programs—across 49 U.S. states—administered by utilities, state/local government agencies, or private lenders.<sup>1</sup> This distributed model has led to significant variation in program design and implementation practices including how data is collected and used. The challenge of consolidating and aggregating data across independently administered programs has been illustrated by a recent pilot of an open source database for energy efficiency financing program data. This project was led by the Environmental Defense Fund (EDF), the Investor Confidence Project, the Clean Energy Finance Center (CEFC), and the University of Chicago. This partnership discussed data collection practices with a number of existing energy efficiency loan programs and identified four programs that were suitable and willing to participate in the pilot database (Diamond 2014).<sup>2</sup> The partnership collected information related to ~12,000 loans with an aggregate value of ~\$100M across the four programs. Of the 95 data fields collected across the four programs, 30 fields were common between two or more programs and only seven data fields were common across all programs. The results of that pilot study illustrate the inconsistencies in current data definition and collection practices among energy efficiency finance programs and may contribute to certain barriers.

More consistent data collection and reporting could be beneficial to two key stakeholder groups:

1. **Program administrators and policy makers** could learn lessons about more effective program design from the comparative analysis of data from alternative program designs.
2. **Lenders and investors** may be able to use loan performance data to more accurately account for risk, increase lending, and ultimately lower financing costs. Consistent data collection may also provide an enhanced ability to sell loan pools to replenish program funds.

## Report Objective

The objective of this report is to take a foundational step towards the establishment of common data collection practices for energy efficiency lending. We review existing practices for data collection for energy efficiency financing programs and, based on discussions with various stakeholders, identify high-priority needs, characterize potential uses for finance program data, and identify use cases that describe how stakeholders use data for key objectives and actions. We address the following topics:

- Rationales for collecting more consistent data from energy efficiency finance programs;
- Identification and discussion of energy efficiency finance program use cases;
- Challenges with collecting information from customers that participate in finance programs; and
- Issues with data collection and aggregation across multiple finance programs.

## Method

The approach to developing use cases and data guidelines involved three key elements and sources of information. First, we summarized current data collection and reporting practices utilized in several large efficiency financing programs, drawing primarily upon the pilot project identified above. Second, we received strategic guidance from the SEE Action Finance Solutions Data Working Group who provided input on project scope and approach, identified key stakeholders to contact, and reviewed work products. Finally, we held discussions with 15 energy efficiency finance data stakeholders in order to inform the use cases and proposed data guidelines.

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<sup>1</sup> This report focuses on loans that fund the cost of the installation of energy efficiency measures, and in some cases, distributed renewable energy projects. It does not cover mortgage products provided at lower rates for properties that meet a prescribed energy efficiency standard.

<sup>2</sup> Loan data was obtained from the following programs: New York State Energy Research and Development Authority (NYSERDA), Pennsylvania Treasury (PA Treasury), Clean Energy Works Oregon (CEWO), and Greater Cincinnati Energy Alliance.

## Data Priorities of Key Actors and Use Cases

At the most aggregate level, the types of data that are most relevant to energy efficiency finance programs can be organized into four categories: (1) Customer Data; (2) Financial Products and Performance Data; (3) Facility-level Data; and (4) Energy Efficiency Project Data.<sup>3</sup> The importance of these different data categories varies among key stakeholders and actors (see Table ES-1). For example, program administrators and policy makers are interested in a wide range of data as they seek to optimize program design and evaluate the costs and benefits of the programs. In contrast, lenders and investors have a more operational role and will be the primary actors in underwriting activities, loan and cash flow management, and refinancing /securitization activities.<sup>4</sup> Lenders and investors indicated that their data priorities are finance loan performance data and customer metrics that have been historically predictive of delinquency and default (e.g., FICO, debt-to-income) for their analysis and decision making.<sup>5</sup>

**Table ES - 1. Data Priorities by Stakeholder Group**

Data Category	Data Priority	Lenders and Investors	Data Priority	Program Administrators and Policymakers
<b>Customer</b>	①	Customer data, including FICO scores, income, and debt, are used for analyzing loans and portfolios.	①	Few critical needs; however, demographic information and participant characteristics could be used in assessing a program.
<b>Financial Products and Performance</b>	●	This data is important for collections, risk assessment, and other operational activities.	①	This could impact credit enhancements or capital provided to a program.
<b>Facility-Level Data</b>	○	Lenders are unlikely to use this data.	○	This information can help with analysis, but is relatively unimportant to stakeholders.
<b>Energy Efficiency Project</b>	○	Lenders did not report that EE project-level data would be used in eligibility or pricing.	●	Program administrators use EE project savings (and cost) data to evaluate the impact of the program.

Data Priority	
<b>High</b>	●
<b>Medium</b>	①
<b>Low</b>	○

We developed six distinct use cases that are linked to the lifetime of an energy efficiency finance program or loan and describe actions and decisions of key actors and their data needs: (1) Program design and implementation, (2) Eligibility criteria, (3) Loan book and cash flow management, (4) Refinance of loan, (5) Securitization, and (6) Program evaluation (see Figure ES - 1).

<sup>3</sup> The Department of Energy is supporting development of a Building Energy Data Exchange Specification (BEDES) to facilitate sharing and utilization of empirical building energy performance data among software tools and data collection and analysis activities (DOE 2013).

<sup>4</sup> In some cases, the program administrator will also take on the role of the lender. In these specific cases, both the program administrator and lender sections are relevant to those organizations.

<sup>5</sup> Tables 3-8 through 3-11 in chapter 3 of this report contain a detailed analysis of data field prioritization.





**Figure ES - 1. Use cases for the lifecycle of energy efficiency finance programs**

For each use case, a description of the roles and objectives (“User Stories”) of the stakeholders (“Actors”) is provided along with the specific ways that these stakeholders use data to achieve their objectives (“Actions”). An overview of the types of data that are a priority for each stakeholder is also provided using the four data categories (i.e., customer data, financial products and performance data, facility-level data, and energy efficiency project data). Table ES - 2 provides an overview of each use case, identifies the relative role of various actors in that use case (e.g., primary, secondary or limited) and summarizes key data needs for that use case (see chapter 3 for detailed presentation of use cases).

**Table ES - 2. Use Case Summary**

Use Case	Actors	Use Case Overview	Key Data Needs
<b>Program Design and Implementation</b>	<p><b>Primary</b> Program Administrator</p> <p><b>Secondary</b> Policy Maker/ Evaluator, Primary Lender</p>	<ul style="list-style-type: none"> <li>Energy efficiency finance programs are typically implemented to encourage the adoption of efficiency measures.</li> <li>Key program design issues include loan terms and conditions, programmatic support and incentives, and the use of novel financing tools (e.g., Property Assessed Clean Energy (PACE) and on-bill repayment (OBR)).</li> </ul>	<ul style="list-style-type: none"> <li>Historical loan performance for comparable financial products to determine the form and level of programmatic support (e.g., credit enhancements, interest rate buy-downs).</li> <li>Data on program participation with different design features, including demographic information.</li> </ul>
<b>Eligibility Criteria</b>	<p><b>Primary</b> Primary lender</p> <p><b>Secondary</b> Program Administrator, Bond Investors</p>	<ul style="list-style-type: none"> <li>Loan eligibility criteria are used to set the minimum creditworthiness requirements of a customer and to inform the decision whether the loan will be provided.</li> <li>There may be a role for program administrators where programmatic benefits such as credit enhancements are used to widen access to finance.</li> <li>If a secondary market for energy efficiency loans develops, investor expectations may influence the eligibility criteria.</li> </ul>	<ul style="list-style-type: none"> <li>The lender will use historical loan performance of comparable financial products to determine what terms, credit thresholds, and analytics (e.g., debt-to-income, and FICO) to use in the underwriting process.</li> <li>It is not common for lenders to consider the cost saving impact of the energy saving measures to be financed in the loan in their credit assessments.</li> </ul>

<b>Loan Book and Cash Flow Management</b>	<p><b>Primary</b> Primary Lender</p> <p><b>Secondary</b> Secondary Lender</p> <p><b>Limited</b> Program Administrator</p>	<ul style="list-style-type: none"> <li>• Lenders collect data on loans and their repayments in order to account for loan receivables, populate loan management systems, and implement collection processes.</li> <li>• The data may also be used in external reporting processes and to manage the cash flow of the loan pool.</li> </ul>	<ul style="list-style-type: none"> <li>• Loan administrators will require the typical loan performance data (e.g., loan payments, arrears, debt age, and defaults) used in the management of standard loan portfolios.</li> <li>• Current customer information is needed where arrears collection processes are implemented.</li> </ul>
<b>Refinance of Loans</b>	<p><b>Primary</b> Secondary Lender</p> <p><b>Secondary</b> Primary Lender</p> <p><b>Limited</b> Program Administrator</p>	<ul style="list-style-type: none"> <li>• Lenders may seek to sell a portfolio of loans to a secondary lender either as a whole portfolio as needed, or by entering into a loan purchase agreement with the secondary lender prior to the loans being originated.</li> <li>• The program administrator may be asked to provide credit enhancements in support of a transaction.</li> </ul>	<ul style="list-style-type: none"> <li>• Data analysis of loan performance, including delinquency and default experience, will be used by both parties to support negotiations of the terms of a transaction.</li> <li>• Data on the credit characteristics of loans (e.g., FICO, Debt-to-income, payment history, loan term) will be used to price the purchase.</li> </ul>
<b>Securitization</b>	<p><b>Primary</b> Rating Agency, Bond Investor</p> <p><b>Secondary</b> Secondary Lender, (and/or), Primary Lender</p> <p><b>Limited</b> Program Administrator</p>	<ul style="list-style-type: none"> <li>• Securitization is the issuance of rated debt (bonds) linked to the revenue from a loan portfolio.</li> <li>• The rating process is thorough with rating agencies seeking a long history of auditable data.</li> <li>• Loans may be consolidated from a number of originators to get sufficient scale to justify the high transaction costs.</li> </ul>	<ul style="list-style-type: none"> <li>• Performance data and credit characteristics are key to evaluation of the portfolio.</li> <li>• Credit rating agencies will analyze risk concentration (e.g., geographic, originator).</li> <li>• Data history is ideally equal to the outstanding term of the loan pool, and if not data should extend to at least 4-5 years.</li> </ul>
<b>Program Evaluation</b>	<p><b>Primary</b> Policy Maker/Evaluator</p> <p><b>Secondary</b> Program Administrator, Primary Lender</p>	<ul style="list-style-type: none"> <li>• Defining and measuring success can be complex and will depend on the program goals.</li> <li>• Program goals can include, increasing the amount of private investment in energy efficiency, expanding access to capital for customers, and acquiring cost-effective energy savings.</li> <li>• Attributing incremental savings to the presence of financing can be very challenging. A database of loan information could potentially provide useful inputs into the evaluation process.</li> </ul>	<ul style="list-style-type: none"> <li>• Total project costs, loan amounts, and other program expenditures (e.g., rebates) alongside projected energy savings will be key data for evaluation.</li> <li>• Tracking energy savings and participation rates along with changes in interest rates or other loan features could help reveal the impact of these adjustments.</li> <li>• Other program goals that could be tested include the ability to attract private capital or expand access to credit.</li> </ul>



## Challenges

A number of issues and challenges with energy efficiency (EE) finance program data collection and reporting were identified in our discussions with stakeholders, which we grouped into four broad categories:

### 1. Concerns about data security and privacy

Handling of personally identifiable information (sometimes referred to as “PII”) represents a risk for organizations. Administrators need to consider how they will collect, manage, transfer, and mask PII at the outset of program design and implementation.

### 2. Lack of data comparability makes aggregation and analysis difficult

Variations in program design and eligibility criteria and inconsistent data definitions and collection practices make it difficult to aggregate data and conduct comparative analysis of energy efficiency financing programs. The development and codification of a typology for different program data elements could facilitate comparative analysis of how different program design features may influence program outcomes.

### 3. Inconsistent data needs and data quality needs across stakeholders

Data quality needs vary across stakeholders. For example, the purchasers of loan pools need to have full access to audit-quality information. In these situations, consolidated data is of limited value unless data providers are willing to provide representations around data accuracy. Program evaluators face challenges when attempting to obtain information (e.g., assessing program impacts or cost-effectiveness) because the information that they typically are interested in may not be well aligned with the priorities and needs of lenders, customers, contractors, or program managers. For example, program evaluators indicated that data on the energy conservation measures installed was inconsistently collected—especially when contractors were requested (or required) to report a significant amount of information for each project.

### 4. Issues around the perceived value of data to justify alternative lending criteria and need for credit enhancements

Lenders indicated that they do not foresee adjusting their lending criteria based on the energy efficiency measures installed because they do not assume that customer energy-related cost savings will always be applied to the debt service payment. These actors did report that collecting time-series information on energy efficiency loan performance along with traditional metrics including FICO, debt-to-income, and loan term on performance are likely to be valuable in developing the case for lower cost funding for energy efficiency.

## Next Steps

There are several activities that could be undertaken to support the development of common data definitions and formats and more consistent data collection practices for energy efficiency finance programs:

### 1. Develop common data definitions of primary data fields that are universally used and needed across stakeholder groups.

For example, loan principal and interest rate values were identified as key data fields during all of our discussions with stakeholders. If standards and definitions were adopted, this process could be a valuable first step to open the benefits of loan pool consolidation.

### 2. Develop reporting guidelines for energy efficiency financing programs that utilize common data definitions, which could be voluntarily adopted and utilized by program administrators and lenders.

The strawman list of data fields presented in this report could serve as the starting point for this process of developing voluntary program reporting guidelines that utilize common data definitions.



**3. Discuss designing and hosting a centralized database system to collect and disseminate information from the disparate programs and stakeholder groups.**

It is unclear whether a centralized database system would be valuable to all stakeholders. For that reason, key stakeholders should discuss the merits of designing and hosting a centralized database.



## Chapter 1: Introduction

There are over 200 energy efficiency loan programs—across 49 U.S. states—administered by utilities, state/local government agencies, or by private lenders. This distributed model for delivering energy efficiency financing across the United States allows each program administrator to design and operate their program to best serve local needs and maximize the impact of available resources. This distributed model has led to significant differences in program design and implementation practices. Data collection and evaluation activities across financing programs reflect this paradigm, with each program administrator (or state regulatory agency) determining what data to collect and how it will be used.

### Existing Data Collection Practices

The challenge of aggregating data across multiple programs has been illustrated by a recent pilot of an open source database for energy efficiency financing program data. This project was led by a partnership of industry experts and interest groups (the “partnership”).<sup>6</sup> The partnership discussed data collection practices with a number of program administrators and identified four energy efficiency finance programs that were suitable and willing to participate in the pilot database (Diamond 2014).<sup>7</sup> The partnership collected information related to ~12,000 loans with an aggregate value of ~\$100M across the four programs.

Of the 95 unique data fields collected by the four program administrators, 30 fields were common between two or more programs, while only seven data fields were common across the four programs.<sup>8</sup> The participating programs all administer and store the data primarily with one organization. This lack of common data definitions and formats would be even more evident if information was obtained from more programs. Furthermore, consolidating data from decentralized programs that use local lending institutions (e.g., Michigan Saves program) creates additional data reporting challenges.

The partnership also identified several other issues in their analysis of program data:

- The programs were all relatively new and therefore had a limited data history. The partnership indicated that data will need to be collected over a longer period if it is to be valuable to commercial financing organizations.
- There was a lack of diversity in the loans represented (e.g., geographic coverage was limited, extent of retrofit was limited). It was noted that a wider pool of financing loan data—covering a larger geographic footprint and across different types of retrofit—would likely provide more diversity.
- The partnership was unable to obtain information on project performance (e.g., savings at the customer level).

### Opportunities from More Consistent Data Collection

More consistent data collection and reporting could be beneficial to both program administrators and lenders.<sup>9</sup> For example, finance program data collected across programs with consistent data guidelines and reporting could facilitate comparative analysis of lessons learned and/or the relative importance of specific program design elements on performance. Improved data collection may also open new opportunities for program administrators

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<sup>6</sup> The Environmental Defense Fund (EDF) Investor Confidence Project (ICP), Clean Energy Finance Center (CEFC) and University of Chicago Data Science for Social Good Fellowship Program formed a partnership to create a public domain database consisting of energy efficiency loan data collected and aggregated from programs across the country. Details on the project can be found on the ICP website: [LINK](#)

<sup>7</sup> Loan data was obtained from the following programs: New York State Energy Research and Development Authority (NYSERDA), Pennsylvania Treasury (PA Treasury), Clean Energy Works Oregon (CEWO), and Greater Cincinnati Energy Alliance.

<sup>8</sup> The common data fields identified across the four programs were: U.S. state, zip code, credit score, loan amount, interest rate, original loan term, and loan approval date.

<sup>9</sup> Consistent data can simply mean that sufficient information is present to enable reconciliation of data between programs. This could mean programs collecting data that they have no immediate operational need for.

(and customers) by facilitating increased availability of low cost private funding and an enhanced ability to refinance loan pools to replenish program funds.

Energy efficiency financing programs are often intended to facilitate customer adoption of high efficiency and clean energy technologies by making financing either more affordable or more widely available in an effort to overcome the perceived barrier of high upfront costs. Financing program design and objectives vary across states with substantial differences in important program features, including targeted market segments (e.g., residential, commercial, industrial), eligible measures and technologies, source of funds, audit requirements, reliance on private capital, and amount of program contributions. Table 1 - 1 outlines some of the key issues that program administrators have to resolve when designing and operating energy efficiency finance programs.

**Table 1 - 1. Key Program Design Issues for Energy Efficiency Loan Program Administrators**

Loan Program Element	Key Decisions
<b>Capital Source</b>	<ul style="list-style-type: none"> <li>• Public funding?</li> <li>• Ratepayer funding?</li> <li>• Private funding?</li> </ul>
<b>Origination/Servicing</b>	<ul style="list-style-type: none"> <li>• Outsource or retain administration?</li> <li>• Where to outsource?</li> <li>• Single or multiple originator/servicers?</li> </ul>
<b>Financial Product</b>	<ul style="list-style-type: none"> <li>• One or multiple products?</li> </ul>
<b>Credit Enhancement</b>	<ul style="list-style-type: none"> <li>• Include credit enhancement and why?</li> <li>• What type of credit enhancement?</li> </ul>

Policymakers and program administrators have several working hypotheses about the value of energy efficiency (EE) loan programs; the evidence to support these hypotheses is still relatively scarce. Some policymakers and program administrators expect that an energy efficiency finance program will provide better leverage and impact than alternative approaches (e.g., rebates). There is also a belief that energy efficiency loans to utility customers have a relatively low risk of losses due to non-payment. Finally, by developing a track record of low default and delinquency, pilot programs could facilitate the use of program funds to support widely accessible, low-cost financing. More consistent and improved data collection by program administrators and lenders could help to test and validate these assumptions.

More consistent data collection and reporting could also provide additional benefits to the energy efficiency services market. Individual programs may not have sufficient scale to attract potential investors, or warrant the due diligence costs associated with such a transaction. The ability to aggregate pools of loans that are based on common data definitions and reporting could open up the opportunity to resell loan portfolios to investors and recycle program funds. Reselling loan portfolios could ultimately lead to lower funding costs and possibly reduce the need for programmatic support for the financing. Over the long term, it is in the best interest of customers, program administrators, and financing institutions to support and help develop common data definitions and more consistent data collection and reporting practices of finance-related data.

## Objectives and Approach

*The objective of this report is to take a foundational step towards the establishment of common data collection practices across energy efficiency finance programs. We review existing practices for data collection for energy efficiency financing programs and, based on discussions with various stakeholders, identify high-priority needs, characterize potential uses for finance program data, and identify use cases for various key stakeholders. We address the following topics:*

- Rationales for collecting more consistent data from energy efficiency finance programs;
- Identification and discussion of energy efficiency finance program use cases;
- Challenges with collecting information from customers that participate in finance programs; and
- Issues with data collection and aggregation across multiple finance programs.

The approach to developing use cases and data guidelines involved three key elements and sources of information. First, we summarized current data collection and reporting practices utilized in several large existing efficiency financing programs, drawing upon a recent pilot study conducted by the Environmental Defense Fund (EDF), the Investor Confidence Project, Clean Energy Finance Center (CEFC), and University of Chicago. Second, we received strategic guidance from the SEE Action Finance Solutions Data Working Group who provided input on project scope and approach, identified key stakeholders to contact, and reviewed work products. Finally, we held discussions with 15 different energy efficiency finance data stakeholders in order to inform the use cases and proposed data guidelines.

### Stakeholder Groups Targeted for Discussions


A series of targeted discussions were held with organizations within each of the four user groups identified (program administrators/policymakers, residential lenders, commercial lenders, and secondary market investors) in order to capture a broad range of perspectives on energy efficiency financing data. In some cases (e.g., residential solar photovoltaic (PV) lease providers/energy service company (ESCO) lenders), we were interested in understanding how more mature markets have dealt with data collection and reporting. Table 1 - 2 identifies the organization types that were targeted for these discussions.

**Table 1 - 2. Stakeholder Organizations Targeted for Discussion**

High-Level Stakeholders	Typical Organizations
<b>Program Administrators/ Policymakers</b>	<ul style="list-style-type: none"> <li>• Ratepayer-funded program administrators</li> <li>• State utility regulators</li> <li>• State policymakers</li> </ul>
<b>Secondary Market Investors</b>	<ul style="list-style-type: none"> <li>• Rating agencies</li> <li>• Institutional investors</li> <li>• Investment banks</li> </ul>
<b>Residential Program Lenders</b>	<ul style="list-style-type: none"> <li>• Existing program financial partners</li> <li>• National lenders/investors</li> <li>• PV lease providers</li> </ul>
<b>Commercial Program Lenders</b>	<ul style="list-style-type: none"> <li>• Existing program financial partners</li> <li>• Commercial property lenders</li> <li>• ESCO lenders</li> </ul>

We asked individuals from these organizations to provide their views on four key topics in order to inform the use cases:

1. How would efforts to develop common data definitions and consistent data collection/reporting from energy efficiency finance programs benefit your organization?
2. If data collection and dissemination improved, what types of new analyses would be useful to your organization?
3. What types of challenges are present in the collection and transfer of finance program-related data?



4. Identify the type of data that would be most useful to collect under the following categories:

- Customer data
- Financial product and performance data
- Facility-level data
- Energy efficiency project data?

### **Report Organization**

The remainder of this report is organized as follows. In chapter two, we discuss key stakeholders and their data-related needs. In chapter three, we present several use cases and chapter four discusses challenges with data collection and guidelines. Chapter five concludes with a number of suggested next steps that can be taken to improve data collection and reporting practices.





## Chapter 2: Key Stakeholders and Their Need for Information

A number of stakeholders are interested in energy efficiency finance program data: program administrators, policymakers, lenders, investors, and a number of other secondary organizations. The usefulness of different types of information to stakeholder groups varies widely. This chapter introduces, at a high level, key stakeholders and the types of information that can be collected.

### Program Administrators and Policymakers

Program administrators are responsible for the design and implementation of energy efficiency programs. This role may include provisioning capital or credit enhancement. Program administrators are primarily interested in programmatic goals (e.g., more widespread adoption of energy efficiency measures). Administrators are typically interested in efficiency finance program data in order to understand of factors that influence program participation and/or how to most effectively utilize available program funds. Energy efficiency finance data allows policymakers to evaluate the impact of existing programs and may also inform future program design modifications.

Many program administrators and policymakers believe that improved data collection will lead to long-run benefits such as the ability to attract private capital at a low cost. For this to happen, though, a sufficient track record for loan performance has to be established. Data that illustrates effective program design can help administrators implement programs that capital providers will likely find more attractive, while devoting program funds to their highest and best use.

The availability of aggregated data across multiple programs may also provide evidence on the relative effectiveness of various financing options in achieving energy savings goals. Quantitative analyses based on this data may help policymakers set parameters and requirements for new financing programs using public or ratepayer funding. Consistent data collection can also support meta-evaluations of loan programs that assess the relative impact and importance of various program designs (e.g., on-bill repayment, property assess clean energy programs) and/or features.<sup>10</sup>

### Lenders and Investors

Lenders and investors provide capital to energy efficiency financing programs and are primarily interested in maximizing their investment returns while minimizing their exposure to the risk of losses. These stakeholders need robust data in order to evaluate risk when defining loan eligibility terms and making a lending or investing decisions. More consistent data collection and reporting may help lenders understand the likely performance of energy efficiency loan products and compare this asset class to other forms of financing. Over time, the ability to cross-reference savings data with delinquency and default rates may also help distinguish the impact of project performance from other aspects of customer creditworthiness on ultimate loan performance, which could lead to lower financing costs for program participants. Improved data collection and reporting practices could also facilitate improved valuation and risk analysis for secondary market sales of energy efficiency loan portfolios. As the available data expands and risk-reward relationships in this sector are better understood, it will give prospective market entrants the information they need to develop new financing products and price new loans for energy efficiency.

Figure 2-1 illustrates the types of organizations that comprise these two broad groups of stakeholders (program administrators/policymakers and lenders/investors). Initial conversations with lenders and investors revealed that while the organizations within the lender and investor community may have broadly similar objectives, data needs and uses vary somewhat between primary lenders and secondary market investors. For example, primary lenders originate new loans and normally perform the administration of the loan portfolio (their need for data is more

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<sup>10</sup> Consistent program evaluation for energy efficiency loan programs is an issue currently being addressed by the SEE Action regulatory policies working group. For more information and reports from the group see here: [LINK](#)

operational). Secondary lenders, who typically purchase existing loans, are primarily interested in financing data to inform their investment decisions and ongoing analysis of asset performance. Based on discussions with lenders, we also found that there is a difference in how lenders evaluate risk with individual consumers (residential) compared to businesses (commercial).

Figure 2 - 1 also shows the objectives of several sub-groups (e.g., residential lenders, commercial property lenders, secondary market investors) and highlights the fact that objectives may vary somewhat among the broad lender/investor group.<sup>11</sup> For example, the approach to lending to individuals for residential improvements would likely involve checking the credit score, along with other simple metrics (e.g., debt-to-income ratios). Loans in this segment are typically low value, so lending decisions need to be performed quickly to avoid high transaction costs relative to the loan. In contrast, commercial sector loans will typically be larger and require a more detailed analysis of the cash flows available for debt service.

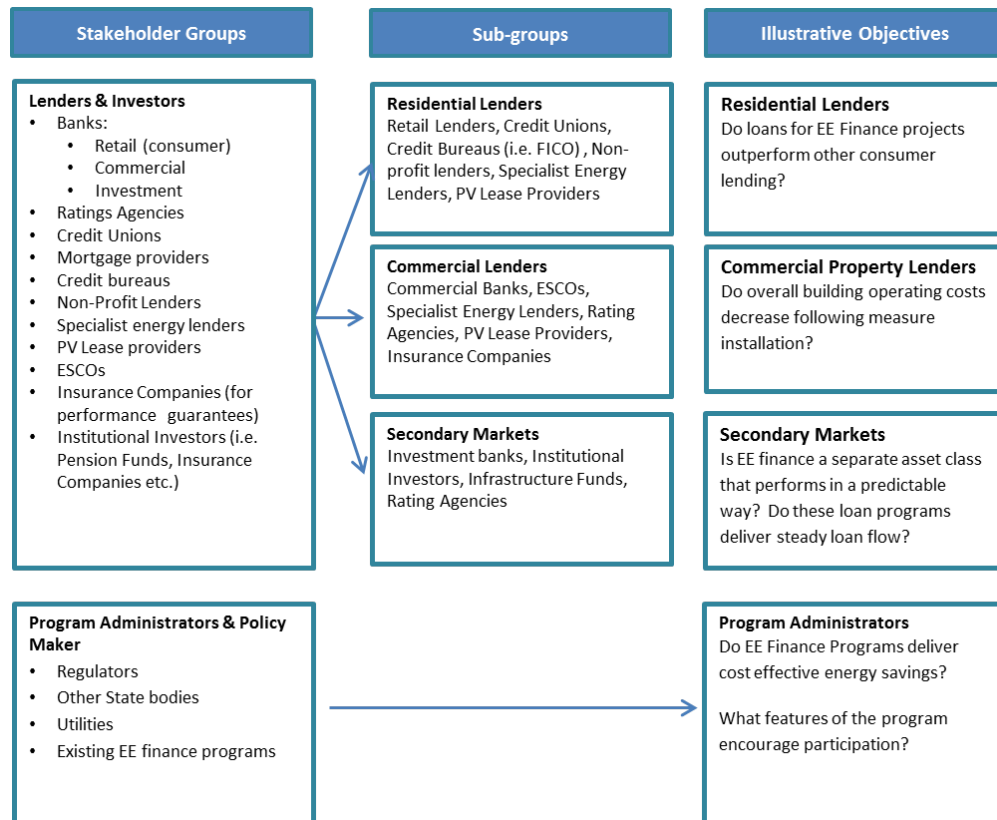


Figure 2 - 1. Energy efficiency market participants

### Other Stakeholders

Other stakeholders are also interested in using energy efficiency finance data (e.g., academic researchers, industry consultants, environmental groups, industrial customer groups, consumer advocates). Most of the data needs of these other stakeholders are similar to policymakers. For that reason, we do not develop separate use cases for them.

<sup>11</sup> For the purposes of this analysis, we have aligned program administrators and policymakers in the same category. Their underlying objectives are not driven by the profitability of the loans, but are tied instead to the adoption of energy efficiency measures. In many cases, program administrators' goals are actually established by policymakers through legislation, thus providing a legal requirement for their objectives to be aligned.

## Information Needs

At the most aggregate level, the types of data which are most relevant to energy efficiency programs can be organized into four different categories:

### 1. Customer data (including financial characteristics)

This data covers identifying information about the participant (e.g., customer name, address, and social security number/taxpayer ID number) as well as data used in underwriting (e.g., FICO scores and debt-to-income ratios). This type of information might also include demographic information, geographic location, etc.

### 2. Financial products and performance data

Financial data is necessary to identify characteristics of financial instruments and monitor their performance over time. This data may include loan principal, terms, payment schedule, receipts, and any delinquencies or defaults.

### 3. Facility-level data

This type of information describes relevant features of the facility to be retrofitted, including property type, location, and any other information that could impact the project performance, costs, or savings.

### 4. Energy efficiency project data

This type of data typically includes measures that were installed and their costs; the baseline energy usage prior to the project, expected and actual energy savings, and information on the service provider (e.g., contractor name).

Clearly, the demand for different types of information will vary significantly between different user groups. In general, it is more likely that lenders (and investor groups) will have a greater interest in the financial product and performance data because it may directly impact their operational decisions and primary goals (e.g., profitability, risk assessment). Program administrators and policymakers will typically have a greater interest in the energy efficiency project and usage data, and to some extent building facility data, given their broader goals of acquiring cost-effective energy savings.

## Data Needs for Specific Programs

The most common energy efficiency loan programs implemented in recent years have been unsecured loan programs supported with credit enhancements or interest rate buy-downs from a program administrator. For the purposes of this report, our 'base' program is a program providing unsecured lending. Other types of financing programs may have additional data requirements.

**Secured lending** is another common form of lending. Under secured lending, a lien is typically placed against a property. For these programs, it is important to record details of the security, assess its value, and identify any other debt liens against the asset (e.g., mortgage).

**Property Assessed Clean Energy (PACE)** uses a property tax assessment as the collection mechanism for the loan. Due to the treatment of property tax debt, PACE loans are essentially secured against the property. Therefore, it is

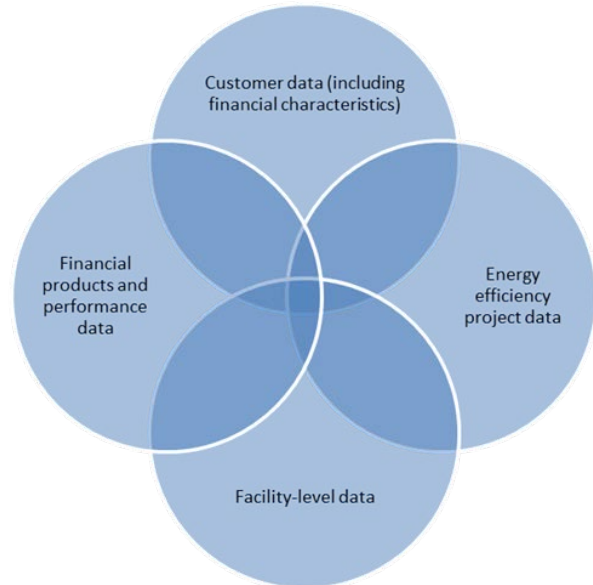


Figure 2 - 2. Energy efficiency finance data types



important to collect loan-to-value information about the mortgage on the property alongside property tax payment history.

**On Bill Repayment (OBR)** programs collect loan payments through a utility bill. In this case, historical utility bill payment information may be used in determining eligibility for the loans.

## Chapter 3: Use Cases and Information Priorities

### Overview

A use case describes the actors as well as the actions and decisions that are made with information in order to achieve a specific objective. In this section, we describe each use case in more detail, including the roles and objectives (“User Stories”) of stakeholders (“Actors”) and the specific ways that they will use the data to achieve their objectives (“Actions”) in order to provide context for the assessment of finance program data that would be useful to collect and report.

For each use case, we also outline the types of data that are a priority using the four data categories described in chapter 2: customer data, financial products and performance data, facility-level data, and energy efficiency project data. The final section of this chapter contains a “strawman” prioritization of data fields for each use case based on data fields currently being collected by stakeholders (or desired to be collected in the future). It should be noted that this strawman analysis is intended to be a high-level, illustrative example of how different users prioritize their information needs. Tables 3-8 through 3-11 are not a comprehensive list of data fields nor are they intended to provide guidance for which data should be collected for energy efficiency financing programs. However, these tables could be useful in developing criteria for what information should be collected going forward.

We have identified six distinct use cases, which follow the lifecycle of the program or loan lifetime (see Figure 3 - 1). Some of the use cases will be primarily led by policymakers and program managers (light green); others will be primarily led by the lender and investor community (dark green).

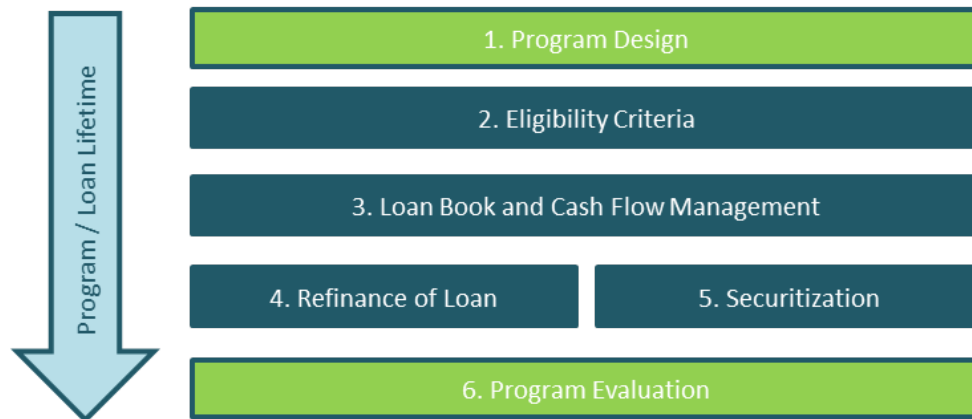


Figure 3 - 1. Use cases for the lifecycle of energy efficiency finance programs

## Navigating the Use Cases

Table 3 - 1 illustrates the role of each of the actors across the use cases. We have classified each as a primary, secondary, or limited actor. Primary actors lead the data needs and activity within a use case. Secondary actors have a significant role to play in the actions of the primary actor or in parallel to those actions. Limited actors have a role to play, but their role is not always critical to the activity.

**Table 3 - 1. The Roles of Actors within Each Use Case**

Actors	
Primary Actor	↑
Secondary Actor	↗
Limited Actor	→

		Use Case					
		1	2	3	4	5	6
		Program Design	Eligibility Criteria	Loan+Cash Management	Loan Refinance	Securitization	Program Evaluation
Actor	Program Administrators	↑	↗	→	→	→	↗
	Policymakers/Evaluator	↗					↑
	Primary Lender	↗	↑	↑	↗	↗ or →*	↗
	Secondary Lender			↗	↑	↗*	
	Rating Agency					↑	
	Bond Investor		→**			↑	

\*A secondary lender will have the main interaction with the rating agency and bond investors when they have purchased a loan portfolio from a primary lender. After a sale, the primary lender may still have a limited role in a securitization as originator of the portfolio.

\*\* The requirements of bond investors could have an impact on eligibility criteria if a secondary market for energy efficiency loans is established.



## Use Case 1: Program Design and Implementation

### Primary Actors

Program Administrators

### Secondary Actors

Policymakers, Primary Lenders

### Use Case Overview

Energy efficiency finance programs are typically implemented to encourage the adoption of energy efficiency measures. The primary actors in designing a program are generally organizations assigned to administer programs, although policymakers may establish the broad parameters and objectives for these programs (in some cases the program administrator and the primary lender may be the same entity). The financial community typically provides input on program design as an interested stakeholder. Collectively, these entities may rely on information from comparable programs, or industries, to inform key program design decisions. Examples of key program design issues include loan terms and conditions, programmatic support and incentives to facilitate customer participation (e.g., interest-rate buy-downs or credit enhancements), and the use of novel financing tools (e.g., PACE and OBR).

### Stakeholder Roles and Data Uses

Table 3 - 2 provides an overview of the objectives (“User Goals”) of various stakeholders (“Actors”) in program design and implementation and the ways in which data can facilitate the actions they must take in this context (“Actions”). The priority data for these actions are then provided across the four data types: customer information, financial product and performance data, facility information, and energy efficiency project data.

A list of suggested data fields and priorities by stakeholder for this use case can be found in tables 3-8 to 3-11, including the roles and objectives (“User Stories”) of the stakeholders (“Actors”) and the specific ways that they will use the data to achieve their objectives (“Actions”).



**Table 3 - 2. The Roles of Actors within Each Use Case**

Actor	User Goal	Actions	Customer Information	Financial Product and Performance Data	Facility Information	Energy Efficiency Project Data
Program Administrators and Policy Makers	<p><b>Program Administrators</b></p> <ul style="list-style-type: none"> <li>Design a cost-effective program that uses program funds to obtain energy savings through energy efficiency installations.</li> <li>Fulfill the program design parameters specified by policy makers.</li> <li>Attract investment from providers of private capital to leverage program funds.</li> </ul> <p><b>Policy Makers</b></p> <ul style="list-style-type: none"> <li>Set the program design parameters.</li> <li>Review, authorize, and set an appropriate budget for a new financing program.</li> </ul>	<p><b>Program Administrators</b></p> <ul style="list-style-type: none"> <li>Analysis of market gaps to enable program design around market needs.</li> <li>Analysis of the design features of peer programs and their effectiveness in encouraging lender and customer participation.</li> <li>Assess the value and impact of novel financing features such as PACE and OBR.</li> <li>Select eligible measures and packages of measures through analysis of EE measure costs and expected savings.</li> <li>Forecast demand and default levels.</li> </ul> <p><b>Policy Makers</b></p> <ul style="list-style-type: none"> <li>Set the target eligibility parameters for the program.</li> <li>Set the level of any program benefits such as rebates or credit enhancements.</li> </ul>	<ul style="list-style-type: none"> <li>Loan application volume, loan approvals/ denials, loan closings.</li> <li>Total customer debt load and “ability to pay” considerations.</li> <li>Program design features such as FICO thresholds, rebate levels, credit enhancements, and other metrics (e.g., interest rate, late payments, loan volume, default levels).</li> <li>Demographic information may be important to some policy makers and lenders.</li> </ul>	<ul style="list-style-type: none"> <li>Loan performance metrics (e.g., delinquencies and default rates).</li> <li>Financial performance data alongside program design features from comparable programs.</li> <li>Loan features, such as interest rates and terms alongside demand statistics from other programs.</li> </ul>	<ul style="list-style-type: none"> <li>Basic building classification.</li> <li>Program administrators are also likely to be interested in any changes in the appraised value of a property that can be attributed to efficiency improvement.</li> </ul>	<ul style="list-style-type: none"> <li>Measures installed, costs of installation, and actual energy savings achieved are all considered high priority.</li> </ul>





Actor	User Goal	Actions	Customer Information	Financial Product and Performance Data	Facility Information	Energy Efficiency Project Data
<b>Lenders and Investors</b>	<b>Primary Lender</b> <ul style="list-style-type: none"> <li>Assist in the development of a program design that the lender is comfortable lending under.</li> <li>Minimize exposure to novel or uncertain risks through the negotiation of credit enhancements.</li> <li>Access to a valuable new customer base.</li> </ul>	<b>Primary Lender</b> <ul style="list-style-type: none"> <li>Analysis to obtain an understanding of the risks of the asset class.</li> <li>Provide analysis that supports their program design recommendations (e.g., the required level of credit enhancement).</li> <li>Development of lending policies that price risk appropriately and make capital available at competitive rates.</li> </ul>	<ul style="list-style-type: none"> <li>Credit scores and other analytical metrics such as debt-to-income, alongside loan performance data.</li> </ul>	<ul style="list-style-type: none"> <li>Delinquency and default information is a high priority.</li> <li>Loan rates and terms from comparable programs are a high priority.</li> <li>A time-series of loan performance is a high priority as loan performance will likely change over time.</li> </ul>	<ul style="list-style-type: none"> <li>Building data is currently considered low priority by most lenders.</li> <li>Some commercial lenders may be interested in the scale of retrofits in different building types (for marketing purposes).</li> </ul>	<ul style="list-style-type: none"> <li>Whether an audit is required and whether estimates of savings are required (i.e., payment neutrality).</li> <li>Measure and savings data is currently a low priority for most residential lenders and of limited value for commercial lenders</li> <li>Total measure cost.</li> </ul>



## Use Case 2: Eligibility Criteria

### Primary Actors

Primary Lenders

### Secondary Actors

Program Administrators

### Limited Actors

Bond Investors

### Use Case Overview

Loan eligibility criteria are used to set the minimum creditworthiness requirements of a customer and to inform the decision whether (and perhaps on what terms) the loan will be provided. The lender will use historical loan performance of comparable financial products to determine terms, credit thresholds, and analytics to use in the underwriting process. It is not common for lenders to consider the cost saving impact of the energy saving measures to be financed in the loan in their credit assessments, with lenders preferring to use traditional underwriting techniques. For residential customers, this will be through the use of analytical methods which have been historically predictive of defaults and delinquency (e.g., FICO score, debt-to-income ratios) and the loan to value ratio of the mortgage for loans secured against a property. For commercial customers, the lender may perform a more general balance sheet assessment, consider the company credit rating, and perform cash flow analysis of the project.

The primary interaction is between the lender and the customer in this process. However, the lender may interact with credit bureaus and appraisal databases after receiving customer approval. There may be a role for program administrators in influencing the eligibility criteria. Program administrators often offer programmatic benefits such as credit enhancements or interest rate buy-downs in an attempt increase demand for energy efficiency measures by lowering interest rates or offering more relaxed funding terms (e.g., long term funding). Credit enhancements can also be used to lower credit thresholds or to support the piloting of alternative eligibility metrics (e.g., considering utility bill payment history). The program administrator may also have a role in determining customer and project eligibility (e.g., assessing whether a project qualifies for programmatic benefits).

Finally, if there is sufficient loan volume and significant interest from secondary market investors in the loans, industry norm for eligibility criteria could develop. Lenders would likely adhere to any industry standard to ensure that they are not stuck holding an investment that is not salable to investors.

### Stakeholder Roles and Data Uses

Table 3 - 3 provides an overview of the objectives (“User Goals”) of various stakeholders (“Actors”) in underwriting and the ways in which data can facilitate the actions they must take in this context (“Actions”). The priority data for these actions are then provided across the four data types: customer information, financial product and performance data, facility information, and energy efficiency project data.

A list of suggested data fields and priorities by stakeholder for this use case can be found in tables 3-8 to 3-11.



**Table 3 - 3. Eligibility Criteria: User Goals, Actions, and Priority Data Needs**

Actor	User Goal	Actions	Customer Information	Financial Product and Performance Data	Facility Information	Energy Efficiency Project Data
<b>Program Administrators and Policy Makers</b>	<p><b>Program Administrators</b></p> <ul style="list-style-type: none"> <li>• Develop a program that expands access to capital and facilitates the most additional energy efficiency improvements. This can include targeting underserved communities.</li> <li>• Ensure that program benefits such as credit enhancements and rebates are used against qualifying efficiency measures.</li> <li>• Maximize the impact of programmatic credit enhancements through increased leverage, and decreased risk program administrator risk.</li> </ul>	<p><b>Program Administrators</b></p> <ul style="list-style-type: none"> <li>• Negotiate with lenders for more flexible underwriting criteria and minimize the amount of credit enhancement needed.</li> <li>• Adjust the lender underwriting criteria through offering various forms of credit enhancement.</li> <li>• Draw the line between extending access to credit and protecting customers who may be at risk of default.</li> <li>• Review loan data to confirm project eligibility</li> <li>• Analysis of alternative underwriting criteria.</li> </ul>	<ul style="list-style-type: none"> <li>• Credit scores and other traditional underwriting metrics are a high priority.</li> <li>• Data on alternative underwriting criteria may also be high priority.</li> <li>• Demographic information from peer programs may be valuable.</li> </ul>	<ul style="list-style-type: none"> <li>• Delinquency and default rate data is a high priority.</li> </ul>	<ul style="list-style-type: none"> <li>• This is not a high priority at present for program administrators, because it may not currently impact their ability to influence eligibility criteria.</li> </ul>	<ul style="list-style-type: none"> <li>• This data is a high priority for program administrators who have an interest in demonstrating whether energy savings correlate strongly with loan performance.</li> </ul>



Actor	User Goal	Actions	Customer Information	Financial Product and Performance Data	Facility Information	Energy Efficiency Project Data
<b>Primary Lenders</b>	<b>Primary Lender</b> <ul style="list-style-type: none"> <li>• Develop eligibility criteria that accurately assesses credit risk level.</li> <li>• Build a loan portfolio with very few occurrences of delinquency and default.</li> <li>• Minimize the administrative burden and cost of credit assessments.</li> </ul>	<b>Primary Lender</b> <ul style="list-style-type: none"> <li>• Set eligibility criteria, including terms and conditions, analytical techniques used to make the credit decisions, and the credit thresholds using those techniques.</li> <li>• Assess a customer’s creditworthiness and determine whether a loan should be made.</li> <li>• Determine what terms and conditions should be offered to the customer to mitigate the risk of delinquency and default.</li> <li>• Determine eligibility of the project for any additional programmatic benefits.</li> <li>• For PACE programs, consideration of the use of property value and loan-to-value ratios.</li> <li>• For OBR programs consideration of the use of historical bill payment data.</li> </ul>	<ul style="list-style-type: none"> <li>• Priority data fields are those metrics that have been historically predictive of delinquency and default (e.g., credit scores, debt-to-income ratios).</li> <li>• For OBR programs: historical electricity bill payment history may be useful.</li> <li>• For PACE programs: tax records, property valuation, and loan to value information is important.</li> </ul>	<ul style="list-style-type: none"> <li>• Delinquency and default rates from other programs are a high priority.</li> <li>• Loan product data (e.g., interest rates and terms) are a high priority.</li> <li>• Financial data alongside loan collection method may be valuable for some programs (e.g., OBR and PACE programs).</li> </ul>	<ul style="list-style-type: none"> <li>• Building data is not frequently prioritized by lenders in the underwriting process.</li> <li>• For PACE programs: property values are a high priority.</li> </ul>	<ul style="list-style-type: none"> <li>• Most lenders today do not use projected energy savings to underwrite loans and are unlikely to prioritize this data.</li> </ul>



## Use Case 3: Loan and Cash Flow Management

### Primary Actors

Primary Lenders

### Secondary Actors

Secondary Lenders

### Limited Actors

Program Administrators

### Use Case Overview

Lenders collect data on loans and their repayments in order to account for loan receivables, populate loan management systems, and implement collection processes.<sup>12</sup> Loan management data may also be used in external reporting processes such as communications between loan servicers and note holders or reporting to regulatory bodies. In some cases, pre-established processes for loan data management may limit the ways in which this data can be standardized across programs. Similarly, adding programmatically useful data fields to existing loan management systems may pose a challenge in some cases.

Lenders will also need to use the data collected to manage the cash flow of the loan pool. Loan pools are often funded using multiple external funding sources including credit enhancements and interest rate buy downs. Data and analysis is needed to support the drawdown from each of these funding sources. Finally, loan portfolio data will be used to support any required hedging activities as part of cash flow management

There may also be some limited ongoing activities performed by program administrators to assess whether the program is operating effectively.

### Stakeholder Roles and Data Uses

Table 3 - 4 provides an overview of the objectives (“User Goals”) of various stakeholders (“Actors”) in loans and cash flow management and the ways in which data can facilitate the actions they must take in this context (“Actions”). The priority data for these actions are then provided across the four data types: customer information, financial product and performance data, facility information, and energy efficiency project data.

A list of suggested data fields and priorities by stakeholder for this use case can be found in tables 3-8 to 3-11.

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<sup>12</sup> In some cases a program administrator may take on the role of lender. In these cases the activities listed below under primary lender will be relevant to the program administrator.



**Table 3 - 4. Loans and Cash Management: User Objectives, Actions, and Priority Data Needs**

Actor	User Goal	Actions	Customer Information	Financial Product and Performance Data	Facility Information	Energy Efficiency Project Data
<b>Lenders and Investors</b>	<p><b>Primary Lender</b></p> <ul style="list-style-type: none"> <li>• Service the loan including ensuring that loan receivables materialize and that collection processes are activated for overdue debt (this could be performed by a third party).</li> <li>• Manage the cash flow of a loan portfolio so that payments to capital providers can be made.</li> </ul> <p><b>Secondary Lender/ Investor</b></p> <ul style="list-style-type: none"> <li>• Determine whether to invest capital in a particular asset class and, in the context of ongoing loan management, keep their money invested or sell off assets.</li> </ul>	<p><b>Primary Lender</b></p> <ul style="list-style-type: none"> <li>• Monitoring of delinquency and default to activate billing and collection processes.</li> <li>• Day-to-day and year-end accounting activities.</li> <li>• Analysis of the reason for any partial or non-payments.</li> <li>• Monitoring of delinquencies and defaults to consider the appropriateness of lending criteria.</li> <li>• Collection of funds from various funding sources.</li> <li>• Data can be used to model the exposure of a loan portfolio to risks that may be hedged (e.g., unduly exposed to risks such as fluctuations in funding costs).</li> <li>• Populate reports to management, secondary market investors and regulators.</li> </ul>	<ul style="list-style-type: none"> <li>• As long as payments continue on a regular basis, additional customer information may not be needed.</li> <li>• Lenders may use customer information to identify assets at risk of delinquency and default. Data could include updated FICO scores, or utility bill payment history.</li> <li>• If loans become delinquent, then a review of data (e.g., current income and debt obligations) may be warranted.</li> </ul>	<ul style="list-style-type: none"> <li>• In general, this type of data is very high priority for lenders to collect on an ongoing basis.</li> <li>• Key data fields include late payments and charge-offs.</li> <li>• Additional detail may also be important (e.g., reasons for missed payments and tardiness in payment).</li> </ul>	<ul style="list-style-type: none"> <li>• Low priority for lenders to track on an ongoing basis.</li> <li>• Exceptions might include any changes in ownership structures, metering arrangements, vacancies, changes in tenancy or major structural changes.</li> </ul>	<ul style="list-style-type: none"> <li>• For most lenders, active monitoring of energy savings is not currently a part of energy efficiency loan management.</li> <li>• Lenders may be interested in additional energy improvements made after loan closing.</li> </ul>



		<ul style="list-style-type: none"><li>• Some lenders may also have a need to report on non-financial information.</li></ul> <p><b>Secondary Lender/Investor</b></p> <ul style="list-style-type: none"><li>• Assess whether all criteria has been met before any funding is released.</li><li>• Day-to-day and year-end accounting activities.</li><li>• Ensure lender is meeting lending criteria and maintaining administrative obligations.</li><li>• Determine whether to hold, sell, or invest in assets more substantially.</li></ul>				
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## Use Case 4: Loan Refinancing

### Primary Actors

Primary Lenders, Secondary Lenders

### Limited Actors

Program Administrators

### Use Case Overview

Lenders may seek to sell a loan or portfolio of loans to a secondary investor. There are two primary ways in which this could occur. First, the lender can seek to sell the portfolio once it has reached sufficient scale and there is a need to replenish capital for further lending. Second, a secondary lender may enter into a loan purchase agreement with the primary lender prior to the loans being originated. In this case, the secondary lender purchases the loans in batches once they are originated and predetermined criteria have been met. The secondary lender may purchase the full loan or agree to contribute funding to a pool of funding that is drawn as loans are originated.

Typically, the secondary lender will perform analysis on the loan portfolio performance to support their investment decision, check that the primary lender has maintained underwriting and administrative standards.

Data analysis will be used by both parties to support negotiations of the terms of a transaction. A strong and demonstrable performance history will maximize the purchase price for the primary lender. With limited data history or mixed performance, the primary lender may have to accept a lower purchase price, or offer additional credit enhancements (e.g., a retention amount to secure the transaction).

The program administrator may have a limited role in allowing for the transfer of the benefit of credit enhancements to another institution.

### Stakeholder Roles and Data Uses

Table 3 - 5 provides an overview of the objectives (“User Goals”) of various stakeholders (“Actors”) in loan refinancing and the ways in which data can facilitate the actions they must take in this context (“Actions”). The priority data for these actions are then provided across the four data types: customer information, financial product and performance data, facility information, and energy efficiency project data.

A list of suggested data fields and priorities by stakeholder for this use case can be found in tables 3-8 to 3-11.





**Table 3 - 5. Loan Refinancing: User Goals, Actions, and Priority Data Needs**

Actor	User Goal	Actions	Customer Information	Financial Product and Performance Data	Facility Information	Energy Efficiency Project Data
<b>Lenders and Investors</b>	<p><b>Primary Lender</b></p> <ul style="list-style-type: none"> <li>Objectives for loan refinancing include replenishing funds available to originate new loans, selling to a lender better suited for managing long term risks, or simply as an opportunity to profit.</li> </ul> <p><b>Secondary Lenders</b></p> <ul style="list-style-type: none"> <li>Secondary lenders primarily invest in loans for profit.</li> <li>Secondary lenders may also be seeking to consolidate pools of loans across programs with the goal of an eventual securitization</li> <li>Certain classes of investors may have additional motives for purchasing energy efficiency loans such as social or environmental missions.</li> </ul>	<p><b>Primary Lender</b></p> <ul style="list-style-type: none"> <li>Attract secondary lenders to participate in the funding of loans.</li> <li>Negotiation of the terms of the transaction.</li> <li>Reporting and responding to audit requests from the secondary lender.</li> <li>Demonstrating that pre-agreed criteria for sale to the secondary lender have been met.</li> </ul> <p><b>Secondary Lender</b></p> <ul style="list-style-type: none"> <li>Analyze and audit program data before they agree to a purchase of loans.</li> <li>Analysis to support negotiations of the sale price, credit enhancements, and excluding high risk loans from the purchased portfolio</li> <li>Check that assets transferred meet contractual criteria (e.g., the application of underwriting criteria).</li> </ul>	<ul style="list-style-type: none"> <li>Typical analysis will include segmenting the portfolio by FICO score to see the distribution of the portfolio, and identify risks.</li> <li>Secondary lenders may take note of other items such as the geographic spread of the portfolio where they may perceive a risk of concentration in certain areas.</li> <li>Mission-based secondary lenders may want to consider items such as demographics of the portfolio.</li> </ul>	<ul style="list-style-type: none"> <li>Analysis of time-series performance data is likely to be the primary analysis performed on the loan portfolio before a purchase decision is made. Key data fields include late payments and charge-offs.</li> </ul>	<ul style="list-style-type: none"> <li>Building facility data would be of low priority for this type of transaction (beyond informing the buyer on what type of properties are included in the portfolio).</li> </ul>	<ul style="list-style-type: none"> <li>For most transactions, this would not be a high priority.</li> <li>One exception could include circumstances when a purchasing organization is seeking some form of mission-based environmental benefit (e.g., greenhouse gas savings).</li> </ul>



## Use Case 5: Securitization

### Primary Actors

Bond Investors, Rating Agencies

### Secondary Actors

Primary Lenders, Secondary Lenders

### Limited Actors

Program Administrators

## Use Case Overview

Securitization and the issuance of rated debt linked to the revenue from a loan portfolio offer an opportunity for lenders to refinance a loan portfolio. There may be many motivations for refinancing. However, obtaining funds for new origination and profiting from the refinancing transaction are traditional motivations for this type of transaction. In some cases, loans will need to be consolidated from several programs in order to reach the scale necessary to justify the high transaction costs associated with a rated debt issuance. The issuing organization could be either a primary or secondary lender.

The bond rating process is very thorough with rating agencies seeking a long history of data demonstrating performance. Rating agencies will seek a high level of assurance over the quality of data and this may include demonstrating that it is auditable (though this may come in the form of professional opinion). The rating agency will retain a responsibility to maintain the date rating on the bond throughout its life. These actors may seek additional data for further analysis in the future.

Investors in rated debt products are seeking high assurance on the level of risk and are drawn to investments rated by rating agencies. The high level of assurance from the rating agency allows them to minimize due diligence costs.

There may be a limited role for a program administrator in agreeing to transfer the benefits of credit enhancements. In some cases, the program administrator may offer additional benefits to secure the transaction as a way of demonstrating a business model.

## Stakeholder Roles and Data Uses

Table 3 - 6 provides an overview of the objectives (“User Goals”) of various stakeholders (“Actors”) in loans refinancing and the ways in which data can facilitate the actions they must take in this context (“Actions”). The priority data for these actions are then provided across the four data types: customer information, financial product and performance data, facility information, and energy efficiency project data.

A list of suggested data fields and priorities by stakeholder for this use case can be found in tables 3-8 to 3-11.



**Table 3 - 6. Securitization: User Goals, Actions, and Priority Data Needs**

Actor	User Goal	Actions	Customer Information	Financial Product and Performance Data	Facility Information	Energy Efficiency Project Data
<b>Lenders and Investors</b>	<p><b>Primary/Secondary Lender</b></p> <ul style="list-style-type: none"> <li>Replenish capital to develop a new portfolio for securitization.</li> <li>Obtain the best credit rating for the securitization as this will increase the value of the portfolio.</li> </ul> <p><b>Credit Rating Agency</b></p> <ul style="list-style-type: none"> <li>The credit rating agencies role is to consider the risks of the proposed securities and provide a rating that reflects that risk.</li> </ul> <p><b>Bond Investors</b></p> <ul style="list-style-type: none"> <li>Bond investors are primarily looking for low risk debt products that will provide a long term predictable income. They will use the rating agency assessment to minimize the need for their own assessment of risk.</li> </ul>	<p><b>Primary/Secondary Lender</b></p> <ul style="list-style-type: none"> <li>Develop an investment prospectus for the raters to use in their analysis and investors to review for their investment decision.</li> <li>Structure the sale of the loan portfolio into tranches to maximize the proceeds from the transaction.</li> </ul> <p><b>Credit Rating Agency</b></p> <ul style="list-style-type: none"> <li>Use available data and comparative data to develop an expected loss curve. They will develop expectation of how loans will behave through economic cycles.</li> <li>Assess the strength of credit enhancements associated with the loan portfolio.</li> </ul> <p><b>Bond Investors</b></p> <ul style="list-style-type: none"> <li>Review the credit report and seller's investment memorandum in assessing investment risks of the loan portfolio.</li> </ul>	<ul style="list-style-type: none"> <li>Analysts will want to segment the portfolio by FICO score to see the distribution of the portfolio and identify risk.</li> <li>Analysts may take note of other items (e.g., the geographic spread of the portfolio) if they perceive a risk of concentration in certain areas.</li> </ul>	<ul style="list-style-type: none"> <li>Key data fields include late payments and charge-offs.</li> <li>Raters will want to see a time series of the performance of the loans to allow them to develop a loss curve.</li> <li>Analysts will want to see how debt that is delinquent ages over time.</li> </ul>	<ul style="list-style-type: none"> <li>Building facility data would be a low priority for this type of transaction.</li> </ul>	<ul style="list-style-type: none"> <li>For most transactions, this is not likely to be a high priority.</li> <li>Raters may consider this type of data for elimination of certain types of risks (e.g., demonstrating that established technologies were installed).</li> </ul>



## Use Case 6: Program Evaluation

### Primary Actors

Policymakers, Program Administrators

### Secondary Actors

Primary Lenders

### Use Case Overview

Policymakers, program administrators, and participating lenders each have an interest in evaluating the level of success of energy efficiency financing programs. Defining and estimating impacts can be complex. Lenders typically define success in financial terms. Some policymakers and program administrators may define success in terms of increasing the amount of private investment in energy efficiency, expanding access to capital for customers, or acquiring cost-effective energy savings. Attributing incremental savings to the presence of financing or to any particular feature of a financial offering can be very challenging. Thus, few formal impact evaluations of energy efficiency financing programs have been conducted to date.

A database of loan information could potentially provide useful inputs into the evaluation process. It would be helpful to have total project costs, loan amounts, and other program expenditures (e.g., rebates) along with projected energy savings. These metrics would provide an initial basis for assessing program impacts but would not necessarily allow for attribution of savings specifically to program financing. For example, in programs using revolving loan funds backed by loss reserves, reserves paid out over time to cover charge-offs are one of the primary program costs and would likely be included in an assessment of program cost-effectiveness. Similarly, tracking savings and participation rates along with changes in interest rates or other loan features could help reveal the impact of these adjustments.

To the extent that evaluations are designed to assess a program's success in attracting private capital, evaluations may focus on sources and costs of capital and relative amounts of private versus public or ratepayer capital invested. Finally, if the objective were to determine whether the program had expanded access to credit, it would be important to analyze loans funded alongside characteristics used to define the underserved population (e.g., credit scores, income levels, customer demographics).

### Stakeholder Roles and Data Uses

Table 3 - 7 provides an overview of the objectives ("User Goals") of various stakeholders ("Actors") in program evaluation and the ways in which data can facilitate the actions they must take in this context ("Actions"). The priority data for these actions are then provided across the four data types: customer information, financial product and performance data, facility information, and energy efficiency project data.

A list of suggested data fields and priorities by stakeholder for this use case can be found in tables 3-8 to 3-11.



**Table 3 - 7. Program Evaluation: User Goals, Actions, and Priority Data Needs**

Actor	User Goal	Actions	Customer Information	Financial Product and Performance Data	Facility Information	Energy Efficiency Project Data
<b>Program Administrators and Policymakers</b>	<p><b>Program Evaluator</b></p> <ul style="list-style-type: none"> <li>Assess how financing has helped achieve the goal of cost-effective energy savings.</li> <li>Assess whether financing programs have increased the amount of private investment in energy efficiency.</li> <li>Assess the extent to which financing programs have extended access to credit for those who wish to make energy improvements but are unable to secure the necessary financing elsewhere.</li> <li>Assess whether the program has led to deeper energy efficiency retrofits.</li> </ul>	<p><b>Program Evaluator</b></p> <ul style="list-style-type: none"> <li>Estimate total program costs.</li> <li>Tracking energy savings and changes in loan features over time could help inform an evaluation of the impact of these changes (other concurrent program changes could complicate this effort).</li> <li>Analysis of the sources of capital for the program.</li> <li>Analysis of the types of customers that the program is reaching.</li> <li>Evaluating the risks of extending credit to customers who might not be able to qualify for other loans.</li> </ul>	<ul style="list-style-type: none"> <li>High-priority data fields may include credit scores, income levels, customer demographics, and geographic data (e.g., census tract information).</li> </ul>	<ul style="list-style-type: none"> <li>Data on charge-off amounts and any related program payouts is a high priority for program designs that make use of loss reserves.</li> <li>Data on the amount of private capital invested.</li> <li>Cross-referencing delinquency and default rates with eligibility criteria is important.</li> </ul>	<ul style="list-style-type: none"> <li>Building facility data is important to the extent that it helps to evaluate energy savings achieved through financing programs.</li> </ul>	<ul style="list-style-type: none"> <li>Savings and cost data are inputs to assessing program impacts and cost-effectiveness although gross savings data may not be sufficient to determine the level of savings attributable to a particular financing program.</li> </ul>



Actor	User Goal	Actions	Customer Information	Financial Product and Performance Data	Facility Information	Energy Efficiency Project Data
Lenders and Investors	<p><b>Primary Lenders</b></p> <ul style="list-style-type: none"> <li>Lenders are interested in evaluating programs primarily in financial terms (e.g., comparing the potential risks and returns of energy efficiency investments to other asset classes).</li> <li>Evaluate the attractiveness of energy efficiency investments.</li> <li>Assess opportunities to reach under-served market segments or attract new customers.</li> <li>Assess the need for credit enhancements for future lending.</li> </ul>	<p><b>Primary Lenders</b></p> <ul style="list-style-type: none"> <li>Analysis of the performance of the loans portfolio against other types of lending to determine whether the loans do perform differently.</li> <li>Analysis of the customers in the portfolio of loans to observe whether energy efficiency lending gives access to desirable customer groups.</li> </ul>	<ul style="list-style-type: none"> <li>Priority data fields may include credit scores, income levels, and total outstanding debt.</li> </ul>	<ul style="list-style-type: none"> <li>Data on delinquencies and default rates are high priority to lenders, as they should help lenders price future loans.</li> <li>Information on interest rates, terms, and prepayments are a high priority to help lenders.</li> </ul>	<ul style="list-style-type: none"> <li>There may be interested in data on building types to understand how loans perform in various market segments.</li> </ul>	<ul style="list-style-type: none"> <li>Energy savings data is typically not a priority for lenders in evaluating investment performance or opportunities. More lenders may begin to be interested in this data if a correlation can be shown between project and loan performance.</li> </ul>



## Use Case Data Summary

For each use case, we discussed the goals of the actors, the action(s) they may take using the data, and identified data that is important in the four data categories: (1) customer information (2) financial product and performance data (3) facility information data and (4) energy efficiency project data.

In this section, we discuss the relative priority of data fields as reported by stakeholders. This analysis was performed through our assessment of the data needs for each of the actions within the use case. This strawman analysis is intended to be a high-level, illustrative example of how different users prioritize their information needs. Tables 3-8 to 3-11 do not represent a comprehensive list of data fields nor are they intended to provide guidance for which data should be collected for energy efficiency financing programs. In many cases, programs will collect fewer data fields than are represented below (and, in some cases, more information will be collected). For each data item, we consider the relative importance of the information for each use case using the key below. In Table 3-8, we also use symbols to identify the types of finance programs (e.g., secured lending, PACE or On-Bill programs) for which the data field is applicable. Most data items could be useful for any type of financing program.



## Customer Data

Table 3 - 8. Customer-Related Data Collection Priorities for each Use Case

Data Field Importance	
High	●
Medium	◐
Low	○

Applicable Programs	
All programs	■
Programs secured against the property	S
PACE programs	P
OBR programs	OB

Data field	Applicable Programs	Design & Implementation	Eligibility Criteria	Loans Management	Refinancing	Securitization	Program Evaluation
Borrower First Name	■	○	●	●	●	◐	○
Borrower Middle Initial	■	○	◐	◐	◐	○	○
Borrower Last Name	■	○	●	●	●	◐	○
Borrower SSN	■	○	◐	●	◐	○	○
Borrower DOB	■	○	◐	◐	◐	○	○
Borrower Contact Telephone Number	■	○	◐	◐	○	○	○
Original FICO Score	■	●	●	●	●	●	●
Credit Repository	■	○	◐	●	◐	●	◐
Latest FICO Score	■	◐	◐	●	●	●	●
Borrowers Total Monthly Income	■	◐	●	◐	◐	●	●
Borrowers Monthly Debt Obligation	■	◐	●	◐	◐	●	●





Data field	Applicable Programs	Design & Implementation	Eligibility Criteria	Loans Management	Refinancing	Securitization	Program Evaluation
Borrower's Annual Income	■	●	◐	●	◐	●	●
Employer Name	■	○	◐	○	○	○	○
Employer Address	■	○	○	○	○	○	○
Employer Phone	■	○	○	○	○	○	○
Length of Employment	■	○	◐	○	○	○	○
Street Address	■	○	●	●	●	◐	◐
Zip	■	●	●	●	●	●	●
State	■	●	●	●	●	●	●
City	■	●	●	●	●	●	●
County	■	○	○	○	○	○	○
Electricity Service Provider Name	OB	●	◐	◐	○	○	●
Electricity Account Number	OB	○	◐	◐	○	○	◐
Electricity Bill Status (i.e. Arrears, current)	OB	◐	◐	◐	◐	◐	◐
Gas Provider Name	OB	●	◐	◐	○	○	●
Gas Account Number	OB	○	◐	◐	○	○	◐
Gas Bill Status (i.e. Arrears, Current etc.)	OB	◐	◐	◐	◐	◐	◐
Other Fuel Supplier Name	OB	●	◐	◐	○	○	●



Data field	Applicable Programs	Design & Implementation	Eligibility Criteria	Loans Management	Refinancing	Securitization	Program Evaluation
Other Fuel Supplier Account Number	OB	○	◐	◐	○	○	◐
Other Fuel Supply Status	OB	◐	◐	◐	◐	◐	◐
Utility Bill payments current	OB	◐	●	●	●	●	◐
Utility bill arrears in the previous 12 months	OB	◐	●	◐	●	●	◐
Property Tax Collecting City	P	○	●	●	●	●	○
City Tax Bill Status (e.g., current, arrears)	P	◐	●	●	●	●	◐
Annual Tax payments	P	◐	◐	◐	◐	◐	◐

### Financial Product and Performance Information

Table 3 - 9. Financial Product and Performance Information Data Collection Priorities for Use Cases

Data field	Applicable Programs	Design & Implementation	Eligibility Criteria	Loans Management	Refinancing	Securitization	Program Evaluation
Loan ID	■	◐	●	●	●	●	◐
Primary Lender Name	■	◐	◐	●	●	●	◐
Requested Loan Principal	■	○	◐	○	○	○	◐
Loan Request Date	■	○	○	○	○	○	◐
Original Loan Principal	■	●	◐	●	●	◐	●
Loan Approval Date	■	○	●	○	○	○	◐
Loan Funded Date	■	●	●	●	●	●	●



Data field	Applicable Programs	Design & Implementation	Eligibility Criteria	Loans Management	Refinancing	Securitization	Program Evaluation
Origination Fees	■	◐	◐	◐	○	○	●
Loan Product	■	◐	●	●	●	●	●
Current Loan Principal Balance	■	●	○	●	●	●	●
Loan Interest Rate	■	●	●	●	●	●	●
Original Loan Term	■	●	●	●	◐	●	●
Current Remaining Term	■	●	○	●	●	●	●
Loan Status (i.e. delinquent/charge off/Days past due)	■	●	○	●	●	●	●
(For Delinquent loans)Days Past Due	■	●	○	●	●	●	●
Reason For Delinquency	■	●	○	●	●	●	●
Amount Overdue	■	◐	○	●	●	●	●
Next Principal Due Date and Amount	■	●	○	●	●	●	○
Next Interest Due Date and Amount	■	●	○	●	●	●	○
Late Fees Due	■	◐	○	●	●	◐	◐
Scheduled Maturity Date	■	●	○	●	●	●	●
Last Payment Amount	■	●	○	◐	●	◐	○
Number of Payments Made	■	●	○	◐	●	●	●
Total Principal Paid to Date	■	●	○	◐	●	●	●



Data field	Applicable Programs	Design & Implementation	Eligibility Criteria	Loans Management	Refinancing	Securitization	Program Evaluation
Total Interest Paid to Date	■	●	○	◐	●	●	●
Late Fees Paid to Date	■	◐	○	◐	●	◐	◐
Charge Off Amount	■	●	○	●	●	●	●
Charge Off Reason	■	●	○	●	●	◐	●
Charge Off Date	■	◐	○	●	●	●	◐
Charge Off Recovered	■	●	○	●	●	●	●
Charge off Recovery Date	■	◐	○	●	●	◐	○
Collection Fees Paid	■	●	○	●	◐	◐	●
Origination Channel	■	●	○	◐	○	◐	●
Early Repayment Amount	■	●	○	●	●	●	●
Early Repayment Fees	■	●	○	●	●	●	●
Security Taken	S,P	○	●	◐	●	●	◐
Secured Asset Current Valuation	S,P	○	●	◐	●	●	◐
Other debt encumbered against the asset (i.e. mortgage)	S,P	○	●	◐	●	●	◐
Current Loan to value on secured asset	S,P	○	●	◐	●	●	◐



## Facility-Level Information

**Table 3 - 10. Facility-Level Information-Related Data Collection Priorities for Each Use Case**

Data field	Applicable Programs	Design & Implementation	Underwriting	Loans Management	Refinancing	Securitization	Program Evaluation
Year Constructed	■	◐	○	○	○	○	●
Floor Space (ft <sup>2</sup> )	■	◐	○	○	○	○	●
Building Type	■	●	◐	◐	◐	◐	●
Number of Occupants	■	◐	○	○	○	○	●
Heating Source	■	◐	○	○	○	○	●
Cooling Source	■	◐	○	○	○	○	●
Exterior Wall Material	■	◐	○	○	○	○	●
Exterior Wall Window %	■	◐	○	○	○	○	◐

## Measure and Energy Use Information

**Table 3 - 11. Measure and Energy Use-Related Data Collection Priorities for each Use Case**

Data field	Applicable Programs	Design & Implementation	Eligibility Criteria	Loans Management	Refinancing	Securitization	Program Evaluation
Measures Installed (Multiple Fields)	■	●	●	◐	◐	◐	●
Measures Removed (Multiple Fields)	■	●	●	○	○	◐	●
Total Invoiced Cost	■	●	●	●	◐	◐	●
Rebates used	■	●	◐	○	○	○	●



Data field	Applicable Programs	Design & Implementation	Eligibility Criteria	Loans Management	Refinancing	Securitization	Program Evaluation
Contractor Name	■	◐	◐	◐	◐	○	◐
Contractor Certification	■	●	●	◐	◐	◐	●
Project Start Date	■	○	◐	○	○	○	●
Project Completion Date	■	○	◐	◐	○	◐	●
Audit Organization	■	◐	◐	◐	○	○	◐
Audit Date Pre	■	◐	◐	●	○	○	◐
Audit Date Post	■	◐	◐	●	○	○	◐
Energy Savings Estimate in Energy Units	■	●	○	○	○	◐	●
Energy Savings Estimate in Dollars	■	●	◐	○	◐	◐	●
Building Primary Fuel Heating	■	●	○	○	○	◐	●
Building Primary Fuel Cooling	■	●	○	○	○	◐	●
Quarterly Electricity Use <b>Pre</b> Installation (Four Data Points)	■	◐	○	○	○	○	●
Total Annual Electricity Use <b>Pre</b> Installation	■	●	○	○	○	○	●
Quarterly Gas Use <b>Pre</b> Installation	■	◐	○	○	○	○	●
Total Annual Gas Use <b>Pre</b> Installation	■	●	○	○	○	○	●



Data field	Applicable Programs	Design & Implementation	Eligibility Criteria	Loans Management	Refinancing	Securitization	Program Evaluation
Quarterly Electricity Use <b>Post</b> Installation	■	◐	○	○	○	○	●
Total Annual Electricity Use <b>Post</b> Installation	■	●	○	○	○	○	●
Quarterly Gas Use <b>Post</b> Installation	■	◐	○	○	○	○	●
Total Annual Gas Use <b>Post</b> Installation	■	●	○	○	○	○	●



## Chapter 4: Issues and Challenges in the Collection and Reporting of Financing Program Information

This chapter discusses issues and challenges with EE finance program data collection and reporting that were identified by stakeholders, which are grouped into four broad categories: (1) concerns about data security and privacy, (2) lack of data comparability, (3) inconsistent data needs and data quality needs across stakeholders, and (4) issues around the perceived value of data to justify alternative lending criteria and need for credit enhancements.

### Concerns about Customer Permission, Data Security and Privacy

Handling of personally identifiable information (PII) represents a risk for organizations. PII is information that can be used to identify an individual program participant. A breach in the security of the information may cause harm to the individual customer and to the program administrators (or lenders) in the form of loss of trust, legal liability, and remediation costs. Accordingly, administrators need to carefully consider how they will collect, manage, and mask PII at the outset of program design and implementation.<sup>13</sup>

Program administrators (and policymakers) may have had less exposure to the risks of handling personal financial data compared to a financial institution. The protection of PII is an area where participating lenders may be able to share useful insights and best practices with policymakers and program administrators.

Unfortunately, complications can occur for lenders when they have multiple financing sources. For example, PII may need to be passed along to another organization to enable the administration of funds. Therefore, it is also important to understand how the counterparty will use and dispose of PII. Some lenders recommend avoiding the use of email and insecure spreadsheets for the transfer of data and suggested more secure methods to ensure the proper protection of personal data. Other lender stakeholders noted that they may need to collect additional non-financial data that is particularly sensitive to customers (e.g., gender, ethnicity) in connection with loans in order to meet additional requirements put on them by capital providers.

### Lack of Data Comparability Makes Aggregation and Analysis Difficult

Variation in program design and eligibility criteria and inconsistent data definitions and data collection practices make it difficult to aggregate data and conduct comparative analysis of energy efficiency financing programs. An analysis of data collected across four efficiency financing programs performed by EDF, The University of Chicago, and CEFC showed that only seven of 95 unique data fields were collected consistently.

#### Program administrators and policymakers

Varying definitions of delinquencies and defaults among program administrators are an example of inconsistent data definitions. For example, a loan that has been outstanding for 120 days may still be considered delinquent by one lender while it might have been charged off by another lender. The development of common data definitions for different program elements could facilitate comparative analysis of how financing structures (e.g., loss reserves, guarantees, subordinate capital) or program design features may influence program outcomes.


#### Lenders and investors

More consistent data collection and reporting across market segments (or programs) may help lenders and investors (and others) better understand factors that may affect loan performance (e.g., eligibility factors, measures installed, or program features). It may also help remove barriers to pooling portfolios of loans to be sold

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<sup>13</sup> For more information about the issues and challenges of accessing personally identifiable information from energy efficiency programs, please see the SEE Action report, “A Regulator’s Privacy Guide to Third-Party Data Access for Energy Efficiency.” ([LINK](#))





to secondary investors and provide lenders with a better picture of the range of risks associated with long-term investments in energy efficiency.

Secondary lenders and investors that are considering purchasing loans indicated that finance program data must have sufficient breadth and quality in order to perform reliable analyses.<sup>14</sup> The prospective secondary market investor considers different ways that risks could materialize. A comprehensive analysis of a pool of loans across different market segments (or programs) would help lenders evaluate a wide range of risks under different conditions. For example, a prospective investor may consider the geographic distribution of the loans; concentration of loans in one geographic area may increase (or decrease) the impact of certain risks.

While stakeholders reported that common data definitions would be valuable to facilitate loan portfolio aggregation for sale, they indicated that a centralized and comprehensive database of EE financing-related information may be of limited value in the purchase and sale of loan portfolios. For example, when a loan portfolio is sold, purchasers (or rating agencies) may be unable to fully rely on comparative analysis from a centralized database without representations of data accuracy. However, program administrators and lenders are unlikely to provide representations for a transaction that they are not an active party if participating could lead to a liability if the data proves inaccurate. Furthermore, variation in the design features among programs may make it difficult for lenders to rely on the results from data from other programs to inform decisions about their own loan products (e.g., the wide variation in credit enhancement structures may make it challenging to categorize this information).

### **Inconsistent Data Needs and Data Quality Needs across Stakeholders**

Data quality needs vary across stakeholders. Collecting consistent data or consolidating data may present a challenge where the relevance of the data fields varies between stakeholders. Meeting stakeholder needs for high quality (validated/auditable) data may present a practical challenge. Stakeholders reported three areas where the quality of data is particularly salient or has been challenging historically: (1) loan pool transactions for lenders and investors; (2) limited information on installed energy efficiency equipment; and (3) information for program evaluators.

#### **Loan pool transactions**

The purchasers of loan pools need to have full access to audit-quality information. Some stakeholders indicated that data records often did not meet the standards of these investors. Improved data collection and record-keeping would allow for a determination if underwriting standards were enforced and whether documentation was correctly completed. Furthermore, at some point during the lifetime of an investment, lenders may be asked to provide representations on the accuracy of their data. Several stakeholders noted that designing data collection systems to ensure that financial information was entered correctly initially and that data systems records were accessible to auditors throughout the lifetime of the loan were ways to manage this challenge.

#### **Installation of energy efficiency equipment**


Some stakeholders noted that collecting data on installed efficiency measures presents a challenge. Typically, contractors that perform energy efficiency retrofits provide this information to program administrators. Some program administrators indicated that it was a challenge to get all contractors to report installed measures in a consistent fashion. If description of installed high-efficiency measures is a desired data field, then it is important for contractors to understand and receive training on energy efficiency project data reporting requirements, which should not be burdensome.

#### **Information to support program evaluation**

Program evaluators also face challenges when attempting to obtain information necessary to fulfill their scope of work. For example, evaluators might be interested in employing an experimental design process to determine how programs might be affected by alternative financing terms or design features. This type of “what-if” analysis might be a low priority for contractors, lenders and customers who are most concerned about sales and loan volume.

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<sup>14</sup> The investor could be another lender seeking to aggregate pools of loans or deploy excess capital (or the sale could be in the form of a securitization requiring a rating agency risk assessment).



In order to overcome this challenge, it is important that provisions for information needed by program evaluators be identified and addressed during the program’s design and initial implementation phase. Policymakers will have the most leverage at the design phase to include requirements for data collection that will enable effective program evaluation. Program administrators may need to work with contractors and lenders to obtain permission to share customer information with evaluators.

### **Issues around the Perceived Value of Data to Justify Alternative Lending Criteria**

Discussions with stakeholders revealed that: (a) most lenders and investors typically do not foresee using EE performance data in determining lending criteria for loans to finance improvements; (b) collecting loan performance data over time may still be valuable and informative for setting loan terms and conditions; and (c) that there were circumstances (e.g., on-bill financing programs) where non-financial information could be a consideration for lending criteria.

#### **Lenders are generally not interested in measure-level performance data**

Lenders currently use information for predicting delinquency and default risk (e.g., FICO scores) and other metrics such as debt-to-income ratios in their underwriting process. The cost savings that will accrue to the borrower (following the completion of the energy efficiency project) is often used as one rationale for why energy efficiency loans are low risk. However, lenders indicated that they do not foresee adjusting their lending criteria based on the energy efficiency measures installed because they do not assume that a customer’s energy-related cost savings will always be applied to the lender’s debt service payment. For example, a property owner may prefer to take some of the energy cost savings from efficiency investments and then purchase a new car—resulting in little change to the risk that the debt will not be paid back.

#### **Collecting energy efficiency loan performance data is valuable to lenders**

It is common for EE lending programs to offer unsecured funding over long terms in an attempt to align the debt service to the timing of the savings. Longer term lending presents a greater risk to the lender (i.e., the probability of defaults increase as loan term increases). Several stakeholders indicated that collecting data on the performance of energy efficiency loans over extended time periods is useful for developing the case for lower cost funding for energy efficiency loans. This information may also be beneficial to administrators in thinking about future program design issues (e.g., how important are credit enhancements; size of loan loss reserves).

#### **Examples of other information that may be useful to specific stakeholders**

Stakeholders reported that there were circumstances when other types of information could be valuable for decision-making. For example, certain program designs (e.g., PACE and on-bill financing) may provide additional assurances for the lender through the collection mechanism and could result in an adjustment to lending approaches. Historical utility bill payment data may be used in the lending criteria for on-bill financing programs. Tax records and property valuations could be used to speed up or modify the underwriting process for PACE programs, which use the potential for tax liens on the property as a form of security.

Second, non-financial information can be used to mitigate the risk of customer dissatisfaction. Lenders reported an interest in the quality and installation of energy efficiency projects (despite their limited interest in utilizing energy-related cost savings in lending decisions). Several stakeholders noted that if the energy efficiency measures did not operate correctly, the customer borrower may be “dissatisfied” and dispute their debt. This concern is particularly evident when contractors are involved in the origination of the loan product. This type of dissatisfaction risk is both financial (if the customer disputes the loan) and reputational (if the lender was also involved in the construction). Lenders expressed an interest in knowing whether: (1) certain energy efficiency measures have a history of problems; (2) the installation is performed by contractors trained to industry standards; and (3) the contractor has a history of complaints.

There may be other circumstances in which some types of lenders and investors partially base their decisions on alternative lending and investment criteria. For example, some Socially-Responsible Investment Funds require the



reporting of greenhouse gas savings (GHG) associated with a particular investment and some community development financial intuitions (CDFIs) are required to report on their efforts to reach under-served communities.



## Chapter 5: Conclusions and Next Steps

A key objective of this report is to take a foundational step towards establishing common data collection and reporting practices for energy efficiency finance programs. We reviewed existing practices for data collection for energy efficiency financing programs and, based on discussions with various stakeholders, identified high-priority data needs, characterize potential uses for finance program data, and identify use cases that describe how stakeholders use data to address key objectives and undertake actions.

Developing consistent data collection practices that satisfy the needs of all stakeholders is challenging due to fundamental differences in data needs. The financial community (lenders and investors) places highest priority on the collection of loan performance data, which is traditionally used in financial analysis and the administration of loans. These stakeholders did not report a significant interest in program data that included information on energy consumption prior to the efficiency project, description and list of installed energy efficiency measures, or the energy savings associated with the measures. In contrast, program administrators and policy makers have a much broader interest in energy efficiency financing-related data. In addition to placing a high value on loan performance data (because it helps to inform program design such as credit enhancements, interest rate buy-downs), program administrators and policymakers also value the energy measure and building performance data as this helps to evaluate the impact of the program.

A number of challenges need to be overcome in order for useful data to be collected and reported across efficiency finance programs, including addressing potential customer privacy concerns, overcoming inconsistencies in data definition, and designing data collection and reporting guidelines with the knowledge that some stakeholders will have a greater need for data quality assurance than others.

### Next Steps

There are several activities that could be undertaken to support the development of common data definitions and formats and more consistent data collection and reporting practices for energy efficiency finance programs:

- 1. Develop common data definitions of primary data fields that are universally used and needed across stakeholder groups.**

For example, loan principal and interest rate values were identified as key data fields during all of our discussions with stakeholders. If common data definitions were developed and adopted, this process could be a valuable first step to open the benefits of loan pool consolidation.

- 2. Develop reporting guidelines for energy efficiency financing programs that utilize common data definitions, which could be voluntarily adopted, and utilized by program administrators and lenders.**

The strawman list of data fields presented in this report could serve as the starting point for this type of effort. The reporting guidelines would include a recommended list of data fields and common data definitions. The guidelines could draw from the Department of Energy's Building Energy Data Exchange Specification (BEDES) for much of the facility, measure and energy use information identified in this report, which could be augmented by common data definitions for financial product and performance data.

- 3. Discuss designing and hosting a centralized database system to collect and disseminate information from the disparate programs and stakeholder groups.**

It is unclear whether a centralized database system would be valuable to all stakeholders. For that reason, key stakeholders should discuss the merits of designing and hosting a centralized database.



## References

International Energy Agency (IEA). 2008. Promoting Energy Efficiency Investments: Case studies in the residential sector. ISBN 978-92-64-04212-8: [LINK](#)

McCallister, E., T. Grance, and K. Scarfone. 2010. Guide to Protecting the Confidentiality of Personally Identifiable Information (PII): Recommendations of the National Institute of Standards and Technology. National Institute of Standards and Technology. [LINK](#)

State and Local Energy Efficiency Action Network. 2012. A Regulator's Privacy Guide to Third-Party Data Access for Energy Efficiency. Prepared by M. Dworkin, K. Johnson, D. Kreis, C. Rosser, J. Voegelé, S. Weissman, M. Billingsley, and C. Goldman. [LINK](#)

State and Local Energy Efficiency Action Network. 2014. Energy Efficiency Financing Program Implementation Primer. Prepared by Zimring, M. for the Financing Solutions Working Group. [LINK](#)

U.S. Department of Energy. 2013 Building Energy Data Exchange Specification Scoping Report: Stakeholder and Technical Review. Prepared by LBNL, Peregrine Energy Group and Raab Associates, August. [LINK](#)

Zimring, M., M. Borgeson, A. Todd, and C. Goldman. 2013. Getting the Biggest Bang for your Buck: Exploring the Rationales and Design Options for Energy Efficiency Financing Programs. LBNL-6524E. Lawrence Berkeley National Laboratory. [LINK](#)

Diamond C, M. Golden, Personal Communication, March 2014.

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