EV360 WHITEPAPER

AUSTIN ENERGY’S RESIDENTIAL “OFF PEAK” ELECTRIC VEHICLE CHARGING SUBSCRIPTION PILOT APPROACH, FINDINGS, AND UTILITY TOOLKIT

AUSTIN ENERGY, CITY OF AUSTIN CUSTOMER ENERGY SOLUTIONS ELECTRIC VEHICLES & EMERGING TECHNOLOGIES
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Executive Summary

Austin Energy is a community-owned utility leading the way in adopting innovative technologies. Serving Austin, TX and its over 8,000 electric vehicle (EV) drivers, the utility oversees a network of 800+ public charging ports and growing.

The EV360℠ Plug-In Electric Vehicle Charging Subscription pilot program offers charging options for residential customers with an integrated home and public charging program. It is a flat-rate subscription with an on-peak residential charging adder, measured by a sub-meter connected to an in-home charging station, and also includes unlimited charging at Austin Energy’s public Plug-In Everywhere™ stations and unlimited off-peak charging at home.

The EV360 pilot program was designed to:

- Shift residential charging from peak periods to off-peak thus reducing cost and carbon from charging
- Subscribe home EV charging with 100% renewable energy credits (Texas wind via GreenChoice™)
- Allow for full cost recovery and a sustainable utility business model without subsidization
- Support community/utility climate protection and clean air goals
- Leverage advanced data analytics to develop customized marketing materials
- Increase customer satisfaction

Austin Energy’s EV360 pilot is unique for two key reasons. First, it is a flat-rate subscription that features an on-peak period extra charge per kWh. Second, it includes a subscription to Austin Energy’s public charging network.

Several data collection and analysis techniques confirmed that Austin Energy was successful in meeting its programmatic, financial, and engagement goals for the program.

- A July 2019 survey revealed that the majority of customers self-reported shifting out of on-peak charging, and sub-meter data confirms that very little home charging occurred during on-peak times.
- The cost analysis found that the EV360 subscription rate is self-sustaining, meaning that another incentive program is not funding the rate; this demonstrates that the rate pricing is correctly set.
- Initial sign-ups to EV360 was slow but accelerated (and pilot cap achieved) based on marketing efforts and electrician/installer engagement
- Finally, customers are satisfied with the program with an overall satisfaction score of 9/10, stating comments like “superb program supporting environmental responsibility” and “this is an incredible cost savings program.”

Recommendations for possible program expansion beyond a pilot include offering greater support of the installer community, developing permits specific to EV station and related installations, providing a staff resource plan to expand and administer the program, and expanding the types of customers allowed to participate in the program beyond single family residential customers.
Introduction

Austin Energy (AE) is a community-owned utility, focused on driving customer value in energy services. Established in 1895, AE provides electric power and retail energy services to the Greater Austin area. Austin Energy is a leader in adopting innovative technologies and the use of renewable energy to build a better Austin.

Austin is nationally recognized as an electric vehicle (EV)-friendly city¹ with over 8,000 EV² drivers in 2019. Austin Energy’s suite of electric vehicle incentives, collectively known as Plug-in EVerywhere, includes rebates for charging stations at residential and commercial properties, pilot programs, and a network of over 800 public electric vehicle charging ports allowing customers unlimited EV charging for only $4.17 a month. Austin Energy is also deploying a citywide network of DC Fast stations to enable long distance travel through Austin, high vehicle-miles-traveled applications such as rideshare, to further support electric vehicle adoption. To provide drivers with options to manage their bills from charging, Austin Energy developed a pilot EV rate.

The EV360℠ Plug-In Electric Vehicle Charging Subscription (EV360) is a flat-rate subscription with an on-peak adder, measured by a sub-meter connected to a charging station, and includes unlimited charging at Plug-In Everywhere™ stations and unlimited off-peak charging at home. All energy consumption on the EV360 sub-meter is supplied by renewable energy, through the application of Austin Energy’s GreenChoice® 100% renewable energy rider.

This report will detail the background, goals, description, methodology, results, and recommendations for EV360.

Background

EV360 was published under "Plug-In Electric Vehicle Charging Rates" in the City of Austin Electric Tariff, effective November 23, 2015. The tariff outlined the application of the rate and terms and conditions, but the EV360 name and operational aspects of the program had not yet been defined. At the time, Austin Energy wanted to offer more rate options for customers, and EV360 was among three newly offered Residential Service Pilot Programs listed in the tariff. Austin Energy developed the operational and marketing aspects of EV360 and began to advertise the pilot program on the Austin Energy website in April 2016. Enrollments to EV360 ended in 2019.

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² Electric Power Research Institute, Inc., Data provided quarterly to Austin Energy for Travis and Williamson County
Goals & Objectives

Austin Energy has a stated goal to reduce carbon emissions by encouraging EV adoption, reaching 65% renewable energy by 2027, and promoting other key technologies such as demand response and energy storage, all while maintaining affordable rates and promoting customer choice. The EV360 pilot rate was designed to contribute to all of these objectives:

- **Avoid usage during peak periods**: EV charging can represent substantial load growth equal to the power draw of several homes, which can contribute to higher costs and emissions if they are charged during peak periods. This is for several reasons:
  - Real-time electricity prices can spike when transmission congestion occurs and when demand nears maximum supply due to the need to run more expensive “peaker” plants.
  - The Electric Reliability Council of Texas (ERCOT) charges load-serving entities like Austin Energy for their percentage of the total system load when ERCOT sets its monthly maximum from June through September (a type of demand charge referred to as the Four Coincident Peaks, or 4CP). In both of those cases, if the power Austin Energy purchases from ERCOT is more expensive or has a higher 4CP cost, those expenses are ultimately passed on to customers.
  - Electricity generated during peak periods has increased carbon emissions, as peaker plants typically run off fossil fuels.
  - High usage can stress distribution networks and equipment that are near capacity during peak periods.

- **Align EV charging with renewable energy generation**: Most charging happens overnight, when renewable generation from West Texas wind farms is highest, so EVs help “soak up” that renewable generation at a time when electricity demand is usually low. In addition, Austin Energy's GreenChoice program is built into the EV360 rate, meaning all energy consumed through EV360 is renewable.

- **Increase customer satisfaction**: EV360 offers consumers another option to manage their electric bills that is easy-to-understand and predictable. Many EV drivers are aware of the environmental and financial impact of on-peak charging, and express satisfaction with Austin Energy addressing those impacts with a rate option that encourages off-peak charging.

These goals were built into the structure of the rate, described below.

Utility EV Rates

There are multiple mechanisms available to utilities to meet the objectives listed above, which include incentives, behavioral initiatives, and curtailment programs (similar to demand response programs for smart thermostats) via the charging station or the car’s telematics. Thirty-eight utilities (including Austin Energy) are running programs or pilots on these topics. However, the most efficient mechanism to influence behavior is arguably through rates, which create clear price signals that consumers can respond to. They also leverage existing utility billing infrastructure, rather than requiring separate reporting systems.

Time-of-use (TOU) rates charge customers based on when during the day the electricity is used. They are intended to more closely align customer behavior with the actual cost to the utility, but without the complexity and administrative burden of providing real-time rates. At least 29 other utilities nationally offer a rate to encourage EV

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owners to charge off-peak. Typically, these rates offer different prices for electricity consumed by the EV during different on-peak/off-peak blocks. These programs usually require the EV charger to be on a separate meter or sub-meter so that its usage can be billed separately from the rest of the home.

Austin Energy’s EV360 pilot is unique for two key reasons. First, it is a flat-rate subscription that features an on-peak period extra charge per kWh. Second, it includes a subscription to Austin Energy’s public charging network. No other utility includes these two features, which have the effect of making customer bills predictable and understandable, and enabling a seamless home-and-away charging experience.

Pilot Description
The EV360 Plug-In Electric Vehicle Charging Subscription includes unlimited charging at Plug-In EVerywhere™ stations and unlimited off-peak charging at home. Off-peak hours are from 7:00 pm - 2:00 pm on weekdays, and anytime on weekends. Participants have access to a flat rate charge of $30/month for a charging demand of less than 10 kW and $50/ month for 10 kW demand or greater if residential charging is done during off-peak times. If vehicle charging is during on-peak times, an on-peak adder is applied in addition to the monthly subscription fee. The adder is set at $0.40/kWh fuel charges in the summer (June through September) and $0.14/kWh fuel charges during non-summer (October-May). EV charging energy usage is measured by a sub-meter connected to a level 2 (240 V) charging station installed at customer’s home. Because Austin Energy has tiered residential rates, separating the customer’s EV charging from their home energy consumption can also lead to whole-home financial savings.

Participation is limited to 100 EV360 meters, and customers must meet several eligibility requirements: they must own or lease a plug-in EV, own a detached home, and have an Austin Energy residential electric account with an electric simple meter. The pilot was limited to EV owners in detached owner-occupied single-family homes to allow the team to focus on the particular use-cases within that sector. Customers must commit to 12 consecutive billing cycles or a termination fee of $200 is applied and an enrollment fee of $150 is charged.

Rate Design & Launch
Austin Energy’s Finance Division designed the EV360 rate in collaboration with Austin Energy’s Electric Vehicles and Emerging Technologies Division in 2015. EV360 pricing is set based on the expected demand from EVs. The rates team estimated charging usage from typical EVs and Level 2 in-home chargers, and recommended two tiers: one for chargers below 10 kW to cover the average energy demand used by a Nissan Leaf and similar models, and another for chargers above 10 kW based on the average energy demand used by a Tesla.

The analysis determined that the typical EV driver would pay, on average, $26 on Austin Energy’s regular residential rate. The existing Plug-In EVerywhere program costs $4.17 per month. Combined, Austin Energy would provide both services for home and away charging, for the rounded cost of $30 a month for the lower tier (less than 10 kW) and $50 a month for the higher tier (10 kW or more). The pilot program name, EV360, came from two reflections on this combination: $30 a month times 12 months a year equals $360, and the notion of holistic home and away charging creates a 360° EV charging experience.

The EV360 team keeps a running list of other utilities developing EV TOU rates, which includes data from an ESource member spreadsheet and internal research.
Once the rate had been designed, it required approvals from Austin Energy executives, the Electric Utility Commission and finally the Austin City Council. Next, the pilot staff developed a program execution plan, involving all relevant divisions within Austin Energy:

- The Complex Metering Operations Division approved and developed a meter programming and installation process.
- The Billing Services Division designed a program for meter scheduling and billing functionality with Austin Energy’s Oracle Customer Care and Billing application.
- The Electric Vehicles and Emerging Technologies Division approved a budget and assigned a program manager.
- The program manager defined a process for customer enrollment and meter installation.

EV360 was publicly launched in April 2016 with a landing page on Austin Energy’s webpage and a form for potential customers to initiate enrollment.

Marketing
The pilot team used a comprehensive marketing approach educating EV drivers and electrical contractors of the program elements and installation requirements of EV360. The primary mediums used to inform stakeholders included mail, email and web. Known EV drivers, identified by their past participation in Austin Energy’s EV incentive programs, received an initial EV360 promotional email, sent by the program manager, instructing them to visit the EV360 webpage and fill out a form to express interest in the pilot program. Program updates, especially updates that could be perceived as enrollment incentives, were also emailed throughout the pilot program duration.

To target messaging to customers who would be most likely to participate, Austin Energy used data-driven customer segmentation – one of the utility’s first uses of the technique. The Data Analytics and Business Intelligence Division collaborated with the Marketing Division to create custom and targeted marketing messages utilizing Esri’s Tapestry Segmentation tool. The tool provided insight into the demographics and socioeconomic characteristics of the existing EV360 customers by classifying each EV360 customer into one of 67 unique Tapestry segments. At the time of Tapestry deployment, 30 customers were on the EV360 pilot rate. With those 30 customers’ dominant characteristics identified by Tapestry segments, Austin Energy was able to identify known EV driving customers which exhibited those same Tapestry characteristics as the EV360 pilot participants. Equipped with that knowledge, Marketing sent promotional EV360 emails and postcards via mail to the targeted EV drivers. The messages were tailored to appeal to the sensitivities and interests of those customers (identified by the Tapestry tool) and included a testimonial from a satisfied customer.

Figure 3 Marketing postcard sent via mail utilizing ESRI Tapestry tool in 2018
In 2017, the pilot team streamlined the EV360 webpage with a customer-centric focus and added a dedicated installers page to Austin Energy’s EV website, www.pluginaustin.com. Intended for an installer audience, the webpage contains a wiring diagram, meter photo, a checklist, program overview with marketing language, Austin Energy’s Design Criteria, the Austin Energy Interconnect Guide, and program contact information. This not only provides installers the tools they need to promote and safely install the EV360 meter set up, but also allows potential customers to know the scope of electrical work required to enroll in the program. The EV360 program manager also mailed installation packets to known Austin-area EV charging station installers containing printouts of the installer webpage contents to get the needed information in the hands of the people responsible for installing the EV360 system. The installer documents can be found in the appendix.

Participation Process

For customers interested in the EV360 rate, an application must be submitted and rate eligibility is confirmed by pilot program staff. A key component of the EV360 rate is the physical installation of a sub-meter attached to an in home level 2 charging station. Installing the meter requires upfront costs to the customer and work to be performed by an electrician and inspector. Electric vehicle charging stations consists of a connector, cord, and interface to electrical power. The charging stations used for EV360 must be level 2 charging stations (240 volts, with amperage ranges from 20A to 80A). These can be either plug-in or hardwired stations depending on the available circuitry in the customer’s garage. The most important residential design considerations are panel capacity, overcurrent protection sizing, and branch circuit demands. The National Electric Code (NEC) section 625 governs the necessary electrical requirements to safely install charging equipment.

Austin Energy requires a sub-meter in order to individually monitor the charging station. The EV360 sub-meter sends kWh consumption information from the charging station to the utility’s meter data management system (MDMS). This information is used to calculate the customer’s electric bill. The EV360 sub-meter is set-up with a subtractive algorithm and is programmed to separate the usage into on-peak and off-peak categories. The customer’s EV usage is billed according to the programmed schedule for on-peak and off-peak periods. The EV360 sub-meter billed amount is based on data delivered to Austin Energy. Customers can have an EV360 plus a solar simple net meter and solar PV meter, but cannot have an EV360 plus a TOU electric meter. The EV360 meter is not configured to communicate with a TOU electric meter.

The EV360 rate cannot begin until a professional electrician installs and secures permitting for the installation, at the customer’s expense. If the property is within the City of Austin jurisdiction, the installer must submit a permit application to the Development Services Department by the installer and pass an inspection. If the property is outside the City of Austin jurisdiction, the EV360 program manager arranges an Austin Energy Solar inspector to inspect the installation. Inspectors refer to the National Electric Code, Austin Energy Interconnection Guide, Austin Energy Design Criteria Manual, and City of Austin electrical ordinances to determine if the installation was completed safely and up to code. A passed inspection signifies that Austin Energy can proceed with the meter installation and set-up of the meter on the customer information system. The detailed process of enrollment can be viewed in the appendix.

Methodology

Austin Energy gathered customer data in several ways. The rates team conducted an Initial cost study in May, 2019 that included the analysis of 89 meters on the EV360 rate. EV360 customers received a digital survey in July, 2019 designed to understand their perception of the pilot program. The survey resulted in nearly 100% completion rate
and participants were generous with fill in the blank responses and comments. The applications submitted by potential EV360 customers provided supplemental data about the customers.

Results
This section presents some of the key results from the EV360 rate pilot, including rate design, participation, installation, and customer perceptions.

Rate Design
The EV360 data set consisted of a mix of in-city and out-of-city customers. It is important to note that the rate structures for the two types of customers are different for in-city vs. out-city customers. To help account for the differences in the rates, the cost-analysis averaged the customers with all of the available residential rate options such as GreenChoice, Community Solar, and Customer Assistance Programs. The cost-analysis revealed that Inside-city limit customers save on average $0.45 per month compared to standard rates, while outside city limit customers pay approximately $3.69 more per month. However, outside city limit customers appear to drive and charge more in comparison to inside city customers. It is important to recognize that these results do not include charging on the public network.

The convenience of the EV360 pricing for customer and the collection of adequate revenues through the pilot program meet the goals of both involved parties.

Off-Peak Charging
One of the primary goals for the pilot, and the significant on-peak adder, was to shift charging demand out of the on-peak period (2:00 P.M. to 7:00 P.M. on weekdays). Based on the chart shown below, from the initial cost study using 89 customers’ EV360 meter data from the beginning of the program, the rate was 99% effective with nearly every EV360 customer avoiding on-peak charges.
Austin Energy also asked customers to self-report on their charging behavior before and during the pilot when surveyed in July, 2019. The majority of respondents indicated a clear reversal of the time of day they charged their EV from charging on-peak (2pm - 7pm) to off-peak (7pm – 2pm). Out of the 15 people who had a charging station prior to joining the EV360 program, 60% said they shifted their charging out of the peak period.
Installation
While the majority of meter installations passed their inspections, Austin Energy noticed several issues that prevented the installation from passing an inspection. For example, Austin Energy requires the all meters to be grouped together including the sub-meter which is classified as meter. Sometimes, contractors will request a variance for the sub-meter to not be grouped with the other meters, usually to lower installation costs. Austin Energy determines if this is a special situation that can be approved prior to installation. Some of the common errors seen during the electrical inspection of EV360 include:

- Misidentification of load-side and line-side wiring
- Metering clearances
- Meter grouping and labeling
- Incorrect charging demand calculations
- Jumper plate not used

In order to help avoid these common mistakes, Austin Energy created an installer toolkit to educate contractors on the process, meter wiring, and other technical requirements. The program manager also requests a photo of the meter arrangement for review of errors before an inspection is scheduled. These resources aid the electrician to safely install the equipment. Please refer to Appendix for the available resources.

Customer Characteristics

*Figure 7 Customer information gathered from the EV360 interest form*
Austin Energy collected customer information through several mediums: supplemental questions on the EV360 interest form, Esri’s Tapestry tool, a customer survey and testimonials. The EV360 interest form revealed that 50% of customers learned about the pilot program by visiting Austin Energy’s EV360 webpage. The majority of customers (75%) who went on to install the EV360 sub-meter drive full battery electric vehicles, mostly from Tesla.

Some other customer survey findings include:

- Thirty-six percent of survey participants recommended public radio and local newspapers as a means to let more customers know about EV360.
- Sixty-five percent of respondents indicated that they use the public option (Plug-In EVerywhere Network) to charge their EV when away from home, while 35% of respondents do not use the public option to charge at all. Access to the Plug-In EVerywhere Network is included in the EV360 pilot program at no additional fee.
- When participants were asked how beneficial different aspects of the EV360 pilot program are, more than 80% responded that having a set price on their utility bill for EV charging, more affordable charging, and environmental benefits of the program were the top benefits.

Customer Satisfaction

Overall, participants were very satisfied with the EV360 rate. When asked on the survey, 83% of customers rated the program very highly (8 or greater), with 63% giving the program a 10 out of 10.

Q16 - On a scale of 1 to 10 where 1 is not at all and 10 is very satisfied, how satisfied are you with the EV360 Pilot Rate program overall?

![Bar chart showing satisfaction levels](image)

**Figure 8** Customer provided answers to satisfaction questions on EV360 participant survey

Among the survey’s comments are statements that would be valuable as testimonials for future program marketing, including:

- “Superb program supporting environmental responsibility and providing a cost effective solution to transportation energy.”
• “This is an incredible cost savings program, likely the most generous in the world.”
• “Austin Energy leads the nation in its innovative approach and programs to support alternative energy choices and vehicles. The EV360 program is an example for all cities looking to support alternative energy vehicles.”

Future Opportunities
The program staff noted opportunities to streamline the process and allow the program to scale if it is approved as a formal rate. These include rate design, rate analysis, installer communication, permit development, staffing, and program guidelines.

Marketing
There is one opportunity related to education and marketing:

• Installer trade allies: Charging station installers can further amplify AE’s marketing efforts and can continue to drive a lot of participation in programs with minimal effort from program staff; they are most effective when engaged and informed. A meeting or set of meetings with installers can help them put a face with a name and ask any questions they might have. Regular communications on program opportunities and updates will ensure that they are keeping the programs top-of-mind and providing the most up-to-date information to customers.

Program Process
There are four opportunities related to streamlining the program process to enable scaling:

• Streamline permitting: Austin Energy should collaborate with the City of Austin’s Development Services Department to provide administrative benefits to the EV360 program. Utilizing the development review, permitting and inspection software application system, commonly referred to as AMANDA (Application Management and Data Automation) will enable workflows such as automated inspection completion notifications sent to Complex Metering Operations to prompt meter installation. This will alleviate the time consuming administrative task of coordinating meter installations after confirming passed permit inspections. EV-specific permits within AMANDA should be developed to define standalone EV charging station installation permits along with an EV360 sub-meter permit. This will enable installers to clearly identify the permit needed for the job and provide inspectors a clear description and scope of work to inspect. Additionally, having defined EV permits within AMANDA will provide valuable and reliable data to City of Austin departments regarding the growth of EV adoption in Austin.

• Resources & reporting: Resources for additional staff and the development of tracking and reporting tools to enable multiple staff to manage EV360 workflows should be considered. The program process and any tools should look and feel similar to other AE programs to allow for ease of use and understanding. Consider opportunities to automate and/or create templates for common notifications or questions to scale EV360 to a larger customer base. Additionally, a dedicated inspector for installations outside of the City of Austin jurisdiction would alleviate the need to utilize the Solar Division’s solar inspector. Inspections could be completed faster with more accuracy if the inspector were to reside in the Austin Energy’s Electric Vehicles and Emerging Technologies Division.

• Eligibility: The program guidelines limited pilot eligibility to EV owners residing in detached owner-occupied single-family homes. It is recommended that rate eligibility be expanded to include condominiums, on the condition that the owner has designated parking and the ability to install a charger and sub-meter. While expanding use cases for EV360, consider enabling and incentivizing EV owners constructing new homes to install preliminary wiring and conduit to lower the cost of EV charging station
and EV360 sub-meter installation. Such an offering could be cross-marketed with the residential Green Building team. Multifamily and workplaces with EV charging can be good candidates for potential rate development, similar to EV360.

- **EV360 Meter Programming:** Finally, it is recommended that AE explore the possibility of programing the subtractive algorithm meter schedule within the utility’s meter data management software, as opposed to within the EV360 meter itself. This would allow the utility to make programmatic changes, like off/on peak time frames, from a centralized, remote location rather than requiring such changes be made by accessing the customers’ meters.

## Conclusion

The initial findings show that the EV360 design is unique among utilities, featuring a flat-rate subscription with an on-peak adder and unlimited access to public charging. Its simplicity and predictability are motivators for customers to enroll. Some EV360 customers, like those who drive routine high mileage trips, could save money on their energy bill while avoiding energy market peak periods. Testimony and survey data reveal that EV360 customers are very satisfied with the pilot program and Austin Energy in general. EV360 helps Austin Energy drive customer values like affordability and care for the environmental through innovative energy services.
Appendix A: Tapestry Results

This appendix contains the abbreviated descriptions of the Tapestry segments that represent the majority of EV360 customers. ESRI’s Tapestry tool identified EV360 customers’ segments that describe the pilot participants’ demographic and socioeconomic characteristics. Approximately half of the Tapestry study population (91 participants total) are among the following customer life mode segments, listed in descending order: 1C Boomburbs represent 13 participants, 8B Emerald City represent 13 participants, 1A Top Tier represent 9 participants, and 1B Professional Pride represent 9 participants.
Appendix B: Detailed Customer Enrollment Process

This appendix contains the detailed process for customer enrollment for the EV360 rate. It involves the coordination of multiple Austin Energy divisions and multiple City of Austin Departments.

1. Customer submits interest form
2. EV360 Program Manager receives form submission
3. EV360 Program Manager verifies applicant meets requirements
4. Customer receives response from Program Manager with eligibility approval and customer’s instructions
5. Customer hires installer to pull permit and install EV meter conduit
6. City of Austin Developmental Services Department (or Austin Energy Solar Inspector if property is located in the ETJ) receives permit application for electrical inspection
7. Electric work is inspected
8. Customer or installer informs EV360 Program Manager of final (passed) permit
9. Program Manager enters customer and meter data into meter release form and submits to Austin Energy
   Complex Metering Operations Division
10. Complex Metering Operations Division programs meter with EV360 schedule
11. Complex Metering Operations Division issues a field activity which schedules the EV360 meter installation
12. Complex Metering Operations Division installs meter at customer’s residence
13. Complex Metering Operations enters premise and service point characteristics into Customer Care &
    Billing Oracle database
14. Billing Division receives remote notification to add EV360 meter to customer’s account
15. EV360 Program Manager submits customer info and charging station system characteristics (charging
    station voltage and kW demand) to Billing Division to add service agreement to customer’s account and
    requests that the Plug-In EVerywhere service agreement is removed (if applicable)
16. EV360 Program Manager verifies EV360 service agreement is present and Plug-In EVerywhere service
    agreement is removed (if applicable)
17. EV360 Program Manager provides customer connection information to connect to ChargePoint, if
    necessary (for Plug-In EVerywhere access), and confirms EV360 rate has begun
Appendix C: Installer Technical Materials and Documents

This appendix contains the materials and documents distributed to electricians to enable them to effectively market the EV360 pilot program and safely install the electric vehicle charging station, EV360 meter base and EV360 meter conduit.

C.1 EV360 Meter Socket Connection Diagram
1.9.0 METERING

See Appendix C - Exhibits for examples of AE metering equipment and requirements.

1.9.1 Meters, Metering Equipment, and Metering Services

1.9.1.1 General

A. Customer shall furnish, install, own, and maintain metering equipment of the proper type and capacity for measurement of Customer’s electrical power consumption. Where more than a watt-hour meter is necessary to measure electrical power consumption, the Customer shall furnish the appropriate metering equipment.

- The Customer shall furnish and install all meter sockets, S-1 socket enclosures, voltage/potential transformers (VTs/PTs) and current transformers (CTs) for permanent installations. AE meter socket shall be identified by "AE" stamped into the metal of the meter socket.

- The Customer shall furnish, install, own, and maintain meter sockets, approved by the AE Complex Metering Operations Section, for temporary meter loops.

- The Customer shall furnish, install, own and maintain meter pedestals when required, transockets, ganged-meter socket assemblies (modular metering), and CT enclosures approved by the AE Complex Metering Operations Section.

- The responsibility of the Customer is to furnish, install, own and maintain enclosures, junction boxes, wireways, connectors, conduit and fittings, and other miscellaneous materials. This equipment shall conform to the installation requirements of the Austin Energy Design Criteria and NEC.

B. The Customer shall allow up to five (5) working days for the installation of the AE Complex Metering Operations equipment by AE after final inspection is approved by the AE Complex Metering Operations Section.

C. It is important that the Customer consults with the Complex Metering Operations Section so that the method of metering will conform to the requirements of the applicable electric service rate schedule.

1.9.1.2 Metering Equipment

A. The Customer shall furnish, install, own, and maintain the following equipment including, but not limited to:
   1. Type 200-S meter socket (single-phase)
   2. Type 200-SP meter socket (three-phase)
   3. Type 320-SLR meter socket (120/240v, 120/208v), (3 wire single-phase)
   4. Type 320-SLR meter socket (120/240v, 120/208v, 277/480v) (4 wire three-phase)
   5. Type Instrument Rated (IR) meter socket enclosure (for instrument-rated services)
   6. Current transformers (CTs) (All window, bushing, and bar type)
   7. Voltage transformer packs.
   8. Potential Transformers
5. General System Layout and Technical Requirements

This section reviews general system layouts and components for simple Residential EV Systems. Figure G-1 represents a simplified diagram illustrating the key requirements for typical EV systems less than 10 kW.

The charging station in Configuration 1 refers to a standardized cord that is provided with the EV. The Level 2 EVSE could also be directly hardwired, bypassing the receptacle.

C.3 AE Interconnection Guide Diagram for Configuration 1
Figure G-2 represents a simplified diagram illustrating the key requirements for other “typical” EV systems, greater than 10 kW, that require review by AE.

The charging station in Configuration 2 refers to a directly hardwired system. This configuration would most likely require an electrical panel upgrade.

Notes from Figures G-1 and G-2 (see this page and previous page):

1. **Service Disconnect**
   All customers must have a code-compliant service disconnecting means. Refer to the AE Design Criteria Manual for specifics.

2. **Overcurrent Protection**
   Overcurrent protection to be sized per NEC Article 625.40.

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C.4 AE Interconnection Guide Diagram for Configuration 2
3. **EV Meter (to be on Time of Use rate)**
   a. **Installations**
      i. Contact [AE Complex Metering](#) (512) 505-7045 or [EV/ET staff](#) (512) 482-5376.
      ii. Refer to Figures G-1 and G-2 for examples of simplified EV installations. Contact AE Complex Metering for any clarification.
         a) Note: The EV Meter shall be grouped with billing meter and disconnects.
         b) Facilities with <200 amps current would typically use a self-contained meter.
         c) Facilities with >200 amps current would typically use an instrument rated meter.
         d) Final determination of meter type and configuration shall be made by the AE Metering group.
      iii. Refer to the AE website for detailed meter socket, meter hub, and other related equipment.
      iv. [http://www.austinenergy.com](http://www.austinenergy.com)
         - Select the “Contractors” tab
         - Select the “Electric Service Design & Planning” tab
         - See “Austin Energy Design Criteria Manual”

4. **Receptacle/Interface/Connection**
The interface between the EVSE and utility power will generally be a plug and receptacle. A receptacle (120-volt or 240-volt rated in the case of Figure G-1) or a hardwired 240-volt connection (in the case of Figure G-2) shall be provided for the customer’s service connection to the EV system. EVSE connection to comply to NEC Article 625.44. Disconnecting means rated 60 amps or more to comply with NEC Article 625.42.

5. **EVSE/Charging Station**
Charging station to comply with IEEE 1547 and P2030.1 safety standards. The EVSE is a safety device that allows electricity to flow. Safety is enhanced by enabling two-way communications between the charging station and the EV and by safely delivering and managing electrical energy between an electrical source and an electric vehicle. The EVSE consists of the J1772 connector, cord, and interface to utility power.

6. **Electrical Plug**
All vehicles produced by automakers in the United States will conform to a single design, known as the J1772 Standard.

7. **EV/Charger**
Power is delivered to the EV’s onboard battery through the EV inlet port to the charger. The charger converts Alternating Current (AC) from the home to the Direct Current (DC) required to charge the battery in the vehicle. The charger and EV inlet port are considered part of the EV.

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C.5 AE Interconnection Guide Definitions
Austin Energy Electric Vehicle Service Equipment (EVSE) and EV360 Installation Checklist

General EVSE Installation

☐ All electrical materials, devices, fittings, and associated equipment should be listed

☐ All electrical components have voltage and current ratings necessary for application and installed per manufactured specifications.

☐ All equipment is electrically certified by OSHA such as UL, CSA, ETL listed

☐ Label and ID as stand-alone or interactive power supply

☐ All EVSE equipment should be marked with “FOR USE WITH ELECTRIC VEHICLES”

☐ Ensure the EVSE is securely fastened to the structure

☐ Equipment is protected from physical damage

☐ Dissimilar metals that have galvanic action are isolated

☐ Has an appropriate NEMA rated enclosure (NEC 110.28) based on environmental factors and possible deterioration through water or elements.

☐ Ensure sufficient space exists around electrical equipment for safe operation and maintenance (NEC 110.26)

☐ Building penetrations are sealed and fire resistance is maintained.

☐ Cable management apparatus is used to control and organize cable

☐ Electric vehicle coupler is polarized (unless part of listed EVSE), noninterchangeable, guarded, and prevents unintentional disconnection

☐ Grounding pole in EV coupler is first and last to break connection

☐ Cord length should be less than 25’ in length (NEC 625.17) does not have excessive slack

☐ Height of outlet should have easily accessible disconnect meeting ADA standards section 4.2.5/4.2.6 (48in.)

☐ EV power outlet terminated in a normal NEMA-type receptacle
• Bubble cover to prevent contact on outlet
• Make sure the outlet is installed with ground pin on top
• Circuit over 60A requires lockable safety switch next to EVSE
• Ensure that no backfeeding is possible through the EV and the EVSE unless permitted by 625.48 (interactive systems)
• Interlock is not required for portable cord-and-plug connected EVSE or 125 volt, single phase, 15 and 20 amps rated
• Ensure that during strain or possible cable rupture or cable separation from live parts, there is a mechanism in place to automatic de-energization per NEC 625.19

Load Calculation
• Load calculations must be done to prevent INSUFFICIENT LOAD SUPPLY
• Record the wattage of load calculation
• Check if circuit breaker is compatible with existing panel and make upgrades as necessary
• Power supply has an ampacity for 8 AWG and larger

Protection
• Interconnection at panel requires OCPD sized main panel busbars according to articles 690 and 705
• Overcurrent protection for feeders and branch circuits supply EVSE shall be sized for continuous duty and have a rating of higher than 125% of maximum load of the EVSE.
• A listed system of protection against personal electric shock is present
• Circuit breakers for (a) level 1 requires a single pole breaker or (b) level 2 requires two pole breaker with dedicated circuitry
Conductors

☐ Conductor is sized to 125% of the rated value

☐ Grounding conductor is 6 AWG or sized according to code and continuous or irreversibly spliced

☐ Color code all conductors

☐ Check electrical connection of circuit conductors and equipment grounding conductors

☐ Neutral should be full-size per AE Design Criteria Manual

☐ EVSE should de-energize the cable conductors and electric vehicle connector upon exposure to strain that may lead to cable rupture or exposure of live parts. Not required for portable cord-and-plug connected EVSE for 125V, single-phase, 15 and 20A

Raceways

☐ Individual branch circuit for EVSE should be installed

☐ Branch and feeder should be sized to 125% of rated current

☐ Check all conduit is properly connected (wrench tight), no loose fittings, no cross threadings

☐ Check fished and surface wiring

☐ Size bonding jumpers meets NEC 250.102(C) and 250.66

☐ Securely fasten the conduit at least every 10’ and within 3’ of each outlet box, junction box, device box, cabinet, conduit body or other termination

Service & Disconnects

☐ Check service grounding and bonding

☐ Manual disconnect switch should be mounted in proximity to the metering equipment, as well as other switches per NEC article 690 and connected per NEC article 404.6

☐ Check the service disconnects as appropriate for system
Metering [EV360]

- 2" clearance around the meter and follow AE design criteria for metering
- Maintain at least 4 foot clearance from the gas meter (measured horizontally)
- Label the meter with the address of location
- Use rigid conduit for meter installation (Section 1.9)
- Install jumper plate on meter socket
- Meters and disconnects should be grouped with billing meter

Workmanship

- Referred to AE Design Criteria, Interconnect Guide, COA Electrical Code, & NFPA 70 2017 for install
- All work was done in a neat and workmanlike manner
- All electrical work done by a licensed electrician
- System works as intended

C.6 Austin Energy EV360 Installation Checklist
Residential Time-of-Use Rate
EV360 Pilot Program
Installer Overview

Austin Energy's EV360 time-of-use rate includes unlimited charging at any Plug-In EVerywhere™ station and unlimited off-peak charging at home.

- Off-peak hours are from 7:00 pm - 2:00 pm on weekdays, and anytime on weekends
- Rate may be as low as $30/month

Customer Qualification Guidelines:
- Enrollment is limited to 100 participants**
- Customers must be an Austin Energy electric customer, own or lease a plug-in electric vehicle and own a detached home
- Customers must install a residential sub-meter circuit and meter socket connected to a level 2 (240 volt) charging station
- Customers must commit to 12 consecutive billing cycles***

Why Should Customers Enroll?
- EV drivers have access to a flat rate every month
- Customers who pay for electric usage in higher rate tiers can now separate their EV charging from their home energy consumption
- By charging during off peak hours, EV drivers are plugging into clean, 100% renewable energy

How to Enroll:
1. Customers submit an EV360 interest form
2. Customers receive installation bid(s)
3. Customers select a licensed electrician (electrician must reserve EV360 meter from Austin Energy**)
4. Electrician installs the sub-meter circuit and passes installation inspection
5. Electrician notifies EV360 Program Manager of final, passed permit
6. Austin Energy will install the EV360 meter

*A flat rate of $30 per month applies for EV drivers requiring a demand of < 10kW. For a demand > 10kW, the fee is $50 per month.

** Meters are limited and installers must receive confirmation of meter reservation from EV360 Program Manager before meter conduit installation. Submission of an interest application for EV360 does not guarantee a meter. Austin Energy is not responsible for costs or inconveniences incurred by failure to reserve a meter prior to meter conduit installation.

***A $200 termination fee will be applied if customers do not commit to 12 consecutive billing cycles.
C.8 Jumper Plate for EV360 Meter Socket
Appendix D. Electric Vehicle Adoption

This appendix illustrates electric vehicle adoption in Austin Energy’s service territory. The data represents Texas vehicle registrations and is provided by The Electric Power Research Institute, Inc.

*Data provided quarterly from EPRI for Travis and Williamson County.*