



DEACTIVATED:

How Electric Utilities
Turned Off the Data-Sharing
Features of 14 Million
Smart Meters

MISSION DATA
empowering energy savings

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Mission:data Coalition is a national coalition of 30 innovative energy technology companies that empower consumers with access to their own energy data. Mission:data advocates for customer-friendly data portability policies throughout the country in order to deliver benefits to consumers and enable a vibrant market for energy management services.

EXECUTIVE SUMMARY

A decade after ARRA, only 2.9% of federally-funded smart meters have real-time data features enabled.

In the years following Congressional passage of the American Recovery and Reinvestment Act (ARRA) in 2009, the U.S. Department of Energy disbursed \$3.0 billion to electric utilities for projects involving advanced metering infrastructure (AMI). The Department of Energy's Smart Grid Investment Grant (SGIG) program was pivotal in sparking widespread deployment of AMI, which today has reached over 115 million electric meters nationwide.¹

In addition to providing operational benefits to utilities, advanced meters promised to empower consumers in two ways: (1) with access to real-time electric usage information and (2) with access to new energy management tools that analyze interval usage data, typically collected at 15-minute intervals.

However, according to an analysis by Mission:data, a decade after ARRA funded the installation of 17.38 million advanced meters nationwide, most of the data access benefits promised to customers have been deactivated. Despite 89.7% of federally-funded meters having real-time access capabilities, today only 2.9% are enabled. This essential feature of advanced metering has been rendered unusable in 13.99 million meters funded by federal taxpayers. Furthermore, only 14.3% of customers are offered an application programming interface (API) by their electric utility in order to access new energy management tools. While 77 utilities received SGIG funds for advanced metering, today only two (2) utilities provide APIs to access smart meter data: CenterPoint Energy (via the Smart Meter Texas system) and Fort Collins Utilities in Colorado. Mission:data's analysis is based on utility reports to the Department of Energy; our regulatory

experience in 15 states over the past decade; and sources within the energy management industry who wish to remain anonymous due to fears of retaliation by utilities.

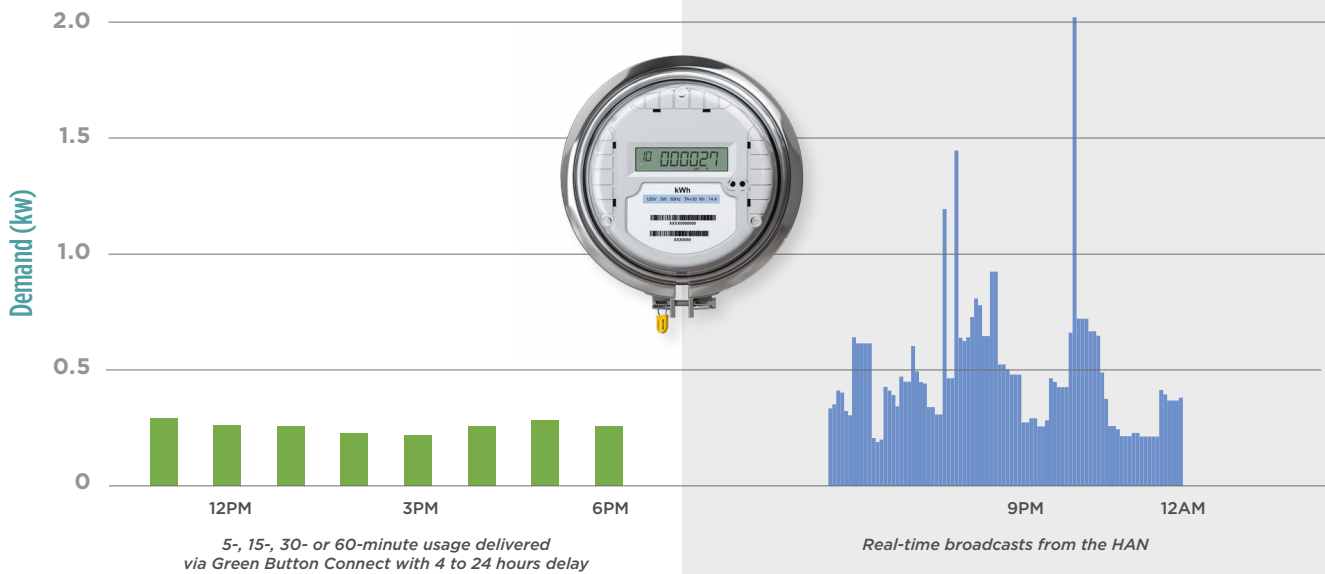
The resulting impact on consumers is significant. According to a previous analysis by Mission:data, energy savings of 6% to 18% are possible when energy usage data is easily portable.² Residential energy use accounts for about 20% of greenhouse gas emissions in the U.S. Unfortunately, utilities focused instead on their own web portals for bill payment instead of empowering consumers to access energy management tools.

Looking Ahead

The Department of Energy (DOE) has a historic opportunity to correct the mistakes of the past and give consumers access to tools to help cut carbon emissions and manage monthly bills. In November, 2021, Congress passed the Infrastructure Investment and Jobs Act (IIJA) which allocated an additional \$3 billion to the SGIG program. As funding requirements are being established by the Biden Administration, there are several key ways DOE can ensure data access outcomes in the future. Specifically, DOE should require SGIG grant recipients to provide real-time usage data to any customer-provided device in the home or business for the life of the advanced meter. In addition, SGIG grant recipients should be required to provide a certified Green Button Connect implementation with a complete dataset to benefit consumers. Finally, the costs associated with providing these essential services should be expressly eligible for SGIG funding.

1 https://www.edisonfoundation.net/-/media/Files/IEI/publications/IEI_Smart_Meter_Report_April_2021.ashx

2 "Got Data? The Value of Energy Data Access to Consumers." Mission:data Coalition, February, 2016. Available at <http://www.missiondata.io/s/Got-Data-value-of-energy-data-access-to-consumers.pdf>



KEY TERMS

WHAT IS GREEN BUTTON CONNECT (GBC)?

GBC is a technical standard developed by industry for exchanging energy usage, account and billing information. GBC defines application programming interfaces (APIs) for energy management services to automatically access energy data after a customer has granted authorization. Due to the time lag associated with smart meters reporting back to the utility and processing delays, it can take from 4 to 24 hours or more for interval usage values to be available in most cases. GBC has been implemented by 16 utilities nationwide, covering over 36.5 million electric meters, and is currently under consideration by regulators in 12 other states.

WHAT IS GBC USED FOR?

Energy management services, solar installers, home performance contractors and others use GBC for many purposes, including getting snapshots of current usage trends, weather sensitivity analysis over historical periods, and even settlement of demand response transactions in wholesale markets.

WHAT IS THE HOME AREA NETWORK (HAN)?

The HAN is a radio in the meter that can communicate real-time usage (among other functions) with devices in the home. Most smart meters deployed from 2012 to 2022 have a Zigbee HAN; Zigbee broadcasts kW and kWh measurements approximately every 5-7 seconds over a secure link. Beginning in 2022, many smart meters come with a Wifi HAN, allowing the meter to connect to home or business Wifi networks. Using the IEEE2030.5 protocol over Wifi, energy usage in kW and kWh can be broadcast approximately once per second.

WHAT IS HAN USED FOR?

Whether Zigbee or Wifi, activating the HAN is the only way for customers (or their devices/appliances) to respond in real-time to their usage, enabling timely alerts to peak pricing periods; diagnostics of faulty equipment; battery charging/discharging based on usage characteristics; and various “smart home” uses in which 24-hour delayed usage is inadequate. In some wholesale markets, real-time HAN usage data can be used for settlement purposes.

METHODS

Sources for this analysis include:

Utility reports to the U.S. Department of Energy:

These publicly-available reports are available at <https://smartgrid.gov/projects/>. There were 77 grant recipients with smart grid projects that involved advanced metering. Non-AMI projects, such as distribution system upgrades or synchrophasers, were excluded.

Mission:data's experience in state regulatory

proceedings: Over the past decade, Mission:data has played an active role in over 15 states' public utility commission dockets, covering AMI deployment, data privacy rules and rate cases. Citations to regulatory proceedings are provided.

Industry sources: Mission:data has approximately 30 member companies that provide energy management services of various types, ranging from demand response to smart home devices and solar.³ Our coalition of entrepreneurs have first-hand experience trying to acquire their customers' energy data, giving Mission:data unique access to information from a wide range of utilities with AMI. These industry sources have provided us with information that is often not available publicly. Mission:data does not identify these sources due to the threat of retaliation from utilities that they face.

EXCLUSIONS. Of the 77 entities receiving ARRA funds for AMI projects, 29 were excluded from the analysis for the following reasons:

- The number of advanced meters deployed was very small or even zero;
- Insufficient information could be obtained

The excluded entities represent 954,000 meters, only 5.5% of the total number of meters deployed with federal funds. As a result, the excluded meters are unlikely to significantly alter the study's conclusions. Attempts were made to contact every utility where information was not available from any source listed above. Utilities are invited to contact Mission:data if they believe corrections are warranted.

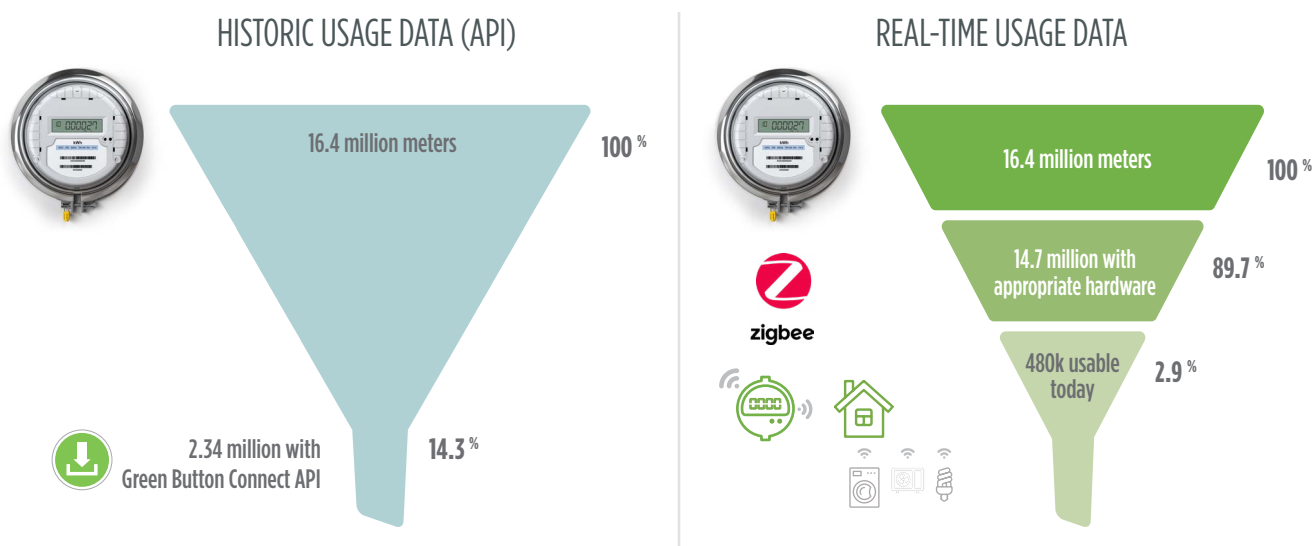


PILOTS AND PARTIAL OFFERINGS. Several utilities incorporated pilot studies with real-time usage data in order to study whether behavior changes could lead to energy conservation. In many cases, these pilots were limited in scope and duration, typically only lasting for the ARRA grant period. For example, Sacramento Municipal Utility District studied consumer behavior as a function of information availability and various rate structures. While such offerings may have been available in 2010-2014, we treated these utilities as “No”s if real-time usage data or API connectivity are not generally available in 2022.

Two utilities (DTE Energy and FirstEnergy) receive partial scores for real-time usage data and API functionality, respectively. DTE Energy only allows customers to connect devices that are made by a DTE Energy affiliate. While DTE Energy's “energy bridge” is generally available to customers, it is arguably not an open ecosystem because HAN devices from other manufacturers cannot be connected. FirstEnergy has an automated method for licensed retail suppliers to access commercial customers' energy usage data via Electronic Data Interchange (EDI), but as of August 2022 licensed suppliers have no automated method to receive residential customers' energy usage data. Furthermore, no API for non-licensed entities (such as energy management firms) is available in any FirstEnergy utility. Thus, due to only partial achievement in each category, DTE Energy and FirstEnergy are treated as “No”s in the quantitative analysis.

³ See listing at missiondata.io.

RESULTS



With \$3.0 billion, 17.38 million smart meters were funded by Smart Grid Investment Grants (2010-2014). We gathered information on the current data portability status of 16.43 million or 94.5% of federally-funded meters.

The Utilities Empowering Consumers with their Data

Ten years after ARRA funding, a handful of grant recipients provide data portability in the form of real-time usage data or API-based access. Only a single utility, Fort Collins Utilities in Colorado, provides both.

Utility	Provides real-time usage data	Provides API for energy management
Fort Collins Utilities (CO)	●	●
Vermont Transco (Burlington Electric and Green Mountain Power)	●	●
CenterPoint Energy — via Smart Meter Texas	●	●
Guam Power Authority	●	●
Madison Gas & Electric (WI)	●*	●

* Commercial customers only

RHETORIC VS. REALITY

Reports submitted by utilities to the Department of Energy often portrayed utilities making strides in providing consumers with energy data in various forms: in-home displays (IHDs), web portals with interval usage data, and even detailed consumer behavior studies. However, a decade later, most utilities have discontinued the offerings that put consumers in charge of their energy data.

Utility	Rhetoric from reports to DOE	Reality
AEP Ohio <i>\$67 million taxpayer subsidy</i>	<p>“The customer gets timely information on how much power they are using, how much it costs and when they are using it.”⁴</p> <p>“AEP Ohio deployed 110,000 General Electric kV2c and I210+c model meters, including...Zigbee communication.”⁵</p>	<p>Industry sources report that AEP Ohio will not connect customer-provided devices to meters.</p>
DTE Energy (formerly Detroit Edison) <i>\$84 million taxpayer subsidy</i>	<p>“DTE also enabled customers to make more informed decisions about electricity usage to control costs.”</p> <p>Equipment installed includes “Home Area Networks,” which “facilitate two-way information exchange between DTE and customers, allowing customers to manage their electricity use through appliance control.”⁶</p>	<p>Industry sources report that DTE does not support meter connectivity with customer-provided devices or energy management services. Real-time usage data can only be accessed by renting from DTE a device manufactured by a utility affiliate for \$1.99/month,⁷ raising anti-trust concerns.</p>
City of Glendale, CA Water and Power <i>\$20 million taxpayer subsidy</i>	<p>“SGIG funding enabled GWP to offer customers several options to access real-time energy usage data, including a web portal and in-home displays on a digital photo frame. ‘We expect annual energy savings of ten to twelve percent, if not more, once all GWP customers are fully engaged with the usage data provided by the smart meters,’ said Craig Kuennen, GWP’s Smart Grid Project Manager.”⁸</p>	<p>Industry sources report that Glendale declines to connect customer-provided devices to their meters. One HAN device maker’s website reads: “Please contact the City of Glendale Water and Power before purchasing. While they have compatible AMI Smart Meters, they might not allow you to connect [our product] to their meter...”⁹</p>

4 https://smartgrid.gov/files/documents/Smart_Meters_First_Step_into_Tomorrow_201007.pdf (page 2, accessed Aug 2022)

5 AEP Ohio gridSMART Final Technical Report. June 2014. https://smartgrid.gov/files/documents/AEP_Ohio_DE-OE-0000193_Final_Technical_Report_06-23-2014.pdf (page 14, accessed Aug 2022)

6 https://www.smartgrid.gov/files/documents/Detroit_Edison_Project_Description_HRR9Nw4.pdf (accessed Aug 2022)

7 <https://newlook.dteenergy.com/wps/wcm/connect/dte-web/insight/dte-insight-faq> (accessed Aug 2022)

8 https://www.smartgrid.gov/files/documents/Glendale_Case_Study_3_19_12.pdf (accessed Aug 2022)

9 <https://www.emporiaenergy.com/utilities> (accessed Aug 2022)

Other utilities reported challenges with managing the energy data generated by smart meters, both technologically and operationally. Despite knowing that advanced meters would generate large volumes of data, many utilities seemed to be ill-equipped to put these data to use, whether internally or for customers. Instead of overcoming these challenges and empowering their customers with data for the long term, many grant recipients treated their SGIG projects as a learning experience, discontinuing their data access efforts once the grant-funded project was over. For example:

- **AEP Ohio (\$67 million):** AEP installed 110,000 advanced meters with Zigbee radios capable of providing real-time usage and pricing information to customers. AEP evaluated Zigbee devices specifically in its SGIG project. In its final technical report to the Department of Energy, AEP stated, “Overall, the integration of devices into AEP Ohio systems proved to be interoperable.”¹⁰ However, AEP discontinued its Zigbee device program for customers in November 2020, and the program’s website is no longer available on the internet.¹¹
- **Lakeland Electric (\$14.9 million):** After installing over 121,000 advanced meters, Lakeland stated the following as a “lesson learned” in its final report to the Department of Energy: “It is essential to plan how to utilize the voluminous data that will be received. A data analytics software package will help maximize the benefits of the system.”
- **Long Island Power Authority (New York, \$12.5 million):** LIPA told DOE, “[Only] a small number of commercial customers received consumption data but not cost data due to the complex pricing formulas that the system cannot easily handle...”¹² Industry sources report that LIPA no longer provides real-time usage data to its customers, whether commercial or residential.
- **Denton County Electric Cooperative (Texas, \$17.2 million):** In its report to DOE Denton stated as a lesson learned, “Deploy a meter data management system. This technology is a necessary component of the AMI system and should be implemented before or during AMI deployment.”¹³ A meter data management system is a prerequisite for an API to be used by energy management services.

Instead of using SGIG funds to provide customer benefits over the long term, many utilities underutilized the capabilities they purchased. The vast majority of utilities deactivated real-time data capabilities in the decade after receiving federal funding.

10 https://www.smartgrid.gov/files/documents/AEP_Ohio_DE-OE-0000193_Final_Technical_Report_06-23-2014.pdf, page 296 (accessed Aug 2022)

11 <https://web.archive.org/web/20210119062039/https://ohio-aep.com/ItsYourPower-ProgramEnd> (accessed Aug 2020)

12 <https://smartgrid.gov/files/documents/DE-OE0000220-Final-Report-04-27-15.pdf> (page 9, accessed Aug 2022)

13 <https://smartgrid.gov/files/documents/Denton-County-Electric-CoServ-Advanced-Metering-Project-2015.pdf> (accessed Aug 2022)

RECOMMENDATIONS

In November 2021, Congress passed the Infrastructure Investment and Jobs Act (IIJA) which allocated an additional \$3 billion to the SGIG program. Tens of millions of advanced meters will be installed across the country by 2030, many with federal money. Advanced meters have a lifespan of 15-20 years. As funding requirements are being established by the Biden Administration, Mission:data recommends that the Department of Energy incorporate the lessons learned from ARRA as highlighted in this report. Specifically, DOE should address the following topics in funding guidelines:

1. Real-time usage data should be required.

Utilities that receive SGIG funds for advanced meters should be required to provide all customer classes with access to real-time usage data for the service life of the meter. Open standards should be a prerequisite; which means that a customer should be able to connect any device they wish to their meter, whether over Zigbee, the IEEE2030.5 protocol over Wifi, or another open, non-proprietary standard. This is similar to a “bring your own device” or “BYOD” program, meaning that utilities should not be permitted to discriminate against the types of devices that customers can connect to their meter.

2. Green Button Connect, with a complete data set, should be required. Utilities that receive SGIG funds should offer Green Button Connect and provide periodic proof of independent certification, thereby ensuring standards compliance and maximum interoperability with distributed energy resources. A complete data set includes (i)

24+ months of a customer’s historic usage data suitable for settlement in wholesale markets; (ii) 24+ months of billing and account information for cost management purposes; and (iii) any other data that is specific to a customer that may be necessary to participate in, or determine eligibility for, demand-side management or renewable energy programs.¹⁴

3. Utilities’ costs of achieving data portability should be eligible for SGIG funding.

While the costs of Green Button Connect are modest — about \$0.25 to \$1.77 per household, according to publicly-available cost data since 2018¹⁵ — many utilities have objected to GBC on the basis of cost. Whether for offering GBC or making real-time usage data accessible, DOE should expressly identify such costs as eligible expenses under its SGIG program.

Conceptually, these recommendations together constitute an optimal model for a “meter-to-customer” data interoperability scheme. Whether customers choose to view their real-time usage on a smartphone app, connect their meter to a home automation system, or simply transfer their energy data to a rooftop solar installer in order to get a price quote — interoperability is what makes a cleaner, more distributed power grid possible. Unfortunately, as demonstrated in this report, utilities’ track record of success in empowering consumers with their energy data from ARRA-funded programs is poor. By establishing interoperability guidelines for a renewed SGIG program, DOE can ensure that Americans will be able to realize tangible benefits such as reduced utility bills and access to innovative clean energy products that will combat climate change.

¹⁴ This includes, for example, I-CAP tags in NYSIO and Sub-LAP and PNode in CAISO.

¹⁵ *Direct Testimony of Michael E. Murray on behalf of Mission:data Coalition*. New Hampshire Public Utilities Commission Docket No. DE 19-197. August 12, 2020 at p. 19. Available at https://www.puc.nh.gov/Regulatory/Docketbk/2019/19-197/TESTIMONY/19-197_2020-08-17_MISSIONDATA_TESTIMONY_MURRAY.PDF

DATA

APPENDIX 1 | Utilities and Data Portability, 10 years after ARRA funding

Utility	ARRA subsidy	Number of meters bought with federal funds	Installed Zigbee Home Area Network (HAN) hardware?	Provides real-time energy usage data?	Provides automated API for energy management?	Notes
● Yes ● No ○ Partially ? Unknown						
Florida Power & Light	\$200 million	3,068,136	●	●	●	
CenterPoint	\$200 million	2,257,860	●	●	●	15-minute usage is available via Smart Meter Texas APIs.
Baltimore G&E	\$200 million	1,302,595	●	●	●	According to a source, BG&E chose not to install security certificates in the meters (at a cost of about \$0.05 per meter) that would have enabled real-time access.
NV Energy	\$139 million	1,202,248	●	●	●	According to a source, NV Energy has provided only limited access via a single manufacturer's Zigbee gateway.
Duke Energy Business Services	\$200 million	1,062,169	●	●	●	Like DTE, Duke has attempted to build its own proprietary Zigbee gateway. ¹⁶
Oklahoma G&E	\$130 million	818,414	●	●	●	
PECO	\$200 million	784,253	●	●	●	PECO does not provide real-time access nor an API despite a state law, Act 129, that requires utilities to "with customer consent, make available direct meter access and electronic access to customer meter data to third parties..."
DTE Energy	\$84 million	688,717	●	○	●	Customers can only use devices purchased from a utility affiliate to access real-time usage data.
Central Maine Power (CMP)	\$95 million	622,380	●	●	●	
Sacramento Municipal Utility District (SMUD)	\$127.5 million	617,502	●	●	●	
Pepco (MD)	\$105 million	552,982	●	●	●	
Salt River Project	\$57 million	458,742	●	●	●	
Idaho Power	\$47 million	380,928	●	●	●	
Vermont Transco, LLC	\$68.9 million	305,464	●	●	●	
Cleco Power	\$20 million	284,797	●	●	●	
Pepco (Washington, D.C.)	\$45 million	277,222	●	●	●	
Denton County Electric Cooperative	\$17.2 million	179,818	●	●	●	
Electric Power Board of Chattanooga	\$112 million	175,116	●	●	●	
Duke Energy Progress	\$200 million	130,315	●	●	●	Like DTE, Duke has attempted to build its own proprietary Zigbee gateway. ¹⁶
Lakeland Electric	\$14.9 million	121,900	●	?	?	
AEP Ohio	\$14.9 million	110,087	●	●	●	In a pilot (now discontinued), AEP exclusively tied real-time usage functionality with AEP-supplied smart home equipment, offering only a closed ecosystem. Devices were "bricked" if customers stopped paying a monthly fee.

16 <https://fcc.report/FCC-ID/2AUYW-A010001/4695781>

Utility	ARRA subsidy	Number of meters bought with federal funds	Installed Zigbee Home Area Network (HAN) hardware?	Provides real-time energy usage data?	Provides automated API for energy management?	Notes
● Yes ● No ○ Partially ? Unknown						
City of Glendale	\$20 million	85,582	●	●	●	According to a source, only one manufacturer's HAN device is supported.
City of Fort Collins Utilities	\$18.1 million	85,328	●	●	●	
New Hampshire Electric Cooperative	\$15.2 million	83,595	●	●	●	Only about 1,000 meters have Zigbee.
South Kentucky Rural Electric Cooperative	\$9.5 million	69,065	●	●	●	
Black Hills Power	\$9.6 million	68,980	●	●	●	
City of Naperville, IL	\$11.0 million	58,407	●	?	?	
Talquin Electric Cooperative	\$8.1 million	54,945	●	●	●	
Rappahannock Electric Cooperative	\$15.7 million	54,200	●	●	●	
Burbank	\$20 million	51,928	●	●	●	
Guam Power Authority	\$16.6 million	50,233	●	●	●	
LADWP	\$60 million	49,500	●	●	●	
Westar Energy	\$19.0 million	47,899	●	●	●	
Navajo Tribal Utility Authority	\$5.0 million	40,001	●	●	●	
Jacksonville Electric Authority	\$12.9 million	40,000	●	●	?	According to a source, JEA has done only limited pilots of Zigbee gateways for some commercial customers.
Cheyenne Light, Fuel and Power Company	\$5.0 million	39,102	●	●	●	
Central Lincoln People's Utility District	\$9.6 million	38,620	●	?	?	
FirstEnergy	\$57 million	34,309	●	●	○	As of 2020, some 11 years after being selected by the Department of Energy for an award, licensed suppliers in Ohio are able to automatically commercial and industrial customers' interval usage via an EDI system. However, no date has been established for the availability of residential customer interval usage to licensed suppliers. No API for unlicensed entities exists.*
City of Leesburg, FL	\$9.7 million	16,683	●	?	?	
KCP&L	\$24 million	13,417	●	●	●	
City of Wadsworth, OH	\$5.3 million	12,600	●	?	?	
Indianapolis	\$20 million	10,275	●	●	●	
Wellsboro Electric Company	\$0.4 million	4,913	●	●	●	
Entergy New Orleans	\$4.9 million	4,436	●	●	●	
Madison Gas & Electric Company	\$5.6 million	4,346	●	●	●	
Knoxville Utilities board	\$3.6 million	3,759	●	?	?	
Modesto Irrigation District	\$1.5 million	3,538	●	?	?	
Long Island Power Authority	\$12.5 million	2,349	●	●	●	

* FirstEnergy Ohio Grid Modernization 1 Collaborative Meeting slideshow, August 8, 2022

* "Its Your Power" program ended November 30, 2020: <https://web.archive.org/web/20210119062039/https://ohio-aep.com/ItsYourPower-ProgramEnd>

APPENDIX 2 | Utilities Excluded from the Analysis

Utility	ARRA subsidy	Number of meters bought with federal funds	Notes
South Mississippi Electric Power Association	\$29.8 million	224,757	No information available; meters were installed across 5 different co-ops
Cobb Electric Membership Corp	\$15.8 million	194,195	No information available
Pacific Northwest Generating Cooperative	\$19.6 million	97,281	No information available; meters were installed across 9 different co-ops
Golden Spread Electric Cooperative	\$17.3 million	88,411	No information available
Battelle Memorial Institute	\$88.8 million	67,286	No information available; meters were installed across 10 different utilities and a university campus
Lafayette Consolidated Government	\$11.1 million	65,375	No information available
Black Hills/Colorado Electric	\$5.5 million	44,920	No information available
Connecticut Municipal Electric Energy Cooperative	\$9.2 million	38,598	No information available
Sioux Valley Energy	\$3.6 million	27,641	No information available
Tri-State Electric Membership Corp	\$1.1 million	15,156	No information available
Woodruff Electric Cooperative	\$2.4 million	14,900	No information available
Town of Danvers, MA	\$8.3 million	12,963	No information available
Iowa Association of Municipal Utilities	\$2.8 million	11,265	No information available
City of Ruston, Louisiana	\$4.3 million	10,596	No information available
Marblehead Municipal Light Department	\$1.3 million	10,215	No information available
Minnesota Power	\$1.5 million	8,030	No information available
City of Auburn, IN	\$2.1 million	7,474	No information available
City of Anaheim	\$5.4 million	7,140	No information available
City of Fulton, MO	\$1.5 million	5,505	No information available
Stanton County Public Power District	\$0.4 million	2,293	No information available
Pecan Street Project	\$10.4 million	318	Not a utility; very small number of meters were federally funded
SCE	\$40 million	38	Very small number of meters were federally funded
Reliant Retail Energy Services	\$19.8 million	0	No meters were federally funded
SDG&E	\$28 million	0	No meters were federally funded
NSTAR (Eversource)	\$5.3 million	0	No meters were federally funded
City of Tallahassee, FL	\$7.5 million	0	No meters were federally funded
Southwest Transmission Cooperative	\$32.2 million		No information available
National Rural Electric Cooperative Association	\$33.9 million		AMI was installed by 5 out of 27 cooperatives; information from the 5 cooperatives was not available
City of Quincy, FL	\$2.5 million		No information available
		954,357	Sum of excluded meters