Enable the label

Optimizing electric appliance data and reporting to unlock a new home energy information ecosystem

The Inflation Reduction Act (IRA) is poised to deliver billions of dollars in rebates and tax credits to drive the adoption of efficient electric heat pumps, heat pump water heaters, induction stoves, electric vehicles, and rooftop solar systems across the United States over the next decade. Federal agencies and state governments are now designing programs to deliver these historic climate investments.[1]

The federal government must leverage the IRA to improve its collection and sharing of data around electric appliance uptake. In doing so, the government will achieve two important outcomes. First, it will **identify millions of new opportunities to educate and empower consumers to make better choices about their home energy infrastructure**, furthering progress toward our nation's climate goals. Second, it will **unlock a new home energy information ecosystem** that will create opportunities for private-sector innovations benefiting homeowners, buyers, sellers, and renters; product suppliers, distributors, and installers; real estate professionals; and others across the U.S. economy.

All of this can be achieved through select improvements to product labeling, data collection, storage, accessibility, and reporting, including:

- **Standardizing data collection** for IRA rebates and tax credits as efficient electric machines are deployed across the U.S.;

- **Introducing digital product labeling** for energy equipment that will radically improve house-level information and empower consumers; and

- **Enhancing agency reporting** of incentive uptake and product information to provide a critical resource for tracking the effectiveness of IRA implementation.

These changes will enable federal, state, and local governments to better target the delivery of IRA benefits to communities that need them most. They will help market participants, researchers, and policymakers understand and respond to changing market dynamics. They will create new opportunities for innovation and they will ensure greater accountability for public officials and participants in the market over the next decade of implementation.

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1. For example, the IRS requested comments on Section 25C Energy Efficient Home Improvement Credit implementation on October 5, 2022 (Notice 2022-48). Data collection and reporting for the HEEHRA rebate program has not yet been defined, but the Department of Energy posed questions about data collection and other topics in its January 18, 2023 Request for Information (DE-FOA-0002981).

Data collection

To most effectively implement the IRA, the Internal Revenue Service (IRS) and State Energy Offices (SEOs) must collect timely information about the **types of equipment** that are installed in buildings across the country, along with **equipment and installation costs** and **amounts claimed for rebates and tax credits**.

For the 25C Energy Efficient Home Improvement Credit and the 25D Residential Clean Energy Credit, the IRS currently collects energy property expenditure information from individual tax filers on [Form 5695, Residential Energy Credits](#). Information is collected on the cost of individual types of energy property (e.g., geothermal heat pumps, fuel cells) as well as more specific product details for certain product types (e.g., installed system capacity for fuel cells). Form 5695 is also used to collect the street address and zip code of the building in which the eligible energy property is installed.

Given that the IRA expanded and/or introduced the 25C, 25D, 30D, and 25E tax credits — and added credit sub-caps, product eligibility requirements, income limits, etc. — the IRS must expand its data collection in Form 5695 and other forms to separately collect claims information for each of the major residential clean energy product types covered by the IRA, as noted in the list at right.
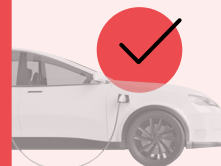
The IRS must collect claims information for each of the major residential clean energy product types covered by the IRA, including:

- heat pumps
- heat pump water heaters
- panelboards
- ground-source heat pumps
- rooftop solar
- battery storage
- electric vehicles

22	Energy property improvements subject to $2,000 credit limit exception	
a	Qualified heat pump property costs	22a
b	Qualified heat pump water heater property costs	22b
c	Qualified biomass stove property costs	22c
d	Qualified biomass boiler property costs	22d
e	Add lines 22a-d	22e
f	Multiply line 22e by 30% (0.30)	22f
g	Enter the smaller of line 22f or $2,000	22g
23	Energy property improvements subject to overall $1,200 credit limit	
a	Qualified panelboard upgrade costs	23a
b	Multiple line 23a by 30% (0.30)	23b
c	Enter the smaller of line 23b or $600	23c
d	Qualified natural gas, propane, or oil furnace or hot water boiler costs	23d
e	Multiple line 23d by 30% (0.30)	23e
f	Enter the smaller of line 23e or $600	23f
g	Qualified natural gas, propane, or oil water heater costs	23g
h	Multiple line 23g by 30% (0.30)	23h
i	Enter the smaller of line 23h or $600	23i
j	Qualified central air conditioner costs	23j
k	Multiple line 23j by 30% (0.30)	23k
l	Enter the smaller of line 23k or $600	23l

A mockup of IRS Form 5695 for tax year 2023 is shown in Figure 1.

For IRA rebate programs, data collection plans are still being developed, though statutory requirements will obligate SEOs to collect consistent and detailed information information for each element of "qualified energy property" (including heat pumps, heat pump water heaters, and panelboards) that is installed. This data will ultimately consist of:

- product type (model number, certification number, or PIN);

- rebate amount;

- equipment and installation costs; and

- street address and zip code where energy property is installed.

Rebate claims and tax credit filings should always include a product reference number that is linked to a source of certified product performance data. This will help to ensure that IRA funds are used only for eligible equipment. For example, SEOs and the IRS will have to verify that heat pumps meet the cooling (SEER2) and heating (HSPF2) efficiency ratings defined in the IRA.

A forthcoming IRS requirement that 25C-eligible energy properties must be assigned a "unique product identification number" (PIN) could streamline this process. If the unique PIN is linked to a suitable public database of certified product performance data, it could be directly referenced by SEOs for use in tracking rebates and by the IRS in its annual statistical reporting. However, the introduction of PINs in 2025 could also introduce new challenges for data collection. Requiring individuals to find and transcribe a long numerical PIN for each piece of energy property onto rebate and tax forms is likely to lead to a high volume of omissions and errors.

Certified product performance data should be stored in a manner consistent with the following open data principles outlined in the White House's 2013 Open Data Policy memo:

- **Public.** Agencies must adopt a presumption in favor of openness.

- **Accessible.** Data are made available in convenient, modifiable, machine-readable, and open formats that can be retrieved, downloaded, indexed, and searched.

- **Described.** Data are described fully so that consumers of the data have sufficient information to understand their strengths, weaknesses, limitations, etc.

- **Reusable.** Data are made available under an open license that places no restrictions on their use.

- **Complete.** Data are published in primary forms (i.e., as collected at the source), with the finest possible level of granularity.

- **Timely & Managed.** Data are made available as quickly as necessary and a point of contact is designated to assist with data use.

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To meet the reporting and access needs outlined herein, the data should also be:

- **Authoritative.** The information should be complete and sufficient to determine eligibility for Energy Star, tax credits, and rebates in the IRA.

- **Addressable.** Each product entry should have a unique URL that can be used in citations, product manuals, labels, warranty registrations, etc. Content should be directly addressable by PIN alone; it is not sufficient for an entry to be retrievable only as part of an interactive search.

- **Stable & long-lived.** Typical devices in the database have useful lives of 20 years or more. As such, any websites, URLs, or other internet resources intended to be distributed in print must be maintained and preserved indefinitely.

- **Up-to-date.** The database must be actively maintained to ensure that new product models are included as soon as they are released.

The Environmental Protection Agency's Energy Star Product Finder Database is a good candidate for product data storage, provided it meets the criteria defined above across all of the relevant product types.

Digital labeling

To further streamline and modernize data collection, the federal government should **introduce digital appliance labeling requirements along with the PIN requirement**. This could, for example, take the form of a QR code printed on every EnergyGuide label and permanently affixed to every product nameplate. QR codes are common, standardized machine-readable labels that provide a URL link to an online resource. When affixed to an appliance, purchasers and installers could scan a QR code with a smartphone app (e.g., from a rebate provider, the IRS, TurboTax, or H&R Block) in a way that would automatically and reliably fill in required details to verify eligibility and streamline claim filing.

Energy efficiency researchers have called for improvements to the Federal Trade Commission's EnergyGuide labeling program for more than twenty years. The introduction of product labeling requirements presents a perfect opportunity to overhaul and modernize the EnergyGuide label to improve consumer comprehension, drive more people to choose high-efficiency products, and realize additional energy and emissions savings across the U.S. economy. There is ample precedent for digital labeling of appliances, both internationally and in the U.S. (e.g., on refrigerators and washing machines from major manufacturers like General Electric).

Perhaps more importantly, **digital labels would not only improve the quality and speed of rebate and tax credit processing, but they would also enable homeowners and occupants to have better interactions with the energy infrastructure in their homes**. For example, at the time of installation, digital labels would enable homeowners to easily submit warranty registrations to manufacturers alongside their rebate and tax claims, and would help building inspectors verify that installations are code compliant. Following installation, labels would enable more sophisticated communication with service providers,

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enabling better maintenance scheduling and reducing the need for unnecessary service calls. Later, when a house is sold, the labels would be useful to home inspectors, appraisers, real estate brokers and lenders, and prospective buyers as they could be used to provide valuable insight into a home's energy performance.

Data storage, accessibility, and reporting

Detailed statistical reporting on the implementation of electrification rebate and tax credit programs will enhance IRA implementation. It will enable program administrators to identify and take action to resolve discrepancies in the distribution of incentives and tax credits within or across geographic regions, allowing for targeted improvements in program design throughout the 10-year IRA implementation period.

The IRS currently reports tax data in a variety of formats including annual publications and detailed Statistics of Income at the state, county, and zip code levels. For energy property in particular, IRS Publication 4801 includes annual national statistical estimates of the number of filings and total credits per line item. From this report, one can derive national estimates[2] for individual energy property credits (e.g., geothermal heat pump vs. fuel cell), but cannot disaggregate to subnational geographic levels or household income tiers. In contrast, IRS Statistics of Income are published for all states, counties, and zip codes and disaggregated by income level, but energy property credits are not separated by product type.

Future statistical reports from the IRS and DOE should allow for the disaggregation of data by product type, geography, and income. Statistical reports should also incorporate data derived from individual PINs and/or digital labels, for example by indicating the average efficiency (e.g., for heat pumps, in terms of SEER2 and HSPF2 efficiency metrics) for products supported by IRA funding.

It's a perfect opportunity to overhaul and modernize the EnergyGuide label to improve consumer comprehension, drive more people to choose high-efficiency products, and realize additional energy and emissions savings across the U.S. economy.

2. In 2020, for example, an estimated 2.4 million taxpayers filed Form 5695. Of these, an estimated 2.3% (55,200 filers) claimed expenses for geothermal heat pumps with a total of $570.4 million in claims for eligible property costs, an average of about $10,300 per installation.