U.S. Environmental Protection Agency Solar for All Household Savings Best Practices

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List of Acronyms

AC	alternating current
EIA	U.S. Energy Information Administration
EPA	U.S. Environmental Protection Agency
HUD	United States Department of Housing and Urban Development
kW	kilowatt
kWh	kilowatt-hour
NOFO	Notice of Funding Opportunity
NREL	National Renewable Energy Laboratory
PPA	power purchase agreement
PV	photovoltaic
QAPP	Quality Assurance Project Plan
QMP	Quality Management Plan
SAM	System Advisor Model
TPL	Transaction and Project Level
VPP	virtual power plant

Background and Purpose

This guide presents a set of best practices for ensuring households participating in the U.S. Environmental Protection Agency's (EPA's) Solar for All Program receive benefits commensurate with 20% of their historical energy expenditures. The document also outlines best practices for designing and implementing a household savings methodology. EPA may approve alternative household savings approaches and methods on a limited, case-by-case basis through the workplan and quality assurance processes.

As explained in the Solar for All Notice of Funding Opportunity (NOFO) Appendix C, Household Savings Guidance, household savings is one of the key outcomes of the program and benefits of residential rooftop and residential-serving community solar. The NOFO defines the household savings target as "delivering a benefit of at least 20% of an average household's electricity bill, including households that do not have individual electricity bills."

In program workplans, all Solar for All Grantees committed to delivering at least 20% cost savings to households benefiting from the program. EPA acknowledges there are many unique circumstances that may impact how Grantees will approach the delivery of and calculation of household savings. The following sections are intended to support Grantees in executing their household savings commitments.

This document provides the following:

- **Guidance on grant oversight and implementation:** How and when household savings approaches and methods will be assessed and reported throughout the grant oversight and implementation life cycle.
- **Key parameters of Solar for All household savings,** including the following:
    - Basic concepts such as the frequency, duration, and granularity of the household savings calculations
    - How to calculate and consider baselines and benefits for multifamily and community solar projects as well as for projects involving energy efficiency, electrification, storage, and so on.
- **Appendices** that define key terminology and example calculations by scenario or use case.

Grant Oversight and Implementation

There are several opportunities throughout the grant oversight and implementation life cycle for EPA and Grantees to collaborate and ensure documented Grantee household savings approaches and methods are aligned with the goals and objectives of EPA's Solar for All Program. These opportunities are described in detail next.

EPA will allow flexibility on a case-by-case basis if Grantees' household savings approaches do not align with the following guidelines. If a Grantee plans to take an alternative approach that is not stipulated next, they should outline their rationale and method in their EPA Solar for All Quality Assurance Project Plans (QAPPs) and workplan updates, if applicable, for review and approval by EPA.

1. **Workplan:** Grantees may have described their approach to household savings and evaluation in their workplans. Those in the planning period should include this in their planning period submissions or workplan updates.

2. **Quality assurance:**
    A. In accordance with EPA's Quality Program, Grantees must describe their environmental information operations, including how they are collecting, calculating, and verifying household savings data.
    B. Grantees must have a completed and approved Quality Management Plan (QMP) and QAPP prior to submitting Environmental Information (EI) to the Office of the Greenhouse Gas Reduction Fund (OGGRF) in their Transaction and Project Level (TPL) reports. The reporting of EI was waived for the first round of TPL reporting that was due on 4/30/25 and was not applicable as most Grantees did not have any transactions or projects to report.
    C. EPA will provide a QAPP template appendix for Grantees to outline their household savings methodology. The template is a guide to provide program-specific methodologies for calculating household savings and can be altered to meet the needs of the Grantee.
    D. Grantees will populate the QAPP template appendix with the following:
        i. Their household savings calculation methodology
        ii. The data elements they will be collecting for that calculation
        iii. Their data collection methods.
3. **Reporting:**
    A. In accordance with the Solar for All Terms and Conditions II.A, Performance Reporting, Grantees will report on the approved Information Collection Request (ICR) data points for projects that have reached the point of financial transaction during the specified reporting periods. Included in the Information Collection Request are the expected annual and total household savings per project.
    B. When a financial agreement is signed with a household, the estimated savings will be reported in the subsequent TPL reporting time frame.
4. **Project outcomes:** Grantees will implement the household savings methodologies and analysis, data collection, and verification plans described in their QAPPs and workplan updates, if applicable.

Key Parameters of Solar for All Household Savings

This section outlines key parameters for designing household savings approaches and methodologies under EPA's Solar for All Program.

1. Duration, Frequency, and Variability

The Solar for All NOFO Appendix C, Household Savings Guidance, states the "financial benefit does not need to be calculated per each individual household and can be based on averages in the utility territory the applicant is serving."

- **Duration:**
    - Household savings should be calculated over the life of the project using nominal (and not real) dollars because the Program intends to deliver actual dollar savings to households. In addition, Grantees should account for future changes in utility bills, solar generation compensation rates, and solar production by applying relevant escalation or degradation factors as defined in Appendix A.

- In designing and implementing household savings methodologies and delivery mechanisms, Grantees should ensure projects deliver 20% household savings throughout the project (beyond the period of performance of the EPA grant, if applicable). See Appendix A for project life definition.
  - Grantees are expected to verify savings throughout the project life cycle (beyond the 5-year EPA grant period of performance).
  - Savings verification methods may include auditing utility bills, spot checks, fleet monitoring, and other program evaluation or monitoring approaches used to ensure and assess savings throughout the project life cycle.
  - Grantees will be required to report on the *Annual Household Savings Provided by Project* and *Total Household Savings Provided by Project*.

- **Frequency:** Grantees should aim for savings to be delivered using the same, or a more frequent, time frame as a customer's utility or energy bills or Solar for All project costs.
  - For example, if a household pays a monthly utility bill or a Solar for All lease payment, the savings should be delivered on a monthly or submonthly basis.
  - The guidance on the frequency of benefit delivery is not related to the magnitude of the benefit delivered on that time frame. For example, if a household pays a monthly loan payment for a rooftop solar system, the monthly solar generation will vary throughout the year—so the magnitude of savings delivered to the household will vary throughout the year and may not reach 20% in every month. However, the net metering credit is delivered monthly on the utility bill, so the frequency of the benefit delivery and the utility bill are aligned.
  - If the financial benefit mechanism used to deliver the 20% savings cannot be aligned with the timing of household costs, the Grantee should explain how they will ensure the households will not have an increased cost to participate in the Program. For example, if a community solar subscription credit is applied to household bills only quarterly, but the household still pays a monthly utility bill, the Grantee should show the subscription cost does not increase the monthly bills or describe some other mechanism used to ensure the households are not paying more than they would have without the community solar subscription.
- **Frequency of reporting:** Grantees will be asked to report the estimated household savings once for each project in the TPL. The TPL is due 90 days after the end of the 6-month coverage period. For example, a TPL covering projects that completed a financial transaction between January 1 and June 30 will be due on October 30. Grantees will be required to provide four household savings data points for each project via the TPL. *The following data elements are drafts and subject to change through the Information Collection Request process; Appendix A provides data element definitions*:
  - Total Household Savings Provided by Project (DE110): The total cumulative dollar value of savings delivered to the household by the project over the duration of the customer agreement, e.g., power purchase agreement (PPA), lease agreement, loan agreement, or grant agreement. Cumulative savings should be the total savings provided by the project net any costs incurred by the household.

- Total Household Savings Provided by Project (Percent) (DETBD): The percent savings delivered to the household by the project over the duration of the customer agreement (e.g., PPA, lease agreement, loan agreement, or grant agreement). Percent savings should reflect the total savings provided by the project net any costs incurred by the household.
- Project Lifetime (DE087): The number of years the household receives benefits from the project. The maximum project life is 25 years.
- Annual Household Savings Provided by Project (DE130): The nominal dollar value of the cost savings provided by the project on an annual basis per household served. These data should be averaged across the total savings over the project lifetime or customer agreement, including any solar cost escalation paid by the household.

- **Variability:** EPA recognizes there might be differences between projected savings and actual savings over the life of the project because of fluctuations in future energy prices, household consumption, actual solar generation, and other factors. Grantees should estimate household savings for the project at the point of financial transaction—in many cases, before the solar system is operational. To account for variability between projected and actual savings, Grantees are encouraged to use conservative estimates, including projected solar generation, to ensure households receive 20% savings.

  Although actual household savings may vary over the project lifetime, it is a best practice that at no point during the project lifetime should the cost to participate in the Program be higher than the savings. However, EPA recognizes in direct ownership scenarios, households may need to pay a principal/down payment upfront that may limit the ability for the Grantee to deliver savings at the point of transaction—and savings would be delivered over the course of the project lifetime.

2. General Calculations and Data Sources

Throughout this guide, "utility costs," "consumption," and "rates" refer to electric utility components and do not include nonelectric utilities unless explicitly stated. In addition, references to utility costs, consumption, and rates apply only to residential buildings or portions of a building.

Grantees may calculate household baseline utility costs and consumption using multiple available data sources with varying granularity:

- Baseline utility costs are the dollar value of expected household utility costs for 1 year based on historical actual bills, representative data, or other approved methods of estimation. This total should include both fixed (e.g., flat monthly fees) and variable costs (e.g., costs per kilowatt-hour [kWh] or kilowatt [kW]) and reflect the entire annual household electric bill.
- Baseline utility consumption is the kilowatt-hours of expected household utility consumption for 1 year based on historical actual bills, representative data, or other approved method of estimation.

EPA recommends one of the following two options for calculating household baseline utility costs, with a preference for Option 1, where feasible:

- **Option 1: Historical actual bills.** Grantees should collect 12 continuous months of utility bill data for the household prior to the point of financial transaction. Bills can be used to calculate an average or blended utility rate that reflects the total amount billed divided by the total kWh consumption over a year, which can be used as the basis of the projected utility costs. There can be up to a 6-month lag in data.
- **Option 2: Representative data.** Grantees may use appropriate representative data to calculate the average residential utility costs for the area. Household baseline utility costs may be calculated by multiplying baseline utility consumption by the applicable utility rate. EPA's preferred data sources for baseline utility consumption are the Residential Energy Consumption Survey provided by the U.S. Energy Information Administration (EIA) and the National Renewable Energy Laboratory (NREL) ResStock State Level Residential Building Stock and Energy Efficiency & Electrification Packages Analysis Dashboard, but Grantees wishing to use a more locally specific data source should identify it and provide justification. EPA's preferred data sources for utility rates are EIA Form 861, utility tariffs, or the Utility Rate Database.

Where baseline utility costs are based on complex utility rates, EPA highly recommends Grantees use actual historical data to reflect real-world costs. Time-of-use utility rates may complicate the calculation of expected household utility costs and the value of solar generation. For example, households may receive less than the required 20% savings if solar generation and household consumption are not well aligned with higher utility rate periods. Historical actual billing data reflect household consumption patterns and may be an appropriate representation of future expected utility costs.

For households who have not lived in a residence for at least 12–18 months but are eligible to benefit from the Solar for All program per the program definitions of Low-Income and Disadvantaged Communities In the Solar for All Terms and Conditions Section I. Definitions, Grantees should use the average utility bill data of the utility territory or the average utility bill cost across a multifamily building's total units, if available.

Costs associated with measures funded solely or in part through Solar for All and borne by the household should be included in the household savings calculations. Costs associated with measures funded solely by a source other than Solar for All should be excluded from the household savings calculations.

3. Scope of Household Savings

Guidance for household savings granularity for each subprogram is listed below:

- **Residential rooftop:** Savings should be calculated per household. Grantees may use either of the two baseline calculation options described in Section 2, General Calculations and Data Sources, or propose an alternative for EPA approval.
- **Multifamily:** Savings should be calculated per household. Options for establishing baseline utility data for projects on multifamily buildings with complex metering structures are provided in Section 4, Multifamily Buildings.

- **Community solar projects:** Savings should be calculated per household. Grantees may use either of the two baseline calculation options described previously. See more in Section 6, Community Solar.

Savings should not be averaged across the entire program or across a portfolio of subprograms.

4. Multifamily Buildings

As defined in the Solar for All NOFO Section I, Funding Opportunity Description, residential rooftop solar includes behind-the-meter solar facilities serving multifamily buildings if the solar facility benefits individual households either directly or indirectly such as through tenant benefit agreements. Residential rooftop solar includes properties that are both rented and owned.

- **Baseline:** The expected household savings of a solar project on a multifamily building might be impacted by several factors, including project system size and generation relative to the building's energy load, metering arrangements, and regulatory environments. Grantees may use the household savings methodologies described next to account for these factors. Grantees should specify their methodology for determining the baseline for 20% household savings for a multifamily building in their QAPPs and workplan updates, if applicable.
  - Submetered buildings:
    - **Option 1: Historical actual bills.** Grantees may calculate the baseline energy consumption and costs for submetered multifamily buildings using historical individual tenant utility bill data, when possible. Grantees should specify whether their baseline calculations include or exclude common area loads, how those loads are calculated, and the rationale for their inclusion or exclusion. Grantees may not base a project's household savings calculation exclusively on a multifamily housing building's common area load.
    - **Option 2: Representative data.** Grantees may use appropriate representative data to calculate the average household utility costs for the area, as described in Section 2, General Calculations and Data Sources.
  - Master-metered buildings:
    - **Option 1: Historical actual bills.** Grantees may use the whole-building utility bill to calculate the baseline energy consumption and costs. To do so, divide the whole-building electricity costs proportionally by the number of households in the building using a relevant basis (e.g., number of households/units, weighted household/unit square footage, weighted household/unit occupant count, or number of bedrooms). Grantees should specify whether their baseline calculations include or exclude common area loads, how those loads are calculated, and the rationale for their inclusion or exclusion. Grantees are not allowed to base a project's household savings calculation exclusively on a multifamily housing building's common area load.
    - **Option 2: Representative data.** Grantees may use appropriate representative data to calculate the average household utility costs for the area, as described in Section 2, General Calculations and Data Sources.
    - **Option 3: Utility allowances.** For regulated affordable multifamily housing, Grantees may use the applicable utility allowance(s) to calculate baseline energy consumption and costs. To do so, multiply the approved utility allowance for each household by 20% to determine the required household savings threshold.

        - If non-utility benefits are delivered in aggregate to all households, the value of the non-utility benefits should represent at least 20% of the aggregate value of the utility allowance for all households.
        - If non-utility benefits are delivered individually to each household, the value of the non-utility benefits should represent at least 20% of the utility allowance for each participating household.
- **Benefits:**
    - For multifamily buildings, benefits do not have to be distributed through utility bills. For more information on alternative approaches, see Section 5, Non-utility Benefits.
    - If a building can accommodate solar that delivers at least 20% household savings, the participating households should receive benefits equal to at least 20% savings. If the building cannot accommodate solar that delivers at least 20% savings to participating households, the Grantee may use an alternative method described in Table 1.

Table 1. Multifamily household savings requirement matrix

	If the solar system is large enough to provide at least 20% savings to building tenants	If the solar system is not large enough to provide 20% savings to building tenants
Submetered	Tenants must receive at least 20% savings on their utility bill	Tenants must receive benefits of at least 50% of the building's net financial benefits from solar
Master-metered	Tenants must receive benefits equivalent to at least 20% of the building's utility bill	Tenants must receive benefits totaling at least 50% of the building's net financial benefits from solar

    - This guidance on systems that are not large enough to provide 20% of building savings does *not* apply to community solar serving households living in multifamily buildings.
- **Best practices for implementation:** Multifamily solar may include technical or financial configurations similar to community solar, but the key distinction is multifamily solar is behind the meter, whereas community solar is typically not. Grantees should identify whether a program supports multifamily solar or community solar and which guidance applies.

5. Non-utility Benefits

- **Types of benefits:** As specified in the Solar for All NOFO (EPA-R-HQ-SFA-23-01), "household savings can be delivered as a direct financial benefit or, for households without an individual utility bill, a direct non-financial benefit equivalent in value to the Program's household savings target in the utility territory."
    - Utility benefits are monetary benefits an individual household receives that directly offset a household's utility bill. Utility benefits may be delivered via the household utility bill or via a third party, such as a community solar operator.
        - Non-utility benefits are benefits an individual household receives that do not directly offset a household's utility, for example, when a household does not pay a utility bill in master-metered housing. Non-utility benefits may be financial or nonfinancial. Financial non-utility benefits have a clear monetary value and may include gift cards, cash payments, and transportation subsidies. Nonfinancial non-utility benefits do not

necessarily have a clear monetary value but have value to participating households, such as provision of services or facility upgrades. For regulated affordable housing, EPA recommends Grantees align with the United States Department of Housing and Urban Development's (HUD's) Treatment of Solar Credits in Master-Metered Buildings in Public Housing memorandum for allowable nonfinancial benefits for buildings enrolled in federally covered housing programs. Except for increased operating reserves, all benefits listed in the memo are eligible as non-utility benefits under Solar for All including:

- Job training and workforce development
- Additional staff support
- Facility upgrades (if facility upgrades include energy efficiency, calculate the savings efficiency according to Section 10, Energy Efficiency Measures)
- Free or reduced cost high-speed internet service
- Financial literacy programs and services
- Wellness programs and services
- Shuttle services
- Community events and/or support for resident associations
- Resilience center
- Nonmonetary donations (see HUD memo for considerations on household income)
- Gift cards or cash payments (see HUD memo for considerations on household income and treatment of one-time or lump sum payments).

  - EPA expects non-utility benefits will typically apply to master-metered multifamily housing, regulated affordable housing facilities, or community facilities serving eligible populations.
  - Grantees may deliver household savings via non-utility benefits in instances where the end user does not have an individual utility bill.

  - Benefits may be delivered as a combination of both non-utility benefits and utility benefits to achieve the required 20% household savings.
  - For market-rate affordable housing (i.e., nonregulated affordable housing), EPA encourages delivering non-utility benefits via gift cards or cash payments.

- **Benefits calculations:**
  - In a master-metered multifamily building, the financial value of the non-utility benefits should meet the savings requirements as discussed in Section 4, Multifamily Buildings.
  - Grantees providing non-utility benefits should specify which types of benefit delivery mechanisms (i.e., gift card, transportation subsidy, or facility upgrades) they plan to use as well as their methodology for calculating the value of these benefits to meet the required 20% household savings. The proceeds from solar generation used to pay for non-utility benefits may be considered the value of the non-utility benefits. Grantees should document and justify how the financial value of delivered non-utility benefits is quantified in Grantee QAPP and workplan updates, if applicable, for review and approval by EPA.
- **Best practices for Implementation:**
  - When designing non-utility benefits, Grantees are strongly recommended to engage low-income multifamily housing residents who may participate in this program for feedback on what kinds of meaningful benefits might align with their needs and circumstances.

- When delivering financial benefits of solar to tenants of regulated affordable multifamily housing, Grantees should *avoid delivering benefits that might increase a household's annual income in a manner that might jeopardize their eligibility for public housing or other state or federal income-based programs.* Grantees should conduct due diligence when designing and implementing non-utility benefits by coordinating with building owners and low-income tenants and confirming approaches against available HUD and other state or federal guidance.
- Grantees should estimate and report the value of non-utility benefits to meet the EPA required semiannual TPL reporting deadline. However, the benefits do not need to be delivered at the relevant reporting period deadline because the reporting must be done at the point of financial transaction rather than at project implementation.

6. Community Solar

As defined in the Solar for All NOFO (EPA-R-HQ-SFA-23-01), "residential-serving community solar" refers to a solar PV power-producing facility or solar energy purchasing program from a power-producing facility with up to 5 megawatts nameplate capacity that delivers at least 50% of the power generated from the system to multiple residential customers within the same utility territory as the facility. A variety of community solar ownership models can be considered, including community-owned solar, third-party-owned community solar, and utility-owned community solar.

- **Baseline:** As described in Section 2, General Calculations and Data Sources, Grantees may use one of two options to calculate household baseline costs: Option 1, Historical actual bills or Option 2, Representative data.
- **Benefits:** Grantees may establish programs that offer custom or standard community solar subscriptions for each community solar project. In states with consolidated billing infrastructure and enabling legislation, EPA recommends Grantees calculate subscriber household savings using customized subscriptions.
  - Customized subscriptions: A community solar offering calculated for each household based on household-specific actual utility consumption and cost data.
  - Standard subscriptions: A predetermined community solar offering specific to a community solar project that is provided to multiple households in a noncustomized fashion:
    - Grantees should ensure all individual subscribers with a standard subscription receive at least 20% in household savings.
    - Grantees should calculate the average utility bill using representative data for the utility service territory and establish subscription levels that deliver 20% household savings relative to the average utility bill.
    - Standard subscriptions may be determined on an individual project or subprogram basis if the household savings requirement will be met for all participating households receiving a standard subscription.

  EPA recommends Grantees aim to provide community solar subscriptions for as long a term as possible, with a minimum of 5 years.

- **Best practices for implementation:**
  - Grantees should aim to ensure their community solar subscribers realize a monthly bill that is lower each month than it would have been had they not enrolled in a community solar program.
  - Coordinating subscription costs and credits with a utility can be challenging, and community solar subscribers may experience a delay in receiving their bill credits relative to their subscription. Therefore, a subscribing household can end up paying a subscription in a month without receiving a credit in that same month adequate to provide the necessary 20% household savings. EPA encourages Grantees to design community solar programs under which subscribers see net savings each month rather than annually. Grantees should elaborate in their workplans how they plan to ensure subscribers see required monthly household savings.
  - For Grantees offering standard community solar subscriptions and calculating the subscription rate using one of the two options stipulated previously, it is encouraged to aim greater than the 20% savings threshold to ensure participating households realize at least 20% savings. This approach accounts for the likelihood that certain participants will have higher utility bills than the average for the utility service territory.
  - Community solar may include technical or financial configurations similar to multifamily solar, but the key distinction is multifamily solar is behind the meter, whereas community solar is typically not. Grantees should identify whether a program supports multifamily solar or community solar and which guidance applies.
  - If applicable, Grantees should design mechanisms to periodically verify utilities are correctly applying community solar credits. Community solar programs are most impactful and successful when program managers verify utility bill coordination.

7. Storage

If Grantees spend Solar for All funding on associated storage projects, the cost of storage should be considered in the delivery of household savings benefits, even if there are no financial benefits associated with the use of the storage technology that can be passed on to the household.

Note: All storage projects funded through Solar for All must be paired with solar.

This section describes how Grantees may treat storage in their household savings calculations.

- **Baseline:** Grantees should follow the guidance provided in Section 2, General Calculations and Data Sources for the applicable solar type (e.g., multifamily, community solar) to calculate the household baseline.
- **Benefits:** Grantees who choose to incorporate storage should still deliver 20% household savings.
  - Solar for All projects that are paired with storage will incur higher capital costs than stand-alone solar systems. Regardless of whether storage benefits are included in the 20% household savings calculations, any cost of storage borne by the household should be included in the net energy cost component of the savings calculations. Grantees may fully subsidize the cost of storage to avoid a negative impact on household savings.

- Grantees can include *direct* financial benefits generated by storage in the 20% household savings calculation if the benefits are passed through to the participating household.
  - For this program, direct storage benefits comprise financial payments to the household generated by the storage component and received from the utility or a third party via a reduction in their utility bill or other financial payment mechanism. Examples of direct financial benefits from associated storage include credits or payments to the household for energy arbitrage/dynamic pricing, demand response programs, virtual power plant (VPP) programs, paid grid service programs, and municipal or state battery incentive programs.
  - Grantees may also include *indirect* storage benefits generated by storage in the 20% household savings calculation if the benefits are financial and are received by the participating household. For this program, indirect storage benefits are the financial value derived from storage passed on to the household via a reduction in program participation costs, which may include lower loan, lease, or other program payments by the household. An example is a project developer or installer that operates the battery on behalf of the household, part or full time, to participate in a program such as a VPP or paid grid service program, and the operator—rather than the household—receives payment for participation. The financial value is passed on to the household as a reduction in program participation cost rather than as a reduction in utility bill or other direct financial payment mechanism.
  - Grantees should identify in their QAPPs and workplans, if applicable, the benefit revenue stream for storage and how it is included in the household savings calculation.

- **Indirect nonmonetary benefits:** EPA acknowledges there are several indirect nonmonetary benefits that storage systems provide households and other end beneficiaries (e.g., resilience, value of lost load). In general, because of the unpredictability in realizing such benefits and the inconsistency in quantification methods, such benefits are excluded from the household savings methodology. However, EPA has chosen to allow an exception to the 20% savings requirement when projects include storage at the household's location, as described next. EPA anticipates this exception will be particularly applicable to Grantees serving states and regions where resilience is an immediate need. Community solar paired with storage projects are *not* eligible for this exception.
  - Grantees may develop a program that gives households the option to choose to receive less than the Solar for All mandated 20% savings requirements if storage is deployed on their household and Grantees deliver nonmonetizable benefits to the household. Grantees should document how they will clearly communicate to households the expected reduction in household savings and the expected delivery of indirect nonmonetary storage benefits.
  - Under this exception, Grantees should ensure households do not pay more than their pre-solar baseline utility rate with solar and associated storage.
  - If storage is not paid for with Solar for All dollars, this exemption would not apply.
  - Projects **without** storage may **not** use this option.

8. Displacement of Nonelectric Fuels: No Electric Service Baseline

This section applies to households that do not have any grid-connected electrical service and plan to replace an existing nonelectric service (e.g., heating, cooking) with electricity.

Note: If the electrification measures are funded through Solar for All, any costs borne by the household should be included in the household savings calculation. If the electrification measures are funded by a source other than Solar for All, the costs should be excluded from the household savings calculation.

- **Baseline:** For households that have marginal to no electricity consumption, a Grantee may determine the baseline utility costs in one of two ways:
  - **Option 1: Historical actual bills.** Grantees should collect the cost of the nonelectric fuel source that solar and electrification will displace. The annual nonelectric fuel costs are then used as the baseline utility costs. This ensures households participating in the program will pay less than they were paying for the nonelectric fuel source.
    - For nonelectric historical fuel consumption baseline, Grantees should collect 12 continuous months of nonelectric fuel cost data for the household prior to the point of financial transaction. There can be up to a 6-month lag in data. Where data are not available, Grantees should propose a method to estimate annual costs.
    - If the household's nonelectric fuel consumption is only partially displaced by solar and electrification, only the portion of the cost displaced should be used as the baseline utility costs.
  - **Option 2: Representative data.** Grantees should calculate household savings for a solar and electrification project using the average utility rate of the service territory and average consumption for dwellings in the area (see Section 2, General Calculations and Data Sources). This option should be used when households will receive electricity from a utility and not if the household is installing an off-grid (microgrid) system.
    - Exception: If the household did not have prior electric service and will continue to not have electric service from the local utility *and* if the household pays no cost for Solar for All, Grantees may request to be exempted from calculating baseline and projected utility costs.
    - The Grantee should continue to calculate and report the value of solar benefits provided using net metering or net billing rates from an applicable electric utility. Such projects will be deemed to meet the 20% household savings requirement.
- **Benefits:** Once the household baseline utility costs have been determined using one of these methods, Grantees should apply the appropriate 20% household savings benefits methodology as described in this guidance.

9. Displacement of Nonelectric Fuels: Electrification of Households With Existing Electric Service

This section applies to households with existing electric and nonelectric (e.g., fossil fuel) utility costs and consumption, where nonelectric fuel usage is displaced by electrification measures. Examples of electrification measures include replacing a natural gas furnace or wood stove with a heat pump or replacing propane cooking equipment with an electric stove. These measures increase electricity consumption but may or may not increase costs because of factors including improvements in efficiency, applicable utility rates, and household behavior.

If the electrification measures are funded through Solar for All, any costs borne by the household should be included in the net energy cost component of the household savings calculation. If the electrification measures are funded by a source other than Solar for All, the costs should be excluded from the household savings calculation.

- **Baseline:** The change in energy consumption because of electrification measures, whether funded by Solar for All or another source, should be incorporated into the projected utility baseline.
    - Grantees should use the applicable options to calculate the historical utility baseline (Option 1, Historical actual bills or Option 2, Representative data). Then, the anticipated change in electric and nonelectric costs resulting from electrification should be applied to the historical utility baseline to calculate the projected utility baseline. For example, if electrification is expected to reduce nonelectric costs by $30 per month but increase electric costs by $40 per month, the projected utility baseline would be $10 per month higher than the historical utility baseline. Subsequently, the household savings delivered by solar would be calculated relative to the projected utility baseline.
    - The changes in utility costs because of electrification are included in the baseline rather than as benefits in the household savings calculation to allow Grantees to appropriately size the solar to the increased expected household electric consumption. Depending on the household, this may result in a larger or smaller solar system, allocation, or subscription than would result from using the historical utility baseline.
- **Benefits:** Grantees should exclude utility savings because of electrification from the benefits portion of the household savings calculation because these savings are included in the projected utility baseline, as noted previously.
- **Best practices for implementation:** Where possible, Grantees should base estimates of changes to utility consumption and costs because of electrification on energy models or installation contractor estimates.

10. Energy Efficiency Measures and Other Enabling Upgrades

Certain buildings and project sites may benefit from enabling upgrades prior to solar deployment. As described in the Solar for All NOFO (EPA-R-HQ-SFA-23-01), "enabling upgrades can include, but are not limited to, electrical system upgrades, structural building repairs, and energy efficiency measures." Enabling upgrade work may lead to either a decrease in energy consumption because of the installation of more efficient equipment or a potential increase in energy consumption because of the rebound effect[1] or other factors.

The change in energy consumption because of energy efficiency upgrades, whether funded by Solar for All or another source, may be incorporated into the household savings calculations via the projected utility baseline or as a delivered benefit.

[1] Greene, Greening, Difiglio. "Energy efficiency and consumption – the rebound effect – survey." *Energy Policy*, June 2000. https://www.sciencedirect.com/science/article/pii/S0301421500000215. Accessed June 4, 2025.

As described in Table 2, if the enabling upgrades are funded through Solar for All, any costs borne by the household for enabling upgrades should be included in the household savings calculation. If the enabling upgrades are funded by a source other than Solar for All, the costs should be excluded from the household savings calculation.

Table 2. Energy Efficiency/Enabling Upgrades Savings

	Funded by Solar for All	Funded by Alternative Sources
New Construction	Costs of enabling upgrades are included in household savings calculations. The change in energy consumption from enabling upgrades is included in the projected utility baseline.	Costs of enabling upgrades are *not* included in household savings calculations. The change in energy consumption from the enabling upgrades is included in the projected utility baseline.
Energy Efficiency Retrofit	Costs of enabling upgrades are included in household savings calculations. The change in energy consumption from enabling upgrades is included either in the projected utility baseline or as a benefit in the household savings calculation.	Costs of enabling upgrades are *not* included in household savings calculations. The change in energy consumption from the enabling upgrades is included in the projected utility baseline.

10.1 Energy Efficiency Measures and Enabling Upgrades for New Construction

- **Baseline:**
  - For solar projects built on or serving new construction, Grantees will not have historical consumption data. In this case, Grantees may calculate the baseline utility costs using the following options:
    - **Option 1: Energy model estimates.** Grantees may use an energy model or engineering estimates provided by the developer, engineer, or contractor to estimate baseline utility costs. This approach is recommended where available, especially for buildings that exceed required building energy codes.
    - **Option 2: Representative data.** Grantees may use appropriate representative data to calculate the average residential building utility cost for residential units in the utility service territory.
  - Energy efficiency measures, whether funded through Solar for All or other sources, should be incorporated into the building projected utility baseline rather than the savings for new construction. The energy efficiency measures reduce baseline household consumption and costs that in turn reduce the magnitude of the required 20% household savings.
- **Benefits:** Grantees should exclude utility savings from energy efficiency measures deployed on new construction from the benefits portion of the household savings calculation because these savings are included in the projected utility baseline, as noted previously.

10.2 Solar for All–Funded Energy Efficiency and Enabling Upgrades for Existing Buildings

- **Baseline:**
  - EPA recommends Grantees do not incorporate future energy consumption changes resulting from electrical system upgrades (e.g., electrical panel upgrades) or structural building repairs (e.g., roof repairs) into the baseline utility costs because of unpredictability and lack of consistency in quantification methods.
  - For energy efficiency retrofits, Grantees should use the applicable options to calculate the historical utility baseline (Option 1, Historical actual bills or Option 2, Representative data). Then, the anticipated change in utility costs resulting from energy efficiency measures should be applied to the projected utility baseline or applied as a benefit in the household savings calculation.
    - **Energy efficiency in the projected utility baseline:** For example, if energy efficiency measures are expected to reduce utility costs by $30 per month, the projected utility baseline would be $30 per month lower than the historical utility baseline. The household savings delivered by solar would then be calculated relative to the projected utility baseline.
    - **Energy efficiency as a benefit:** For example, if energy efficiency measures are expected to reduce utility costs by $30 per month, this amount would be added to the expected savings from solar to calculate the total expected household savings.
- **Benefits:**
  - Grantees may include utility savings because of energy efficiency measures in the benefits portion of the household savings calculation, as noted previously. Grantees should clearly describe the treatment of energy efficiency savings in the QAPP or workplan updates.
  - The timelines for installing energy efficiency measures and solar may not align because of differing contractors, approval processes, or other programmatic factors. To claim savings from energy efficiency measures as benefits in a Solar for All project, the energy efficiency measures and solar should be installed within 1 year of one another.
- **Best practices for implementation:**
  - Where possible, Grantees should base estimates of changes to utility consumption and costs because of energy efficiency measures on energy models or installation contractor estimates.
  - If energy efficiency measures and solar will be installed on different timelines, Grantees should collect appropriate documentation of the commitment to install the energy efficiency measures.

Appendix A: Definitions

Term	Definition
Annual household savings provided by project	The dollar value of the cost savings provided by the project on an annual basis per household served. These data should be averaged across the total savings over the project lifetime or customer agreement, including any solar cost escalation.
Annual net household cost of project	The dollar value sum of all costs the household pays for solar, storage, and energy efficiency (as applicable), net of fixed and annual costs and fixed and annual incentives for each year of the project. Fixed and annual costs may include loan, lease, subscription, or other payments made by the household at any time during the project life. Fixed and annual incentives may include tax credits, rebates, Solar for All subsidy, state or local government payments, foundation grants, or funding from other sources. Fixed costs and incentives are typically applied at the beginning of the project but may occur in later years. Net metering or net billing payments from utilities for solar generation are *not* considered incentives for this field.
Associated storage	Storage measures installed as part of a solar installation. All storage projects funded through Solar for All must be paired with solar.
Baseline utility costs	The dollar value of household utility costs based on historical actual bills, representative data, or other approved methods of estimation. This total should include both fixed and variable costs and reflect the entirety of the annual household electric bill. EPA's preferred data sources for utility rates are U.S. Energy Information Administration (EIA) Form 861, utility tariffs, or the Utility Rate Database. In Appendix B, this is also referred to as the "annual baseline utility costs," which are used to calculate the total projected utility costs.
Baseline utility consumption	The kilowatt-hours of expected household utility consumption for 1 year based on historical actual bills, representative data, or other approved methods of estimation. EPA's preferred data sources for baseline utility consumption are the Residential Energy Consumption Survey provided by EIA and the National Renewable Energy Laboratory (NREL) ResStock State Level Residential Building Stock and Energy Efficiency & Electrification Packages Analysis Dashboard; however, Grantees wishing to use a more locally specific data source should identify it and provide justification.
Blended utility rate	A blended utility rate is a dollar per kilowatt-hour ($/kWh) rate calculated by summing all household electric utility costs in a year and dividing by the total kWh of consumption in a year. If using a blended utility rate in calculating household savings, all fixed and variable utility charges should be included.
Non-utility benefit	Benefits that an individual household receives that do not directly offset a household's utility, such as where a household does not pay a utility bill in master-metered housing. Non-utility benefits may be financial or nonfinancial. Financial non-utility benefits have a clear monetary value and may include gift cards, cash payments, and

	transportation subsidies. Nonfinancial non-utility benefits do not necessarily have a clear monetary value but have value to participating households, such as provision of services or facility upgrades.
Environmental Information	Includes data and information that describe environmental processes or conditions which support EPA's mission of protecting human health and the environment.
Environmental Information Operations	A collective term for work performed to collect, produce, evaluate, or use environmental information and the design, construction, operation or application of environmental technology.
Enabling upgrades	Investments in energy and building infrastructure that are necessary to deploy or maximize the benefits of residential rooftop and residential-serving community solar projects. Enabling upgrades must satisfy the following criteria to be an eligible zero-emissions technology: 1) be an investment in energy or building infrastructure and 2) be necessary to deploy or maximize the benefits (i.e., financial savings or resiliency benefits) of a residential rooftop and residential-serving community solar project.
Grantee	An entity that receives a federal award directly from a federal agency to perform an activity under a federal program. The term "recipient" does not include subrecipients or individuals that are participants or beneficiaries of the award.
Household	Collectively, all persons living in a dwelling unit that participates in a Solar for All project. Typically, one member of the household would be responsible for paying the utility bills and signing a participation agreement or contract to enlist in Solar for All. Because solar benefits will be scaled to energy costs and consumption for all individuals living in the dwelling unit, for this guidance we refer to households rather than individuals as the recipient of Solar for All benefits. All households participating in Solar for All should qualify as low-income and disadvantaged communities as defined in the Solar for All Terms and Conditions.
Household allocated solar generation	The number of kilowatt-hours of solar generation that is allocated to a participating household over a 12-month period. For rooftop solar, the household is allocated 100% of the solar generated. For community solar, the household is allocated a portion of the generation via subscription. For non-utility benefits, the household may be allocated a portion of the generation or proceeds from the larger multifamily project and receive equivalent financial value. Recommended data sources for photovoltaic (PV) solar generation include PVWatts, System Advisor Model (SAM), REopt, and contractor estimates. When using contractor estimates, it is suggested that Grantees validate estimates using one of the other recommended tools.
Market rate affordable housing	Housing where rents or home prices are considered affordable for low-income populations. Affordability is typically defined as where housing costs are less than 30% of household income. Market rate affordable

	housing does not receive public sector assistance and does not involve income restrictions or obligations to maintain affordability.
Master-metered	Multifamily buildings where utilities are metered and billed at the building or property level and each household does *not* receive a bill from the utility.
Multimetered/submetered	Multifamily buildings where utilities are metered and billed for each unit individually and each household receives a bill from the utility.
Project life	The number of years the household receives benefits from the project. This may coincide with the asset life or the term of the financial product or neither. The maximum project life is 25 years.
Regulated affordable housing	Housing that involves income restrictions and obligations to maintain affordability for a given period. Affordability is typically defined as where housing costs are less than 30% of household income. Regulated affordable housing typically receives federal, state, or local funding or financing and may be owned and operated by private, public, or nonprofit entities.
Solar AC degradation rate	The rate at which solar panels are expected to decline in performance, producing fewer kilowatt-hours from solar over the life of the panels. The default annual solar degradation rate is set at 1.0% alternating current (AC) unless otherwise approved in a Grantee's Quality Assurance Project Plan. The default value is based on Ramasamy et al. (2021).[2]
Solar generation compensation rate	The dollar per kilowatt-hour rate at which a utility compensates customer or community solar generation. This may be a net metering rate (where solar is compensated at the residential retail rate), a net billing rate (where net exported solar is typically compensated at the utility's avoided cost rate), a qualifying facility rate, or other rate. The effective rate may also include revenue from the sale of renewable energy credits or other attributes. For areas with complex net metering or net billing rates, an estimated blended rate may be proposed. For programs providing non-utility benefits to participating households, this is the total financial value of non-utility benefits provided to the household over the project life.
Solar generation compensation escalation rate	The rate at which solar energy generation compensation is expected to increase over time. By default, the solar generation compensation escalation rate may be set at the utility bill escalation rate. This assumption is most relevant if the solar generation compensation rate is based on net metering or net billing. If the solar generation compensation rate is fixed (such as in a non-escalating power purchase agreement [PPA] or as specified in utility tariffs), the solar generation compensation escalation rate should be set to zero or other known escalation rate.
Subprogram	A distinct component of the Grantee's overall Solar for All Program that may serve a specific housing or population type (e.g., single family, multifamily, or Tribal), provide specific solar products (e.g., rooftop

[2] Ramasamy et al. (2021). *U.S. Solar Photovoltaic System and Energy Storage Cost Benchmarks: Q1 2021.* NREL/TP-7A40-80694. November 2021. https://docs.nrel.gov/docs/fy22osti/80694.pdf.

	solar, community solar, enabling upgrades, or solar with storage), and/or feature specific financial products (e.g., grants, loans, leases, or PPAs). Each subprogram may have distinct budgets, processes, and household savings methodologies.
Total efficiency cost savings	The dollar sum of financial benefits delivered by efficiency investments to the household over the life of the project.
Total household savings provided by project	The total cumulative dollar value of savings delivered to the household by the project over the duration of the customer agreement (e.g., PPA, lease agreement, loan agreement, or grant agreement). Cumulative savings should be the total savings provided by the project net any costs incurred by the household.
Total household savings provided by project (percent)	The percentage of savings a given project delivers to a household calculated by subtracting the total net household energy costs from the total projected utility costs, dividing by the total projected utility costs and multiplying by 100. The formula for total household savings provided by project (percent) is provided in Appendix B.
Total net building energy costs	The dollar value sum of all costs a multifamily property pays for solar, storage, and energy efficiency (as applicable), net of fixed and annual costs and fixed and annual incentives for each year of the project. This value is an intermediate step in calculating the total household savings provided by project (percent) for multifamily properties. Fixed and annual costs may include loan, lease, subscription, or other payments made by the household at any time during the project life. Fixed and annual incentives may include tax credits, rebates, Solar for All subsidy, state or local government payments, foundation grants, or funding from other sources. Fixed costs and incentives are typically applied at the beginning of the project but may occur in later years. Net metering or net billing payments from utilities for solar generation are *not* considered incentives for this field.
Total net household energy costs	The dollar sum of total projected utility costs and the total net household cost of solar + storage + efficiency. The formula for total net household energy costs is provided in Appendix B.
Total projected utility costs	The dollar sum of expected future household energy costs, calculated by modifying the baseline utility costs by applicable factors, such as a utility rate escalation factor and known changes to energy consumption because of the installation of electrification or energy efficiency measures.
Total solar generation compensation	The dollar sum of financial benefits delivered by a given solar project to the household over the life of the project. This is calculated by multiplying the total household allocated solar generation (with the solar degradation rate applied) by the applicable solar generation compensation rate (with the solar generation compensation escalation rate applied).
Total storage compensation	The dollar sum of financial benefits delivered by the storage component of a project to the household over the life of the project.
Utility bill escalation rate	The rate at which utility bills are expected to increase over time. The default annual utility bill escalation rate is deemed 2.5% based on

	nationwide historical utility rate data for 1997–2024 from EIA: https://www.eia.gov/outlooks/steo/data/browser/#/?v=21&f=A&s=&start=1997&end=2025&map=&linechart=~ESRCU_US&ctype=linechart&maptype=0&id=. The utility bill escalation rate should be applied to both projected utility costs and the solar generation compensation rate if the solar generation compensation rate is based on net metering or net billing. If the solar generation compensation rate is fixed (such as in a PPA), the utility bill escalation rate would not apply.
Virtual power plant	Networks of distributed energy resources—such as solar, batteries, and electric vehicle charging—that are aggregated and managed to provide load flexibility to utilities.
Whole-building savings provided by project (percent)	The percentage of savings a given project delivers to a multifamily property, calculated by subtracting the total net building energy costs from the total projected utility costs, dividing by the total projected utility costs and multiplying by 100. This value is an intermediate step in calculating the total household savings provided by project (percent). The formula for whole-building savings provided by project (percent) is provided in Appendix B.

Appendix B: Household Savings Formulas and Example Calculations

General Household Savings Formulas

The following sections describe sample household savings calculations that can be used in the Quality Assurance Project Plans. The general formula for calculating household savings can be found next. Minor adaptations will be needed to address the nuances of various market segments (e.g., single-family home rooftop, multifamily solar, or community solar) or business models (e.g., grants, loans, or power purchase agreements). Specific terms (such as annual net household cost of solar) will have different components depending on the financial structure of a given project. In other words, whether the project includes tax credits, a loan, a grant, or fixed or variable solar incentives will determine how a given term is calculated, but the general formula should be consistent. Household savings calculations for common use cases are provided next. Cases where the formula for household savings differs from the general version next are identified in the examples.

Note: The formulas include a utility rate escalation factor and a solar degradation factor that affect the expected costs and benefits in future years and are based on national data.[3,4] All terms included in the household savings calculations are from the perspective of the costs and benefits experienced by the household and do not reflect the all-in development costs of solar from the perspectives of the Grantee, solar developer, or financier.

The Total Household Savings Provided by Project (Percent) is calculated as follows:

Equation 1

$$Total\ Household\ Savings\ Provided\ by\ Project\ (Percent) = \frac{Total\ Projected\ Utility\ Costs - Total\ Net\ Household\ Energy\ Costs}{Total\ Projected\ Utility\ Costs} * 100$$

Where:

Equation 2

$$Total\ Projected\ Utility\ Costs = \sum_{i=1}^{N} Annual\ Baseline\ Utility\ Costs * (1 + Utility\ Bill\ Escalation\ Rate)^{i-1}$$

N = Project Lifetime

i = a specific year in the project's life

Equation 3

$$Total\ Net\ Household\ Energy\ Costs = Total\ Projected\ Utility\ Costs + Total\ Net\ Household\ Cost\ of\ Project$$

[3] Annual utility escalation rate is deemed 2.5% based on nationwide historical utility rate data from the U.S. Energy Information Administration: https://www.eia.gov/outlooks/steo/data/browser/#/?v=21&f=A&s=&start=1997&end=2025&map=&linechart=~ESRCU_US&ctype=linechart&maptype=0&id=.

[4] Annual solar degradation rated is deemed 1.0% from Ramasamy et al. 2021. *U.S. Solar Photovoltaic System and Energy Storage Cost Benchmarks: Q1 2021*. NREL/TP-7A40-80694. November 2021. https://docs.nrel.gov/docs/fy22osti/80694.pdf.

Equation 4

$$Total\ Net\ Household\ Cost\ of\ Project = \left[\sum_{i=0}^{N} Annual\ Net\ Household\ Cost\ of\ Solar + Storage + Efficiency_i\right] - Total\ Solar\ Generation\ Compensation\ - Total\ Storage\ Compensation - Total\ Efficiency\ Cost\ Savings$$

Equation 5

$$Annual\ Net\ Household\ Cost\ of\ Solar + Storage + Energy\ Efficiency\ in\ year\ i = Fixed\ Solar\ Cost_i + Annual\ Solar\ Cost_i + Fixed\ Storage\ Cost_i - Fixed\ Solar\ Incentives_i - Annual\ Solar\ Incentives_i + Annual\ Storage\ Cost_i - Fixed\ Storage\ Incentives_i - Annual\ Storage\ Incentives_i + Fixed\ Energy\ Efficiency\ Costs_i + Annual\ Energy\ Efficiency\ Costs_i - Fixed\ Energy\ Efficiency\ Incentives_i - Annual\ Energy\ Efficiency\ Incentives_i$$

Equation 6

$$Total\ Solar\ Generation\ Compensation = \sum_{i=1}^{N}[Annual\ Household\ Allocated\ Solar\ Generation * (1 - Solar\ Degradation\ Rate)^{i-1}] * [Solar\ Generation\ Compensation\ Rate * (1 + Solar\ Compensation\ Escalation\ Rate)^{i-1}]$$

Equation 7

$$Total\ Storage\ Compensation = \sum_{i=1}^{N}[Fixed\ Storage\ Revenue_i + Annual\ Storage\ Revenue_i\ ]$$

Equation 8

$$Total\ Energy\ Efficiency\ Cost\ Savings = \sum_{i=1}^{N}[Annual\ Energy\ Efficiency\ Cost\ Savings_i\ ]$$

The Household Savings Provided by is calculated as follows:

Equation 9

$$Annual\ Household\ Savings\ Provided\ by\ Project = \frac{(Total\ Projected\ Utility\ Costs - Total\ Net\ Household\ Energy\ Costs)}{Project\ Life}$$

Example 1: Single Family, Historical Actual Bills

A Solar for All Program plans to install rooftop solar for households living in single-family homes via low-interest loans. The Program will establish the historical utility baseline by collecting the past 12 months of electric bills from each household. The sum of these bills establishes the annual baseline utility cost.

In this example:

- **Duration:** The household secures a 25-year loan via the Grantee's program.
  - *Project Lifetime* = N = 25 years
- **Baseline:** Option 1, Historical actual bills. The household's Annual Baseline Utility Costs are $1,200 based on 12 months of historical utility data.
  - *Annual Baseline Utility Cost* = $1,200
- **Benefits:** The program installs a 5-kW system projected to produce 7,595 kWh in Year 1, which is compensated via net metering at the residential retail rate of $0.09/kWh.
  - *Household Allocated Solar Generation* = 7,595 kWh
  - *Solar Generation Compensation Rate* = $0.09/kWh
  - *Storage* = N/A
  - *Energy Efficiency* = N/A
- **Costs:** The household will pay a $1,000 payment in Year 0 followed by $100 annually for Year 1 onward. The Grantee has chosen to reimburse the cost to households via a $1,000 forgivable loan and $90 annual loan rebate.
  - *Fixed Solar Cost* = $1,000 only in Year 0
  - *Annual Solar Cost* = $100/year for Years 1 through 25
  - *Fixed Solar Incentives* = $1,000 only in Year 0
  - *Annual Solar Incentives* = $90/year for Years 1 through 25
- The utility bill escalation rate is estimated at 2.5% annually, and the solar degradation rate is set to 1% annually.

Note: In this example, it is assumed the solar generation compensation rate will increase at the same rate as the utility bill escalation rate, 2.5%, because it is a net metering rate tied to the residential retail rate.

Total Household Savings Provided by Project (Percent) is calculated as follows:

- Total Projected Utility Costs = $\sum_{i=1}^{25} \$1{,}200 * (1 + 0.025)\text{^}(i - 1) = \$40{,}989$
- Total Net Household Cost of Project = $1,000 + ($100 * 25 years) – $1,000 – ($90 * 25 years) = $250
- Total Solar Generation Compensation = $\sum_{i=1}^{25} [7{,}595\ kWh * (1 - 0.01)^{i-1}] * \$0.09 * (1 + 0.025)\text{^}(i - 1) = \$20{,}511$
- Total Net Household Energy Costs = $40,989 + $250 – $20,511 = $20,728
- Total Household Percent Savings Provided = ($40,989 – $20,728) / $40,989 * 100 = 49%

By providing household savings of 49%, this project would exceed the required 20% savings.

The Annual Household Savings Provided by Project is calculated as follows:

> Total Projected Utility Costs – Total Net Household Energy Costs / Project Life = ($40,989 – $20,728) / 25 = $829.

Example 2: Multifamily, Representative Data, Non-utility Benefits

A Solar for All program aims to serve households living in master-metered multifamily housing and provide residents with non-utility benefits. The program plans to provide residents with benefits equivalent to at least 20% of the building's electricity bill, including common areas. Benefits per household will be distributed to each household proportionally based on the number of bedrooms per unit. The property has 32 units comprising four 1-bedroom units, sixteen 2-bedroom units, eight 3-bedroom units, and four 4-bedroom units, for a total of 76 bedrooms.

For this case, the Household Savings Provided by Project (Percent) is calculated at the whole-building level and then calculated for each unit type using the proportional weighting per bedroom.

Note: Grantees may propose other weighting factors, such as number of units, weighted unit square footage, or weighted unit occupant count.

In this example:

- **Duration:** The property owner secures a 20-year loan via the Grantee's program
    - *Project Lifetime* = N = 20 years
- **Baseline:** Multifamily Option 2, Representative data. The whole-building annual baseline utility costs are $20,708 resulting from 159,600 kWh of consumption at the utility rate of $0.13 per kWh, using representative data from EIA.
    - *Annual Baseline Utility Cost* = $20,708
- **Benefits:** The program installs a 25-kW system with annual generation of 41,810 kWh in Year 1, which is compensated at the net billing rate of $0.11 per kWh, based on the utility's avoided cost rate.
    - *Whole-Building Allocated Solar Generation* = 41,810 kWh
    - *Solar Generation Compensation Rate* = $0.11/kWh
    - *Storage* = N/A
    - *Energy Efficiency* = N/A
- **Costs:** The property owner will bear all the costs and incentives for project funding and program participation. Therefore, the households will bear no cost for participation, making their *Total Net Household Cost of Project* zero.
    - *Fixed Solar Cost* = $0
    - *Annual Solar Cost* = $0
    - *Fixed Solar Incentives* = $0
    - *Annual Solar Incentives* = $0
    - *Storage* = N/A
    - *Energy Efficiency* = N/A
- The utility bill escalation rate is estimated at 2.5% annually, and the solar degradation rate is set to 1% annually.

Note: In this example, it is assumed the solar generation compensation rate will increase at the same rate as the utility bill escalation rate, 2.5%, because the net billing rate is tied to the utility's avoided cost rate.

Whole-building savings provided by project (percent) is calculated as follows:

- Total Projected Utility Costs = $\sum_{i=1}^{20} \$20{,}708 * (1 + 0.025)\text{^}(i - 1) = \$528{,}979$
- Total Net Building Cost of Project = $0
- Total Solar Generation Compensation = $\sum_{i=1}^{20}[41{,}810\ kWh * (1 - 0.01)^{i-1}] * [\$0.11 * (1 + 0.025)\text{^}(i - 1)] = \$106{,}193$
- Total Net Building Energy Costs = $528,979 + $0 – $106,193 = $422,786
- Whole-Building Savings Provided by Project (Percent) = ($528,979 – $422,786) / $528,979 * 100 = 20%

By providing non-utility benefits with a value of $106,193 over the life of the project to all residents of the building, the project would comply with the required 20% savings. However, because the non-utility benefits will be distributed individually to each household, the household savings provided by project (percent) can be calculated by allocating the savings proportionally to each household, as shown in Table B-1.

Table B-1. Proportional benefit breakdown by unit and unity type

Unit Type	Number of Units in Building by Unit Type	Total Bedrooms in Building by Unit Type	Proportion of Total Building Benefit for Each Unit Type	Proportion of Total Building Benefit for Each Unit (household proportion)
1-bedroom	4	4	5.2%	1.3%
2-bedroom	16	32	42.1%	2.6%
3-bedroom	8	24	31.6%	4.0%
4-bedroom	4	16	21.1%	5.3%

Therefore, the Total Household Savings Provided by Project (Percent) for each unit type can be calculated by applying the household proportion. The following example shows the Household Savings Provided by Project (Percent) for each 2-bedroom unit:

- Total Projected Utility Costs = $\sum_{i=1}^{20} \$20{,}708 * (1 + 0.025)\text{^}(i - 1) * (Household\ Proportion) = \$528{,}979 * 2.6\% = \$13{,}753$
- Total Net Household Cost of Project = $0
- Total Solar Generation Compensation = $\sum_{i=1}^{20}[41{,}810\ kWh * (1 - 0.01)^{i-1}] * [\$0.11/kWh * (1 + 0.025)\text{^}(i - 1)] * (Unit\ Proportion) = \$106{,}193 * 2.6\% = \$2{,}761$
- Total Net Household Energy Costs = $13,753 + $0 – $2,761 = $10,992
- Total Household Savings Provided by Project (Percent) = ($13,753 – $10,992) / $13,753 * 100 = 20.0%

The dollar value of the non-utility benefits to be allocated to each household over the life of the project can also be calculated by multiplying the total solar generation compensation by the household proportion from Table B-1:

- 1-bedroom = $106,086.70 * 1.3% = $1,381
- 2-bedroom = $106,086.70 * 2.6% = $2,761
- 3-bedroom = $106,086.70 * 4.0% = $4,248
- 4-bedroom = $106,086.70 * 5.3% = $5,628

The Annual Household Savings Provided by Project is calculated by dividing the household proportion above by the Project Life, which is 20 years.

Example 3: Multifamily, Representative Data, Master-Metered with Less Than 20% Savings

A Solar for All program aims to serve households living in master-metered multifamily housing and provide residents with non-utility benefits. However, available roof space limits the system size available and the resulting financial benefits. Therefore, the project will exercise the option to distribute 50% of the system savings to each household, proportionally based on the number of bedrooms per unit. The property has 32 units comprising four 1-bedroom units, sixteen 2-bedroom units, eight 3-bedroom units, and four 4-bedroom units, for a total of 76 bedrooms.

For this case, the Household Savings Provided by Project (Percent) is calculated at the whole-building level, including common area costs, and then calculated for each unit type using the proportional weighting per bedroom.
Note: Grantees may propose other weighting factors, such as number of units, weighted unit square footage, or weighted unit occupant count.

In this example:

- **Duration:** The property owner secures a 20-year loan via the Grantee's program
    - *Project Lifetime* = N = 20 years
- **Baseline:** Multifamily Option 2, Representative data. The whole-building annual baseline utility costs are $20,708 resulting from 159,600 kWh of consumption at the utility rate of $0.13 per kWh, using representative data from EIA.
    - *Annual Baseline Utility Cost* = $20,708
- **Benefits:**
    - The program installs a 20-kW system with annual generation of 33,448 kWh in Year 1, which is compensated at the net billing rate of $0.11 per kWh, based on the utility's avoided cost rate.
        - *Whole-Building Allocated Solar Generation* = 33,448 kWh
        - *Solar Generation Compensation Rate* = $0.11/kWh
- **Costs:** The property owner will bear all the costs and incentives for project funding and program participation. Therefore, the households will bear no cost for participation, making their total net household cost of solar zero.
    - *Fixed Solar Cost* = $0
    - *Annual Solar Cost* = $0
    - *Fixed Solar Incentives* = $0
    - *Annual Solar Incentives* = $0
- The utility bill escalation rate is estimated at 2.5% annually, and the solar degradation rate is set to 1% annually.

Note: In this example, it is assumed the solar generation compensation rate will increase at the same rate as the utility bill escalation rate, 2.5%, because the net billing rate is tied to the utility's avoided cost rate.

Whole-Building Savings Provided by Project (Percent) is calculated as follows:

- Total Projected Utility Costs = $\sum_{i=1}^{20} \$20{,}708 * (1 + 0.025)\text{^}(i - 1) = \$528{,}979$
- Total Net Building Cost of Solar = $0
- Total Solar Generation Compensation = $\sum_{i=1}^{20} \left[33{,}448\ kWh * (1 - 0.01)^{i-1}\right] * [\$0.11 * (1 + 0.025)\text{^}(i - 1)] = \$84{,}954$

- Total Net Building Energy Costs = $542,203 + $0 – $84,954 = $444,025
- Building Savings Provided by Project (Percent) = ($542,203 – $444,025) / $542,203 * 100 = 16%

Therefore, because the solar is incapable of providing 20% savings, 50% of the Whole-Building Savings Provided by the Project must be provided to residents:

Whole-Building Savings Provided by Project = $542,203 – $444,025 = $84,954 * 0.5 = **$42,477**

By providing benefits with a value of $42,477 over the life of the project to all residents of the building, the project would comply with the required savings through 50% of the building's net financial benefits.

Because the benefits will be distributed individually to each household, the household savings provided by project can be calculated by allocating the savings proportionally to each household, as shown in Table B-2.

Table B-2. Proportional benefit breakdown by unit and unity type

Unit Type	Number of Units in Building by Unit Type	Total Bedrooms in Building by Unit Type	Proportion of Total Building Benefit for Each Unit Type	Proportion of Total Building Benefit for Each Unit (household proportion)
1-bedroom	4	4	5.2%	1.3%
2-bedroom	16	32	42.1%	2.6%
3-bedroom	8	24	31.6%	4.0%
4-bedroom	4	16	21.1%	5.3%

Therefore, the dollar value of the benefits to be allocated to each household over the life of the project is as follows:

- 1-bedroom = $42,477 * 1.3% = $552
- 2-bedroom = $42,477 * 2.6% = $1,104
- 3-bedroom = $42,477 * 4.0% = $1,699
- 4-bedroom = $42,477 * 5.3% = $2,251

The Annual Household Savings Provided by Project can be calculated by dividing the household proportion above by the Project Life of 20 years.

Example 4: Community Solar, Representative Data

A Solar for All program aims to use a community solar program to serve households in rental units in a given utility service territory that earn up to 200% of the federal poverty guidelines. The program aims to offer standard community solar subscriptions that provide more than 20% savings free to households for 10 years using Residential Energy Consumption Survey data to calculate annual baseline energy consumption for rented single-family homes.

In this example:

- **Duration:** The household secures a 10-year subscription.
  - *Project Lifetime* = N = 10 years
- **Baseline:** Option 2, Representative data. The Residential Energy Consumption Survey annual baseline utility consumption for a rented single-family home is 9,950 kWh. The relevant residential utility rate is $0.1882 per kWh. Therefore, the resulting annual baseline utility cost is 9,950 * $0.1882 = $1,873.
  - *Annual Baseline Utility Cost* = $1,873
- **Benefits:** The program subscribes the household to a 5,500-kWh annual community solar subscription, which is guaranteed for the life of the subscription. The subscribed energy is compensated at the utility avoided cost rate of $0.1368 per kWh.
  - *Household Allocated Solar Generation* = 5,500 kWh
  - *Solar Generation Compensation Rate* = $0.1368/kWh
  - *Storage* = N/A
  - *Energy Efficiency* = N/A
- **Costs:** The community solar subscription is provided to households at no cost, so the net cost of solar is zero.
  - *Fixed Solar Cost* = $0
  - *Annual Solar Cost* = $0
  - *Fixed Solar Incentives* = $0
  - *Annual Solar Incentives* = $0
- The utility bill escalation rate is estimated at 2.5% annually, and the solar degradation rate is set to 0% because the subscription kWh amount is guaranteed over the project lifetime.

Total Household Savings Provided by Project (Percent) is calculated as follows:

- Total Projected Utility Costs = $\sum_{i=1}^{10} \$1{,}873 * (1 + 0.025)\text{^}(i - 1) = \$20{,}984$
- Total Net Household Cost of Solar = $0 = $0
- Total Solar Generation Compensation = $\sum_{i=1}^{10} [5{,}500\ kWh * (1 - 0)^{i-1}] * \$0.1368/kWh * (1 + 0.025)\text{^}(i - 1) = \$8{,}429$
- Total Net Household Energy Costs = $20,984 + $0 – $8,429 = $12,555
- Total Household Percent Savings Provided = ($20,984 – $12,555) / $20,984 * 100 = 40%

By providing household savings of 40%, this project would comply with the required 20% savings.

The Annual Household Savings Provided by Project is calculated as follows:

> Total Projected Utility Costs - Total Net Household Energy Costs / Project life = ($20,984 – $12,555) / 10 = $843.

Example 5: Single-Family Solar Plus Storage, Historical Actual Bills

A Solar for All program plans to install rooftop solar plus behind-the-meter battery storage for households living in single-family homes via low-interest loans. The household is on a net billing rate where all energy consumed on-site offsets the full retail rate whereas exported energy is compensated at the avoided cost rate. The battery storage allows the household to use all solar generation without exporting any to the grid. As a result, the solar generation offsets electricity used at the retail rate. Therefore, the solar generation compensation rate is equal to the residential retail rate. Although the storage may provide resilience benefits, the battery system provides no further direct financial benefit to the household.

The following general household savings formula shows inclusion of storage terms:

Equation 3

$$\textit{Total Net Household Energy Costs} = \textit{Total Projected Utility Costs} + \textit{Total Net Household Cost of Project}$$

Equation 4

$$\textit{Total Net Household Cost of Project} = \left[\sum_{i=0}^{N} \textit{Annual Net Household Cost of Solar + Storage}_i\right] - \textit{Total Solar Generation Compensation} - \textit{Total Storage Compensation}$$

Equation 5

$$\begin{aligned}\textit{Annual Net Household Cost of Solar + Storage in year } i &= \textit{Fixed Solar Cost}_i + \textit{Annual Solar Cost}_i + \textit{Fixed Storage Cost}_i \\ &+ \textit{Annual Storage Cost}_i - \textit{Fixed Solar Incentives}_i \\ &- \textit{Annual Solar Incentive}_i - \textit{Fixed Storage Incentives}_i \\ &- \textit{Annual Storage Incentive}_i\end{aligned}$$

In this example:

- **Duration:** The household secures a 20-year loan via the Grantee's program.
  - *Project Lifetime* = N = 20 years
- **Baseline:** Option 1, Historical actual bills. The household's annual baseline utility costs are $2,200 based on 12 months of historical utility data.
  - *Annual Baseline Utility Cost* = $2,200
- **Benefits:** The program installs a 5-kW photovoltaic (PV) system and 2-kW/4-kWh battery system projected to produce 7,041 kWh in Year 1 (after accounting for losses associated with battery charging/discharging), which is compensated at the residential retail rate of $0.1284/kWh. Storage enables the solar generation to offset electricity purchased from the utility at the retail rate rather than exported and compensated at a lower avoided cost rate.
  - *Household Allocated Solar Generation* = 7,041 kWh
  - *Solar Generation Compensation Rate* = $0.1284/kWh
- **Costs:** The 20-year loan has no down payment but a monthly payment of $25 starting in Year 1.

    - *Fixed Solar Cost* = $0
    - *Fixed Storage Cost* = $0
    - Combined *Annual Solar and Storage Cost* = $25/month * 12 months = $300
    - *Fixed Solar Incentives* = $0
    - *Annual Solar Incentives* = $0
    - *Fixed Storage Incentives* = $0
    - *Annual Storage Incentives* = $0
    - *Efficiency = N/A*
- The utility bill escalation rate is estimated at 2.5% annually, and the solar degradation rate is set to 1% annually.
- Total Household Savings Provided by Project (Percent) is calculated as follows:
    - Total Projected Utility Costs = $\sum_{i=1}^{20} \$2{,}200 * (1 + 0.025)\text{^}(i - 1) = \$56{,}198$
    - Total Net Household Cost of Solar = $0 + $0 + ($300 * 20 years) – $0 – $0 – $0 – $0 = $6,000
    - Total Solar + Storage Generation Compensation = $\sum_{i=1}^{20} [7{,}041\ kWh * (1 - 0.01)^{i-1}] * \$0.1284 * (1 + 0.025)\text{^}(i - 1) = \$20{,}875$
    - Total Net Household Energy Costs = $56,198 + $6,000 – $20,875 = $41,324
    - Total Household Percent Savings Provided = ($56,198 – $41,324) / $56,198 * 100 = 27%

By providing household savings of 27%, this project would comply with the Solar for All required threshold of 20% savings.

The Annual Household Savings Provided by Project is calculated as follows:

> Total Projected Utility Costs – Total Net Household Energy Costs / Project life = ($56,198 – $41,324) / 20 = $744.

Example 6: Single-Family Solar Plus Storage, Historical Actual Bills

A Solar for All program plans to install rooftop solar plus behind-the-meter battery storage for households living in single-family homes via low-interest loans. The household will receive net metering compensation for all solar energy and will also be compensated for the battery by participating in a virtual power plant (VPP) program operated by a third party.

In this example:

- **Duration:** The household secures a 20-year loan via the Grantee's program.
  - *Project Lifetime* = N = 20 years
- **Baseline:** Option 1, Historical actual bills. The household's annual baseline utility costs are $2,200 based on 12 months of historical utility data.
  - *Annual Baseline Utility Cost* = $2,200
- **Benefits:** The program installs a 5-kW PV system and 2-kW/4-kWh battery system projected to produce 7,041 kWh in Year 1, which is compensated via net metering at the residential retail rate of $0.1284/kWh. The household is also paid $20 a month for allowing a third-party operator to call the battery up to four times a month for a VPP program.
  - *Household Allocated Solar Generation* = 7,041 kWh
  - *Solar Generation Compensation Rate* = $0.1284/kWh
  - *Battery Compensation* = $20/month = $240 annually
- **Costs:** The 20-year loan has no down payment but a monthly payment of $25 starting in Year 1.
  - *Fixed Solar Cost* = $0
  - *Fixed Storage Cost* = $0
  - *Combined Annual Solar & Storage Cost* = $30/month * 12 months = $360
  - *Fixed Solar Incentives* = $0
  - *Annual Solar Incentives* = $0
  - *Fixed Storage Incentives* = $0
  - *Annual Storage Incentives* = $0
  - *Efficiency = N/A*
- The utility bill escalation rate is estimated at 2.5% annually, and the solar degradation rate is set to 1% annually.

Total Household Savings Provided by Project (Percent) is calculated as follows:

- Total Projected Utility Costs = $\sum_{i=1}^{20} \$2{,}200 * (1 + 0.025)\text{^}(i - 1) = \$56{,}198$
- Total Net Household Cost of Solar = $0 + $0 + ($360 * 20 years) – $0 – $0 – $0 – $0 = $7,200
- Total Solar + Storage Generation Compensation = $\sum_{i=1}^{20}[7{,}041\ kWh * (1 - 0.01)^{i-1}] * \$0.1284 * (1 + 0.025)\text{^}(i - 1) + \sum_{i=1}^{20}[\$240] = \$25{,}675$
- Total Net Household Energy Costs = $56,198 + $7,200 – $20,875 = $37,723
- Total Household Percent Savings Provided = ($56,198 – $37,723) / $56,198 * 100 = 33%

By providing household savings of 33%, this project would comply with the Solar for All required threshold of 20% savings.

The Annual Household Savings Provided by Project is calculated as follows:

> Total Projected Utility Costs – Total Net Household Energy Costs / Project life = ($56,198 - $37,723) / 20 = $924.

Example 7: Single-Family, Energy Efficiency Upgrades

A Solar for All program plans to install rooftop solar and energy efficiency upgrades for households living in single-family homes. The program will install solar and energy efficiency at no cost to the household. The program will also leverage a home energy rebate for half of the cost of an electric panel upgrade. The program will establish the historical utility baseline by collecting the past 12 months of electric bills from each household. The sum of these bills establishes the annual baseline utility cost.

In this example:

- **Duration:** The household receives the solar and efficiency installations at no cost; the life of the solar installation is set at 25 years, and the life of the energy efficiency measures is set at 15 years. Because the household receives project benefits over 25 years, the project life is set at 25 years, and the cost savings from the energy efficiency measures are included only for the first 15 years.
    - *Project Lifetime* = N = 25 years
- **Baseline:** Option 1, Historical actual bills. The household's annual baseline utility costs are $1,200 based on 12 months of historical utility data.
    - *Annual Baseline Utility Cost* = $1,200
- **Benefits:** The program installs a 4.5-kW system projected to produce 6,835 kWh in Year 1, which is compensated via net metering at the residential retail rate of $0.09/kWh. The package of energy efficiency measures is estimated by the weatherization agency to save the household an average of $372 per year for 15 years.
    - *Household Allocated Solar Generation* = 6,835 kWh
    - *Solar Generation Compensation Rate* = $0.09/kWh
    - *Storage* = N/A
    - *Energy Efficiency* = $372 per year for 15 years
- **Costs:** The household bears no cost for solar and energy efficiency but must pay for the electric panel upgrade to access the rebate. The electric panel upgrade costs $1,500, and the household receives a rebate for half of the cost at the end of Year 1.
    - *Fixed Solar Cost* = $0
    - *Annual Solar Cost* = $0
    - *Fixed Solar Incentives* = $0
    - *Annual Solar Incentives* = $0
    - *Fixed Energy Efficiency/Enabling Upgrade Cost* = $1,500
    - *Annual Energy Efficiency Cost* = $0
    - *Fixed Energy Efficiency/Enabling Upgrade Incentives* = $750
    - *Annual Energy Efficiency Incentives* = $0
- The utility bill escalation rate is estimated at 2.5% annually, and the solar degradation rate is set to 1% annually.

Note: In this example, it is assumed the solar generation compensation rate will increase at the same rate as the utility bill escalation rate, 2.5%, because it is a net metering rate tied to the residential retail rate.

Total Household Savings Provided by Project (Percent) is calculated as follows:

- Total Projected Utility Costs = $\sum_{i=1}^{25} \$1{,}200 * (1 + 0.025)\text{^}(i - 1) = \$40{,}989$

- Total Net Household Cost of Project = $1,500 – $750 = $750
- Total Solar Generation Compensation = $\sum_{i=1}^{25}[6{,}835\ kWh * (1 - 0.01)^{i-1}] * \$0.09 * (1 + 0.025)\hat{}(i - 1) = \$18{,}459$
- Total Energy Efficiency Cost Savings = $\sum_{i=1}^{15}[\$372] = \$5{,}580$
- Total Net Household Energy Costs = $40,989 + $750 – $18,459 – 5,580 = $17,701
- Total Household Percent Savings Provided = ($40,989 – $17,701) / $40,989 * 100 = 57%

By providing household savings of 57%, this project would comply with the Solar for All required threshold of 20% savings.

The Annual Household Savings Provided by Project is calculated as follows:

Total Projected Utility Costs – Total Net Household Energy Costs / Project life = ($40,989 – $17,701) / 25 = $932.

Appendix C: Household Savings Baseline Methodology Options

Table C-1. Household Savings Baseline Methodology Options

Subprogram Type	Methodology Option	Description
Standard	Option 1: Historical actual bills	Grantees should collect 12 continuous months of utility bill data for the household prior to the point of financial transaction. There can be up to a 6-month lag in data.
	Option 2: Representative data	Grantees may use appropriate representative data to calculate the average residential utility costs for the area. The U.S. Environmental Protection Agency's (EPA's) preferred data sources are the Residential Energy Consumption Survey provided by the U.S. Energy Information Administration (EIA) and the National Renewable Energy Laboratory (NREL) ResStock State Level Residential Building Stock and Energy Efficiency & Electrification Packages Analysis Dashboard, but Grantees wishing to use a more locally specific data source should provide justification.
Multifamily: Submetered buildings	Option 1: Historical actual bills	Grantees may calculate the baseline energy consumption and costs for submetered multifamily buildings using historical individual tenant utility bill data, when possible. Grantees should specify whether their baseline calculations include or exclude common area loads, how those loads are calculated, and the rationale for their inclusion or exclusion. Grantees may not base a project's household savings calculation exclusively on a multifamily housing building's common area load.
	Option 2: Representative data	Grantees may use appropriate representative data to calculate the average residential utility costs for the area. EPA's preferred data sources are the Residential Energy Consumption Survey provided by EIA and the NREL ResStock State Level Residential Building Stock and Energy Efficiency & Electrification Packages Analysis Dashboard, but Grantees wishing to use a more locally specific data source should provide justification.
Multifamily: Master-metered buildings	Option 1: Historical actual bills	Grantees may use the whole-building utility bill to calculate the baseline energy consumption and costs. To do so, divide the whole-building electricity costs proportionally by the number of households in the building using a relevant basis (e.g., number of households/units, weighted household/unit square footage, weighted household/unit occupant count, or number of bedrooms). Grantees should specify whether their baseline calculations include or exclude common area loads, how those loads are calculated, and the rationale for their inclusion or exclusion. Grantees are not allowed to base a project's household

Subprogram Type	Methodology Option	Description
		savings calculation exclusively on a multifamily housing building's common area load.
	Option 2: Representative data	Grantees may use appropriate representative data to calculate the average residential utility costs for the area. EPA's preferred data sources are the Residential Energy Consumption Survey provided by EIA and the NREL ResStock State Level Residential Building Stock and Energy Efficiency & Electrification Packages Analysis Dashboard, but Grantees wishing to use a more locally specific data source should provide justification.
	Option 3: Utility allowances	For regulated affordable multifamily housing, Grantees may use the applicable utility allowance(s) to calculate baseline energy consumption and costs. To do so, multiply the approved utility allowance for each household by 20% to determine the required household savings threshold. If non-utility benefits are delivered in aggregate to all households, the value of the non-utility benefits should represent at least 20% of the aggregate value of the utility allowance for all households. If non-utility benefits are delivered individually to each household, the value of the non-utility benefits should represent at least 20% of the utility allowance for each participating household.
Community solar	Option 1: Historical actual bills	Grantees should collect 12 continuous months of utility bill data for the household prior to the point of financial transaction. There can be up to a 6-month lag in data.
	Option 2: Representative data	Grantees may use appropriate representative data to calculate the average building utility costs for the area. EPA's preferred data source is the Residential Energy Consumption Survey provided by EIA, but Grantees wishing to use a more locally specific data source should provide justification.
Storage	Option	Grantees should follow the guidance for the applicable solar type (e.g., single family, multifamily, or community solar) to calculate the household baseline.
No electric service baseline	Option 1: Historical actual bills	Grantees should collect the cost of the nonelectric fuel source that solar and electrification will displace. The annual nonelectric fuel costs are then used as the baseline utility costs. This ensures households participating in the program will pay less than they were paying for the nonelectric fuel source. For nonelectric historical fuel consumption baseline, Grantees should collect 12 continuous months of nonelectric fuel cost data for the household prior to the point of financial transaction. There can be up to a 6-month lag in data. Where

Subprogram Type	Methodology Option	Description
		data are not available, Grantees should propose a method to estimate annual costs. If the household's nonelectric fuel consumption is only partially displaced by solar and electrification, only the portion of the cost displaced should be used as the baseline utility costs.
	Option 2: Representative data	Grantees should calculate household savings for a solar and electrification project using the average utility rate of the service territory and average residential consumption for dwellings in the area. EPA's preferred data sources are the Residential Energy Consumption Survey provided by EIA and the NREL ResStock State Level Residential Building Stock and Energy Efficiency & Electrification Packages Analysis Dashboard, but Grantees wishing to use a more locally specific data source should provide justification. This option should be used when households will receive electricity from a utility. This option should not be used if the household is installing an off-grid (microgrid) system.
	Exception	If a household did not have prior electric service and will continue to not have electric service from the local utility *and* if the household pays no cost for Solar For All, Grantees may request to be exempted from calculating baseline and projected utility costs. The Grantee should still calculate and report the value of solar benefits provided using net metering or net billing rates from an applicable electric utility. Such projects will be deemed to meet the 20% household savings requirement.
Electrification	Option	Grantees should follow the guidance for the applicable solar type (e.g., single family, multifamily) to calculate the household baseline. Then, the anticipated change in electric and nonelectric costs resulting from electrification should be applied to the projected utility baseline.
Energy efficiency measures: New construction	Option 1: Energy model estimates	Grantees may use an energy model or engineering estimates provided by the developer, engineer, or contractor to estimate baseline utility costs. This approach is recommended where available, especially for buildings that exceed required building energy codes. For new construction, energy efficiency measures should be incorporated into the building projected utility baseline rather than the savings.
	Option 2: Representative data	Grantees may use appropriate representative data to calculate the average residential utility costs for similar residential units in the utility service territory.

Subprogram Type	Methodology Option	Description
		For new construction, energy efficiency measures should be incorporated into the building projected utility baseline rather than the savings.
Energy efficiency measures: Existing buildings	Option 1: Historical actual bills	Grantees should collect 12 continuous months of utility bill data for the household prior to the point of financial transaction. There can be up to a 6-month lag in data. If the energy efficiency measures are funded through Solar For All, the anticipated change in utility costs resulting from energy efficiency measures may be applied to the historical utility baseline to calculate the projected utility baseline or applied as a benefit in the household savings calculation.
	Option 2: Representative data	Grantees may use appropriate representative data to calculate the average residential utility costs for the area. EPA's preferred data sources are the Residential Energy Consumption Survey provided by EIA and the NREL ResStock State Level Residential Building Stock and Energy Efficiency & Electrification Packages Analysis Dashboard, but Grantees wishing to use a more locally specific data source should provide justification. If the energy efficiency measures are funded through Solar For All, the anticipated change in utility costs resulting from energy efficiency measures may be applied to the projected utility baseline or applied as a benefit in the household savings calculation.