AMI-DRIVEN **INSIGHTS REPORT**

Bidgely | May 2022

EXECUTIVE SUMMARY

Advanced Metering Infrastructure is becoming ubiquitous throughout the utility industry, providing many sources of value for both utilities and ratepayers. When it comes to analytics in particular, Bidgely's unique ability to unlock previously unavailable insights to help customers understand their consumption and take informed action has allowed the company to serve as a pioneer in the use of AMI data and analytics for customer engagement.

However, the full potential benefits of analyzing AMI data have not yet been realized. With eight years of experience in load disaggregation and applying artificial intelligence to household consumption data, no other company is better equipped than Bidgely to help utilities unlock this value. This report is focused on the residential sector, Bidgely's core area of expertise, though some of the analyses can also be applied to other sectors.

The goal of this report is to describe and provide examples as to how AMI data analysis can support utilities across core operational use cases. The executive summary highlights five of these use cases: non-wires-solutions, TOU rate optimization, EV adoption, rooftop PV analysis and demand side management. The balance of the report provides additional detail on each use case as well as anonymized, representative examples of analyses performed for utilities around the world. These examples are built from analytics provided by Bidgely's Insights Engine.

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Non-wires solutions (NWS) are becoming increasingly important for utilities. However, the tools to plan and develop them have not yet matured. Load and savings potential are typically analyzed using aggregate estimates based on periodic surveys, and therefore are neither up to date nor sufficiently geographically specific. For example, if pool ownership is 3% in aggregate across the territory, the utility might determine that pool pump load shifting will not play a valuable part in its NWS. But what if in fact the load-constrained geography ownership is actually >20%? In that case, pool pumps should be a critical component of the NWS. Further, when implementing the solution, the utility will know which customers to target with which programs. This report will dive into the types of insights and analytics that are available to support NWS planning and execution.

Similarly to NWS, the ultimate goal of time of use rates (TOU) is generally load shifting, across the whole population rather than just one substation or feeder line. Therefore, the analysis is similar. The benefit of disaggregation-based analytics is the ability to analyze at a more up-to-date and granular level and identify who would benefit from TOU rates, what kinds of loads are available to shift, and, as the program goes on, which applications customers are using to shift load.

Electric vehicles present both a challenge and an opportunity for utilities. If they are integrated properly, they offer increased revenue potential. But at the same time, they threaten grid stability. Because EV owner often clusters in geographic areas,they can have a big impact on the grid even at very low penetration and can easily cause localized blackouts. However, the low penetration makes it very difficult to develop and market solutions for EV-specific issues. AMI-based EV detection and analytics unlocks the potential for utilities to target EV owners precisely, ensuring the EV adoption curve ramps up smoothly to the benefit of both utilities and customers.

While most utilities currently know which homes have rooftop PV, they generally don't have submetering on the PV. This limits their ability to identify precisely how much energy is being fed back into the grid. Analysis of net consumption AMI data allows utilities to develop an 8760-hour-per-year energy production profile for each home, thereby analyzing the effect of PV on the grid and planning PV rates without having to deploy expensive submetering.

AMI-based end-use disaggregation can improve DSM programs at every stage, including program planning and estimation, program targeting, analysis and supporting M&V. This report will dive deeper into these use cases, and provide examples as to how these ideas can be applied to specific types of programs.

Note: all numbers in this document are anonymized representations of Bidgely performed utility client analyses

NON-WIRES SOLUTIONS

Non-wires solutions (also called Non-wires alternatives or NWS) refers to the opportunity for utilities to avoid large capital expenses associated with grid upgrades if they can find more cost-effective solutions through load shifting or reducing peak load. Rocky Mountain Institute defines it as follows:

> ***Increasingly, electric utilities are able to reduce their system infrastructure investments and save customers money by employing NWS, including portfolios of distributed energy resources (DERs) like solar photovoltaics, energy storage, energy efficiency, and demand response to cost-effectively meet growing grid needs.***

SUMMARY

When planning NWS, deep knowledge of appliance ownership at the local scale is critical for estimating NWS potential, planning NWS deployment and pinpointing which homes to reach out to with which types of programs. Currently, the majority of appliance-level information available to utilities is derived from periodic surveys carried out on a subset of ~0.1% of the population, then extrapolated out to the overall population. These surveys might include specific appliance submetering.

While the surveys can collect very granular data (e.g. thermostat type, fireplace ownership, etc.), they are limited because the information quickly becomes outdated. And, more importantly for this use case, the survey sample set is generally not statistically significant or applicable to the smaller group of homeshome targeted for NWS. By contrast, information based on consumption data is scalable to every home in the territory, and can therefore be applied with high confidence to NWS regions.

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Examples

Key Appliance Ownership Statistics

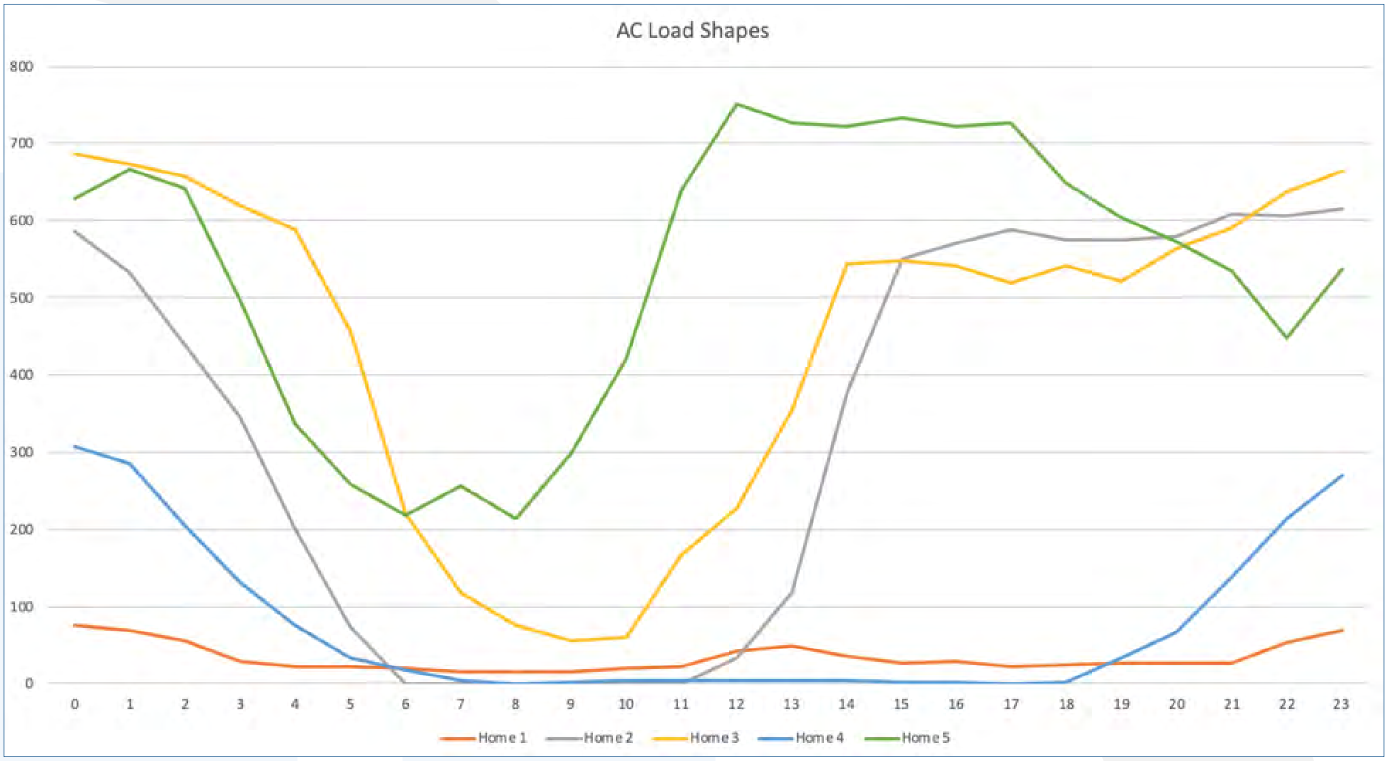
Understanding ownership of key appliances in the specific geographic region gives insight into the types of opportunities that might exist when designing and planning non-wires solutions.

APPLIANCE	NWS REGION	OVERALL REGION
ELECTRIC SPACE HEATING	12% ownership	16% ownership
AIR CONDITIONING	79%, of which: • 30% window A/C • 70% Central A/C	57% of which: • 45% window A/C • 55% Central A/C
WATER HEATING	7% ownership	19% ownership
EV CHARGING	2.5% ownership	0.7% ownership
POOL PUMP	15% ownership • 73% single speed • 27% variable speed	6% ownership • 89% single speed • 11% variable speed

This example shows an affluent region with a pattern of higher A/C, EV and pool ownership, and a higher penetration of gas-powered appliances. This profile differs significantly from the general population. If the utility relied upon only overall statistics, they may focus on electric water heating as an opportunity for load shifting, but miss opportunities for EV charging and pool pump-based programs.

A/C Targeting

Utilities offer customers an incentive in exchange for control of their devices and appliances. By targeting the highest value customers (largest loads, typically running during peak times), utilities make sure that incentive is spent as wisely as possible. We can see the effect by analyzing five homes with air conditioning, each with its own unique usage pattern. In the following chart, we see load shapes for the homes' A/C consumption between June and September. The chart shows the average consumption (in watts) for every hour of the day.



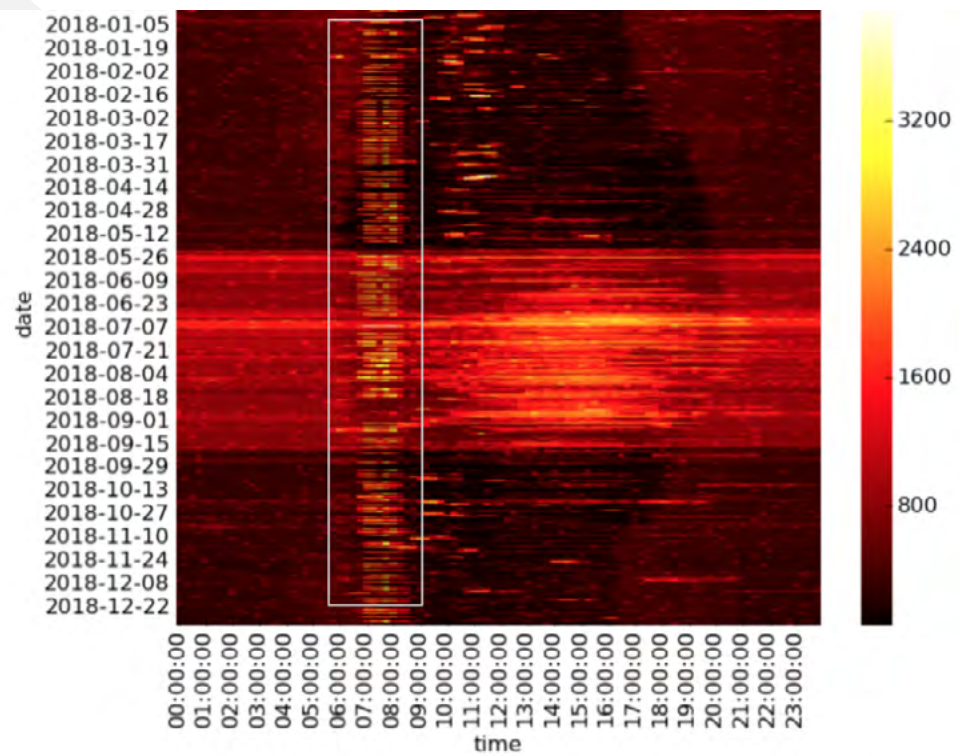
Homes 1 and 2 offer very little opportunity for A/C load shifting, because home 1 has low overall consumption and home 2 primarily uses A/C after peak hours (often indicative of a commuter with a window unit). Paying incentives to homes 1 and 2, therefore, would achieve little to no load shifting. Home 5 uses a lot of A/C during peak times, but might not have as much opportunity to shift load with a smart thermostat because it also uses a lot of energy before and after peak times, making it a better candidate for an A/C retrofit to bring down the overall A/C consumption. Homes 3 and 4 would see load shifting benefits through pre-cooling the home, and would be excellent candidates for a BYOT program.

Water Heater Detection and Targeting

Electric tank water heaters are also an excellent source of potential load shifting, since the hot water tank is essentially a large thermal battery. This is especially true in the winter, when peak times tend to fall during the mornings and evenings, when people are home and using hot water and heating. The following home uses their hot water between 7 am and 9 am on most weekday mornings. This also aligns with the winter peak, making it an especially high priority.

HOW TO READ A HEAT MAP

A heat map is a concise visualization of a year's worth of consumption data on one chart. The vertical axis shows days of the year, and the horizontal axis shows times of day. The color of the cell indicates the total Wh consumption during that time period. The bar on the right shows the color scale, with yellow representing higher consumption. Since these are 15 minute time periods, multiply the scale by 4 to estimate average kW used over the time period, (e.g. 1 kWh used over 15 minutes means an average of 4 kW power draw).

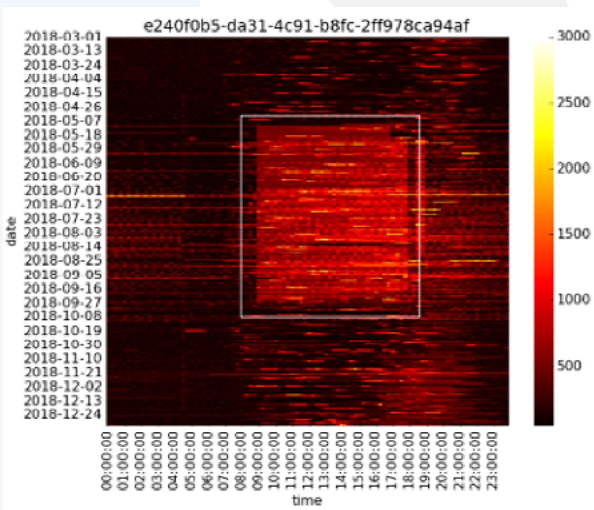


Pool Pump

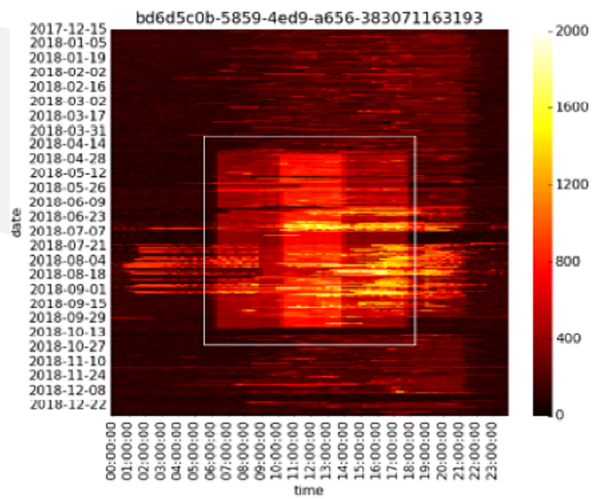
Pool pumps provide another excellent opportunity for load shifting, since in most homes they can run any time of day with limited impact to the customers' behavior or wellbeing. In addition, there is a significant opportunity to reduce overall consumption in homes that have single speed pool pumps, by replacing them with variable speed pool pumps, so energy efficiency and load shifting can be combined for extra benefits.

Through AMI analytics we can identify what time of day pool pumps are running, as shown in the following heat maps.

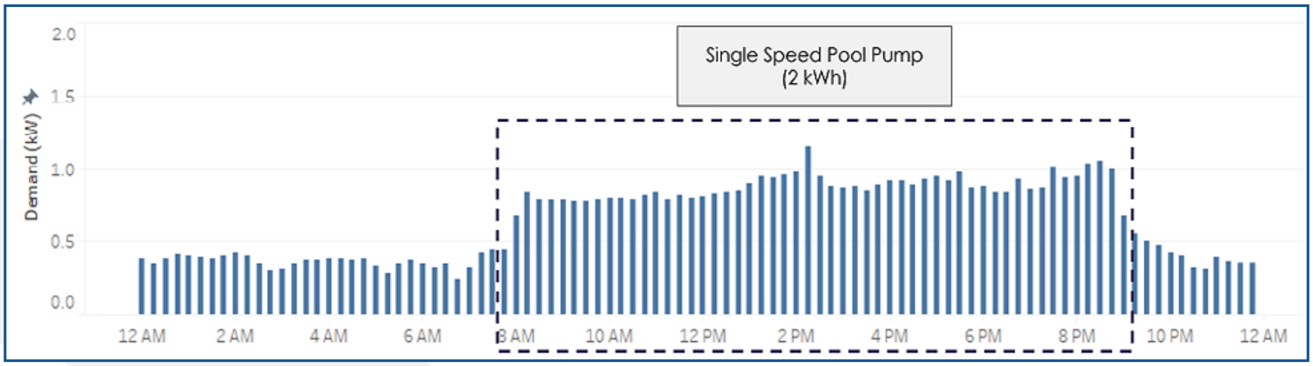
Single Speed Pool Pump
Duration - 9 hours



Variable Speed Pool Pump
Duration - 12 hours
(Filtration - 12 hours; Cleaning - 4 hours)



The heat map on the left shows a home with a single speed pool pump that runs from May through September, and the home on the right has a variable speed pool pump than runs from April through September. Both homes might benefit by signing up for a time of use rate and re-scheduling their pool pumps to run overnight.



A simpler view shows a single day of consumption for a home with a single speed pool pump.

This home has programmed their pool pump between 8 am and 8 pm, which overlaps with the peak period, generating an additional 2 kW of load. Reaching out to these homes at scale and incentivizing them to shift their consumption could yield significant benefits to the local grid.

TOU RATES

SUMMARY

Similar to non-wires solutions, generally the ultimate goal of time of use (TOU) rates is load shifting across the whole population rather than just one substation or feeder line. Therefore, the analyses in the NWS section hold for TOU applications as well.

When implementing TOU rates, the goal is to better align customer price signals, while avoiding creating a bad customer experience. This is hard to do, because often the customers who have the most load shifting potential are those that lose most when adopting a TOU rate. Getting it wrong can lead to a customer backlash due to increased bills that are hard to explain. Getting it right leads to economic alignment of customer incentives with their cost to serve.

One way to support these customers through the transition is to specifically identify customers who have the highest shiftable loads — i.e. pool pump, water heating, AC, electric heating and EV charging — and encouraging them to sign up and change their behavior, whether manually or through grid-connected devices. These customers could stand to save significantly on their bill, and shift load for the utility.

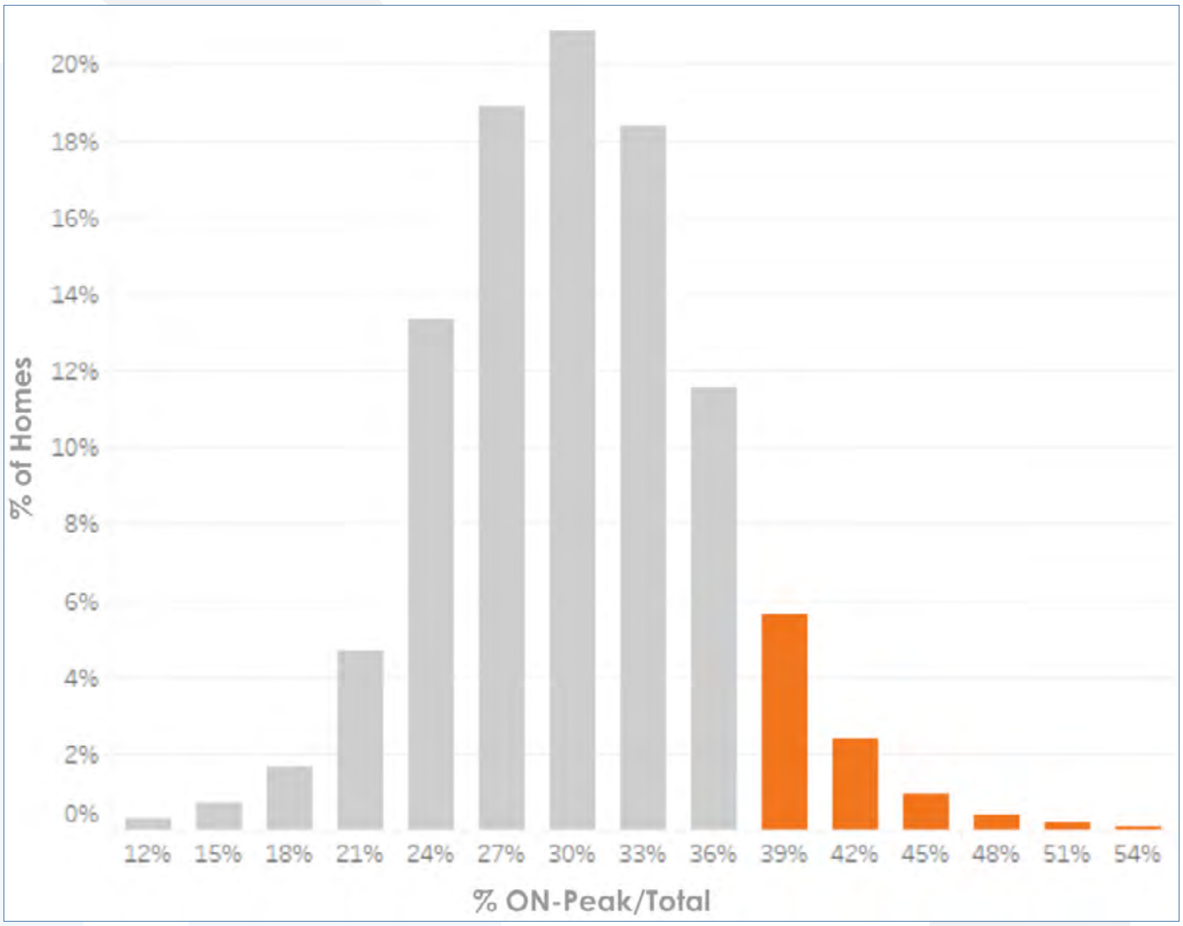
Alternatively, some customers are already using most of their energy during off-peak times, making it likely that they would passively benefit from a TOU rate plan. These customers can be encouraged to save money by signing up for TOU rates without having to explicitly change their behavior. Over the long term they should also change their behavior to use even more electricity off-peak and benefit the grid as well.

Examples

Peak Consumption Distribution Histogram

The following histogram illustrates the distribution of peak consumption across homes, revealing that there are a wide variety of customers.

The highlighted 10% homes consume more than 40% of their summer power during the peak hours of 5 pm to 9 pm. These are the potential passive losers from a TOU rate plan and could be targeted with appropriate messaging to help them shift their loads to off-peak times.



TOU Rate Impact Analysis

With TOU rates implemented, we can also analyze customers who are on the TOU rates' peak vs off-peak consumption to look for changes in their usage patterns, down to the appliance level. This insight should inform further rate design and rate targeting. If behavior modification is limited, it may mean that the difference between on- and off-peak rates is not providing enough incentive to change behavior.

CATEGORY	ON TOU RATE	ON FLAT RATE
NUMBER OF HOMES	78,341	891,401
TOTAL CONSUMPTION ON-PEAK	30%	32%
AVG A/C POWER USE ON-PEAK (KW)	0.85	0.9
AVG HEATING POWER USE ON-PEAK (KW)	0	0
AVG WATER HEATING POWER USE ON-PEAK (KW) - FOR HOMES W/ ELECTRIC WH	0.15	0.15
AVG ALWAYS ON POWER USE ON-PEAK (KW)	0.15	0.15
AVG POOL PUMP POWER USE ON-PEAK (KW) - FOR HOMES W/ POOL PUMP	1.0	1.2
AVG EV POWER USE ON-PEAK (KW) - FOR HOMES W/ EV	1.3	1.5

This analysis shows that, while some pool pump and EV consumption shifted— likely because those are the easiest to change — there has been no significant change in overall consumption. This is a likely indicator that the difference between peak and off-peak rates is not large enough to drive real behavior change. However, the rate structure has successfully motivated homes with pools and EVs, signaling an opportunity to target TOU rates to those homes. Ideally rates can be changed over time to encourage more behavior change in connection with other appliances.

EV ADOPTION

SUMMARY

EVs represent a massive opportunity to increase utility revenue, reduce carbon emissions and reinforce the utility / customer relationship. However, they also present the potential to dramatically increase the load on the grid and cause local blackouts during high usage. EV ownership often grows in pockets, so the effects on the grid are typically highly localized. Making sure that EVs are properly integrated into the grid is critical to keeping costs down and power online for everyone.

It will be a long time until EVs constitute the majority of cars on the road. Until that time, utilities will face the problem that programs marketing EV-related products and services aren't relevant for the majority of their customers who do not yet own an EV. Analyzing consumption data to detect which homes are charging their EVs allows utilities to target EV program messaging to only those customers for whom it is relevant, unlocking personalized communication and feedback opportunities.

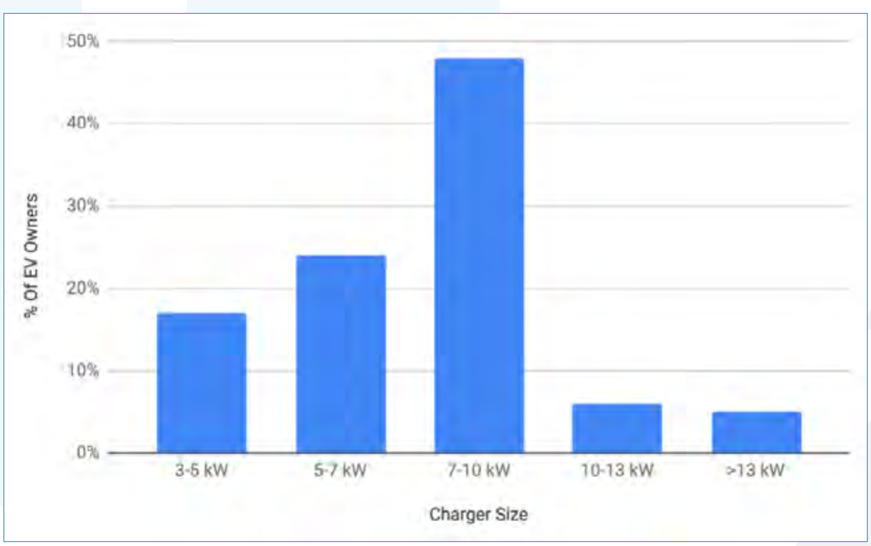
Additionally, understanding the size of chargers and identifying charging patterns allows utilities to analyze the effect that EV charging will have on the grid, both now and in the future. This leads to more streamlined rate planning and grid planning, saving utilities time and money and helping with regulatory processes.

Examples

Overall Ownership Results and Patterns

Overall ownership, as well as the size of chargers and geographic distribution of ownership can be detailed. A heat map of the territory reveals where there are spikes in EV ownership that might indicate future issues. (An example for this is not provided as it is not possible to anonymize a map.)

A histogram can show the typical charger size in the territory and what the range of charging is.



Grid Disruption Potential Reporting

With additional information, it is possible to identify feeder lines or even individual transformers that could come under strain due to multiple EVs , and tag them for either upgrade or to ensure that the customers in that region are on EV rates or controlled chargers, to encourage load shifting.

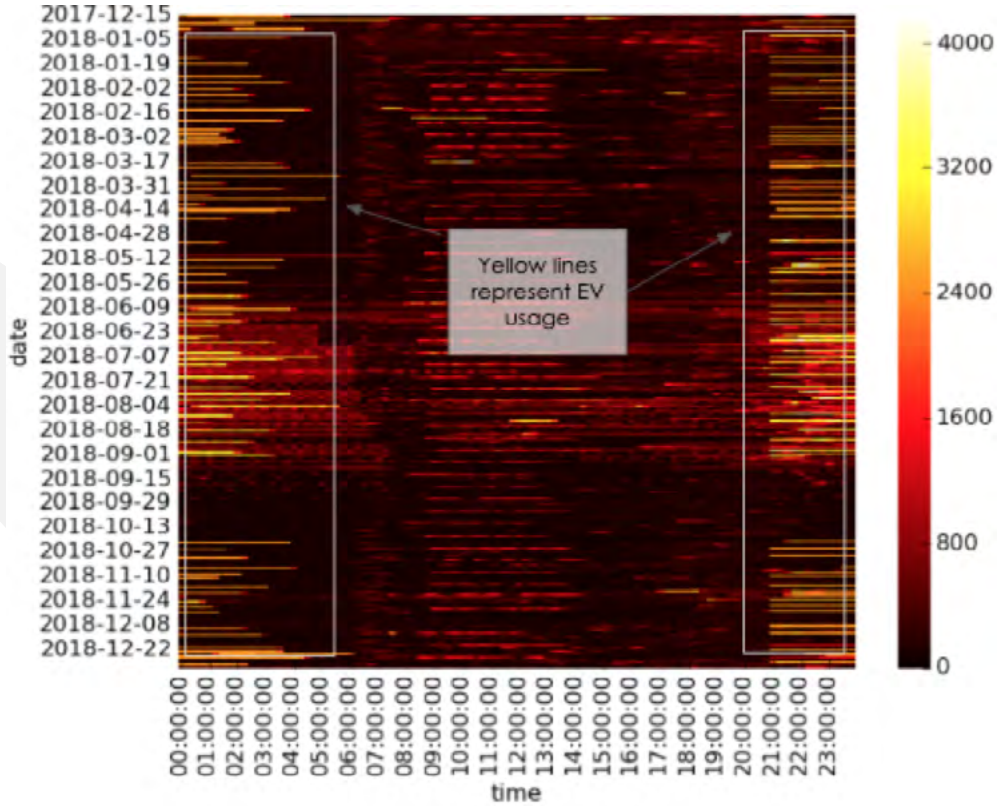
TRANSFORMER ID	# OF EVs DETECTED	TOTAL CHARGING CAPACITY
FLWKYQUSVG	5	53.3 kW
ATVSXWNRXD	4	34 kW
PZOFFAYQYB	4	27 kW
YEZZPAFUCQ	4	23 kW
KALTJELQNY	3	30 kW

Time-of-Day-Based Analytics and Customer Engagement

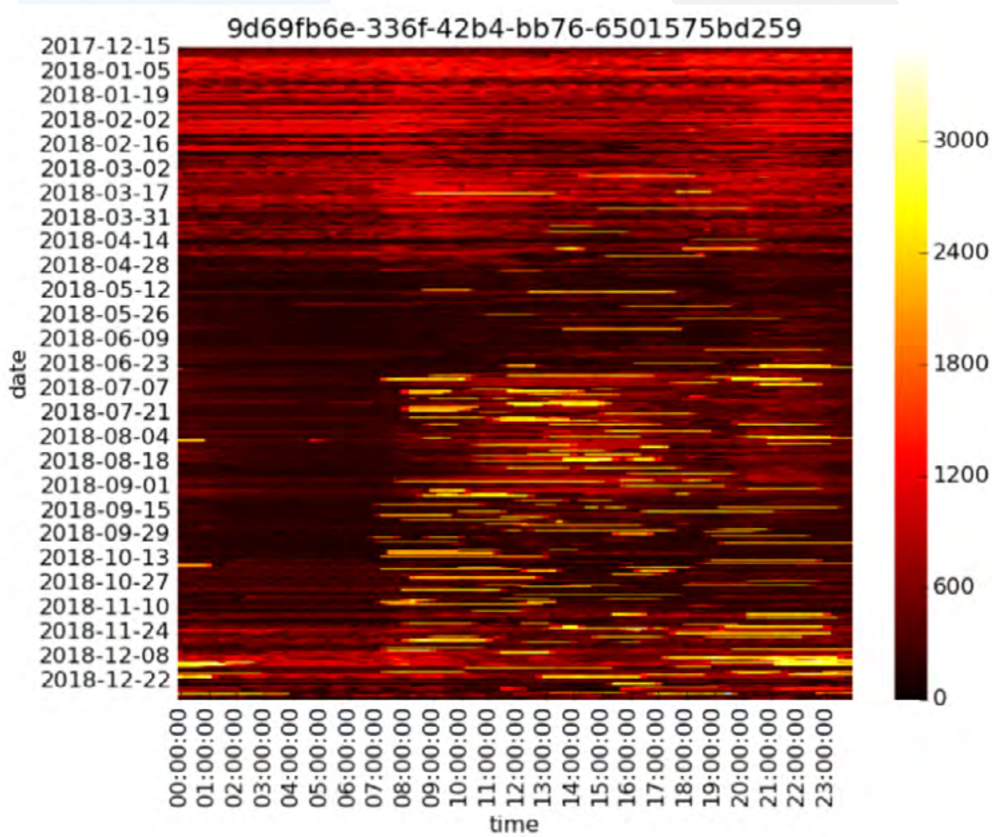
Understanding when EV owners are charging helps utilities better plan EV rates and load shifting programs. This section will show data signatures of EV charging at home during different times of day.

The next example is a heat map, showing the same EV owner's total consumption patterns over a full year, where EV charging periodically shows up as high intensity horizontal "streaks".

The following heat map shows that this customer is already exhibiting behaviors as though they are on some sort of TOU rate or load control, since their EV charger seems to consistently be turned on at approximately 9 pm and runs as long as it has to overnight. This customer could be targeted with positive outreach encouraging them to keep it up and reminding them how much they are saving by charging overnight vs. a typical home, assuming they are already on a TOU rate.



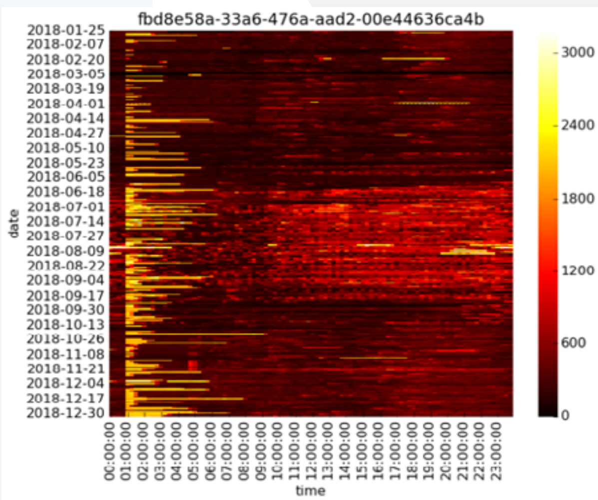
The next heat map shows a home that charges their EV with a ~10kW charger periodically throughout the day. This home is putting a lot of strain on the grid, as they are plugging in during summer peaks when every other home (including this one) would be using a lot of air conditioning.



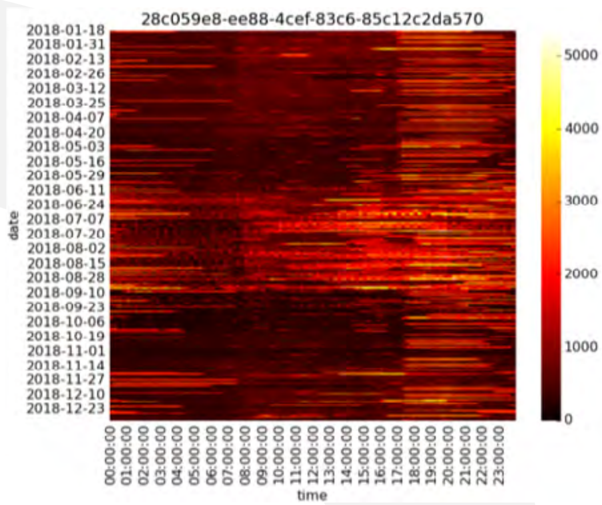
Alternatively, because this customer frequently charges during the middle of the day, they might be a great candidate for rooftop solar. This is the kind of customer that would realize maximum value from their solar panels, and also have a positive effect on grid stability.

In this final example, two different EV owners in a single zip code are using L2 chargers with an amplitude of 9-10 kW to charge their vehicles on what appears to be a schedule, starting at a set time and running until the car battery is full. But, the second home usually starts charging in the late afternoon / early evening time period which coincides with the peak.

High Usage Overnight



High Usage During Evening



When customers are found to be charging during peak times, they should be encouraged to sign up for an EV rate and shift their charging patterns to save money and preserve the grid.

ROOFTOP PV

SUMMARY

While most utilities currently know which homes have rooftop PV, they generally don't have submetering on the PV, so they aren't able to determine on a home-by-home basis how much energy is being fed back into the grid. Analysis of net consumption AMI data allows for an 8760-hour-per-year energy production profile, through which utilities can analyze the effect of PV on the grid and plan PV rates without having to deploy expensive submetering.

Generally, distribution utilities know the nameplate capacity of a rooftop solar installation as customers have to report that information when they connect to the grid. This is a useful piece of information but can be misleading for a number of reasons:

- Customers can upgrade or downgrade their system without updating the utility
- Shading, dirt, snow, etc. can degrade actual output
- Solar panel orientation (vs horizon or east/west) affects the hour of day and day of the year that output peaks

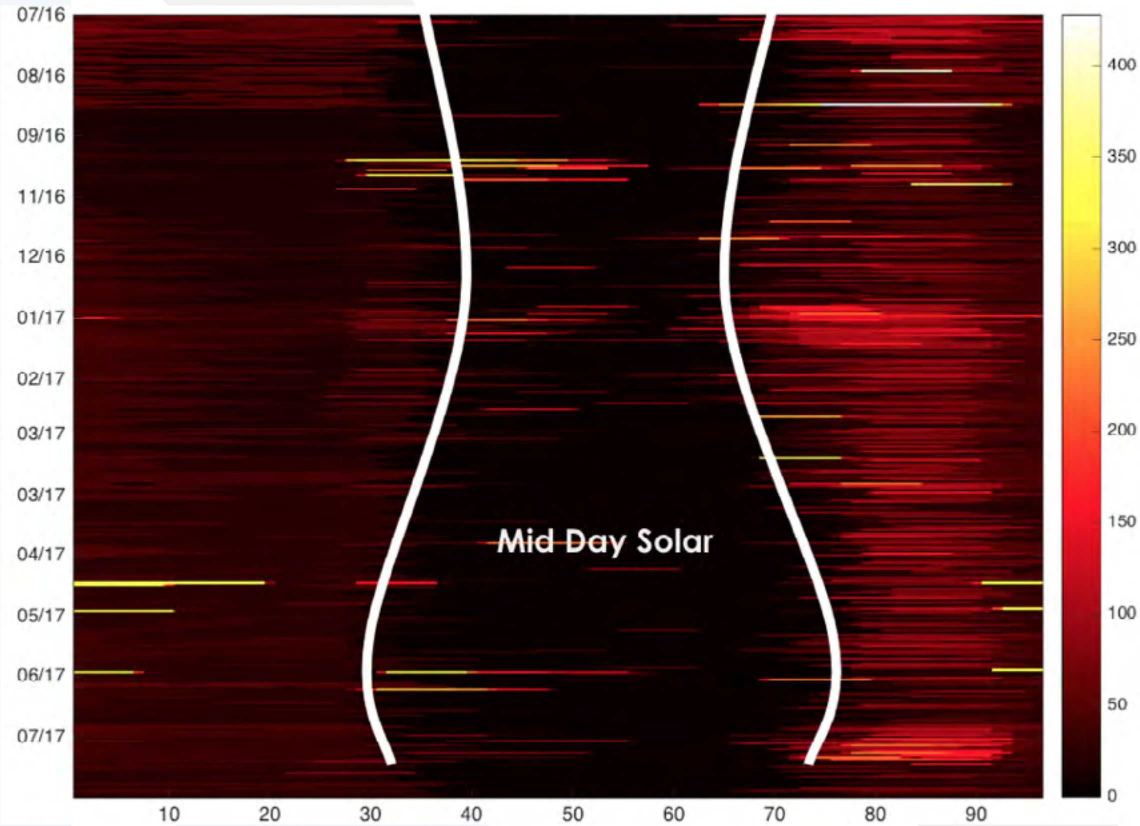
Fortunately, utilities have access to AMI data and can therefore achieve more accurate estimates of solar production down to the home level. This can support:

- Rate planning and rate making, and supporting PV solar rate cases to the PUC by understanding the effect it will have on customers
- Grid stability during outages and maintenance, understanding the flow of solar energy onto the grid at the line level to ensure no lines are overloaded
- Peak load planning, understanding the effects of solar down to the feeder or transformer level to inform semi-annual peak load planning sessions and necessary capital upgrades

Examples

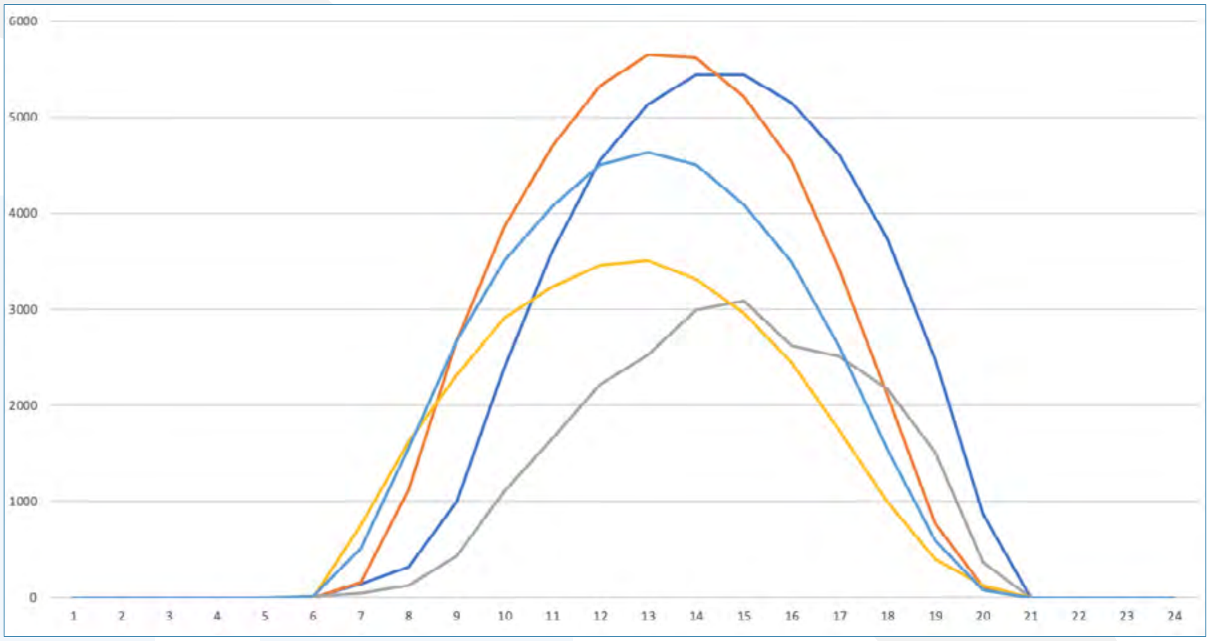
Solar PV Detection

Some utilities, especially retail-only utilities operating in competitive environments, may not know which homes have solar panels. Homes with solar panels have a distinct data signature over the course of the year, with zero or negative consumption (depending on how it is metered) during the middle of the day. The heat map below shows a home with rooftop solar, and is highlighted to show the blank space in the middle of the day, and how that pattern starts earlier and ends later during the summer months. Knowing which homes have solar panels is a useful piece of information for marketing energy solutions, services, and more.



Solar Production Estimation

The chart below shows hourly solar production for five different homes in the same region, averaged across June. As we can see, they all start producing between 5 and 6 am and stop between 8 and 9 pm. However, their peak production differs significantly, with some homes peaking closer to noon and other homes seeing peak production closer to 3 pm, which indicates that their panels are tilted towards the west.



Example: daily solar production for 5 homes, averaged across June (Watts / hr)

This exemplifies that knowing only the nameplate capacity of the solar array will not give an accurate model of production, because the tilt and orientation of the solar panels affects what time of day and day of the year production peaks.

Solar Production by Substation

Aggregating solar production per substation can inform peak load planning. The solar produced during the expected peak can be subtracted from expected consumption. This analysis can be run for any expected peak hour of the year.

SUBSTATION ID	# OF HOMES WITH SOLAR	PEAK TIME PRODUCTION (kW)
49772388	5	53.3 kW
73677337	4	34 kW
89365555	4	27 kW
84854472	4	23 kW
03088743	3	30 kW

Solar Targeting

Analytics of AMI data can be used to find customers who will benefit the most from installing solar. Because net metering will not likely be continued, the time value of energy will be high. Homes that can use the power that they generate rather than exporting it onto the grid will gain the most value. These customers can be targeted to help utilities diversify into new revenue streams, help utilities hit renewables goals, or implement non-wires alternatives. Customers can be diverted to a solar impact calculator to help them understand the size and orientation of a system and how much they could save per year.

DEMAND SIDE MANAGEMENT

SUMMARY

Disaggregation and analysis of AMI data can also support DSM programs throughout their lifecycle. This analysis generally does not assume that the analytics will replace any individual parts of the program lifecycle (such was the promise of M&V 2.0). Rather, the analysis becomes an integral part of DSM program planning, implementation and evaluation to enable utilities and program implementers to easily and efficiently maximize the effectiveness of their programs.

Planning

Understanding appliance ownership across the territory is a critical aspect of program planning. Currently, utilities periodically engage in end-use surveys that involve direct surveying of homes and sometimes submetering appliances. The process can be expensive and is often only updated every few years. Through analysis of AMI data, appliance ownership information is kept up-to-date and gathered more cost-effectively.

Targeting

Disaggregation allows for better program targeting by identifying programs that are applicable to each individual home. For example, approximately 10% of homes have pools, so any pool pump program marketing would be targeted only to those homes to avoid spamming the 90% of homes that don't have pools. Or, smart thermostats given away to help shift peak load would be targeted to customers who have electric heating or A/C.

Targeting the right customers for each program has two key benefits:

The first benefit is simple: more efficient marketing. Targeted program outreach to homes most likely to benefit saves marketing spend and improves the customer experience because the recommendations they receive are specifically relevant to them.

The second benefit is more substantial: better allocation of rebate dollars. Typically, treating one home vs. another "costs" about the same amount in rebate spend. However, the savings from home to home differ drastically, so if utilities and implementers can target more homes that can realize high savings, the overall program will be drastically more cost effective. This is covered in more detail in the linked article:

https://www.bidgely.com/blog/energy-efficiency-what-you-have-to-know-before-launching-your-next-program/

Often, implementers and utilities are constrained by the use of deemed savings as the typical model. However, even within the deemed savings regime, utilities still often get credit for replacing larger and less efficient appliances, which can be pinpointed using disaggregation. Therefore, improved targeting is still relevant in virtually all programs.

Operational Support

End use disaggregation supports programs throughout their execution, primarily by automating and assisting quality control efforts. Often implementers have to check in on a certain percentage of installations. By analyzing the AMI data, they can automate these processes and add intelligence to inform which homes are flagged for quality control. This automation and improved accuracy has the potential to reduce costs and increase program effectiveness, ultimately improving the total resource cost.

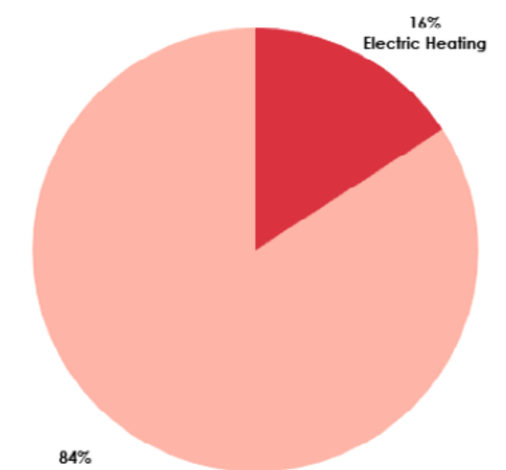
M&V

Finally, at the end of the program lifecycle, measurement and verification is enhanced by AMI data analysis. M&V 2.0 has not yet lived up to its promise of offering a better and cheaper product by automating the M&V process. However, even within the current process, M&V providers can leverage disaggregation as a key input to help pinpoint how much energy consumption change can be attributed to the program vs. business as usual.

i-DSM and DR

This analysis becomes even more important when layering in the time of day of appliance consumption. As utilities move into a world where integrated DSM and combining EE and DR are more important, being able to identify which homes are using appliances during peak times is important for all aspects of the program lifecycle.

In addition, having more granular data facilitates geo-specific program design, similar to what was discussed in the non-wires solution section.



Examples

Electric Heating Programs

When it comes to determining which homes should be targeted for heating programs, understanding which homes have electric heating and which homes have gas or oil based heating is an essential first step. Heating type becomes clear through an analysis of electric AMI consumption data. In territories where all homes in the territory require some form of heating, homes that do not have large electric heating signatures must have gas- or oil-based heating.

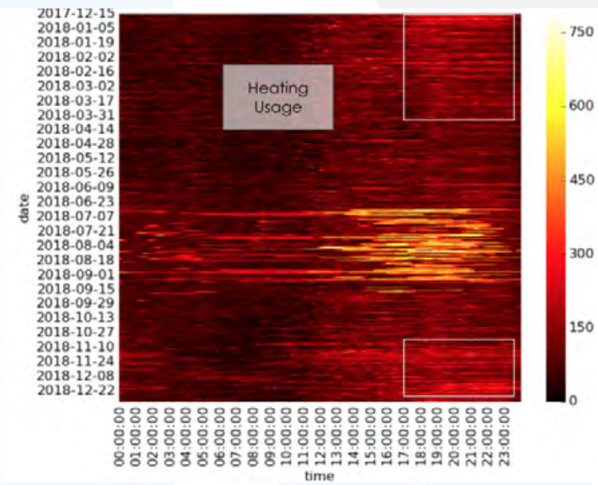
In the example analysis, 16% of homes were found to have electric heating. While the majority of the homes had at least some electric component of heating, in most cases, it was a pump or fan on a gas- or oil-powered central furnace or boiler and not the main heating source.

In the following two heat maps, we compare a home with non-electric heating to a home with electric heating.

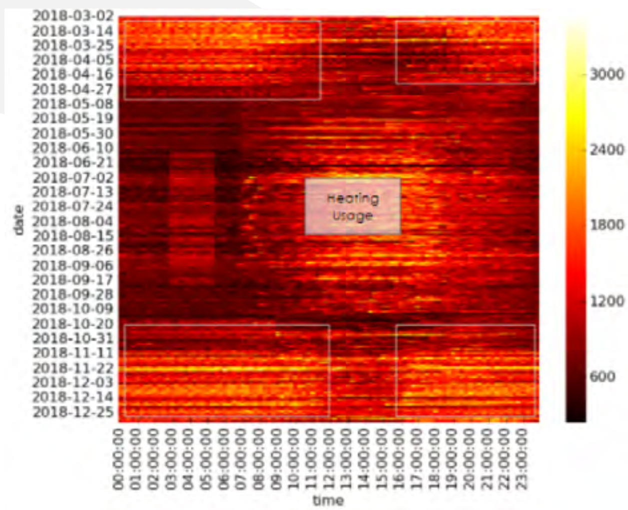
The first home does not have main electric heating. It shows a home with a small amount of heating signature in the winter, which is most likely an electric component of a gas or oil heating system such as a furnace fan to blow the hot air throughout the home.

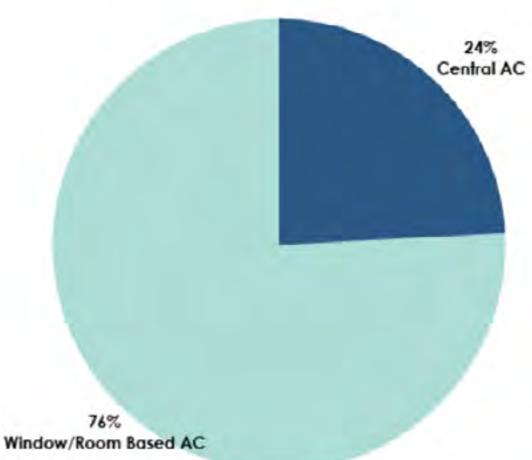
The next home has electric heating (and A/C in the summer), which is used for for 14-16 hours a day during peak winters. The electric heater has an amplitude of approximately 9 kW.

Non-Electric Heating Home



Electric Heating Home





Air Conditioning Programs

DSM programs that are applicable to a given home differ depending on whether those homes have window / portable A/C units or central air conditioning. By analyzing the size of these units through energy disaggregation, we can tell which homes are best suited for each program, and target them accordingly. Typical breakdowns would be as follows:

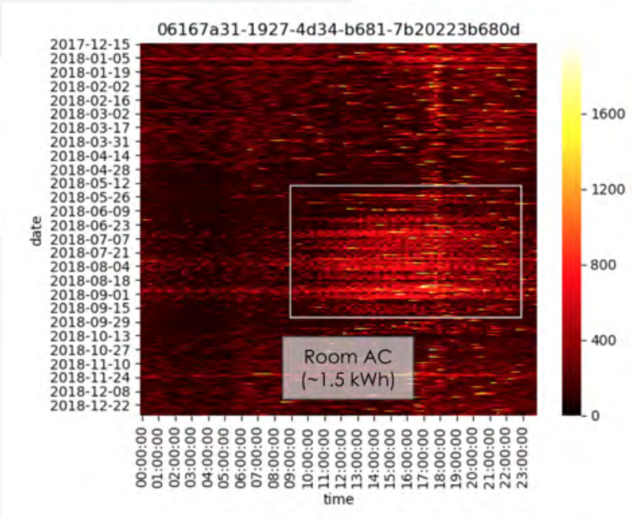
- **Central Air conditioners**, consume more than 700 kWh per month (with rating of 3+ kW)
- **Window/Air room conditioners**, consume on an average 320 kWh per month (with an appliance rating of 1-2 kW, running for 6-8 hours)

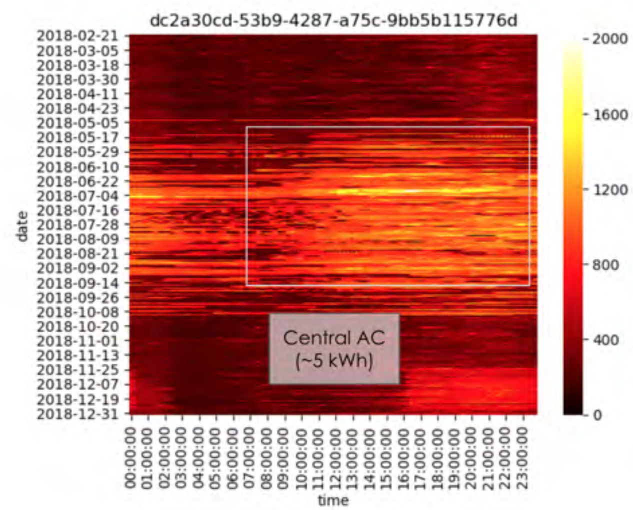
Below is the bifurcation of cooling homes into central and window/room air conditioners as per the data given —

Two individual homes' heat maps exemplify the difference between window or room A/C unit and central A/C units.

Window or Room A/C Unit Home

Central A/C Home



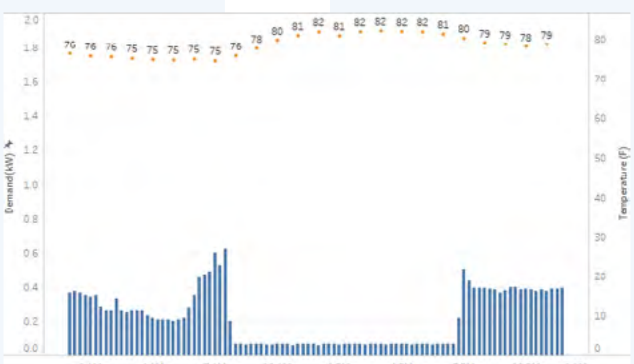


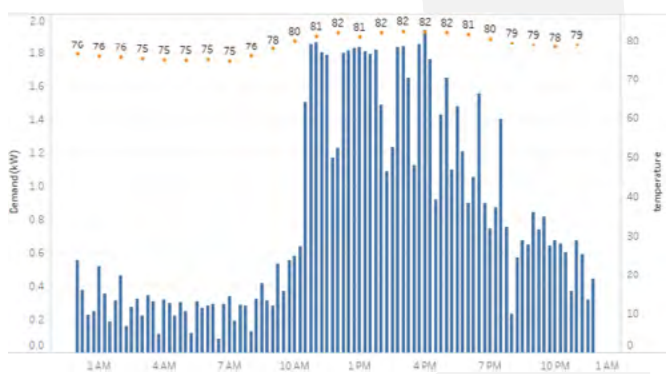
The home on the left has a room air conditioning unit, which is typically in the 1-2 kW range. The usage pattern is also consistent with the homeowner running their air conditioning unit periodically when they are home, rather than for most of the day and night, as with the central air conditioning unit to the right.

Below is an example of two similar homes in the same zip code that have very different AC usage patterns. On the same day,the home on the left uses a room air conditioner at night and switches it off when they go to work, while the home on the right has a central air conditioner at a given set point that cools mid-day when it is hottest out.

Window or Room A/C Unit Home

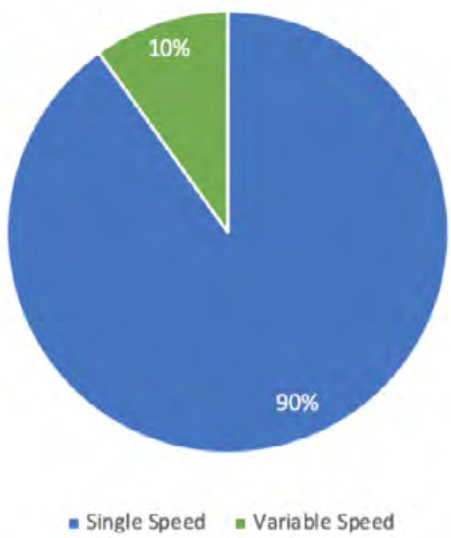
Central A/C Home





These homes should be engaged differently. Homes with inefficient window units should be encouraged to buy more efficient window units through a marketplace, while central air conditioners should be tuned by a professional, or optimized with a smart thermostat.

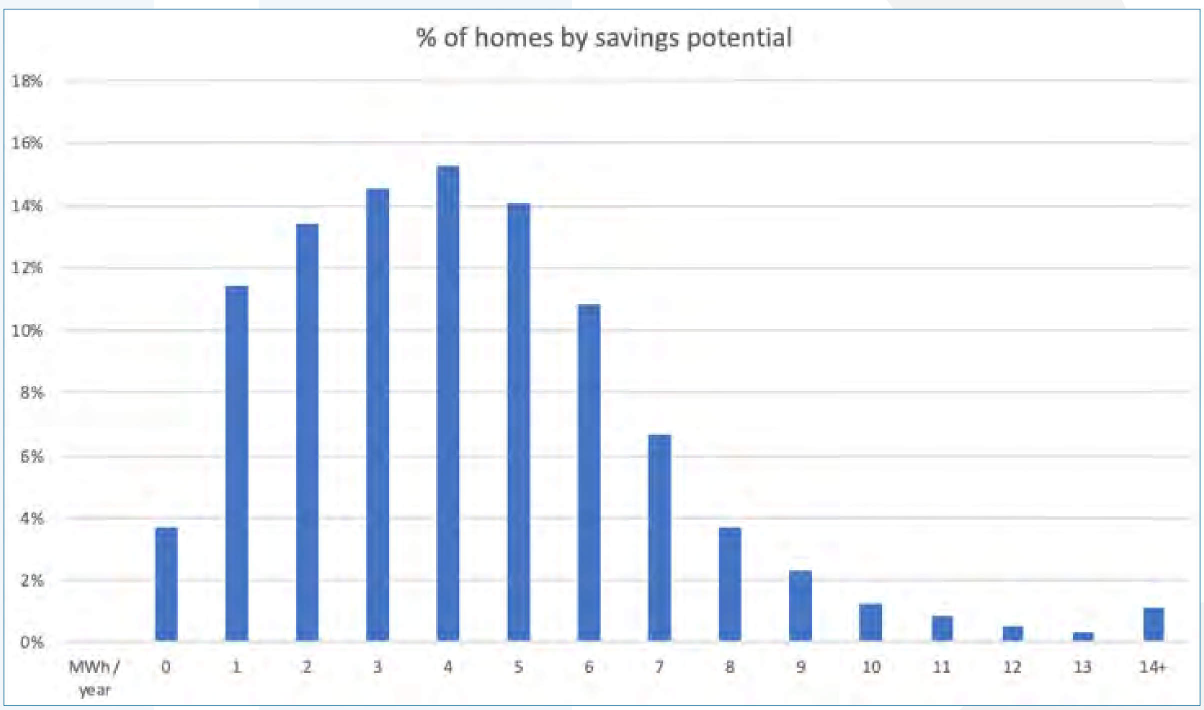
Pool Pumps



Pool pump ownership is approximately 8-10% across the USA. Since pool pump owners are not the majority, program targeting must be targeted, to avoid spamming the 90% of homes nationwide that do not have a pool. Variable speed pool pumps are an excellent energy saving device, with no negative impact on the homeowner outside of up-front capital, and significant energy savings over its lifetime.

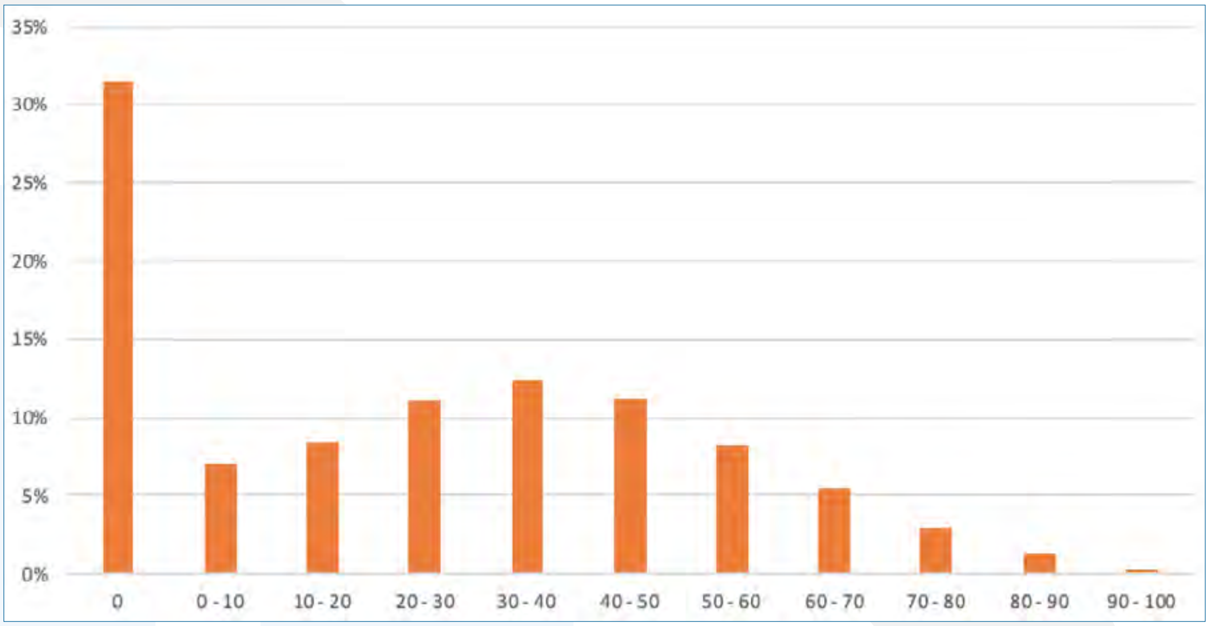
We can also view which homes have the highest savings potential by switching to a variable speed pool pump based on their current single speed pool pump consumption, which as the following histogram shows, can differ significantly.

Chart: histogram of savings potential



Similarly, the consumption during peak times — and therefore the potential grid benefits of shifting the homes' load — shows a strong distribution from home to home, as would be expected. We see many homes have no overlap during peak times, as they were programmed thoughtfully. However, the majority of homes have at least some overlap and other homes are running their pool pump during peak times at no value to the customer but significant cost to the utility.

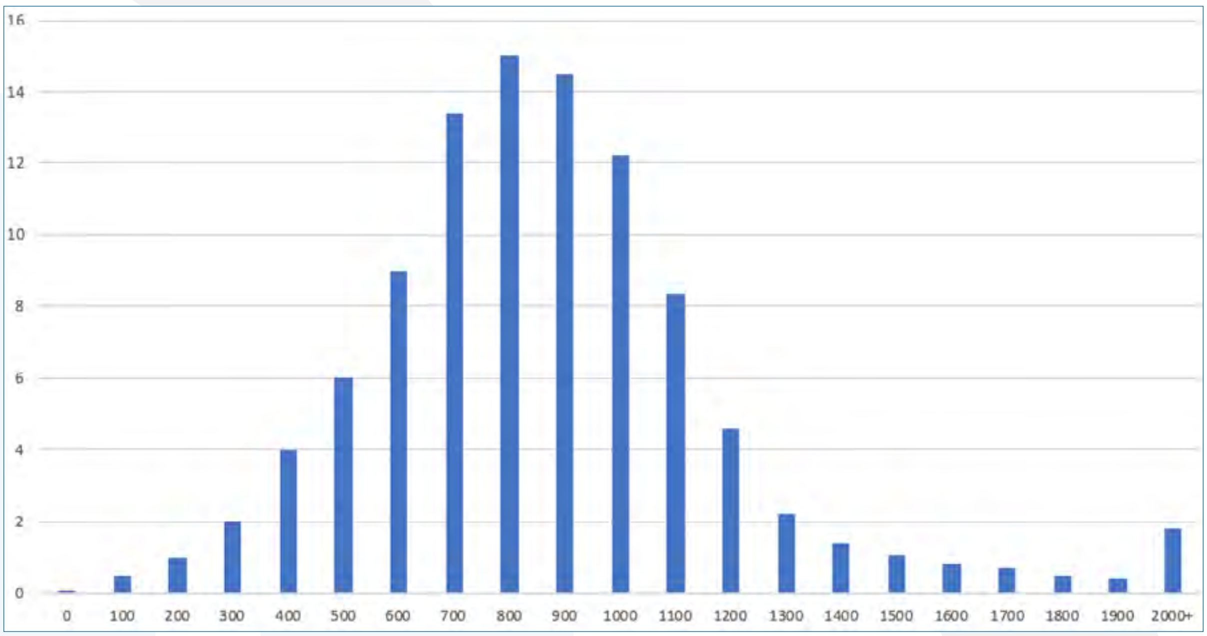
Chart: Histogram of % of consumption between 3 and 8pm



Always On

Always on or “vampire” load is a substantial energy user, and tends to differ significantly from home to home, as we can see in the following histogram. Homes with high always on consumption can be targeted for energy audits, as they might not realize how much savings they might realize. Many homes are spending hundreds of dollars a year on vampire load, and could save a lot of money and energy by upgrading their appliances (e.g. through the utility marketplace) or buying smart power strips.

Histogram of total kWh Always On consumption per year



SUMMARY

As this report has shown, AMI analytics and disaggregation can support a myriad of use cases across the utility, adding key pieces of information and intelligence to streamline decision making and improve the experience for all stakeholders. We recommend that utilities start their disaggregation journey with one or two use cases, picking something tangible that has the potential to deliver immediate benefit. Initial successes can be used to build momentum and support a utility-wide analytics transformation. The ideal end state is a broad set of available customer data, derived from Bidgely's disaggregation models, that sits in the data center where it is available to be incorporated throughout the utility's operations.