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Electric Vehicle Service Equipment Load Control Case Studies

NRECA

America's Electric Cooperatives

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ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE)
LOAD CONTROL CASE STUDIES

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1. Article Snapshot

What has changed in the industry?

As Americans continue to adopt electric vehicles (EVs) at an increasing pace, the electricity used to charge EVs will increase. Co-ops are watching as EVs come to their territories, and many are interested in preparing to manage and respond to the increased electricity demand they will create.

What is the impact on electric cooperatives?

Although increased electricity sales are often welcomed by co-ops, the time of day that EV charging occurs can determine whether or not it is beneficial to the co-op from a cost perspective. Co-ops that pay peak demand charges are motivated to minimize the amount of charging that occurs during peak hours. Co-ops that pay time-varying rates will benefit if they can shift EV charging to lower cost periods. Although the strategy for control and the optimal time to charge varies from co-op to co-op, it is clear that leaving the load unmanaged can cause negative impacts once EV adoption reaches a critical level.

What do cooperatives need to know or do about it?

Early pilot results indicate that EV charging behavior varies from member to member and co-op to co-op. Understanding how members charge and the degree to which they can shift their charging to beneficial periods of the day will help a co-op develop programs that ensure the adoption of EVs is beneficial for both the co-op and the member. Co-ops can collect information and gain experience through piloting electric vehicle supply equipment (EVSE) and charge control strategies, then use this information to develop EVSE programs.

2. Preparing for EV Adoption

EVs are continuing to appear in co-op service territories in increasing rates. As of the end of 2019, almost 1.5 million EVs have been purchased in the U.S., and EVs comprised 5% of new car sales in December 2019 (EEI 2020). Although many co-ops and other electric utilities see the additional electricity sales as a remedy to the declining sales of the previous decades, it is clear that encouraging members to charge their EVs during certain periods of the day can increase benefits of EV adoption. Successful EV charging control decreases load during demand peaks, shifts load to periods when electricity prices are low, and matches demand with the capacity of distribution transformers and other grid infrastructure (Dayem et al. 2019, Nelder et al. 2016).

The success of any load shaping depends on having reliable equipment to carry it out, and member buy-in and participation. The common approach today is using Internet-connected, Level 2 electric vehicle supply equipment (EVSE) to charge vehicles and a load control program or time-of-use (TOU) rates to shape the load. Because charge behavior varies from member to member and co-op to co-op, it is important for co-ops to learn about how members respond to load shaping strategies, in addition to testing the equipment that enables that shaping.

In this article, we examine two co-ops who are piloting EVSE hardware and load shaping strategies:

Central Electric Power Cooperative, Inc. (CEPCI) in South Carolina piloted eight EVSE and three control strategies in 2019. NRECA supplied funding for Xergy Consulting to assist CEPCI with pilot design and for data analysis and reporting. The results of CEPCI's pilot are presented in the first case study below.

The second case study describes Delaware Electric Cooperative's (DEC) pilot of eight EVSE and direct load control in 2018. The successful pilot led DEC to develop a program that began in 2019.

In these pilots, the co-ops gain experience with EVSE hardware and control platform, and begin to understand what issues to expect as more members purchase EVs and install EVSE. The co-ops gain valuable insight into what load control strategies work best for their members and the resulting financial benefits. These lessons help the co-op decide what is important to look for in the EVSE hardware and software that orchestrate load management, as well as the management strategies that best suit the co-op from a financial and member services perspective.

3. Case Study: Central Electric Power Cooperative

Central Electric Power Cooperative, Inc. (CEPCI) is a generation and transmission co-op with headquarters in Columbia, South Carolina. They and their membership of 20 distribution co-ops serve about a third of South Carolina's population. With the continued increase of EV adoption, CEPCI and its distribution co-op members are working to understand the impacts of new and future EV charging load and to develop strategies to manage the load through EV rates, whole-home TOU rates, or load control programs. They also want to understand how and when members charge, and work with various EVSE vendors to find equipment and charge control platforms that best suit their needs.

Pilot Approach

As a first phase in their EVSE exploration, CEPCI ran a pilot to specifically test load control strategies. They selected the Siemens VersiCharge, a network connected EVSE with on-board metering capability. The participating distribution co-ops selected participants, and in late 2018 and early 2019, EVSE were installed at one home in each of five co-ops, and at two homes in a sixth co-op. An eighth EVSE was installed in the summer 2019 at a condo building (Table 1). CEPCI worked with the distribution co-ops to identify the EVSE location and complete its installation and set-up, including establishing the network communication link.

Table 1: Pilot EVSE locations, primary vehicle type, and average monthly charge added.

Co-op	EVSE location	Primary vehicle	Vehicle type	Vehicle range (miles)	On-board charger (kW)	Average monthly charge added (kWh)	Estimated miles driven per month
Blue Ridge	Outdoor	Nissan Leaf	BEV	71	3.3	104	310
Coastal	Outdoor	Unknown				86	Unknown
Fairfield-1	Indoor	Kia Soul EV	BEV	93	6.6	102	340
Fairfield-2	Indoor	Tesla Model 3	BEV	310	10	208	860
Horry	Indoor	Chevy Bolt	BEV	238	7.2	107	420
Palmetto	Indoor	Tesla Model S	BEV	265	10	135	420
Palmetto-2	Outdoor	n/a				76	n/a
York	Indoor	Mitsubishi Outlander	PHEV	22	3.7	160	290
Note: All EVSE were installed at single family homes and were connected via the home's Wi-Fi network, with the exception of Palmetto-2, which was installed at a multi-family building complex and was connected via cellular.							

The pilot was divided into three main phases:

- **Baseline (February to May):** Participants charged as they wished and in the absence of guidance from the co-op on when to charge. Baseline load shape represents EV charging impact in the absence of load control programs, incentives, or information distributed from the co-op about the best times of day to charge EVs.
- **Load control (June to September):** To test the load reduction potential related to controlling EV charging during critical peak events, CEPCI either initiated direct control events or signaled voluntary events during the peak hours of 3:00 p.m. to 7:00 p.m. CEPCI initiated one direct control event in May, four events in June, and six events in July. They called six voluntary events in July, and five voluntary events in August. CEPCI has a *Beat the Peak* program to curtail other loads and applied the same process to EVs.
- **Overnight charging phase (October to November):** Because the distribution co-ops set their own rates, implementing a time-of-use (TOU) rate to encourage charging at beneficial times was not possible. To mimic a TOU rate, CEPCI asked participants to charge overnight to help the co-op continue to provide low electricity rates, but without a direct financial incentive, like an EV rate or bill credit, to do so.

In the analysis below, we examine the portion of charging that took place during four periods during the day:

- **Day:** 6:00 a.m. to 3:00 p.m.
- **Peak:** 3:00 p.m. to 7:00 p.m.
- **Evening:** 7:00 p.m. to 10:00 p.m.
- **Overnight:** 10:00 p.m. to 6:00 a.m.

The goal of the load control phase was to reduce EV charging during the peak period, whereas the goal of the overnight charging phase was to shift charging to the overnight period.

Results

Electricity Consumption

On average, each participant used about 120 kWh per month for vehicle charging, ranging from 90 to over 200 kWh per month (Table 1). The electricity delivered to the vehicles provided about 300 to almost 900 miles of driving per month based on EPA-rated EV ranges. For battery electric vehicles (BEVs), electricity used for charging loosely correlates with vehicle range. The one plug-in hybrid electric vehicle (PHEV) in the study charged more than all but one of the BEVs, despite having only 22 miles of range. The EVSE installed at the multi-family complex used about 80 kWh per month, but because it was installed late in the study, only a couple of months of data were recorded for the unit. Usage may increase as the station's presence becomes known to occupants. For distribution co-ops that participated in the study, which charge about \$0.09 to \$0.14 per kilowatt-hour, 120 kWh per month would increase electricity sales by \$10.80 to \$16.80 per vehicle per month.

Impact of Control Strategies on Charging

- ***Baseline charge behavior***

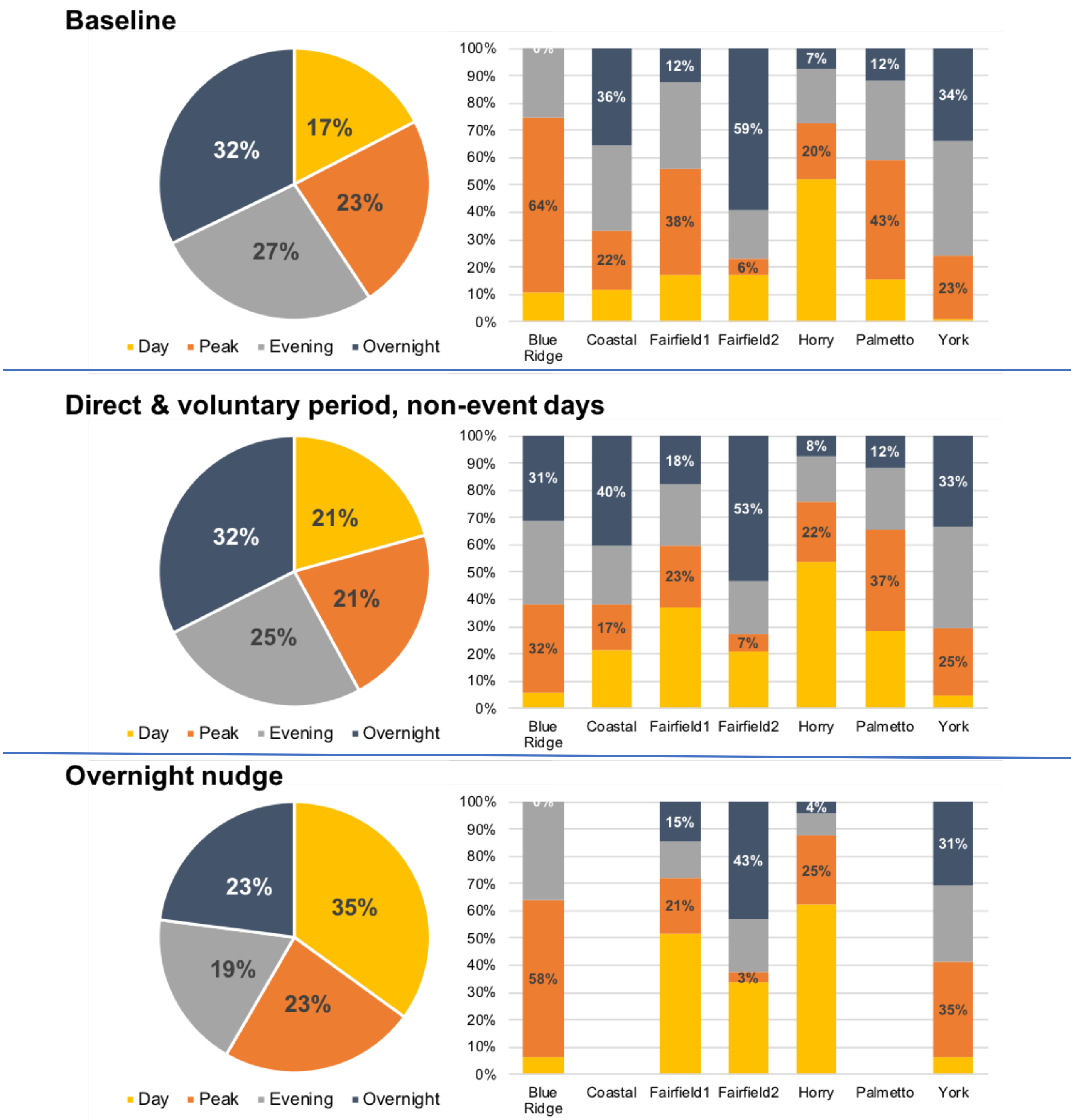
  Many participants noted in post-pilot interviews that before the implementation of the control strategies, they typically plugged in their EVs and commenced charging upon their return home. Results from the baseline period show that some participants do exhibit this behavior (Figure 1, top): half the charging across the seven residential EVSE occurs during peak and evening hours. The timing of charging varies widely across participants, however. Some, like Fairfield-2, add most of their charge overnight and add very little load to peak hours, but others add significant charge load during peak hours during the baseline period.

- ***Direct load control***

  Charging behavior during the load control period on days when a control event was not called is similar to the baseline period. A slight reduction in peak charging between baseline and control periods is observed, suggesting that awareness of the load control events may help participants shift charging away from peak periods even if no event is called (Figure 1, middle panel).

  The charging that occurs during peak hours during non-control events is the maximum amount of load that can be shifted during a load control event. The load control potential for each station is shown in Figure 2. The blue bars show the typical power drawn by the EVSE during a charge event (also listed in Table 1). The magnitude of the load depends on the capacity of the vehicle's on-board charger; higher capacity chargers draw more power. The load control potential depends not only on the typical power draw of a particular EVSE, but also the number of days that the vehicle actually requests charge during peak hours. If the vehicle never requests charge during peak hours, its load control potential will be zero.

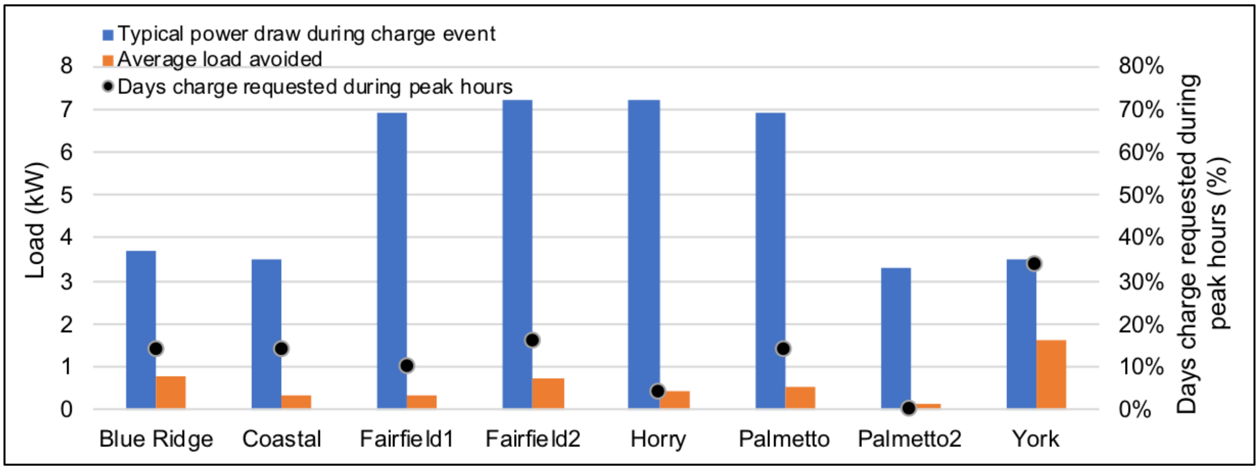
Figure 1: Distribution of charging throughout the day during the three pilot phases: Baseline, Load Control, and Overnight Charging.



Note: The Palmetto-2 station is not shown because it began operating late in the pilot. No data was reported from the Coastal or Palmetto stations in the last two months of the pilot. The middle panel shows behavior on days without load control, and therefore, represents the potential load that could be shifted from peak hours.

Figure 2: Load Control Potential for Each Station

Typical power draw during a charge event (blue bars, left axis), average load that can be shifted during peak hours using direct load control (orange bars, left axis), and the percent of days the vehicle requests charge during peak hours (black dots, right axis) during the direct load control period of the pilot.



The amount of load available for control, which is the average load requested during peak hours on non-control days during the direct load control period of the pilot, is shown by the orange bars in Figure 2. The load available for control is about 4 to 35 percent of the typical load during charging, which is related to how often the vehicle requests charge during peak hours (Figure 2, black dots). For the eight EVSE in the study, the load available for control during peak hours averaged 5 kW in total, or 0.63 kW per vehicle, with about one of the eight EVSE (12%) requesting charge.

If the EVSE and load control platform work reliably, most to all of the load available can be avoided during direct load control events. This requires the EVSE to maintain network connectivity, and reliably respond to the load control signals sent by the charge control platform. Although the amount of time network connectivity was lost was not available from the charge control platform, it would be a valuable metric to confirm that charge control is being maximized. We were, however, able to observe how well the EVSE responded to load control signals. Although the units appeared to halt any charging that was in progress when the event was called, some allowed charging to begin if requested during a control period. CEPCI brought this issue to Siemens' attention, who made later improvements to the control software. These improvements were ongoing at the conclusion of the pilot.

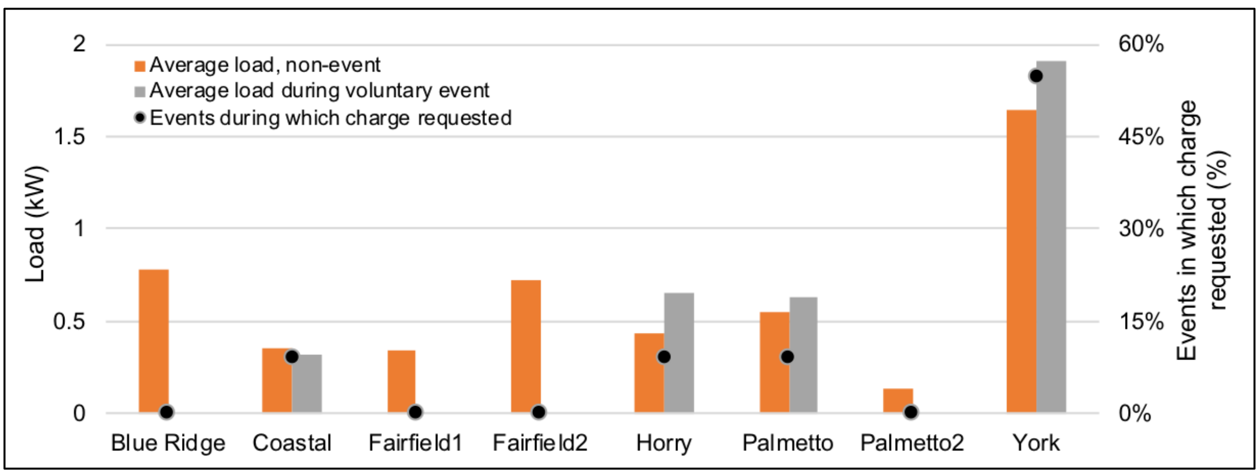
Assuming the issues above are resolved, the pilot results indicate that direct load control events should curtail an average of 0.63 kW per vehicle during each direct load control event. CEPCI can estimate its demand charge avoided by multiplying the average charge avoided, the number of vehicles in the program, and the per-kW demand charge. While EV adoption is low, this figure may not be a significant impact on the co-op's bottom line. However, with this information, the co-op can begin to estimate the number of vehicles needed in a load control program to realize impactful savings.

- ***Voluntary load control***

During voluntary load control events, four participants refrained from charging during all 11 events, and three participants charged only once during an event (Figure 3). The York participant was the only one that charged regularly during the voluntary control events, charging during more than half of them. In post-pilot interviews, this participant indicated that the EV's primary driver did not want the hassle of participating in the control events, and always charged upon returning home. The average load during peak hours on voluntary control days was 3.5 kW, indicating a load reduction of 1.5 kW across the eight EVSE. We note, however, that the sample size is fairly small (8 vehicles over 11 events). We expect these figures may change if CEPCI adds more participants and more control events to a pilot or program.

Figure 3: EVSE Load and Events

Average EVSE load during the voluntary control period on non-event days (orange bars, left axis) and on event days (grey bars, left axis); and the percent of events during which charge was requested (black dots, right axis) by station.

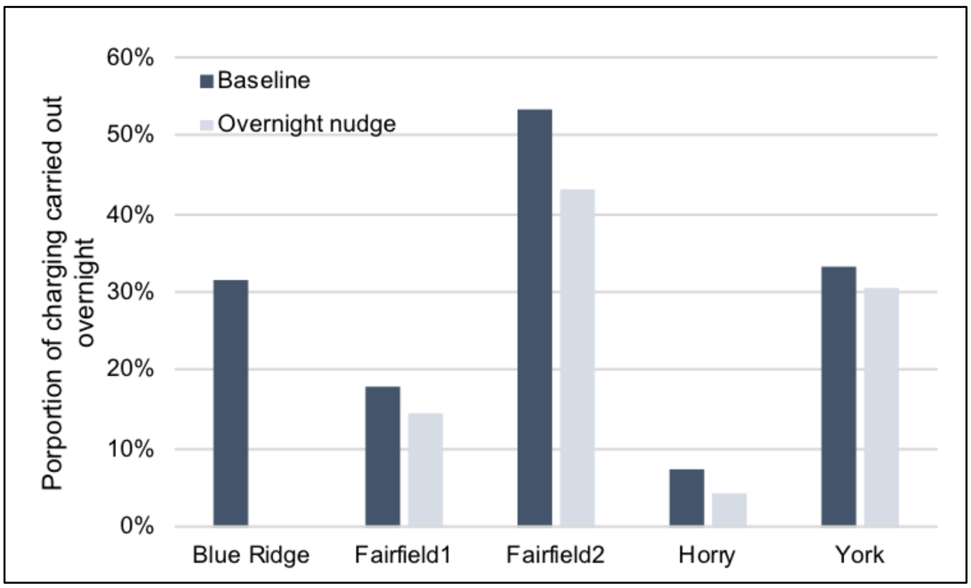


- ***Overnight charging***

Simply asking participants to charge overnight to keep co-op costs low did not prove an effective means of shifting load to beneficial hours. In fact, none of the single family residential participants increased charging overnight in response to the nudge, and one member did not do any overnight charging after the nudge. By this point in the pilot, two stations were no longer reporting data. We confirmed that one participant removed his Siemens EVSE and replaced it with the EVSE he used prior to the pilot, because the Siemens unit was not communicating with his EV properly. The other participant was unresponsive to emails and the post-pilot interview, and the cause for the lack of data is unknown.

Much of the charging that was carried out overnight in the baseline period was shifted to daytime hours (Figure *1*, bottom panel). The cause of this shifting is unknown. Once the load control testing was complete, perhaps participants felt free to again charge upon returning home, rather than planning charging for off-peak hours. The overnight nudge was carried out in the fall (October and November) when participant schedules may differ than during the summer months. This could create some seasonal variability that can be teased out during longer studies, but for now we have insufficient data to understand this shift in charging behavior.

Figure 4: Charging performed during overnight hours during baseline and overnight nudge periods.



Member Experience and Feedback

After the end of the pilot, participants were asked for their feedback via a short questionnaire, and six of the eight participants provided their input. Participants generally had positive experience with the EVSE and the load control events. A few mentioned some initial problems related to the network connection or EVSE set-up. Resolution of these issues required boosting Wi-Fi signal strength with range extenders, and, in some cases, replacing the EVSE.

Once installation and set-up was complete, charging was a smooth process for most participants. The exception was the participant at Palmetto, who noted interoperability issues between his Tesla Model S's on-board charger and the EVSE, which led him to replace the Siemens unit with his original, non-communicating EVSE. The other Tesla in the study, a Model 3, however, encountered no communication issues between the vehicle and the EVSE. Most participants scheduled charging through the EV itself, rather than the EVSE app, which some thought could be more user-friendly. One member noted that the EVSE cord was too short and, therefore, required precise parking; a longer cord would improve usability.

None of the participants felt impacted by any of the load control strategies, and all of them expressed interest in participating in future direct or voluntary load control or EV rate programs. Four participants also expressed interested in whole home TOU rates, but the remaining participants had reservations related to modifying their electricity usage in the home.

The Co-op Perspective

Although participants mostly reported positive experiences with the EVSE and load control events, CEPCI and the participating co-ops learned many lessons over the course of the pilot.

The distribution co-ops were responsible for participant recruiting and EVSE installation, including any necessary electrical service upgrades. The installation was generally straightforward, but pairing the EVSE to the member's Wi-Fi network was challenging in some cases, due to Wi-Fi signal strength, especially for outdoor installations. The co-ops worked to maximize signal strength by moving the router closer to the EVSE or by adding a range extender. In another situation, the member had a mesh Wi-Fi network, for which Siemens' setup instructions were lacking. Stephen Raines, Member Services Representative of Fairfield Electric Cooperative, reported that as long as he followed the instructions, the setup process was fairly straightforward.

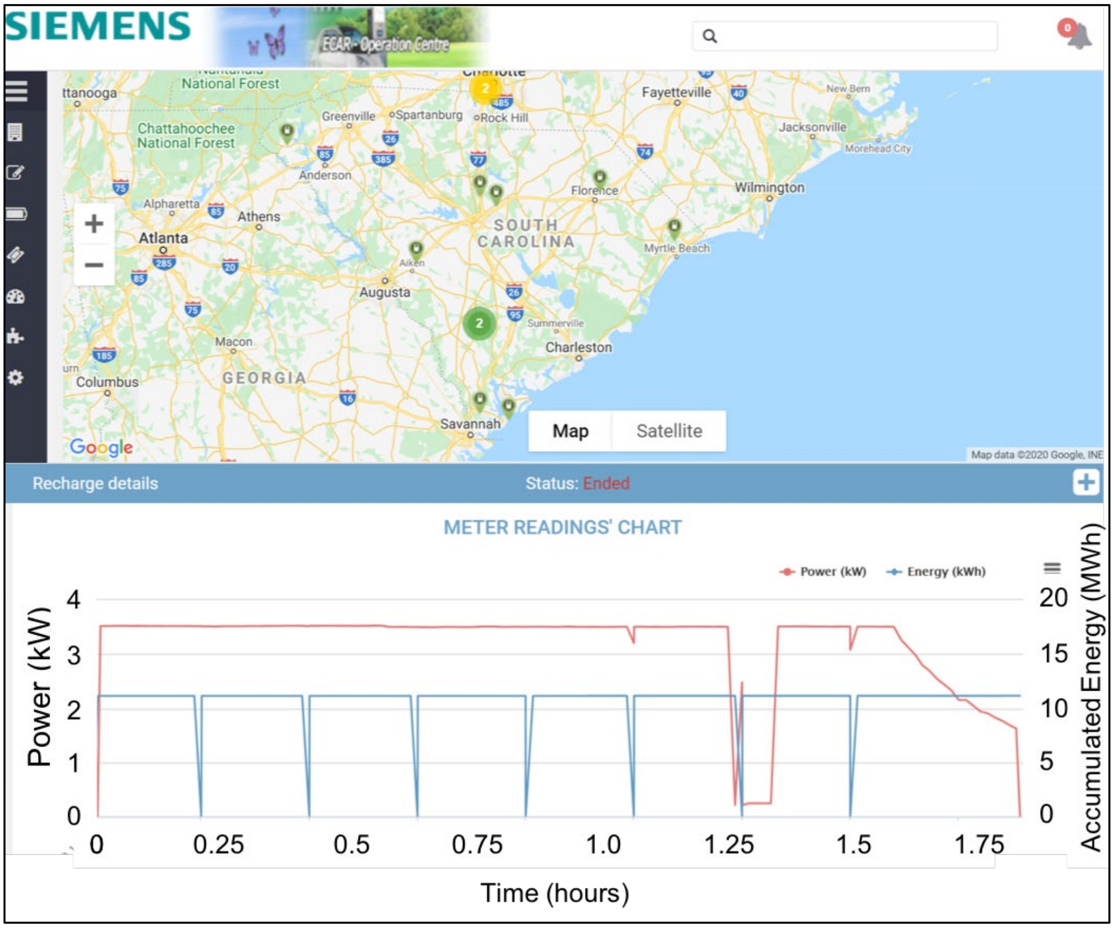
The Siemens EVSE hardware itself was relatively new to the U.S. market, and, as noted above, several units were replaced throughout the study in order to get a unit that could charge and communicate, according to John Becker, Member Services Analyst at CEPCI. EVSE models that have been on the U.S. market for several years may not have these issues. The metering capability included on the EVSE meant that a separate meter was not necessary. However, the data received from the EVSE had many gaps, and until this issue is resolved, the co-ops will be unable to use the EVSE data for billing.

In addition, Becker noted that the control platform provided some basic information (Figure 5), but did not deliver all of the data that would be useful for evaluating energy use and load control event results in a clear and concise manner. These data include:

station communication status; real-time information on how many vehicles are charging and how much load they are drawing; and daily, weekly, or monthly aggregate energy and usage data.

Figure 5: Example Views of Siemens Control Platform.

Map view shows stations in use (yellow) and available (green). Other data, such power and energy for a specific station as shown in the bottom of the figure, are also available. Image provided by John Becker, CEPCI



CEPCI will continue to pilot the Siemens EVSE with load control improvements, as well as test EVSE from ChargePoint and possibly other vendors. The results here have highlighted the need to ensure that the EVSE is reliable and delivers robust data. Members appear willing to participate in load control programs, but likely need financial incentives like EV rates to shift charging to overnight hours.

4. Case Study: Delaware Electric Cooperative

For many electric cooperatives, peak demand charges comprise a significant portion of annual electricity cost. To reduce these charges, Delaware Electric Cooperative (DEC), a distribution co-op with about 84,000 members in Kent and Sussex County, introduced their Beat the Peak program in 2008. A key aspect of the program involves the active participation of the co-op's members. During times of high electricity demand, DEC issues alerts that ask members to reduce their electricity demand by shifting their electricity use to other periods of the day or week. Recently, DEC has directly pursued large, flexible loads for the program. In 2018, DEC implemented their smart thermostat program, Beat the Peak with Nest.

Given the success of the Beat the Peak program, DEC began studying EVSE as a potential load to add to the program. To do so, they ran a pilot project to evaluate the effectiveness of EVSE load control to shift and shape the load associated with EV charging in their service territory. DEC deployed eight residential ChargePoint Home Level 2 EVSE in member homes and put them to the test from July to December 2018. The goals of the pilot project were to:

- Gather charging data from EVSE
- Determine the feasibility of a long-term program to generate new revenue and minimize grid impacts by responding to DEC Beat the Peak signals
- Evaluate members acceptance of managing the EV charging load
- Understand and develop required incentives

Pilot Approach

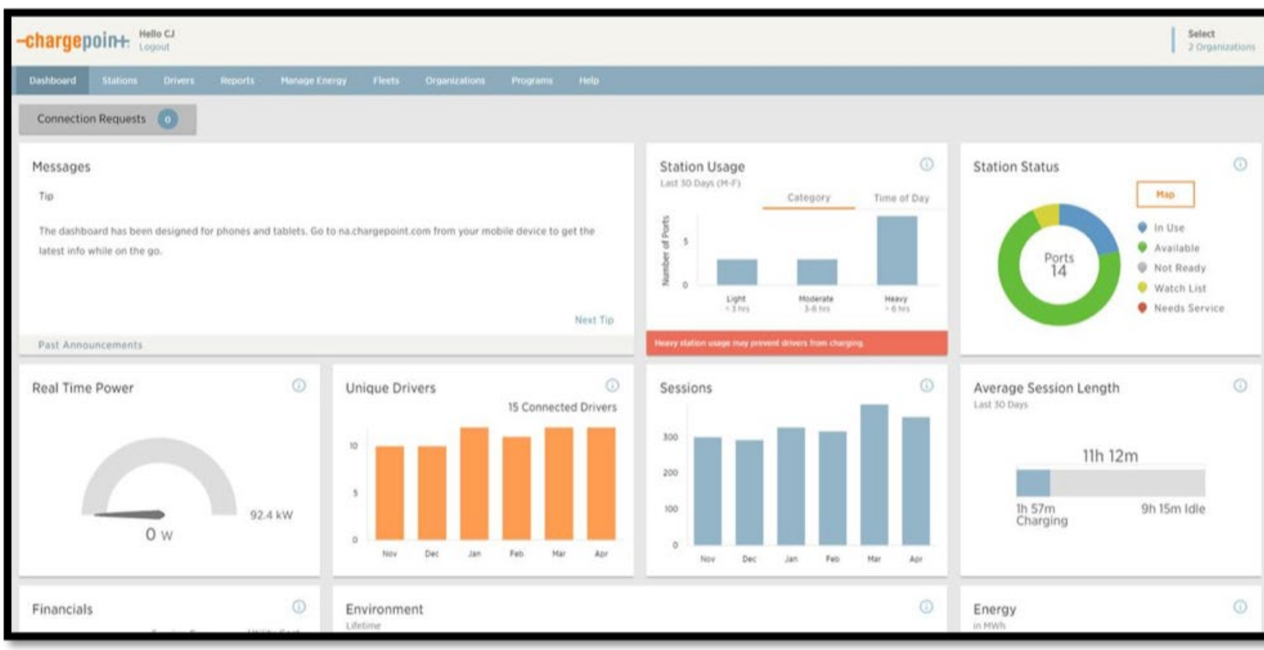
In designing the pilot, DEC set out to find participants with large EVSE load. To identify these members, DEC looked for participants with full BEVs who consumed at least the average monthly electricity use of their membership, about 1,000 kWh per month. To minimize installation effort and expense, they also sought members with broadband service and Wi-Fi in the home. They realized that a large proportion of EV owners in their area had trouble meeting the first two criteria; many had PHEVs rather than BEVs, and many had net-metered solar systems that reduced their monthly net energy use. Ultimately, DEC dropped the monthly energy use requirement and selected 2 participants with BEVs, and six with PHEVs. DEC chose the ChargePoint Home EVSE, which has on-board metering to monitor EVSE electricity usage separately from the rest of the home, and is connected to the home's network via Wi-Fi. Each participant received a free EVSE and arranged and paid for its installation. Participants provisioned the EVSE using the ChargePoint mobile app, which also allows the user to schedule charging times and track real-time power and energy consumption for each charging session.

DEC ran peak demand events similar to those in the Beat the Peak program: participants received an email or text alert prior to a peak demand event, and DEC used the ChargePoint control platform to curtail or cut power to the charger during the event. Kevin Yingling, Manager of Business Development and Energy Services at DEC, noted that the system allows a more gradual, “graceful” transition into the control period, rather than the abrupt shut-off of load control switches. The pilot program permitted members to opt out of demand events, but DEC observed few opt-out instances.

DEC used the ChargePoint control platform to track and visualize electricity use (Figure 6). Information available on the platform included the real-time status and power draw of connected stations, and monthly aggregate usage information. Delaware Electric monitored how many cars were charging when they had an event and determined the potential controllable demand from EV charging.

Figure 6. ChargePoint Control Platform Dashboard

Showing examples of real time and aggregate data, including station status and power draw and monthly charge behavior.
Image provide by Kevin Yingling, DEC.



Results

Energy consumption

The power draw during charge events depends on the size of the vehicle's on-board charger, and longer range vehicles typically have higher capacity chargers. During the pilot, power draw ranged from 3.5 to 17.2 kW (Yingling 2019). On average, each EVSE used 270 kWh per month for vehicle charging, and at an average retail rate of $0.106 per kW yielded $29.23 of electricity sales per vehicle per month.

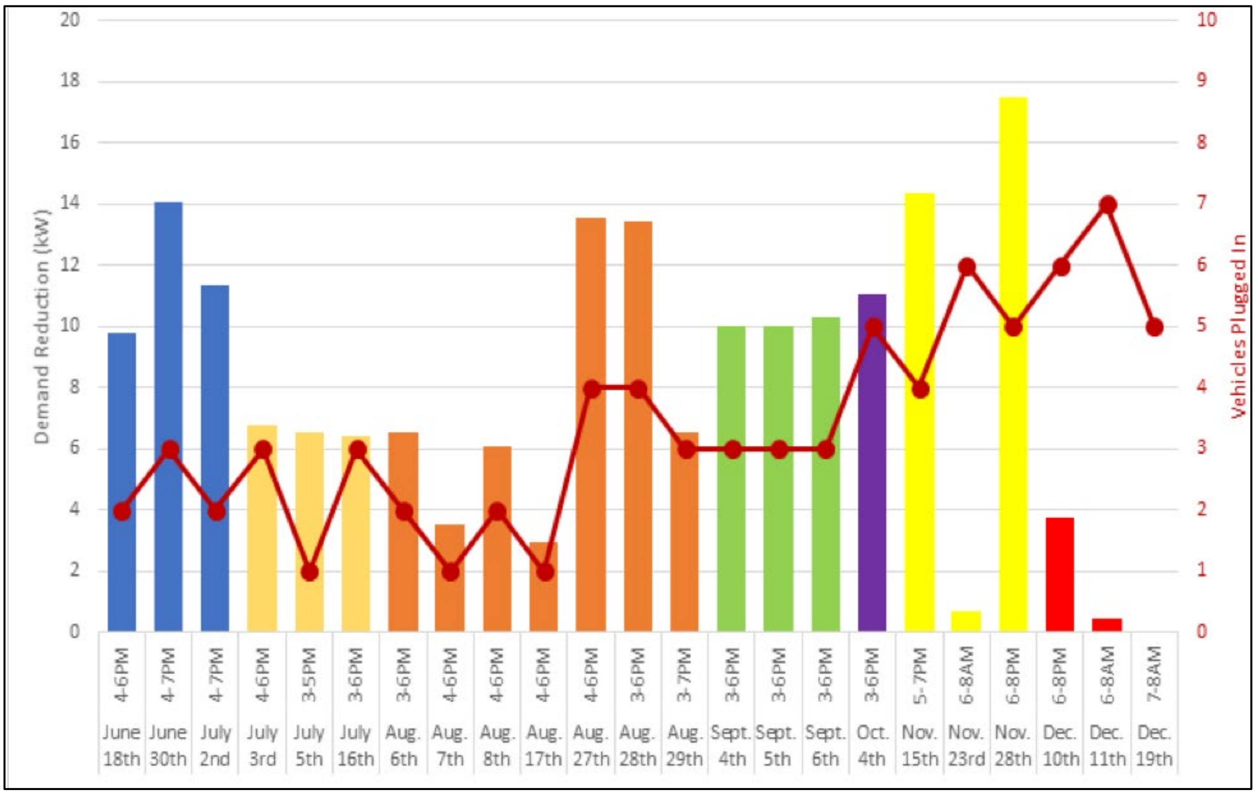
Impact of control strategies on charging

To determine the load reduction potential related to controlling EV charging during peak demand events, DEC initiated 23 Beat the Peak events during peak hours in the morning (6:00 a.m. to 8:00 a.m.) or afternoon (two- to four-hour windows between 3:00 p.m. and 7:00 p.m.) (Figure 7). EVSE that were charging a connected vehicle at the beginning of the event were curtailed, and EVSE that requested charging during the event were delayed until after the event.

During morning events, 63 to 88 percent of EVSE were connected to vehicles, but most of those vehicles had already been charged overnight and were not drawing power, except for a few for battery heating. During afternoon events, only 10 to 20 percent of the EVSE were connected to vehicles at the beginning of the control event, but more connected and requested charge as the event progressed. DEC estimated that on average about 2 to 3 vehicles were requesting charge during load control events. The charging load interrupted during peak hours averaged 8.3 kW across the EVSE that attempted to charge during the event (Yingling 2019).

Figure 7: Beat the Peak Events Tested

Demand reduction (left axis) and number of vehicles plugged into the EVSE during load control events.
Figure provided by Kevin Yingling (DEC).



DEC estimates that shifting 8.3 kW from demand peaks would yield $29.70 per month of demand charge savings (Yingling 2019) for vehicles that request charge during load control events. If 30 percent of vehicles request charge during events, this would yield $8.91 per vehicle per month in savings.

We calculate the lifetime benefit of EVSE by adding the average additional energy revenue per vehicle and the weighted demand savings per vehicle over the lifetime of the EVSE (i.e. 5 years). The pilot results indicate that the benefits of a control program could be about $2,300 per vehicle over the EVSE's lifetime. The ChargePoint Home EVSE cost $559, and DEC does not pay any monthly or licensing fees. Cost effectiveness of an EVSE program, and therefore the incentive that DEC can offer its members for their participation, also depends on wholesale electricity and program administration costs. Ultimately, DEC decided to offer a $200 bill credit for installation of the EVSE and a $5 per month credit for participating in their EVSE load control program launched in January 2019.

Lessons and Next Steps

After the pilot, DEC surveyed members and found the load control events went mostly unnoticed. Overall, participants were very satisfied with the pilot and opt-outs were infrequent. The pilot showed that if EVSE are connected and functional, load control is an effective means of shifting charging off peak for DEC. Given the promising pilot results, DEC launched a long-term program in January 2019, which reached 37 participants by March 2020. Early results indicate that 11 to 19 percent of EVSE are connected to and charging vehicles at the beginning of control events. DEC continues to monitor program performance to identify improvements as additional EVSE are added.

5. EVSE Pilots to Build the Groundwork for Successful Programs

The experiences of CEPCI and DEC show that pilots can be an effective way for the co-op to learn which EVSE will suit its (and its members') needs, which strategies are most effective at shifting EV charging load to low-cost hours, and the related financial benefits of doing so. This information can help the co-op understand the current and future impacts of EV charging and decide when and how to best manage it.

Each co-op will have different goals for managing EV charging, and it is important to consider those goals when selecting EVSE hardware as well as designing control strategies and rate structures. To design a program to meet its goals, the co-op will need to gather key information about the utility of potential EVSE options, and financial impacts of load management strategies. Table 2 lists many of these considerations, but is not likely to be exhaustive. Based on the experience of CEPCI and DEC, it is clear that piloting EVSE is a straightforward way to learn which EVSE and load control strategies are a good fit for the co-op and its members.

Table 2: Key information to gather for EVSE program development.

EVSE Selection
▪ Equipment and installation cost ▪ Ease of installation ▪ Ease of use: connecting to the EV, scheduling and managing charging ▪ Features that are important to members, e.g., app features, cord length ▪ Ability to maintain network connectivity, including best location for EVSE and network equipment within the home ▪ Ability to respond to load control signals ▪ Utility of control platform, including event scheduling and dashboard views ▪ Accuracy of on-board meter, if present ▪ Data reporting at individual station and aggregate level as appropriate, with proper flags for missing or corrupt data ▪ EVSE vendor customer service and willingness to respond to specific needs of the co-op
Program Design
▪ Member charge behavior ▪ EVSE electricity use and load shape ▪ Potential of charge control to shift peak load ▪ Potential of TOU pricing to shift load ▪ Economic benefits of increased sales and load shifting

Pilots offer co-ops the ability to test EVSE hardware and control platforms on a small scale and find a solution that meets their goals. Characteristics that are useful to investigate include the ease of installation, the quality of the network connection, accurate response to load control signals, and robust and useful data outputs. Asking participants for their feedback on their experience with the EVSE and features that are important to them can help co-ops make sure that EVSE equipment suits the needs of the members. Members in the CEPCI pilot, for example, said that a more intuitive app and a longer EVSE cord would improve usability.

Cooperatives interested in assistance in starting or expanding an existing EV pilot program are encouraged to contact NRECA's Business & Technology Strategies Department. Our Management Services and Consulting team is available to work with you to clearly define your unique needs and provide a proposal on how we can help you achieve your goals. The service is offered on a fee basis.

The data collected during a pilot provides valuable information for future program design. It can help co-ops understand member charging behavior, determine load management strategies that members are likely to accept, and estimate costs and benefits related to those strategies. We note, however, that pilots are generally small. EVSE usage patterns and load management benefits should continue to be updated as EV adoption increases in co-op territories. Co-ops can also combine forces, sharing results and learnings from their pilots with others, to broaden the impact of piloting and ensure that co-ops have the information they need to develop programs that reap the benefits of EVs.

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