

Advanced Metering Technology Overview

Before the
Montana Energy and Telecommunications Interim Committee

Chris Villarreal
Plugged In Strategies
May 19, 2022

Topics for Discussion

- ▶ What is AMI
- ▶ U.S. Department of Energy report on AMI
- ▶ Data Access

Conversations are occurring across the U.S.

- ▶ On-going proceedings in
 - ▶ Minnesota (AMI and Data)
 - ▶ New Hampshire (Data)
 - ▶ Arkansas (Data)
 - ▶ Michigan (Data)
 - ▶ New York (Data)
 - ▶ Connecticut (AMI and Data)
 - ▶ Maryland (Data)
 - ▶ New Mexico (AMI)
 - ▶ Louisiana (AMI)
 - ▶ Kentucky (AMI)
- ▶ According to EEI, close to 70% of US customers will have AMI by 2022

AMI

“Advanced metering infrastructure (AMI) is an integrated system of smart meters, communications networks, and data management systems that enables two-way communication between utilities and customers. Customer systems include in-home displays, home area networks, energy management systems, and other customer-side-of-the-meter equipment that enable smart grid functions in residential, commercial, and industrial facilities.”

https://www.smartgrid.gov/recovery_act/deployment_status/sdgp_ami_systems.html

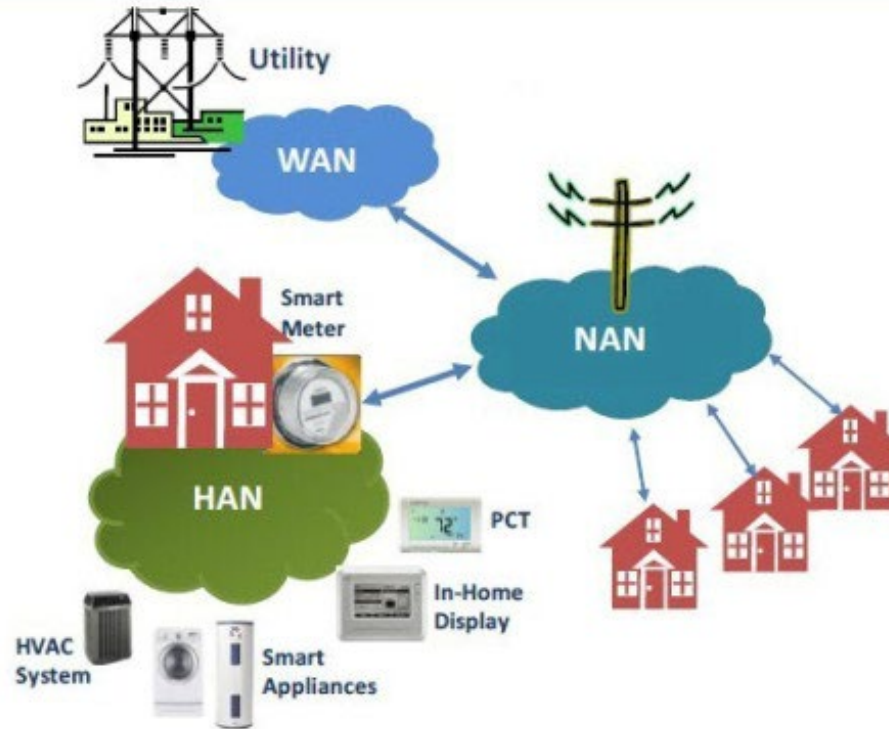


What the meter collects

- ▶ Depending on utility needs, digital meter collects and stores kWh readings between 15-60 minutes.
- ▶ Usually transmits the data back to the utility a couple times a day
- ▶ Meter can collect more than just kWh! Meter monitors kW, current, volt, var, to name a few.
- ▶ This data is an important part of business case for AMI, however...
 - ▶ Utility needs to use the data
 - ▶ Customer needs access to the data
 - ▶ Customer needs to share the data
- ▶ Access to this information may be restricted by the utility for.....
 - ▶ Business reasons
 - ▶ Meter memory and processing
 - ▶ Communication network bandwidth
- ▶ Distributed intelligence is an emerging component for AMI
 - ▶ Allows the meter to act as a sensor
 - ▶ Can enable autonomous functions
 - ▶ Generates enhanced data about the system (and customer premise) at grid edge

Meter Communications

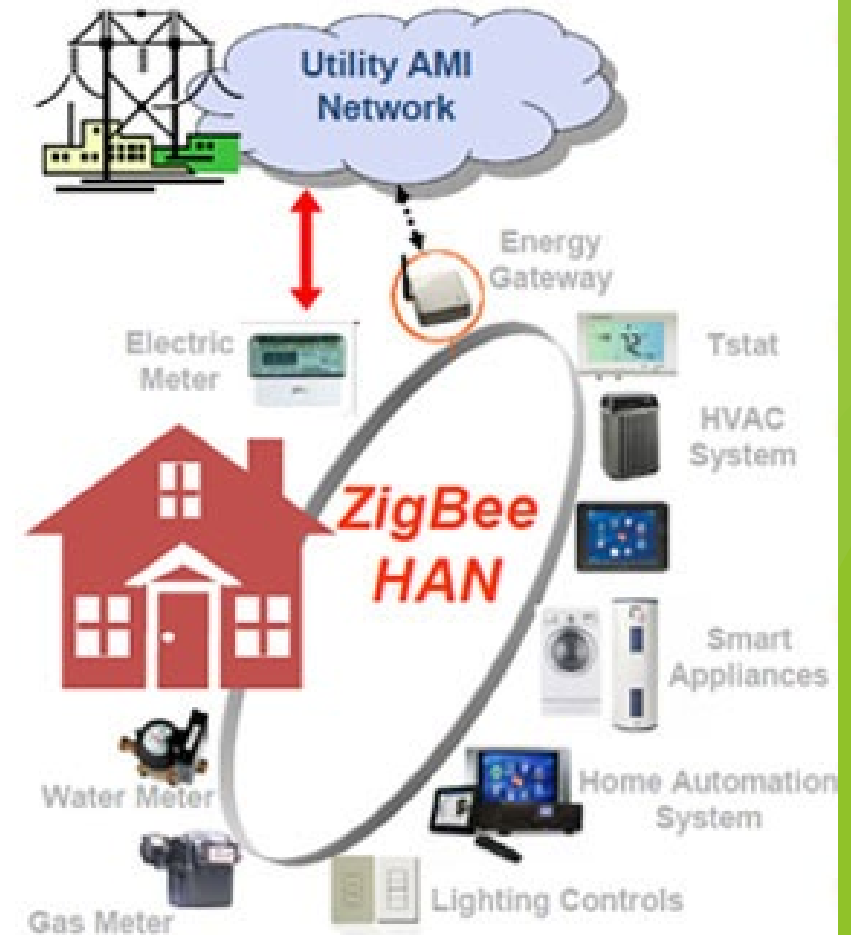
- ▶ Meter usually comes with 2 radios
- ▶ First radio (900 Mhz) is to communicate back to the utility (over a mesh network)
- ▶ Second radio (2.4 Ghz) is to communicate locally into the home



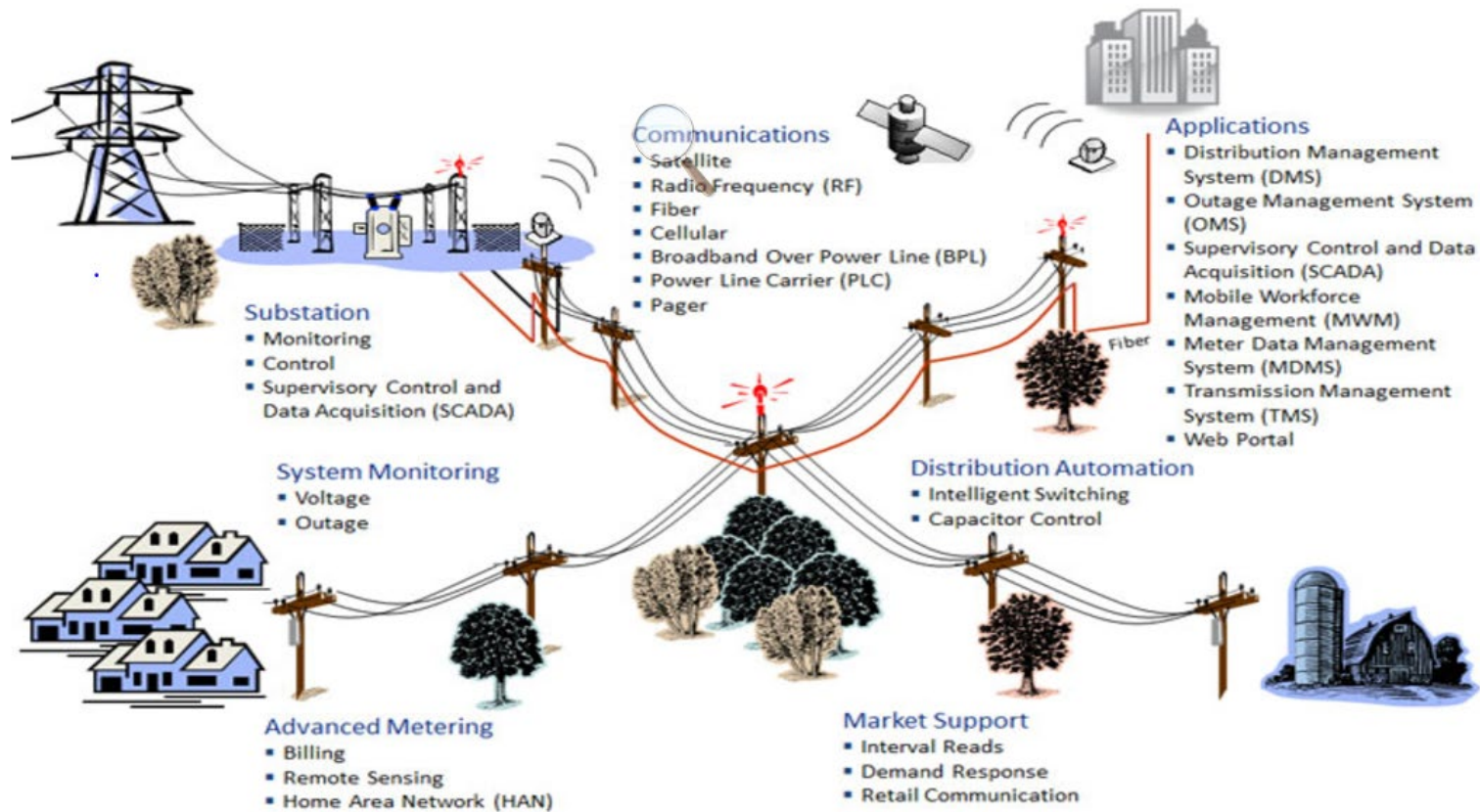
Advanced Metering Infrastructure with Home Area Networking

Home Area Network (HAN)

- ▶ Smart Meters come with two radios
 - ▶ One to send information back to the utility
 - ▶ One to send information into customer premise
- ▶ HAN radio capable of sending information every 7 seconds
 - ▶ Usage
 - ▶ Other meter data
- ▶ Requires Zigbee-certified (IEEE 2030.5) equipment
 - ▶ Router
 - ▶ In home display
- ▶ HAN can provide usage, rate, and cost information received from meter and utility via AMI network



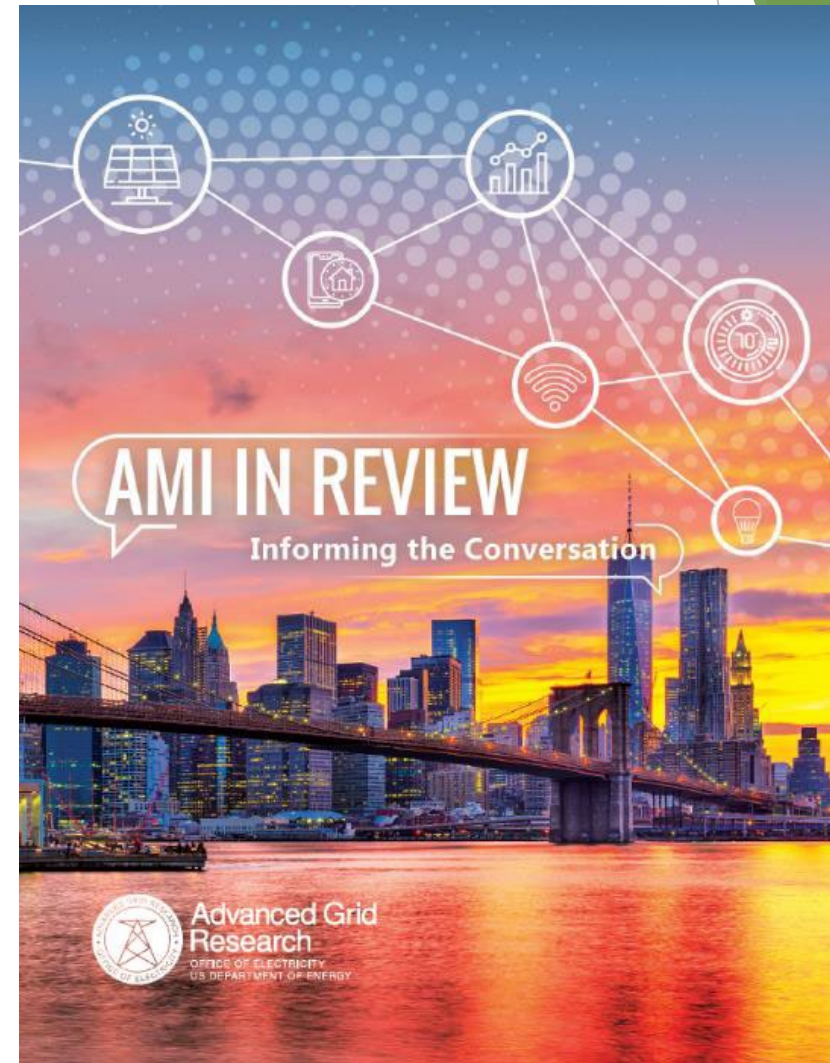
Foundational Component of Grid Modernization



U.S. Department of Energy Report: AMI In Review: Informing the Conversation

Report can be found here:

https://smartgrid.gov/files/documents/AMI_Report_7_8_20_final_compressed.pdf



Effort Overview

Objective: *Investigate how investments are being evaluated, determine if there was additional data or information that would be helpful, and explore the impact of new grid modernization technologies on the regulatory process.*

Phased research study with two components

- Analysis of public records: Reviewed more than 100 AMI applications
- Convene stakeholders: Spoke with over 125 individuals from over 50 entities representing commissions, utilities, customer advocates and third parties
- Compiled reference materials of 600 filings from over 230 proceedings

Aim of effort

- Provide insights and perspectives on how AMI applications are being developed and evaluated
- NOT seek to offer an opinion on state actions or to advocate for or against any position.

Underlying Goals

1. Create valuable resource for industry
2. Help bridge perspectives
3. Identify opportunities for success
4. Illuminate the evolving nature of regulatory proceedings

Conversation Findings and Observations

- Increased review scrutiny due to inconsistent implementation results
- Value is being left on the table
- Lack of a sufficient record hampers approval and increases frustration
- AMI is a big project that needs a multidisciplinary team with executive support
- CBA is a decision tool and is not necessarily a means in and of itself
- Pre-application stakeholder processes can be valuable but depends on approach
- AMI Investments funded through ARRA have had mixed results in informing regulatory proceedings

“We had an executive sponsorship that understood the magnitude of changes and made it a business priority. This was critical.”

– Utility

Approaching the Filing

Four major elements that commissions and parties are looking for

The vision

- A well-articulated vision and transparency about future investments can help alleviate concerns
- Raises questions for utilities about the right balance and how much to include

Customers at the forefront

- Make a direct connection to the customer – don't rely on the commission to infer or hear it during exploratory questions

Sufficient detail to support the record

- A proposal needs to stand on its own merits even if the commissions is favorable to the technology

**“A full grid modernization proposal
– the big picture – can be scary.”**

– Utility

Commitments and accepting risk

- Perspective differs between the various parties
- Well-defined metrics and additional reporting can give commissions and advocates confidence and level-set expectations
- Underscored by the analysis - settlement agreements typically included provisions that bound the utility to specific commitments regarding timelines and AMI functionality

Collaboration and Transparency

A collaborative stakeholder process with two-way dialog can increase understanding, bridge perspectives, instill confidence, and foster trust

- Parties increasingly **want more details and a voice in the programs and value streams** a utility might pursue
- **Hearing from engineers** about the technology and potential limitations integrating with legacy systems can be important for understanding utility choices and stakeholder viewpoints
- **Helps think through value from all perspectives**
- **Agreement on all areas is a lofty but unlikely goal**
- **Demeanor matters** – a formal demeanor can stifle impressions of openness and the free-flow of information
- **Who manages the process can make a difference**
- **Mitigate surprises through continued collaboration.** Don't necessarily limit the stakeholder process to pre-approval or an AML deployment

AMI Analysis

- **Review often includes two components**
 - Specific cost-benefit analysis
 - Technical review
- **A positive cost-benefit analysis is not necessarily enough**
- Commissions and advocates are looking for **details, a timeline for realizing benefits, and what it will take to achieve the benefit**
- Technical **details help** regulators understand the functionality so they can **determine if the investment will perform as described and accomplish utility and state goals**
- Providing **details can address concerns about cost recovery, obsolescence, and useful life** of the asset
- Parties emphasized the importance of achieving benefits for customers sooner rather than later

“I expect to see an AMI application that is as detailed as something a utility manager would provide to the utility’s financial officer.”

– Commission

Presentation of Cost and Benefits

- The **majority of benefits** identified in utility applications **were operational benefits** with no stated connection to the customer – over 70% on average
- Operational benefits may **be easier to quantify**
- **Think about benefits** – even operational benefits - **through the lens of the consumer** (e.g., predictive maintenance can reduce unplanned outages and decrease customer frustration)
- **Intangible benefits** can be a significant factor and **can tip the scale positive**
- **Customers are not homogenous** and will prioritize value differently. Focus groups can help demonstrate an understanding of which programs hold the most value for different customers.
- Some benefits might not be cost effective to achieve
- **Don't forget about benefits that may accrue to the market** (and thus customers) – regulators, advocates and others are interested in these



Interaction Between AMI & the Customer

- AMI is **expanding the commission's and advocates' views of value** to beyond what can be achieved with utility programs
- Assessment weighs the **cost-effectiveness for consumers, whether a utility or a third-party product or service**
- **Four broad classes of issues were most prominent**
 - Can derail utility applications if not addressed.
 - Often require lengthy conversations
 - Increased sensitivities around these topics result because projected savings or benefits often depend on customer programs and participation creating a relationship between the customer and the AMI system
- **Customer education plan is important**
 - In more than 20 settlement agreements, elements of the customer engagement plan were addressed as stipulations within the agreements in nearly every one

Four broad classes of issues:

1. Enabling customer capabilities and technology
2. Customer choice and opt-out
3. Impacts to vulnerable or disadvantaged customers
4. Education and engagement

Moving Forward

“What impact will AMI have on the customer experience?”

- AMI is an early indicator of how the review process is changing
- Customer-centric view of value that is not limited to what utility can provide
- Role of the commission is changing too requiring more knowledge of the technical details
- Commissions must have a record with sufficient detail on which it can issue a decision
- Collaboration is becoming an essential component
- Benefits are being replaced with capabilities

“A bad proposal for a good technology is still a bad proposal.”

-Commission

Data Access and Data Privacy

Data Privacy

- ▶ AML data introduces new opportunities, but also new risks
 - ▶ Moving from 12 data points a year to 96 data points a day
- ▶ Data is very valuable and important to utility, customer, and market participants
- ▶ Managing data privacy can be a fine line between making too much information available versus not making enough data available
- ▶ Leverage available models, such as U.S. DOE DataGuard privacy framework can help inform utility and third-party data privacy practices
- ▶ Individuals can have different perspectives on privacy
- ▶ Putting the customer in control of their usage data allows them to decide who can access it, for how long, and for what purpose.
- ▶ Limiting customer options or frustrating customers will result in a negative perspective of the investment

Green Button

- ▶ Standards-based means of providing usage data to customer authorized third parties
 - ▶ Standard capable of providing wide variety of data, e.g., voltage, billing cycles, gas, water
- ▶ Developed starting in 2011
- ▶ Green Button Download
 - ▶ File format with all metering data
 - ▶ Customer provides file to third party
- ▶ Green Button Connect
 - ▶ Customer authorized third party obtains data directly from utility
- ▶ Based on delivery of AMI data, but can use any level of granularity
- ▶ Challenge: Utilities in US have implemented non-standard version of Green Button Connect, which has limited effectiveness of the standard



Conclusion

- ▶ Utility needs to put customer benefits up front and not delay
- ▶ Utility needs to maximize benefits of the investment, including expanding use of data for utility purposes
 - ▶ Use AMI data to develop better demand forecasts
 - ▶ Use AMI data to inform distribution system planning and integrated resource planning
- ▶ Increasingly, a positive cost-benefit analysis isn't sufficient for regulators who want to see how the utility is going to use AMI and what the customer gets out of it
- ▶ AMI is at the center of modernizing the utility system in response to changing customer preferences, growth of DER, aging infrastructure, etc.
- ▶ Utilities need to identify plan and timeline for implementing programs
 - ▶ Rate Design
 - ▶ Access to data
- ▶ Enabling data access is important to enable the benefits of AMI deployment, but important that customer privacy concerns are put in the hands of the customer.

Thank you!

Chris Villarreal

Plugged In Strategies

chris@pluggedinstrategies.com