



Executive Toolkit

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ELECTRIC VEHICLE ADOPTION PLAYBOOK

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If current projections hold, Boston Consulting Group estimates that electric vehicles could create between \$3 and \$10 billion in new value between now and 2030 for an average energy business with 2 to 3 million customers.

This colossal increase represents the most significant opportunity in a generation to increase base demand and margins while simultaneously introducing new utility services like home and public charging infrastructure and bolstering grid reliability and resiliency.

The potential is massive, and at the same time the business transformation required to achieve it is equally large. In less than 10 years, analysts predict 200 million chargers will be installed, accounting for 550 TWh of charging with the potential to strain the grid and threaten resiliency.

To achieve the big changes that are required on the tight timelines presented by net zero goals, a mix of agile and flexible systems and a future-ready mindset is required. Data makes it possible.

Bigely equips energy providers with AI-powered analytics, insights and practical operational strategies to maximize EV upside and mitigate EV-related grid instability.

As a starting point, we've developed this EV Playbook to guide energy providers through four data-driven phases of EV adoption:

- Accelerating customer awareness, education and adoption
- Analyzing the EVs on the road today and forecasting where EVs will be tomorrow
- Shifting EV load with AMI based passive managed charging
- Shifting EV load with direct managed charging



PHASE 1: ACCELERATING CUSTOMER AWARENESS, EDUCATION AND ADOPTION

Starting early with a strong engagement foundation is a fundamental time to lean into pre- EV purchase customer engagement to increase the pace of EV adoption by initiating an ongoing, targeted and personalized EV education and awareness effort.

ACTION STEPS



Develop **360° customer profiles** to enable personalized outreach to consumers who are EV-inclined.



Initiate an ongoing, personalized **pre-purchase EV dialogue** with targeted customers.



Establish energy provider's role as **go-to EV ownership resource**.

HOW TO GET STARTED

As with any transformative new technology, consumers are at different stages of EV acceptance. While some are enthusiastic adopters, others are taking a wait and see approach. It is essential for energy providers to understand each customer's unique mindset in order to meet them where they are to effectively generate EV awareness and excitement.

When advancing a mindset shift of the magnitude of transportation electrification, billboard ads, mass email campaigns and other costly traditional marketing strategies fall short. It's personalized marketing that aligns with each customer's needs, motivations and values that captures their attention, wins them over and prompts action.

Develop 360° Customer Profiles

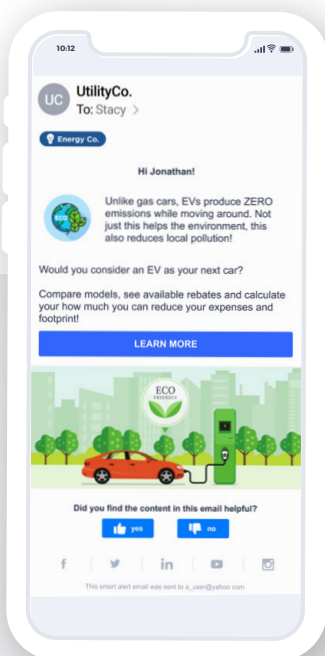
Effective personalized engagement starts with creating a holistic and accurate 360° profile of every customer in a service territory. This one-to-one consumer understanding is attainable by using sophisticated machine learning and statistical solutions to analyze raw energy consumption AMI data and pinpoint essential attributes that describe each customer's behavior, lifestyle and other characteristics. These hyper-personalized customer profiles enable more effective and engaging EV education.

Initiate Pre-purchase EV Dialogues

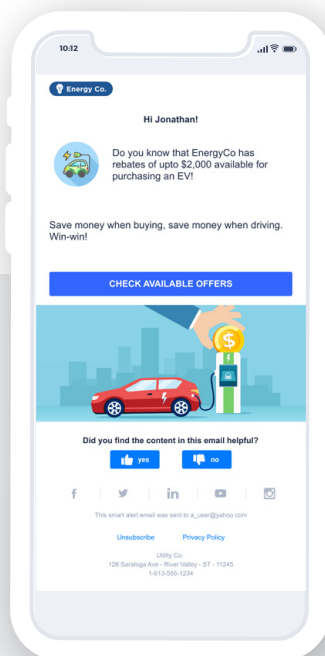
Pre-purchase customer engagement should be designed to pique customers' interests with the EV ownership value proposition that resonates most. "Personalized nudges" delivered on a regular cadence encourage their purchase and nurture them throughout their buying journey.

Become the Go-To EV Resource

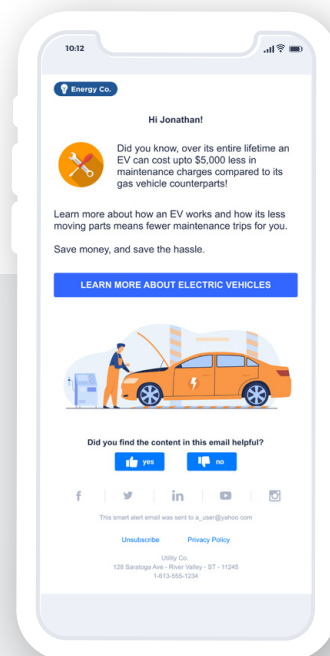
The goal is to educate consumers about all the info, support, rebates, and programs that the energy provider has to offer to EV owners, ensuring that the customer is eager to engage with their utility as they plan to buy an EV.



HELP THE PLANET



SAVE MONEY



SAVE TIME

PHASE 2: EV DETECTION AND FORECASTING

As EV ownership begins to accelerate, it's time to get serious about data-informed preparation for the coming adoption wave.

ACTION STEPS



Identify every **EV driver** and their **charging patterns**.



Engage proactively with all new drivers, establishing yourself as the new “fueling station” and building a foundation for collaboration.



Inform and improve **grid management** and **infrastructure planning** by leveraging EV data analytics.



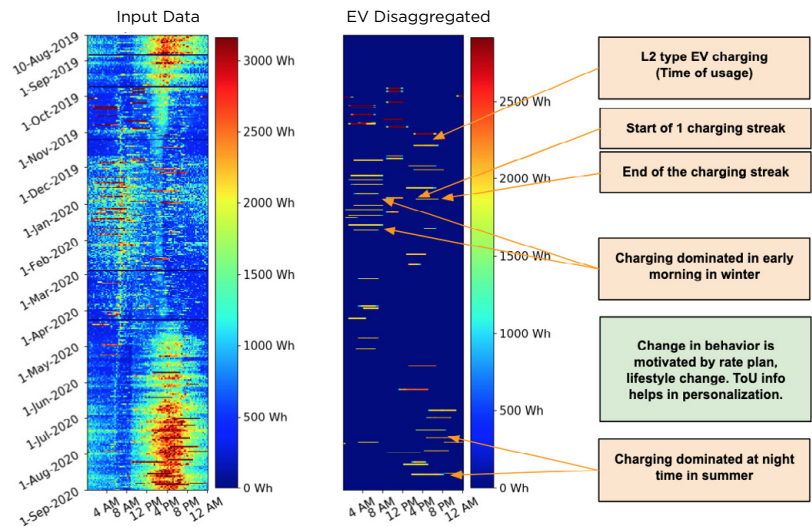
Design **EV rates** and incentives based on actual time and location of EV charging.



HOW TO GET STARTED

Energy providers that have made the investment in AMI infrastructure already have all of the necessary inputs at their fingertips. Now it's a matter of further empowering in-house data analysts with specialized tools to detect EVs and reveal essential EV insights from within each customer's total raw energy consumption profile.

With the world's most sophisticated EV disaggregation, Bidgely is able to identify charger types, charger amplitude, typical hours when EV charging happens, if charging is occurring on a schedule, and monthly EV consumption — all with a very low false-negative and false-positive coverage.



Load Profile and Flexibility Analysis

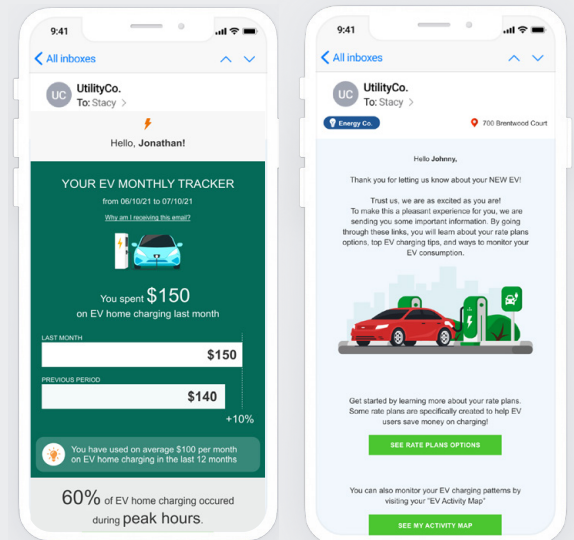
Charger Type	L2	# runs peak hours (summer)	10	Charging frequency (avg)	4 times / week
Amplitude	11,900 W	Consumption Peak Hours (summer)	425.814 kWh	Location of Charge*	Home*
# runs peak hours (winter)	3	Interval start-end time (avg)	8pm - 4am	Battery Level*	70%
Consumption Peak Hours (winter)	64.437 kWh	Load profile and flexibility analysis		Miles Driven Since Last Charge	60

Motor vehicle registration data is not sufficiently granular, and it is quickly out-of-date. Telematics data is incredibly valuable, but limited in utility because it requires drivers to opt-in to share it, and at this time, few choose to do so.

Engage Proactively

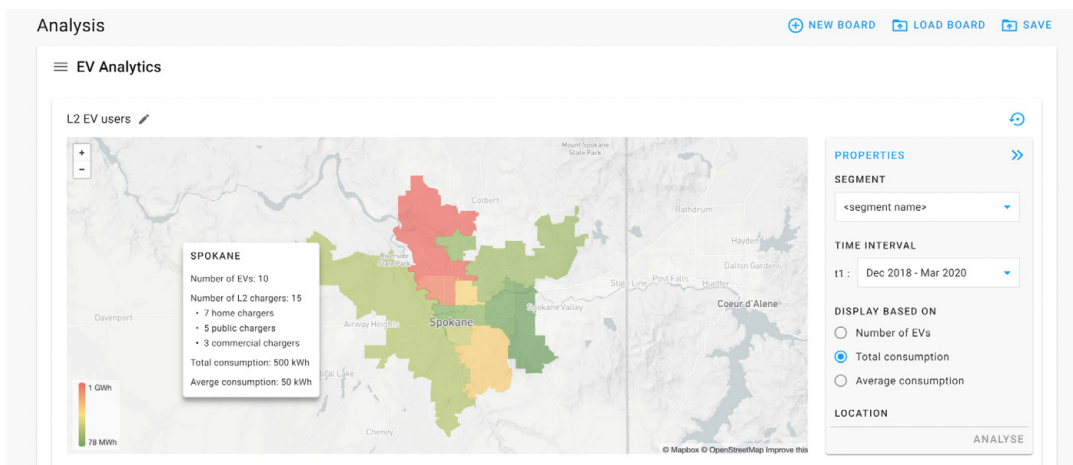
Smart meter-based EV data and load disaggregation is more accurate than low fidelity motor vehicle registration records and more complete than opt-in telematics. With personalized EV analytics for every customer in a service territory, energy providers are able to proactively engage with all new drivers as a trusted advisor, and set them up from the start to optimally manage their EV-related energy usage. Educate drivers about EV rate plans, charging programs, optimal charging equipment and more.

Throughout a customer's car ownership journey, energy providers should leverage smart meter insights to continue to inform personalized outreach – including regular summaries of charging activity and EV energy costs. This regular cadence reinforces the collaborative relationship between drivers and energy providers as the new fueling station.



Improve Grid Management & Planning

Smart meter EV detection insights also serve as powerful inputs for both real time grid operations and forward-looking infrastructure planning. Utilities are able to see the total charging consumption and EV load by region, zip code, substation or feeder; the percentage of level 1 vs. level 2 chargers; EV load forecasts; percentage of on vs. off-peak charging; specific geographies with the highest charging; and more.



This data can help utilities determine with high accuracy where grid constraints may exist or are likely to develop as a guide as to where and when to upgrade or install grid infrastructure. Similarly, data reveals pockets of both current and forecasted high EV growth should factor into identifying prime locations for public charging infrastructure.

Design EV Rates

Energy providers are also able to design EV rates and incentives based on time and location of use for the entire EV population in a given territory and with respect to forecasted EV growth. EV rates should be informed by usage patterns that are expensive to serve (peak hours) and customized based on driver lifestyles (i.e charging at work vs. charging at home). Data-informed rates more successfully encourage consumers to opt-in to the rate plan best suited to their electric vehicle and energy usage and nudge them toward load-shifting activities.

PHASE 3: SHIFTING EV LOAD WITH AMI-BASED PASSIVE MANAGED CHARGING

When EV adoption surpasses 3 percent, it is likely that system constraints will begin to emerge and load shifting will become an imperative.

ACTION STEPS



Identify customers who are ideally suited for **load balancing** programs.



Adopt a personalized, data-driven and targeted approach to **behavioral program outreach, enrollment and management**.



Target **incentives** to customers with the highest **grid value**.

HOW TO GET STARTED

Energy efficiency programs have proven the value of behavior management in achieving load balancing objectives.

Prioritize Load Balancing Targets

On-peak charging behaviors can constrain the grid and require expensive power to serve, while off-peak charging is generally lower cost and therefore enables higher-margin kilowatts. The most sophisticated AMI data disaggregation technology is able to detect when customers are charging, identifying those who habitually charge on-peak and therefore should be priority targets for load balancing programs.

Personalize Program Outreach

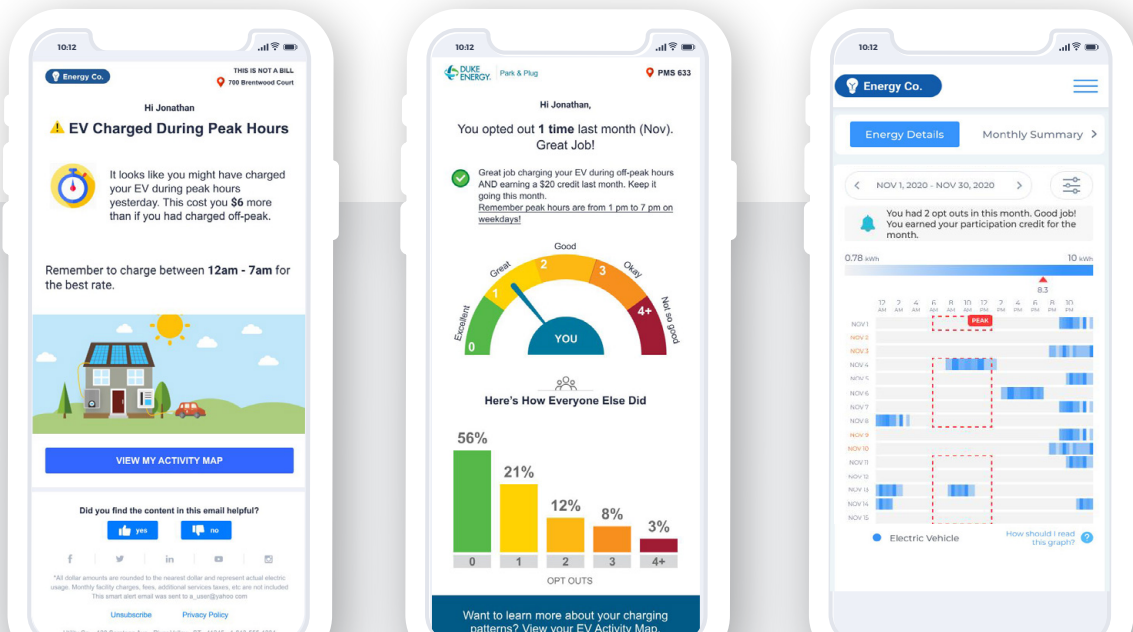
When it comes to making better energy decisions, there is no universal motivator or set of rules that applies to all customers. That's why AMI data is so vital to behavioral EV load management programs. With AMI insights, energy providers are able to engage each customer as a segment of one with more effective personalized marketing and program recruitment. Generalities are replaced by precise and profoundly relevant energy saving advice that more effectively influences charging behavior.

AMI-data-driven personalization informs and enables ongoing behavioral digital alerts or “nudges” that reflect each customer’s personal charging history to motivate them to change their behavior to charge off-peak - with or without an incentive that pays EV owners for charging their vehicle at optimal times. AMI data can then also be used to verify customers whether or not customers have changed their charging behavior.

Align Incentives to Value

One of the most powerful aspects of a data-informed load shifting is the ability to target the highest grid value customers to optimize grid edge load. Traditional EV incentive programs offer the same incentive to all EV owners. A more impactful and cost effective approach is to target load-shifting programs based on the value each customer can bring to the grid. When incentive programs are focused on EV owners who are charging their vehicles on-peak or in congested areas, the grid realizes the greatest possible benefit through relief in a given location or at a particular time, and both energy consumers and providers enjoy more significant ROI from improved grid resiliency and reliability.

MANAGED CHARGING



PHASE 4: SHIFTING EV LOAD WITH DIRECT MANAGED CHARGING

Once EVs begin to make a substantial impact on grid systems, it becomes necessary to leverage direct managed charging to balance the grid - either through telematics or networked level two charger control.

ACTION STEPS



Layer **opt-in managed charging** onto established behavioral managed charging programs.



Evaluate unique **grid-value-based incentive structures**



Engage and optimize **EV charging and home energy storage to improve grid resiliency**, eventually signaling EV batteries to dispatch from Vehicle-to-Grid during peak demand events.

HOW TO GET STARTED

Opt-In Direct Managed Charging

Opt-in direct control programs in which vehicle charging can be managed remotely and optimized for the energy provider will be critical to maintain demand flexibility. Energy providers should design scalable managed charging programs for the future, when EVs are able to store and supply energy to the grid through vehicle-to-grid integration. Energy providers can prepare for this transition by engaging EV owners with signals to stop charging to reduce load when the grid requires.

Align Incentives to Value

As with behavioral load shifting, managed charging can be structured with incentives for enrollment and incentives for charging off-peak. Energy providers can offer enrollment incentives to engage EV owners, and reinforce positive behavior by offering incentives for continued off-peak charging.

Improve Resiliency with EV Charging and Energy Storage

Electric vehicle charging can be orchestrated in tandem with load forecasting as a demand response lever, or virtual power plant, to reduce peak demand during extreme weather events that correspond with high HVAC loads.

PHASE NEXT: FUTURE PROOF

Our platform is built with future-readiness and flexibility in mind. Markets promise to evolve in an unpredictable way that will demand real-time pricing signals to customers, real-time control of EVs in the field, variable incentives to extract the highest value from each dollar spent to shift a kW and more. Bidgely's Analytics Workbench enables energy providers to innovate and scale EV programs as EV adoption reaches critical mass.

BIDGELY'S DATA SCIENCE LEADERSHIP

Electric vehicle charging disaggregation is incredibly complex. EV signals overlap with many other appliances, requiring sophisticated AI for accurate EV identification. As the leader in energy disaggregation with 17 patents and experience with more than 40 energy companies in 25 million homes worldwide, Bidgely possesses an EV knowledge base that consists of advanced ground truth for geographies in both North America and internationally that other technology providers cannot match. Bidgely's EV analytics work on 15min/30min/60min interval meter data with at least 6 months of historical loads. Our data set allows Bidgely to pinpoint who has an EV and their monthly consumption, charger size and typical hours of charging with high confidence – even in traditionally hard-to-detect cases. All of this intelligence is made possible without any hardware or customer inputs required.

Interested in learning more about how Bidgely's EV Solution can set you on a transportation electrification road to success? Contact one of our representatives at utilityai@bidgely.com to schedule a demo and see how Bidgely can drive more EV value for both your customers and your business.

LEVERAGING ENERGY LOAD DISAGGREGATION FOR GRID PLANNING, MANAGEMENT AND OPERATIONS

Bidgely's patented Load Disaggregation technology provides both customers and utilities with visibility into home energy consumption down to the appliance level. This technology can be applied to grid management with highest accuracy, reducing manual efforts to analyze energy demand, improving cost to serve, and increasing grid reliability. Learn more about the core technology [here](#).

Gain Visibility Into Distributed Energy Resources (DER)

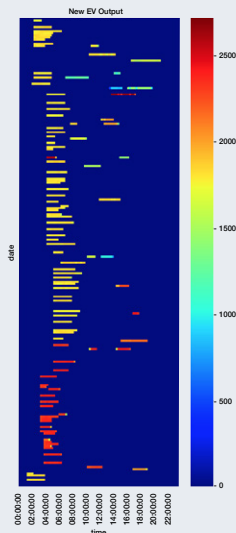
Bidgely's patented disaggregation technology allows for upwards of 90% accurate detection and estimation of Distributed Solar Generation as well as EV Charging Loads and Batteries (that are on net metering). Operations technology systems such as ADMS or DERMS will receive accurate forecasting and estimation of aggregated consumer loads and resources (gen, batteries, EV) from AWB, enabling accurate real time or future studies of the grid for security and energy balancing as well as for maintenance scheduling.

EV

Bidgely provides EV home charging usage (Lvl 1,2,3) for each customer down to the sampling rate level. Overall ownership, as well as the size of chargers and geographic distribution ownership can be detailed and aggregated to substation/feeder/transformer levels.

- Better plan for EV charging infrastructure by seeing the current total EV charging demand
- Promote EV program adoption among accurately detected EV owners

EV Charging Load For One Customer

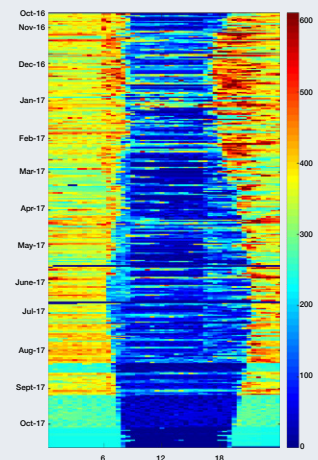


Solar

Bidgely is able to detect homes with solar panels for their distinct data signature over the course of the year and estimate their solar energy production without a separate meter feed or real time telemetry.

- Improve rate planning and rate making, and supporting PV solar rate cases
- Provide grid stability during outages and maintenance, understanding the flow of solar energy onto the grid
- Manage peak load planning, by understanding the effects of solar down to the feeder or transformer level to inform semi-annual peak load planning sessions and necessary capital upgrades

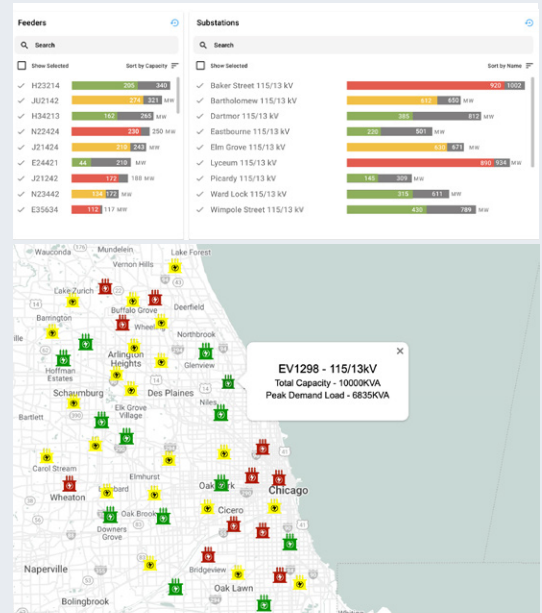
Solar Disaggregation for One Customer



Optimize Grid Asset Utilization

Bigdely provides information based on consumption data that is scalable to every home in the service territory, and can therefore be applied with high confidence to non-wire alternative (NWA) programs. Utilities are provided with over 10+ key appliance energy consumption curves (such as electric heating, air conditioning, water heating, EV charging, pool pumps, etc.).

- **Identity shiftable and non-shiftable peaks & energy loads down to the customer level**
- **Accurately identify potential grid hotspots including by the substation, feeder, geographical region allowing for dynamic reallocation reducing cost to serve**
- **Determine if NWA is possible or if a bump in infrastructure is needed**



Energy loads aggregated by substation & region

High Accuracy, On-Demand Load Research

Bigdely's level of disaggregation accuracy enables the use of meter-based analytics to provide a thorough & reliable knowledge of trends, and general behaviour of the load characteristics of the customers serviced. Filter by geography, time, weekdays or weekends, as well as customer segment filters like rate plans, or house ownership, including ad hoc queries

- **Improve your forecasting models for short term and long term reducing potential energy cost**
- **Improve rate design by considering appliance loads in use**
- **Target program enrollment/ recruitment efforts based on detected appliance inefficiencies**
- **Run soft M&V evaluations of energy efficiency or peak demand response events to measure the impact in real-time**



Hourly usage analysis of a single appliance

Frequently Asked Questions

1. What data is required? AMI data, 15mins, 30mins, or 1hr intervals
2. What other utilities utilize this? Duke Energy, NV Energy, Portland General Electric, Avista, Ameren, PSEG Long Island, PNM, Fortis BC, New Hampshire Electric Co-op and more
3. Can your solution handle large amounts of meter data? Yes, Bigdely currently handles over 25 million meters of residential and SMB customers.
4. Why can't my data scientists already do this? Accurate energy load disaggregation is difficult to replicate, it would be akin to trying to build voice recognition. Bigdely removes this hurdle allowing your data scientists to do what they do best - analyze large amounts of data for specific business cases but now with exponentially more power behind them, making them highly efficient and accomplish more than before. With years of experience in load disaggregation and applying artificial intelligence to household consumption data, no other company is better equipped than Bigdely to help utilities unlock the full potential benefits of analyzing AMI data.



ANALYTICS WORKBENCH FOR MARKETING & MEASUREMENT

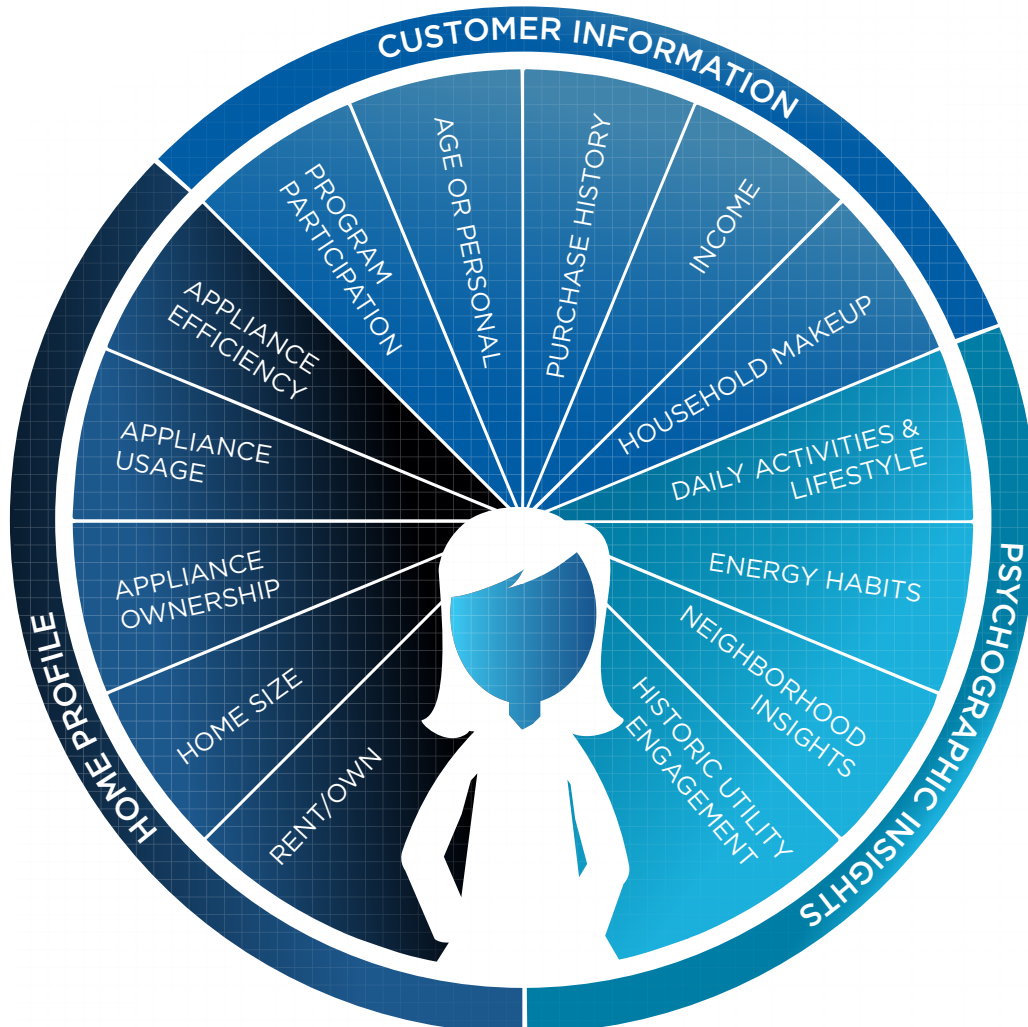
Augmenting Customer
Segmentation with the Power of AI



Historically, one of the greatest challenges to successful demand side management (DSM) and other customer-centric programs has been that when it comes to making better energy decisions, there is no universal motivator or set of rules that applies to all customers.

The concept of segmentation is useful, but with so much variation in customer personas and energy habits, even segment-tailored programs and outreach sometimes miss the mark because customers rarely fall neatly into one distinct segment.

That's why the most effective utility marketing and rate design programs today are leveraging AMI data insights to empower a new era of personalized marketing -- harnessing the potential to engage each customer as a segment of one.






Conventional tools such as mass surveys, focus groups and manual utility population data collection take time, are static, lack granularity, don't update consistently and fail to account for behavioral and lifestyle aspects in their models.

Using a more accurate and real-time approach, Bidgely's Analytics Workbench builds a 360-degree profile of every customer by analyzing raw energy consumption data using sophisticated machine learning and statistical solutions to tap into essential attributes that describe people's behavior, lifestyle, income and other characteristics.

DSM TARGETING

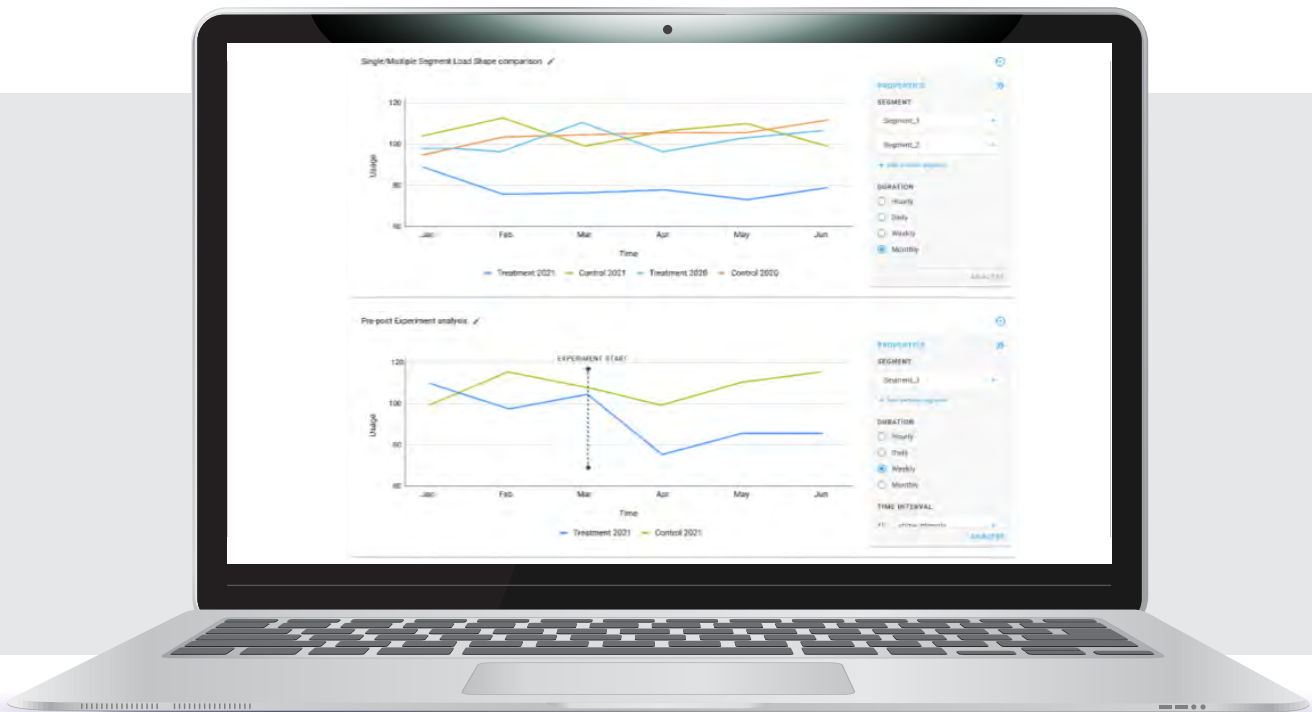
Analytics Workbench transforms the substance of DSM initiatives from generalities into precise and profoundly relevant energy saving advice that more effectively influences behavior. Our technology captures essential aspects of a customer's lifestyle over time, and reflects variations in customer behavior or occupancy at different points during the year and in response to unexpected environmental and societal events. Bidgely's targeting can even pinpoint the time of the day a customer is most likely to be present at home to improve utility outreach, amplify conversion rates and lower acquisition costs.

New Appliance Rebates & Target Audience	Managed Charging Programs	Free or Low-Cost Programs That Support CO2 Reduction
 TARGET AUDIENCE: HOMEOWNERS WITH INEFFICIENT APPLIANCES	 TARGET AUDIENCE: EV OWNERS WHO CHARGE ON-PEAK	 TARGET AUDIENCE: ENVIRONMENTALLY CONSCIOUS LMI CUSTOMERS
RENT/OWN	RENT/OWN	RENT/OWN
HOME SIZE	HOME SIZE	HOME SIZE
APPLIANCE OWNERSHIP	APPLIANCE OWNERSHIP	APPLIANCE OWNERSHIP
APPLIANCE USAGE	APPLIANCE USAGE	APPLIANCE USAGE
APPLIANCE EFFICIENCY	APPLIANCE EFFICIENCY	APPLIANCE EFFICIENCY
PROGRAM PARTICIPATION	PROGRAM PARTICIPATION	PROGRAM PARTICIPATION
AGE OR PERSONAL	AGE OR PERSONAL	AGE OR PERSONAL
PURCHASE HISTORY	PURCHASE HISTORY	PURCHASE HISTORY
INCOME	INCOME	INCOME
HOUSEHOLD MAKEUP	HOUSEHOLD MAKEUP	HOUSEHOLD MAKEUP
DAILY ACTIVITIES & LIFESTYLE	DAILY ACTIVITIES & LIFESTYLE	DAILY ACTIVITIES & LIFESTYLE
ENERGY HABITS	ENERGY HABITS	ENERGY HABITS
NEIGHBORHOOD INSIGHTS	NEIGHBORHOOD INSIGHTS	NEIGHBORHOOD INSIGHTS
HISTORIC UTILITY ENGAGEMENT	HISTORIC UTILITY ENGAGEMENT	HISTORIC UTILITY ENGAGEMENT

PROGRAM MEASUREMENT & TRACKING

Measurement and Verification (M&V) is a critically important function, but it has historically been left to the post-completion program phase. As a result, utilities have not been empowered to course-correct during program implementation in order to improve outcomes.

Leveraging Analytics Workbench, program managers are able to use data to drive more agile, successful programs. Utilities can monitor program performance in semi-real-time and make program adjustments to align outcomes with defined program goals. The platform also provides daily and monthly insights into how programs are performing against control or self (pre-treatment) groups and allows for proactive intervention for non-performing programs.



With patented load disaggregation and an intuitive, easy-to-use platform, Analytics Workbench makes possible more versatile, accurate and impactful customer segmentation and outreach to yield greater customer engagement and optimized marketing spend.

GET STARTED

Interested in learning more about how Bidgely's UtilityAI platform and Analytics Workbench product can benefit your utility?

Contact one of our representatives at utilityai@bidgely.com to schedule a demo and see how UtilityAI can drive more value for your customers and your business.

Learn More at <https://www.bidgely.com/resources/resources-ami-driven-insights-report/>



ABOUT BIDGELY

Bigdely is an AI-powered SaaS Company accelerating a clean energy future by enabling energy companies and consumers to make data-driven energy-related decisions. Powered by our unique patented technology, Bigdely's UtilityAI™ Platform transforms multiple dimensions of customer data—such as energy consumption, demographic, and interactions - into deeply accurate and actionable consumer energy insights. We leverage these insights to empower each customer with personalized recommendations, tailored to their individual personality and lifestyle, usage attributes, behavioral patterns, purchase propensity, and beyond. From a Distributed Energy Resources (DER) and Grid Edge perspective, whether it is smart thermostats to EV chargers, solar PVs to TOU rate designs and tariffs; UtilityAI™ energy analytics provides deep visibility into generation, consumption for better peak load shaping and grid planning, and delivers targeted recommendations for new value-added products and services. With roots in Silicon Valley, Bigdely has over 17 energy patents, \$75M+ in funding, retains 30+ data scientists, and brings a passion for AI to utilities serving residential and commercial customers around the world. For more information, please visit www.bigdely.com or the Bigdely blog at bigdely.com/blog.