Energy Poverty Policy Simulator Methodology

Tool overview

EPPS is a state level tool that is designed to estimate the costs and bill impacts of a state implementing a suite of energy poverty policies. EPPS currently only accounts for electricity expenditures.

State level baselines

Annual electricity costs and burden

The EPPS tool builds the baselines of annual electricity bills and burden for all 50 states and across federal poverty level (FPL) and state median income (SMI) groups. This data comes from the Department of Energy's Low Income Energy Affordability Data (LEAD) tool. The LEAD tool collects household energy expenditure information from the US Census Bureau's American Community Survey (ACS) and computes census tract level estimates. There have been two data releases of LEAD tool data. The most recent data, which EPPS utilizes, comes from the ACS 5-year estimates for 2018–2022. This baseline will serve as the basis for comparison once energy bill and burden impacts are calculated from the EPPS policy levers.

Annual consumption

The DOE LEAD tool provides average annual energy expenditure and income for each FPL and SMI category. We reverse calculate an average consumption figure for each of these income groups by dividing the energy expenditure figure by the average residential electricity rate in 2022 for each state. State-level electricity rate information is available for download in the EIA Electricity Data Browser. Once each state has an average consumption figure for each income group, we connect those values by creating a line of best fit through a linear regression. With this state-specific linear regression, we can estimate the annual energy consumption of any income for any state.

Energy poverty policies

Low-Income Home Energy Assistance Program

Description

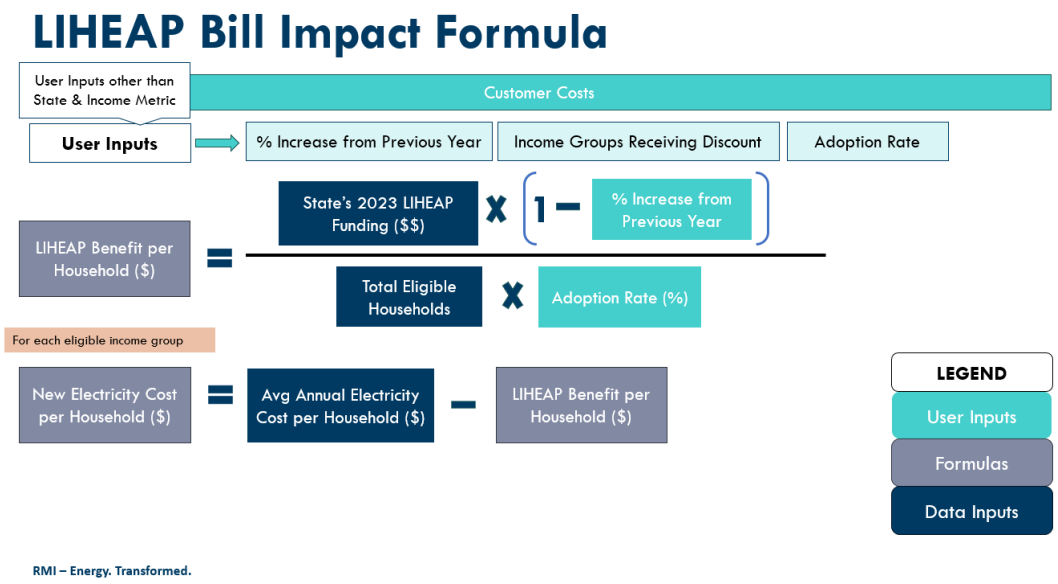
The Low-Income Home Energy Assistance Program, LIHEAP, is a federal energy assistance block grant allocated to all states in the country to support low-income energy affordability. More info on LIHEAP is available here.

The LIHEAP policy module in EPPS will estimate household bill and burden impacts based on user inputs tied to state program funding, income eligibility, and adoption rate among eligible households.

Policy inputs

User input	Unit	Description	Additional note
Percent increase from last year's funding	%	Percent increase in energy assistance funding state received last year (of available data – 2023)	Default value is set to 100% for all states
Income groups eligible	Selection from list	Select the income groups eligible to receive LIHEAP bill assistance	If State Median Income (SMI) toggle is selected, the user can select multiple income groups from the following list: 0–30%, 30%–60%,60%–80%,80%–100%,100%+ If Federal Poverty Level (FPL) toggle is selected, the user can select multiple income groups from the following list: 0–100%, 100%–150%,150%–200%,200%–400%,400%+
Adoption rate	%	Percentage of eligible households receiving LIHEAP benefit	Default value: State-level adoption rate from latest year of available data, 2023.
Funding model	Selection from list	Select the source that will pay for the costs of this specific program	Available funding options are: Ratepayer: all customers in state Ratepayer: only residential customers in state Ratepayer: only non-eligible residential customers in state Shareholder via return on equity Federal income taxpayers

Bill impact formula



Low-Income Energy Efficiency

Description

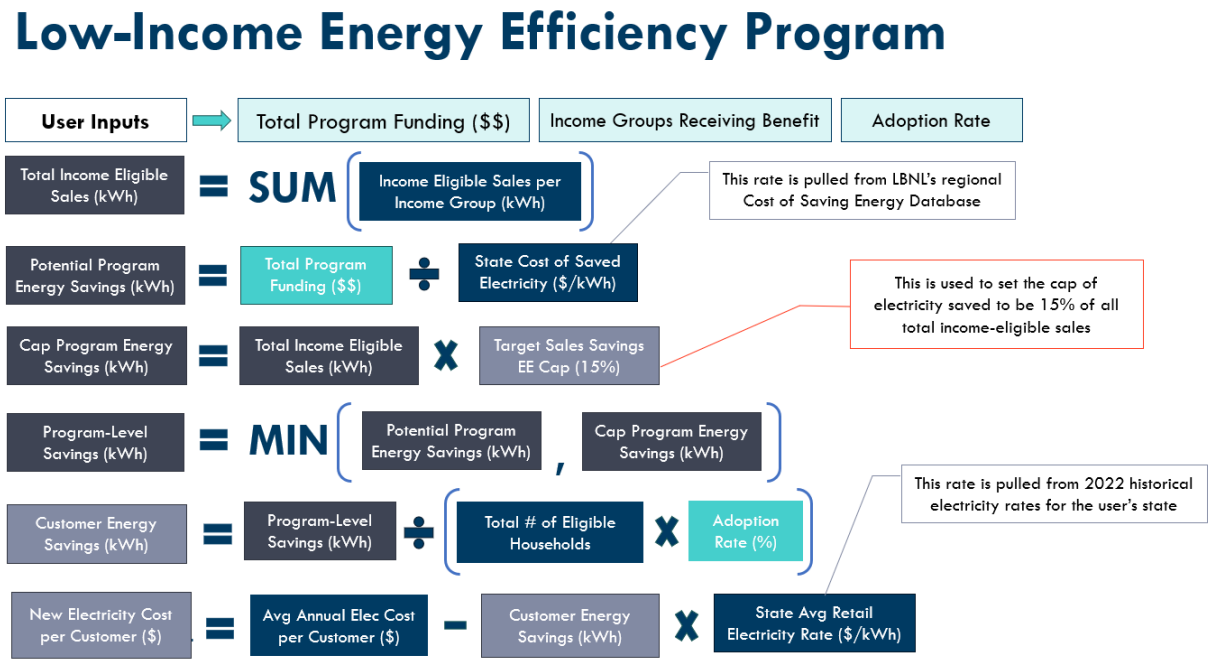
Low-income energy efficiency programs provide a targeted benefit to low-income customers — such as weatherization, more efficient appliance deployment, and/or improved controls — that help customers to lower their consumption, thus lowering overall energy bills.

Policy inputs

User input	Unit	Description	Additional note
Total program funding	$	Total annual funding for a state's energy efficiency program	Default value is set to $500,000

Bill impact formula

A user can select the total funding size of the program, and the function calculates the minimum "Program-Level Energy Savings" possible between the savings possible with that funding or the technical cap of 15% of total low-income eligible sales. We calculate a potential program energy savings using the input funding divided by the state's LBNL Cost of Saved Electricity ($/kWh) (COSE), but the maximum allowable energy savings is set by the technical cap on existing income-eligible sales. Those "Program-Level Energy Savings" are then distributed across eligible households to calculate a discount per household using the state's average retail electricity rate.



Flat Discount Rate

Description

Flat "low-income discount rates are a bill discount policy targeted to lower the energy bills and burden of low-income households by discounting a fixed percentage off eligible customers' energy bills. Compared to tiered discount rates, flat discount rates will apply the same rate to all eligible income groups.

Policy inputs

User input	Unit	Description	Additional note
Discount rate	%	percentage of a customer's bill being discounted	Default value is set to 30% for states without a discount rate. If state selected has an existing discount rate, the average state level discount rate is populated as default value.

Bill impact formula

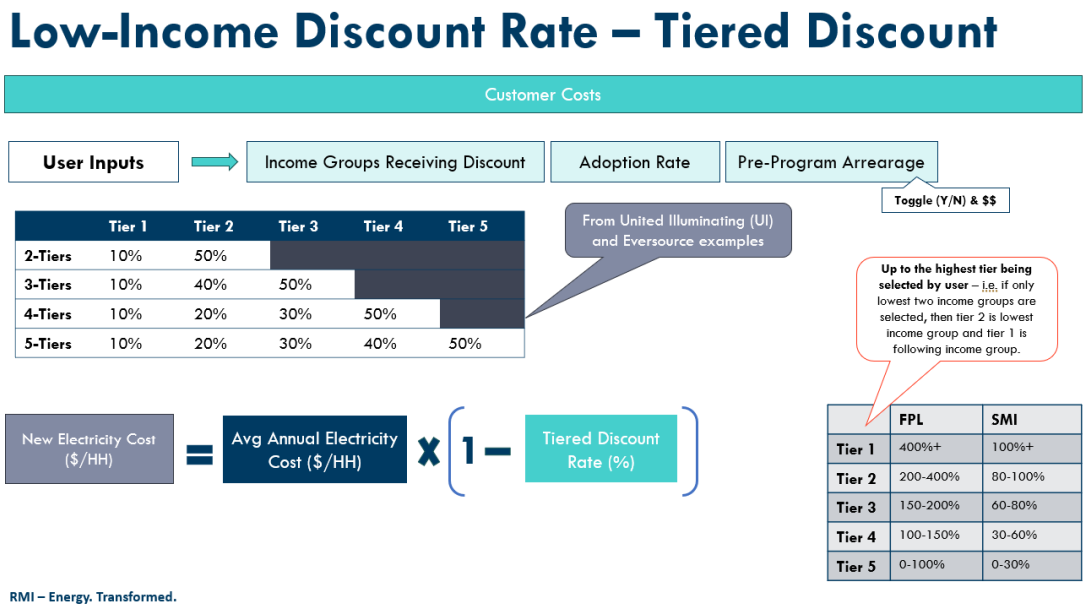
Tiered Discount Rate

Description

Tiered low-income discount rates are a bill-discount policy targeted to lower the energy bills and burden of low-income households by discounting a certain percentage off an eligible customers' energy bill. The discount that each eligible income group receives will vary, as they are typically tailored to provide the largest level of discount to the income group with the lowest income.

Bill impact formula

The tiered discount rates pre-set in EPPS' backend are based off the tiered discounts for electricity currently administered by United Illuminating and Eversource utilities.



Percentage of Income Payment Plan (PIPP)

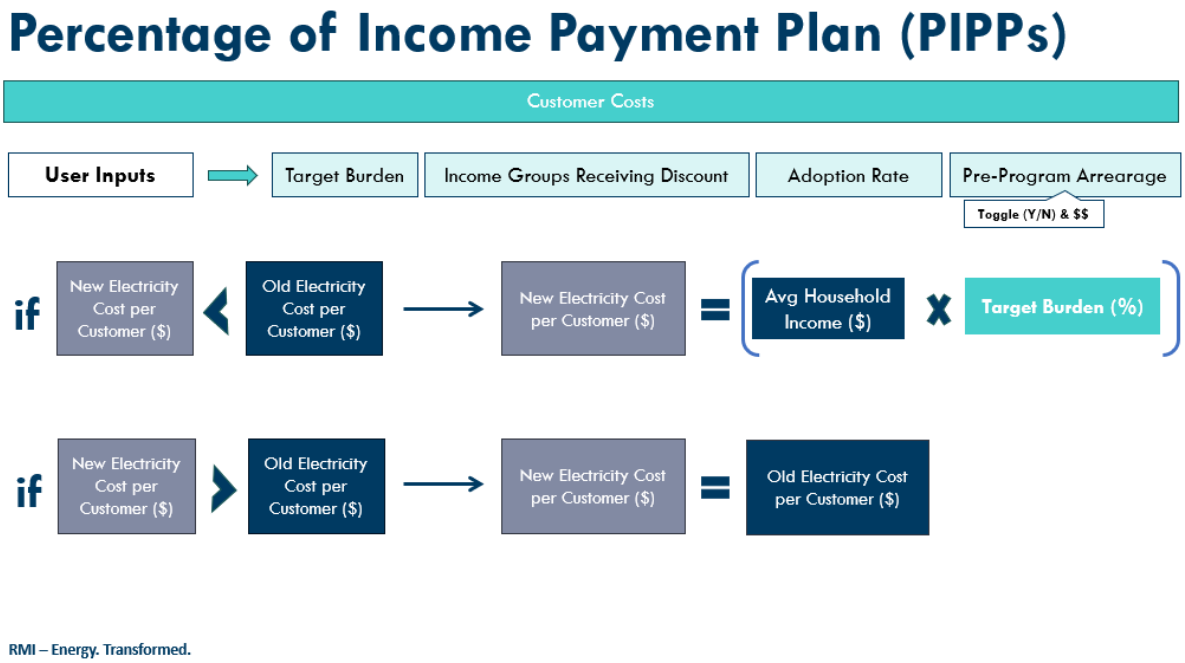
Description

Percentage of income payment plans (PIPPs) are a bill-discount policy targeted to lower the energy bills and burden of low-income households by capping energy bills at a set percentage of a household's income. Currently, nine states across the country have a PIPP. The most common percentage an energy bill is capped at is between 4% and 6%.

Policy inputs

User input	Unit	Description	Additional note
Target energy burden	%	percentage of income that electricity bill should be capped at for individual income group	Default value is set to 4% for states without an existing PIPP. If state selected has a PIPP, the average state level PIPP is populated as default value.

Bill impact formula



Arrearage Forgiveness Program

Description

Arrearage forgiveness programs provide customers who are behind on their energy bills relief by forgiving a portion of their utility debt. Many states and utilities provide these programs for low-income customers on the conditions that they are enrolled in a bill discount program and/or make a certain number of on time payment. For the purposes of this tool, arrearage forgiveness programs do not lead to a reduction in annual electricity bills and are solely reflected within the costs section of this tool.

Policy inputs

User input	Unit	Description	Additional note
Annual arrearage amount	$	Annual amount of past-due utility bills per customer that will be forgiven per customer	Default value is $500

Cost Control Policies

RMI has conducted national level analyses on policy levers that lead to savings in electricity system-related costs, providing energy affordability benefits for all customers. The policies focused on within these analyses are described as “cost control” policies. The costs saving findings attached to each of these analyses have been translated to the state-level ratepayer level to identify the annual bill impact savings attributable to employing each cost control policy.

Clean Repowering

Description

Clean repowering is a project development strategy that sites new clean generation at the same point of interconnection as existing or retiring fossil generators. This allows these projects to take advantage of specific IRA incentives and to potentially pursue a streamlined interconnection process. The analysis constructs a set of potential clean repowering portfolios for each balancing authority and then selects the portfolio from that set that provides the most savings for the balancing authority. RMI's clean repowering analysis identifies the total level of savings attributable to each balancing authority pursuing all the clean repowering opportunities within their jurisdiction. Reference this website for more information on RMI's clean repowering analysis.

Economic Dispatch

Description

Power plants are ideally operated in an order going from least cost to highest cost — their "merit-order." This practice, which we refer to as "economic dispatch," ensures that consumer costs for electricity are as low as possible by using the cheapest generation whenever available. When utilities run their coal plants uneconomically and allow them to be dispatched instead of other cheaper forms of generation, the difference in costs is directly passed on to ratepayers. RMI's economic dispatch analysis identifies the total level of losses attributable to each coal plant operating uneconomically. Reference this website for more information on RMI's economic dispatch analysis.

Return on Equity (ROE) Reform

The return on equity (ROE) component of utility regulation is an important financial consideration that accounts for 15%–20% of customers' bills. Without reform, high ROEs will make the energy transition slower for utilities and more expensive for customers, costing billions of dollars to ratepayers. RMI's ROE Reform Report has information on the total systemwide savings that are possible by reforming electric utility shareholder's ROE. Reference this report for more details on ROE reform.

Cost results

Cost calculations

Each energy poverty policy has an associated cost.

- **LIHEAP**: Total Cost of Policy ($) = (2023 LIHEAP Funding [$] * (1 + Percent Increase from Previous Year [%]) * (1 + Administrative Cost [%])
    - The current administrative cost value is set at 2.5%.
- **Low-Income Discount Rates (Tiered or Flat) and PIPP**: Total Cost of Policy ($) = ((Discount per Customer ($) * # of eligible households * adoption rate (%)*(1 + Administrative Cost [%])
    - The current administrative cost value is set at 2.5%.
- **Low-Income Energy Efficiency**: Total Cost of Policy ($) = Total Program Funding ($) * (1 – Rate Ratio (%))
    - The rate ratio is calculated by dividing each state's average retail electricity rate ($/kWh) by the cost of saved electricity (COSE) ($/kWh). Rate ratios range between 0.15 and 1.0.

- **Arrearage Forgiveness:** Total Cost of Policy ($) = ((Annual arrearage amount forgiven per customer ($) * # of eligible households * adoption rate (%)*(1 + Administrative Cost [%])

Energy poverty policies show up in the total cost outputs AND energy bill and burden impacts, while cost control policies only pass through as customer benefits in the energy bill and burden outputs.

Savings from avoided arrears

EPPS estimates the savings attributable to avoided arrears for each portfolio of energy poverty policies. Avoided arrears are estimated based off the level energy burden is reduced for a state's income group with the lowest average household income. This analysis assumes that 16.3% of all households within a state are in arrears, per the latest national average reported by NEADA.

Funding models

Users have the option to select which funding models will be used to cover the costs of each specific policy. After the total cost of each policy selected is calculated, one or multiple policy's costs will be passed through the funding model modules and output the costs to the respective stakeholders subsidizing each policy.

Federal income tax

The "Federal Income Tax" funding model takes the total and aggregated cost of the policies and calculates the increase in federal taxes for each income bracket.

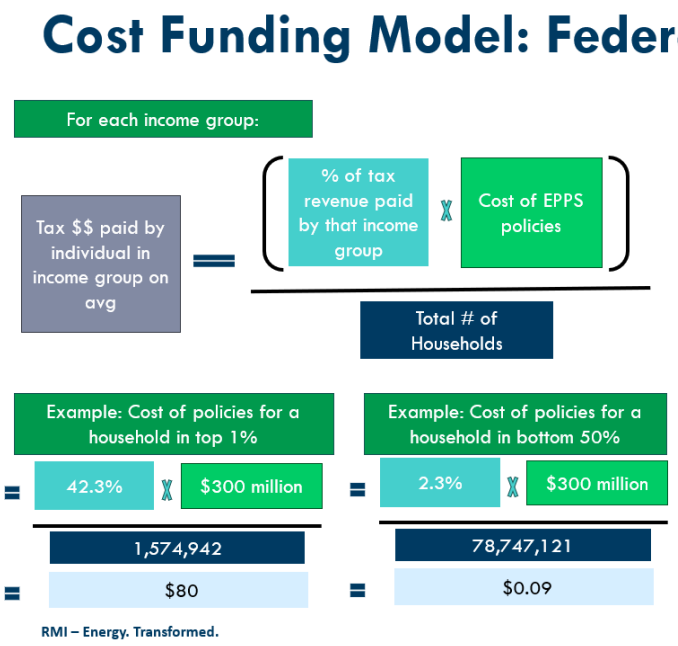


Table 1. Summary of Federal Income Tax Data, Tax Year 2020

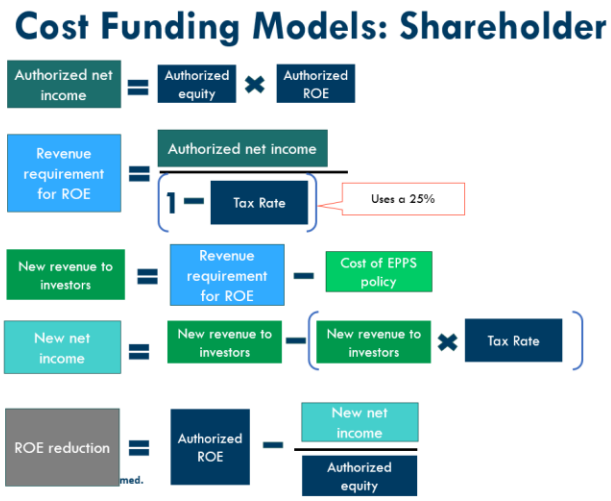
	Top 1%	Top 5%	Top 10%	Top 25%	Top 50%	Bottom 50%	All Taxpayers
Number of Returns	1,574,942	7,874,712	15,749,424	39,373,561	78,747,121	78,747,121	157,494,242
Average Tax Rate	26.0%	22.4%	20.3%	17.1%	14.8%	3.1%	13.6%
Average Income Taxes Paid	$458,894	$136,091	$79,897	$38,396	$21,187	$504	$10,845
Adjusted Gross Income ($ millions)	$2,780,754	$4,775,995	$6,198,022	$8,862,578	$11,257,092	$1,276,009	$12,533,102
Share of Total Adjusted Gross Income	22.2%	38.1%	49.5%	70.7%	89.8%	10.2%	100.0%
Income Taxes Paid ($ millions)	$722,732	$1,071,681	$1,258,335	$1,511,786	$1,668,410	$39,671	$1,708,081
Share of Total Income Taxes Paid	42.3%	62.7%	73.7%	88.5%	97.7%	2.3%	100.0%
Income Split Point	$548,336	$220,521	$152,321	$85,853	$42,184	$42,184	

Source: IRS, *Statistics of Income*, "Individual Income Rates and Tax Shares."

Source: https://taxfoundation.org/data/all/federal/latest-federal-income-tax-data-2024/

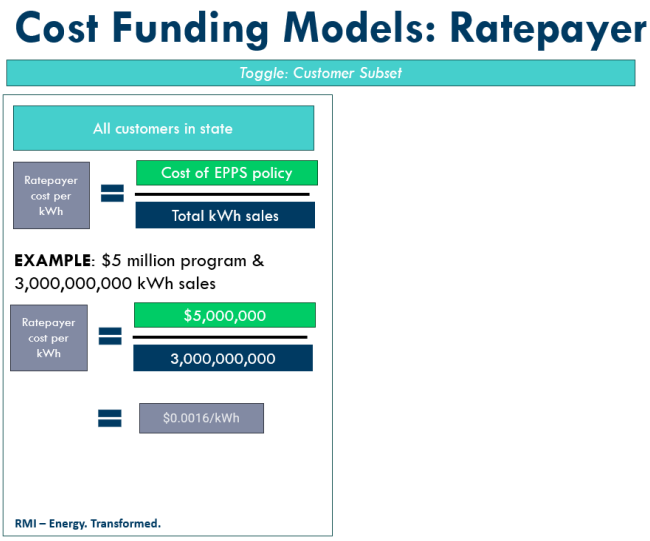
Shareholder

The "Shareholder" funding model takes the total and aggregated cost of the policies, creates a state-weighted ROE based on the share of utility sales coverage, and uses a calculated revenue requirement to reduce the state-weighted ROE to meet the cost of the policies.



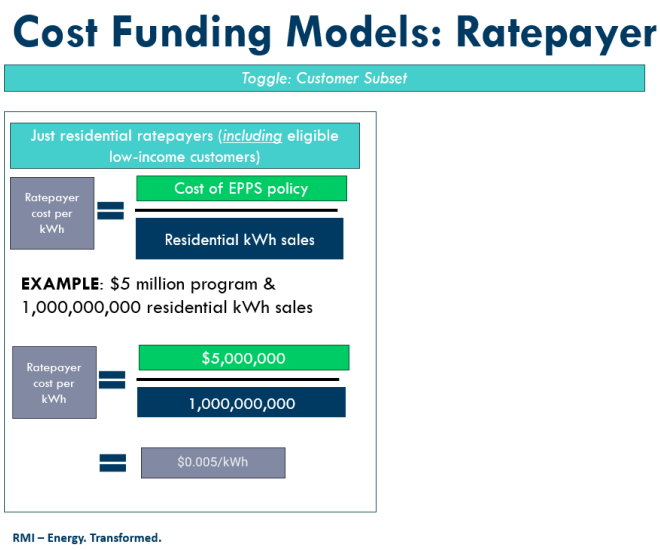
Ratepayer: All customers

The "Ratepayer: All Customers" funding model takes the total and aggregated cost of the policies and distributes the costs to industrial, commercial, and residential customers in the state based on their energy consumption.



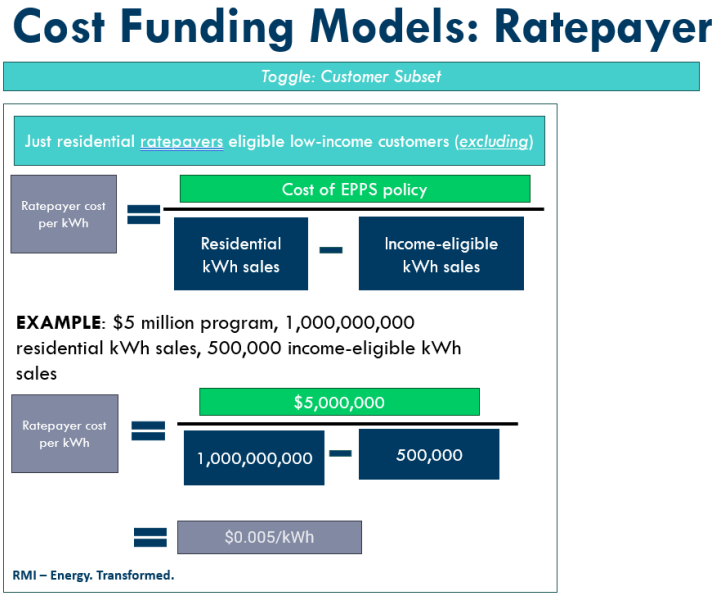
Ratepayer: Residential Customers

The "Ratepayer: Residential Customers" funding model takes the total and aggregated cost of the policies and distributes the costs to all residential customers in the state based on their energy usage.



Ratepayer: Non-Eligible Residential Customers

The "Ratepayer: Non-Eligible Residential Customers" funding model takes the total and aggregated cost of the policies and distributes the costs to all residential customers that are not selected in the income groups to receive the policy benefits.



Electricity Bill and Burden Reduction Impacts

EPPS calculated a new annual energy bill that incorporates reductions from energy poverty and cost control policies for each income group within a state. There are increases in annual energy bills if the ratepayer funded model is selected, which vary in amount based on costs of programs chosen for each type of ratepayer funding model. Each income group's new annual electricity bill value is then divided by that income group's average household income value to calculate a new electricity burden.