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Empowering Utilities with True, Behind-the-Meter Disaggregation: BIDGELY'S PROVEN APPROACH AND REAL-WORLD IMPACT

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Bidgely UtilityAl[™] Disaggregation

The original AI-based, non-intrusive energy disaggregation

Bidgely has long been recognized as the trailblazer of energy disaggregation.

While others may make bold claims, it is Bidgely who pioneered disaggregation and has spent the last decade partnering with energy companies to refine and perfect our approach. Through innovation and unmatched expertise, Bidgely continues to deliver the most **accurate and impactful** results in the industry using intelligence derived from the utility meter and customer data.

And while some providers are now beginning to deliver various forms of statistical and data driven disaggregation, it was more than 10 years ago that Bidgely submitted its first meter data disaggregation <u>patent</u>:

"Systems and methods for improving the accuracy of appliance level disaggregation in non-intrusive appliance load monitoring techniques (US9612286B2)"

Since then, as the leader in AI-based, behind-the-meter energy intelligence, we've added more than a dozen disaggregation-based patents to a growing treasury of data science innovation.

A MATURE AND TRUSTED SOLUTION

Bidgely's innovative approach, backed by a decade-long partnership with utility companies, has enabled us to tackle some of the most critical challenges facing the industry. We are partnering with energy companies across the globe to deliver differentiated value, better program outcomes and enhanced customer experience.



You can read more about individual customer use cases and results in the Putting True Disaggregation to Work in the Real World section of this paper.

FROM FUD TO FACTS

As the disaggregation market becomes increasingly competitive, with new entrants and legacy data vendors vying for attention, it is not uncommon for them to resort to fear, uncertainty, and doubt (FUD) tactics to deflect attention from their own limitations. However, as the category-creator for energy disaggregation, Bidgely has always been committed to transparency by providing clear explanations of our approach, accuracy metrics, and proof points from the market.

This paper aims to dispel the FUD that has emerged around disaggregation by providing clarity on what true disaggregation is and showcasing real-world results that Bidgely has achieved with our utility partners. We will outline Bidgely's unique approach to disaggregation, which leverages many years of ground-truth data to train our models and achieve unparalleled accuracy in the market. Furthermore, we will present a range of compelling case studies that illustrate what sets us apart from other providers.

In addition, this paper will challenge readers to think 'bigger' - beyond displaying a pie chart in any customer interaction - and explore how true disaggregation can offer a deeper level of behindthe-meter visibility that supports a wide range of utility objectives, including improved customer experience, greater energy efficiency, and better management of the proliferation of distributed energy resources (DERs).

WHAT IS DISAGGREGATION

Disaggregation is the process of breaking down premise level energy consumption data on a device-by-device or categories basis to isolate what appliances and energy habits are contributing to that total consumption. Disaggregation enables both consumers and utilities with personalized information and analytics to make smart energy decisions.

However, it's important to note that not all disaggregation methods are created equal. The accuracy and effectiveness of disaggregation techniques can vary significantly depending on the approach used.

WHAT MAKES BIDGELY'S DISAGGREGATION UNIQUE

Bidgely's signature-based **true** load disaggregation algorithms utilize energy usage data, weather data, and dwelling data to identify and track true customer behavior through their actual daily appliance usage.

Each appliance usage has its own unique signature which our AI is detecting across all homes in real time.



Example of residential heatmap and intelligence

[For more example of heatmaps and their application see Appendix: Disaggregation Applied - Example Heatmaps]

This ability to extract fingerprints to identify true behavior, including when a customer's behaviors change is unique and patented. For example, when a customer goes on vacation, or buys an EV, their usage patterns change dramatically. Our solution recognizes the change in usage patterns and adjusts actual energy itemization accordingly.

We can detect:

- Which appliances a customer has, including heating, cooling, lighting, refrigeration, water heating, pool pump, EV, solar, and more
- Energy usage by appliance (in kWh, therms, CCF, cost)
- Time of use by appliance (daily, weekly and seasonal load profiles, peak/off-peak usage, and more)
- Appliance size and fuel type (e.g. electricity vs. gas)
- Type of appliance with the same fuel type (such as central AC vs, room AC)
- Relative efficiency and degradation



16 Patents | No Hardware Required | Electric & Gas | Zero Customer Inputs Required

UtilityAITM true disaggregation applies AI-based algorithms to hourly (or more granular) meter data to extract appliance signatures that identify true consumer behavior and create a personalized energy profile for each customer.

TYPES OF DISAGGREGATION

There are various types of disaggregation. These fall broadly into 3 buckets:

True Disaggregation

Any non intrusive disaggregation that captures the true behavior of appliances based on appliance specific unique signatures. With true disaggregation, appliance itemization is based on data from each home's smart meter and reflects actual energy usage of the home in monthly (or other frequency) cycles.

Non-intrusive, cost-effective and highly accurate.

Statistical Disaggregation

Any disaggregation performed based on statistics of population. This approach relies on a static model which is created via research and survey data on typical monthly usage for a geographic region and climate.

Non-intrusive and costeffective but not accurate at a user level, only accurate at a population level. Hardware-based Disaggregation

This type of disaggregation relies on load monitoring delivered via hardware. These include Home Area Network (HAN) devices that can be attached to smart meters, or CT clamps.

Intrusive, however most accurate, and most costly.

(for more details see our glossary of disaggregation terms)



DISAGGREGATION BY DATA: GRANULARITY & SOURCE

In addition to different types of disaggregation, there are also various levels of disaggregation that depend on the source hardware used. These are:

- **Inside-the-Meter (Distributed Intelligence)**: This is an emerging and rapidly growing level of intelligence, where disaggregation is performed directly inside the smart meter. This approach provides real-time data on energy consumption, allowing for near-instantaneous insights.
- HAN data (Home Area Network): The Home Area Network connects an energy monitoring device to a smart meter, enabling near real-time data on energy usage to be captured and analyzed. This level of disaggregation provides valuable insights at 1-60 second intervals.
- **AMI (smart meters):** Advanced Metering Infrastructure (AMI) is a smart metering system that records detailed information about energy usage at 15, 30, or 60 minute intervals.
- **Non-Smart Meters:** These are traditional meters that record information about energy usage at daily, monthly, or annual intervals. While they may not provide real-time or high-frequency data, they are still widely used in many utility settings.



Bidgely is able to disaggregate across all DI, HAN and meter types.

APPLIANCES ITEMIZED

Disaggregation capabilities can also vary according to appliance. Bidgely is able to disaggregate consumption detail across 12 appliance categories. Depending on the granularity of the meter data, some of these appliances - such as water heaters and refrigeration - may be identified via true disaggregation or rule-based/user centric disaggregation.

List of Appliance Categories in Bidgely 'Residential Electric' Itemization

APPLIANCE	SIGNATURE DETECTION (15-Min AMI Data)	DEPTH
Always On – Always On includes "plugged-in" devices such as personal computers, monitors, printers, stereos, and televisions that consume energy even when they're off	True	Detection*, Estimation**, Inefficiency
Cooling – This includes common cooling appliances such as central air conditioners, room air conditioners, heat pumps, "swamp" coolers, and mini-split air conditioners.	True	Detection, Estimation, Inefficiency, Size, Time of Use***
Heating - Space heating includes any type of heaters: radiant, convection, fan, storage, underfloor, heat pumps, furnaces, etc.	True	Detection, Estimation, Inefficiency, Size, Time of Use
Lighting – This includes all lights in the home, from efficient LED bulbs to inefficient halogen bulbs, and everything in between.	True	Detection, Estimation, Inefficiency, Time of Use
Pool Pump – Pool pumps have motors that keep pool water filtered and clean year-round.	True	Detection, Estimation, Size, Time of Use, Type (Single or Variable Speed)
Refrigeration - Refrigeration includes the aggregate usage of refrigerators and freezers.	True	Detection, Estimation, Size, Inefficiency
Water Heater – Water Heater includes all whole- home water heaters (tanked, tankless, and heat pumps) as well as specific-use water heaters (e.g. electric showers).	True	Detection, Estimation, Inefficiency, Size, Time of Use, Type (Electric or Gas), Timed or Untimed
Electric Vehicle - This category includes the aggregate usage of all EVs at home.	True	Detection, Estimation, Size, Time of Use, Charger Type (L1/L2/L3)
Solar Generation - This refers to energy generated by solar photovoltaic systems.	True	Detection, Estimation, Size, Time of Generation
Cooking – Cooking and food preparation appliances that consume significant energy can be found in this category, including oven, stove, toaster, and toaster oven.	Rule-Based	Estimation
Entertainment- Entertainment consists of two main appliance types: consumer electronics (TV, DVR, game console, stereo) and home computing (desktop, monitor, modem).	Rule-Based	Estimation
Laundry/Cleaning- Laundry consists of "wet washing" appliances, such as dishwashers, washing machines, and dryers.	Rule-Based	Estimation

*Detection refers to whether an appliance/category is present in a home

**Estimation refers to the estimated usage of the appliance

Monthly data for Heating, Cooling, & Always On

^{***}Time of use refers to each instance of usage along with aggregated attributes (i.e., average usage duration of appliance, number of usage instances per day/week)

¹⁵ and 30-min data have true disaggregation for those Truel Categories listed above;

⁶⁰⁻min and monthly data have true disaggregation for Heating, Cooling, Pool Pump, and Always On;

DEPTH OF DISAGGREGATION

There is another critically important consideration when it comes to disaggregation - and that is depth. The value of disaggregation lies in the detail.

Depth of disaggregation refers to the ability to provide detailed insights beyond consumption level detail, to include the capture of additional information such as appliance type, efficiency, time of use, type of fuel (electric or gas), timed or untimed usage, and more. This depth of granularity enables a more comprehensive understanding of energy consumption patterns and empowers consumers and utilities with valuable information for making more informed decisions.

Bidgely is able to provide a greater depth of disaggregation than other providers (see table above).

An example of this kind of depth is being able to identify inefficient and/or degrading appliances. In this instance, households with HVAC appliances that consume more energy over time to maintain similar temperatures due to degradation, can be targeted for appliance change/upgrade initiatives.



Sample AC degradation over 3 years: Appliance degradation can be detected by looking at the yearly trend in FCC and duty cycle.

INDUSTRY-LEADING ACCURACY

Disaggregation is complex - and it's important to get it right. Accuracy is a key requirement for building customer trust and guiding meaningful energy efficiency outcomes.

Founded in 2010, Bidgely has well over a decade of developing accurate disaggregation technology. We measure accuracy across two key parameters:

- 1. Detection identifies if an appliance has been used within a given time period. From a customer engagement standpoint, accurate detection is critical; simply put, customers know when they use an appliance. Inaccurate detection can erode customer confidence.
- Estimation accuracy is the difference between disaggregated consumption and actual consumption. Minor inaccuracies in appliance-level consumption estimation don't have a significant impact on the consumer's bottom line (e.g. a 10% error on an appliance that consumes 20% of the home's energy is only a 2% error in terms of whole home consumption).

The following table reflects the accuracy levels of Bidgely's true disaggregation categories with AMI data at 15m intervals.

APPLIANCE CATEGORY	DETECTION ACCURACY	ESTIMATION ACCURACY
Always On	100%	95% (+/-2)
Heating	95% (+/-2)	82% (+/-5)
Cooling	97% (+/-2)	88% (+/-5)
Lighting	100%	75% (+/-5)
Refrigeration	99%	75% (+/-5)
Water Heating	92% (+/-2)	85% (+/-5)
EV	98% (+/-1)	90% (+/-5)
Pool Pump	96% (+/-2)	85% (+/-5)
Solar	99%	87% (+/-3)



Getting The Groundwork Right - Ground Truth Data

Ground truth data is essential for developing accurate and reliable disaggregation algorithms, as it allows data scientists to compare the estimated energy consumption of individual appliances to the actual energy consumption measured by hardware. This comparison can help identify areas where the algorithm needs improvement and guide the development of more accurate algorithms.

Understanding Bidgely's history and our access to ground-truth data provides insight into how we have been able to finely tune our algorithms and stand behind the precision of our disaggregation.

Bidgely was originally established as a cloud partner company for hardware CT clamp firms like TED and Blueline, and quickly expanded its reach by gaining a significant user base from Google Power Meters and Microsoft Home projects.

Bidgely received separate streams of high-resolution ground truth data for major appliances from many of these homes, resulting in a database of tens of thousands of homes in North America, primarily the US, with high-resolution data granularity (1-10 seconds) that guided the initial development of our algorithms. In addition to this, Bidgely also acquired the work of a prominent thermostat partner and gained access to 50,000 homes' ground truth for heating and cooling, which provided further data to allow us to continue to test and refine our algorithms and to develop saturation and degradation use-cases.

With time, Bidgely and the market realized that HAN devices were very costly and served as a significant barrier for large-scale deployment. This resulted in Bidgely innovating to further provide low-resolution disaggregation from AMI data at 15/30/60 min granularity.

Additionally, Bidgely has conducted many validation POCs where CT clamps were used to collect estimation ground truth for different appliances.

Estimation accuracy is measured against these ground truths using metrics such as MAE (Mean absolute error) or MAPE (Mean absolute percentage error).

Tips on Evaluating Accuracy

Measuring and representing accuracy is complex, and comparing accuracy numbers from different vendors requires understanding how they are calculated.

1. Understand the definition behind 'accuracy'. Bidgely stating 90% EV detection accuracy and another vendor stating 98% can mean two different things. If you are trying to determine if an appliance is present in a home, and there are 30 instances of usage for that appliance, detecting 5 of them with high confidence would allow you to confidently conclude that the home has that appliance, resulting in almost 100% detection accuracy at the home level. However, if you define detection accuracy as **detecting each occurrence of the appliance individually,** detecting it only 5 out of 30 times would translate to only 16% accuracy.

Tip: Ask your vendor how they are defining detection accuracy.

2. Consideration of sample size: Measuring accuracy in small sample sets, such as 5 or 10 homes, may seem easy and accurate, as algorithms can be tuned for those specific cases. However, scaling up to hundreds of thousands of homes introduces different data scenarios that may impact accuracy. Bidgely, for example, has used ground truth appliance data from thousands to tens of thousands of homes to measure and improve accuracy.

Tip: Ask your vendor about their sample size.

3. Consideration of variations in accuracy: The accuracy of disaggregating an appliance depends on various factors, such as the presence of other appliances with similar amplitudes or usage characteristics, as well as seasonal usage patterns of other appliances. For example, if a 2.5kW air conditioner only runs during the summer, it may interfere with the disaggregation accuracy of a 2.2kW pool pump.

Tip: Ask your vendor about how they account for these types of variations.

4. Understanding appliance variations: Appliances within the same category can have significant variations in signatures due to differences in electrical circuitry over time. For example, ACs and dryers may exhibit varying characteristics across homes. Therefore, accuracy tested for a few appliances in a few homes may not necessarily indicate accuracy for other variations of the same appliance category.

Tip: Ask your vendor about how they account for these types of appliance variations.

DISAGGREGATION THAT DELIVERS VALUE

Bidgely's true disaggregation provides a level of "behind the meter" visibility that supports a wide range of utility objectives - from improved CX, to greater Energy Efficiency, to being better able to manage the proliferation of DERs.

True disaggregation is so much more than just the ability to show a pie graph in your customers' emails or web application. Yet, that's what most providers who rely mainly on statistical disaggregation do - and that's where they stop.

Rather, true disaggregation delivers a range of benefits by embedding accurate, actionable intelligence into interactions - including targeting - delivering tangible outcomes, such as lowering bill shocks and calls, and significant shifts away from peak charging.



Bidgely's behind-the-meter intelligence gives utilities the insights needed to improve customer experience, drive energy efficiency and enable new grid management strategies and programs.

Bidgely's solution stack is built from the ground up to harness the intelligence derived from meter data disaggregation, enabling us to deliver unparalleled value to utilities across a diverse range of use cases.



Bidgely's solution stack embeds energy intelligence across multiple applications

Embedded energy intelligence supports:

- Consumer Engagement and CX Programs
- Demand Side Management Programs

Turnkey program management - including recruitment, enrollment, incentives management and M&V for:

- ° Energy Efficiency/BEE
- ° Flex Demand
 - Demand Response
 - Critical Peak Management
 - TOU Shifting
 - Active Device Control

• EV Load Management

- ° Passive Load Management (Behavioral)
- Active Load Management (Managed)
- ° EV Program Management
- Demand Side Grid Analysis
 - ° Demand Segmentation
 - ° Grid Load Analysis
 - ° EV Load Analysis

AI Integrations

• Data integration to power consumer applications and demand side analytics

The types of scenarios in which Bidgely's time of use disaggregation tackles real-world problems facing utilities, include:

- Similar Home Comparison (SHC) for EV owners: EV owners have unique charging habits based on their individual needs and circumstances, making it challenging to cluster and compare them effectively. High-accuracy EV charging estimation disaggregation is necessary to provide a more accurate comparison.
- **Bill Projection for Balanced Billing:** Monthly bill projections are no longer useful for customers on balanced billing, where they pay the same amount each month. Usage and cost insights need to align with the concept of annual true-up to provide more accurate bill projections.
- **TOU Transition:** Transitioning to a new rate structure brings challenges for customer segments, including Balanced Billing customers. Effective rate coaching requires true disaggregation down to the appliance time of use to provide accurate guidance.
- **Supporting Beneficial Electrification:** To successfully convert customers to heat pump technology, accurate identification of customers who do not already own heat pumps or have less efficient heating systems is crucial. True disaggregation helps in accurately identifying potential customers for beneficial electrification.
- Rate Comparison or Best Rate module for recent EV owners: Traditional algorithms for rate comparison or best rate modules rely on the last 12 months of usage, which may not accurately reflect the next 12 months for customers who recently purchased an EV. Accurate disaggregation is essential for modeling the usage patterns of these customers to provide more accurate rate comparison results.

The next section provides real-world details on how these capabilities have driven value for our customers.



PUTTING TRUE DISAGGREGATION TO WORK IN THE REAL WORLD

Bidgely's disaggregation capabilities have been empowering better program results in utilities for more than a decade.

Our utility partners have realized a wide range of customer engagement and grid management value outcomes based on our appliance-level insights. Here are a number of examples:

BEHAVIORAL ENERGY EFFICIENCY SAVINGS Highlights UTILITY APPLICATION RESULTS Rocky Mountain Power selected 228+ GWh in savings. 8.2% Bidgely's AI-powered UtilityAI[™] to Cost savings of 25% relative to replace its legacy HER program with an conventional HERs. EE Programs advanced Next-Gen HER solution. Digitization - with more than 92% savings uplift of the 747.000 customers who Of particular importance in this receive Next-Gen HERs receiving deployment was the ability to provide them digitally. the same level of insight to non-24/7 online access to Next-Gen smart-meter customers as is possible 228+ GWh HERs for 1 million residential for smart-meter customers. Machine customers. In savings as learning from more than 50 billion Increased customer engagement smart meter reads made possible of December 2022 - including 40% open rate, 3.6% consumption disaggregation of monthly click-through rate, 26% increase meter reads and allowed and the in website traffic, and 80% 'likes' generation of accurate appliance-level rate for digital communications insights for non-smart-meter customers received.

Highlights

50%

Lower high-bill calls from users receiving alerts

84% Positive customer

UTILITY APPLICATION

A utility serving more than 7 million customers in the Eastern half of the United States deployed UtilityAl to improve its customers' budget journeys.

Leveraging Bidgely's disaggregation science and customer engagement tools, the utility was able to utilize its smart meter data to automatically send customers a series of monthly communications at key intervals during the billing cycle, including estimated electricity costs to date and projected energy costs for the month. The program also offered customers the option to enroll in budget alerts.

RESULTS

CX/CE

- Improved customer engagement and customer satisfaction as well as financial return for the utility.
- The program enjoyed 46% email open rates and 2.6% click rates, and the utility received 84% positive customer reviews when they asked for feedback on the alerts.
- There was a more than 50% high bill call reduction - worth about \$1h/y or around \$1.5M.

Highlights

99-100%

Home level solar

92-98%

detection accuracy

ANALYTICS/GRID

UTILITY APPLICATION

Utilities in the US and Europe are working with Bidgely to leverage net consumption AMI data analysis to simply, affordably and efficiently create an 8760-hour-per- year energy production profile to accurately forecast the effect of PV on the grid.

AMI data analysis can calculate aggregate solar production per substation to inform peak load planning, rate planning and rate making. Utilities are also leveraging UtilityAI to identify homeowners who are most likely to benefit from rooftop solar to inform PV rebate and marketplace programs

RESULTS

- 99-100% Home level solar detection accuracy.
- 92-98% Solar consumption estimation accuracy.

Highlights

EV DETECTION, TARGETING, ENGAGEMENT & MANAGED CHARGING

•

UTILITY APPLICATION

A large investor-owned utility (IOU) in the Southeastern U.S. wanted to develop a reliable way to shift EV charging load to off-peak hours in anticipation of growing transportation electrification across its service territory

Using Bidgely's Analytics Workbench for EV detection, behavioral load shifting alerts, and the mobile- responsive web app for behavioral-based load shifting, the utility was able to identify EV owners through meter data disaggregation, recruit them into their EV program, and track charging behavior and eligibility for incentives through ongoing personalized alerts.

RESULTS

90% EV detection accuracy. 71% email open rate with

- 55% click-through.
- 70% kWh reduction in on-peak charging.
- 16% reduction of households charging on peak.
- 100% "thumbs-up" rating.

90%+ EV detection

accuracy

70% kWh reduction in on-peak charging

Highlights

Rank increase in

JD Power score for

business customer

+45

SMALL & MEDIUM SIZED BUSINESS (SMB) EFFICIENCY

UTILITY APPLICATION

Rocky Mountain Power introduced a Business Energy Reports program and began to roll out welcome and monthly emails to 50,000 SMB customers.

The program was based on read data from non-smart meters only.

With Bidgely, their monthly emails were able to deliver a billing summary together with personalized tips to save energy, such as reducing always-on load and leveraging energy efficiency rebates.

RESULTS

- RMP surveyed these Business Energy Report customers to assess customer satisfaction, and found that they gave the utility higher scores across most CSAT pillars: Corporate Citizenship, Community, Environment, Energy Efficiency, and Electrification. The increase in positive feedback contributed to RMP's effort to raise its JD Power rank, which they have successfully done every year.
- RMP received an SECC <u>Award</u> in association with this program.

Highlights

100%

Confirmation of tariff misuse cases detected in trial

3

Categories of theft detected: tariff misuse, direct theft, meter tampering

ENERGY THEFT DETECTION

	UTILITY APPLICATION	RESULTS
of cases rial	Bidgely was selected to participate in an India Ministry of Power-sponsored technology incubation challenge called Powerthon 2022, to address challenges facing the grid in India.	 In early results published by the Powerthon group, Bidgely was able to deliver a 100% booking rate on tariff misuse detected, with 35% of those cases also found to have potentially dangerous technical
f theft	Bidgely was the only provider selected for energy theft detection in support of the national Revamped Distribution Sector Scheme (RDSS) to reduce losses across India by up to 15% by 2025	faults, which were quickly resolved.
iff t theft, ring	Bidgely is working with a large DISCOM in central India to demonstrate how Al- enabled data analytics can detect and	

resolve India's energy misuse issues.

BIDGELY VS. OTHER VENDORS

Bidgely is able to deliver these types of the results because our disaggregation is more advanced and mature than what other vendors are able to provide.



ADDED VALUE	BIDGELY CAPABILITIES	COMPETITORS'CAPABILITIES
Appliance Usage by Hourly Time of Use	 Detecting appliance type and usage hour by hour, which is necessary to realize TOD-personalized journeys. 	→ Static models based on research and survey data on typical monthly usage for a given geographic region.
Broadest Coverage of Appliances	 12 appliance categories Also detects appliance attributes such as degradation, amplitude, and appliance types (e.g. heat pumps). 	→ Statistical disaggregation cannot predict the depth of appliance attributes for targeting programs or inefficient or degrading appliances.
Disaggregation-Powered CX	 True Disaggregation is deeply embedded in bill interactions, targeting, EV journeys, peak alerts, and TOD coaching journey. 	→ Limited to displaying a pie chart in emails and on the web, indicating a shallow use of the technology.
TOD Transition	 Time of Use-based true disaggregation powers pre and post-TOD transition. 	→ Only use whole-home TOD rates, without appliance-level reliable time band personalization.
EV Engagement	→ EV Solutions successfully deployed across many large utilities, with realized results in EV detection and load shifting.	→ Claimed, yet unproven EV accuracy. No experience with EV TOU solutions.

In contrast to other vendors' disaggregation capabilities which are limited to monthly levels on limited appliance categories, Bidgely is able to provide annual, monthly, weekday, and weekend trends across actual time of use for true disaggregation categories. The difference is evident in the end product, used by energy consumers.



MAKING THE RIGHT DECISION FOR YOUR UTILITY

If your utility is evaluating different disaggregation providers, we highly recommend reaching out to our team to discuss how Bidgely's true disaggregation can benefit your organization. Our unmatched accuracy and value, together with the positive feedback from our customers across various program types, make us a trusted and reliable choice.

We have also received notable validation from analysts and industry groups, attesting to the effectiveness and reliability of our technology, including:

- Guidehouse Insights named Bidgely a "Leader" in its 2021 Leaderboard: Home Energy Management Providers and a top-ten vendor in its 2021 Leaderboard: Smart Meter Analytics and Leaderboard: AI Vendors for DER Integration.
 More recently, Bidgely was noted for our disaggregation capabilities among a short list of "next-generation smart meter analytics providers" in Guidehouse Insights' 2022-Q3 report "Analyst Insight: Smart Meter Analytics—Leveraging AMI."
- IDC (International Data Corporation) named Bidgely a "Leader" in the MarketScape: Worldwide Digital Customer Engagement Solutions for Utilities 2021 Vendor Assessment, noting the strength of our meter data disaggregation for delivering personalized customer engagement.

- The Smart Energy Consumer Collaborative (SECC) awarded Rocky Mountain Power a 2022 Best Practices Award for its Bidgely-enabled small-to-medium (SMB) business energy reports and engagement program, which leveraged appliance-level SMB consumption data. The SECC also awarded Avangrid's United Illuminating with a 2023 Best Practices Award for its Electric Vehicle Managed Charging program with Bidgely – the first of its kind in the state of Connecticut.
- Bidgely was also named a finalist for the <u>S&P Platts Global Energy Awards</u> in both 2021, 2022, and 2023.

Behind our innovation is a team of highly trained data scientists, and other SMEs who continue to innovate and work on building out new capabilities and use cases to support the evolving needs of utilities and their customers, so that you are resilient, agile, and future-ready.

Further Reading:

<u>True Disaggregation: What It Is and Why It Matters</u> <u>Energy Load Disaggregation Just Became Even Smarter (Hybrid 2.0)</u> <u>Universal Disaggregation for Smart Meters</u> <u>Unleashing the power of disaggregation: Time of Use (TOU) Disaggregation</u> Bidgely Patents

EMPOWERING UTILITIES WITH TRUE, BEHIND-THE-METER DISAGGREGATION • BIDGELY, INC ©

GLOSSARY OF DISAGGREGATION TERMS

	DEFINITION	UNIQUE TO BIDGELY?
Universal Disaggregation	Capability of performing disaggregation for all different kinds of data sources. Different fuel types (Electric/ Gas/Water) and sampling rates (HAN, AMI, NSM), and user segment type (Residential, SMB).	Yes
User Centric Disaggregation	True Disaggregation methodology which also encompasses user meta data and lifestyle behavior to further enhance the accuracy is called user-centric disaggregation.	Yes
TOU Disaggregation (Time band)	TOU disaggregation uses machine learning models and signal processing algorithms to define energy consumption patterns at 60, 30 and 15 minute intervals.	Yes
True Disaggregation (Signature-based disaggregation)	Any non intrusive disaggregation that captures true behavior of appliances based on appliance specific unique signatures.	No (Bidgely's is the most mature and tested)
Non Intrusive Load Monitoring (NILM)	Any method of load disaggregation which is not dependent on deployment of appliance specific sensors in households is called NILM.	No
100% Itemized Disaggregation	Disaggregation which provides 100% breakdown of complete whole house data in different appliance categories.	No
Rule Based Disaggregation	Disaggregation performed using pre-defined rules. Rules could be driven by market research or cluster of data etc.	No
Statistical Disaggregation	Disaggregation performed based on statistics of population. These statistics are captured through meter readings or published data.	No

APPENDIX DISAGGREGATION APPLIED - EXAMPLE HEATMAPS







