

Drive EverGreen Electric Vehicle Incentive Pilot Program: Evaluation Report

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I. Executive Summary

Background

Sonoma Clean Power (SCP), the public electricity provider for Sonoma County, is dedicated to reducing greenhouse gas (GHG) emissions and providing customers with alternative energy options. Because vehicular transportation is a significant contributor to local energy consumption and GHG emissions, SCP launched a broad campaign to promote clean vehicle adoption called Drive EverGreen (DEG). One of the first elements of this effort was a pilot electric vehicle (EV) incentive program administered by the Center for Sustainable Energy (CSE) that ran during October 2016 to January 2017. This evaluation report summarizes the incentive program, evaluation activities and recommendations to inform future programs.

The pilot program reduced the cost of acquiring EVs by issuing certificates to applicants that they could redeem at two participating dealerships at the time of purchase or lease. Eligible vehicles included the BMW i3 (including the i3 with Range Extender, REx) and Nissan LEAF. SCP wanted to provide special support for clean mobility options among lower-income customers and thus provided two levels of incentives: \$5,000 for customers participating in California Alternate Rates for Energy (CARE) or Family Electric Rate Assistance (FERA) and \$2,500 for other applicants. In addition, SCP negotiated price discounts with participating dealers.

Outcomes

In total, 522 participants were approved for certificates and 206 (40%) redeemed incentives to purchase or lease an eligible vehicle. CARE/FERA participants were issued 108 certificates, 35 (32%) of which were redeemed. The majority (86%) of all redeemed certificates were applied to Nissan LEAF acquisitions. Nearly 83% of all incentivized vehicle acquisitions were leases.

Program Evaluation

SCP and CSE collaborated in developing questions to guide evaluation strategy. Table 2 provides a complete list of the selected evaluation questions and the primary data sources used to address each one. At the highest level, evaluation questions covered:

- What were the program's short-term impacts on EV adoption?
- What were the program's short-term impacts on EV awareness, the SCP brand, the free charger program and EverGreen?
- What were the program's short-term impacts on reductions in GHG emissions and gasoline use?
- What lessons were learned from the pilot administration of the incentive program, and how can the program be improved in the future?

Evaluation Results

Program evaluation activities included participant surveys, interviews with stakeholders, summary of lessons from other EV incentive programs and estimation of GHG emission reductions. Findings include:

- CARE/FERA participants were more likely to be renters of multi-unit housing with smaller households, were more likely to identify as female, were less likely to identify as white and had a lower average education level.
- Survey respondents who purchased or leased an eligible vehicle rated "reducing environmental impacts" and "increased energy independence" as their most important motivators.
- Out of 20 survey respondents who did not redeem their incentives but did purchase new vehicles, 16 adopted EVs.
- Survey respondents who did not acquire an EV or have plans to in the near future rated range anxiety and vehicle price as their most significant barriers.
- The most common reason survey respondents did not redeem certificates was limited vehicle choice. Other common responses included range concerns (17%), deciding to buy/wait for different EVs (17%), poor dealership experience (11%) and dealership out of inventory (9%).
- Respondents rated the incentives as very important to their decision to purchase or lease an eligible vehicle: 88% would not have adopted an EV without the program. However, they had difficulty distinguishing the different elements of the total incentive value.
- Approximately 181 EVs were added to Sonoma roads by the presence of the program.
- About 68% of survey respondents who redeemed incentives plan to get rid of one or more gasoline-fueled vehicles, while 31% plan to keep them or didn't have a gasoline vehicle. Most of these respondents (85%) will primarily use their EV.
- About 44% of survey respondents indicated they knew about EVs, but didn't know enough to make a decision about getting one prior to participating in the Drive EverGreen pilot.
- The AFLEET Tool estimated a displacement of 29,172 barrels of petroleum over the life of the incentivized vehicles. This equates to approximately 4.8 barrels saved for every \$100 in incentive funding and 142 barrels per incentivized vehicle.
- Estimates indicate that the operation of incentivized vehicles over their lifetime will reduce GHG emissions equivalent to 7,726 to 13,640 metric tons of CO₂, with an average reduction of 1.8 metric tons per \$100 of incentive funding spent.
- Survey respondents felt that more outreach was necessary to promote the program.
- Participating dealers and manufacturers expressed satisfaction with the program and a desire to participate or even scale up their involvement in future programs.

Recommendations

Recommendations, further detailed in the report, include:

- Clarify and clearly communicate the total cost reduction provided through the program.
- Include vehicles of other technology types and a wider variety of models.
- Consider additional program features to reach lower-income participants.

- Consider bundling future EV incentives with the EverGreen rate plan.
- Secure stable, long-term funding to support a longer-term program.
- Plan for a longer recruitment period for participating dealers and manufacturers.
- Scale up investments in training and resources for dealers.
- Harmonize timing and administration of vehicle and charging equipment incentives.
- Devote resources to a more sophisticated information technology platform.
- Allocate additional resources for outreach.
- Consider additional evaluation methods for assessing direct and spillover program effects.
- Use caution when comparing GHG emissions benefits to other programs.
- Incorporate strong evaluation components into future programs.

Additional details about the program, its outcomes and findings, and recommendations are provided in this report in order to inform SCP's future efforts to promote clean vehicles through the Drive EverGreen program.

II. Introduction

Sonoma Clean Power (SCP) is a public “community choice” electricity provider in Sonoma County. SCP aims to provide local, clean and affordable power to its customers while helping Sonoma County become “the epicenter of effective environmental business solutions.” Reducing greenhouse gas (GHG) emissions also is core to SCP’s mission. Transportation is the largest source of GHG emissions in Sonoma County and SCP has developed programs under the Drive EverGreen (DEG) campaign to reduce emissions and give customers more affordable, clean mobility options through a variety of programs and strategies.

As a part of this broader DEG initiative, SCP contracted with the Center for Sustainable Energy (CSE) to administer a pilot incentive program to support electric vehicle (EV) adoption in Sonoma County by reducing costs for local purchasers and lessees. This pilot provided an opportunity to explore how SCP can most effectively support EV adoption in Sonoma County. CSE also performed an evaluation of the pilot program to gather lessons learned and inform strategic direction for future efforts. This report describes the pilot EV incentive program, evaluation design and methodology, findings and recommendations for future program design and implementation.

Program Summary

As of September 30, 2016, an estimated 3,550 EVs¹ were on the road in Sonoma County, including plug-in hybrid electric vehicles (PHEVs), all-battery electric vehicles (BEVs) and fuel-cell electric vehicles (FCEVs). However, gasoline-fueled vehicles continue to be one of the largest sources of GHG emissions in the county.

One of the first initiatives under SCP’s Drive EverGreen campaign to promote clean mobility options was a pilot EV incentive program administered by CSE. SCP negotiated significant discounts from participating local vehicle dealers and manufacturers for eligible EVs acquired by program participants. In addition to reduced prices negotiated with participating dealers, SCP offered its customers an incentive of \$2,500 per vehicle, increased to \$5,000 for low-income customers enrolled in either the California Alternate Rates for Energy (CARE) or Family Electric Rate Assistance (FERA) programs. Eligible

¹ Estimated using Clean Vehicle Rebate Project (CVRP) rebate data and historical CVRP participation rates for Sonoma County (59% for PHEVs, 87% for BEVs, and 72% for FCEVs):

Rebate data: Center for Sustainable Energy (2016). California Air Resources Board Clean Vehicle Rebate Project, Rebate Statistics. Data last updated December 01, 2016. Retrieved December 7, 2016, from <https://cleanvehiclerebate.org/rebate-statistics>.

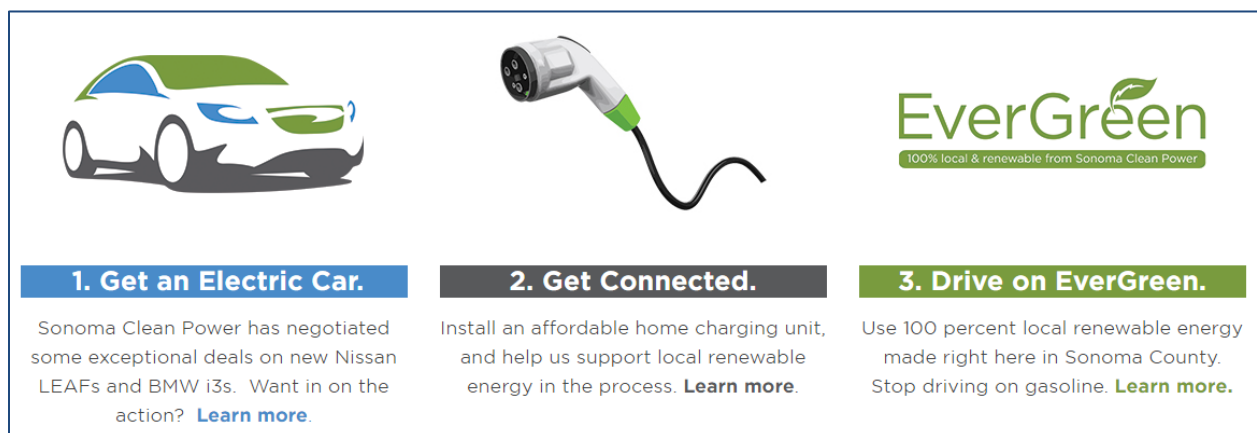
Participation rates: Williams, B., Anderson, J., Santulli, C., and Arreola, G. (2015). Clean Vehicle Rebate Project Participation Rates: The First Five Years (March 2010 – March 2015). Center for Sustainable Energy, San Diego CA, October. <https://cleanvehiclerebate.org/eng/content/cvrp-participation-thru-2015-03>

vehicles included the 2016 Nissan LEAF 2017 and the BMW i3 (including the i3 with Range Extender, or REX)² at two participating dealerships: Hansel BMW of Santa Rosa and Jim Bone Nissan of Santa Rosa.

The pilot program accepted applications from October 27, 2016, through January 5, 2017, with \$1.5 million allocated for incentive funding. Participating SCP customers were required to submit an application with supporting documents. These materials were reviewed by program staff, and, if approved, the applicant received a certificate for the vehicle incentive. This certificate was presented to a participating dealership at the time of purchase or lease for a point-of-sale discount.² Not all applicants approved for certificates chose to redeem them in a purchase or lease. In this report, such cases will be referred to as “unredeemed certificates” as opposed to “redeemed certificates” that were eventually used for a purchase or lease.

The certificate application process was completed through SCP’s website. The homepage for DEG also connected visitors to additional programs. The CleanCharge program launched alongside the vehicle incentive program to provide affordable EV chargers through the end of June 2017. Visitors also were offered the option to switch to 100% local, renewable energy by enrolling in SCP’s EverGreen energy plan. A screenshot from the website illustrating this side-by-side promotion appears in Figure 1.³

Figure 1. Drive EverGreen Home Page



Alongside the pilot EV incentive program, SCP also ran a concurrent program that offered free home charging units to all active customers that included an optional demand response (DR) component. The pilot charger program, started shortly after the EV incentive program, will continue through June 2017.

² Sonoma Clean Power (2016). Drive EverGreen terms and conditions. Retrieved from: <https://sonomacleanpower.org/drive-evergreen-terms-and-conditions-english/>.

³ Sonoma Clean Power (2016). Drive EverGreen. Retrieved from <http://sonomacleanpower.org/drive-evergreen/>.

Comparison to Other EV Incentive Programs

Many other EV incentive programs exist at the local, state and federal levels. Programs vary widely in their design and implementation. Table 1 displays some of the elements of EV incentive program design and how SCP's program compares to alternative options.

Table 1. EV incentive program design elements

| Program Design Elements | DEG Pilot EV Incentive Program | Alternative Designs |
|---|---|--|
| Delivery mechanism | Voucher | Rebate, tax incentive (one time or recurring), fee exemption, toll waivers/discounts |
| Time of delivery | Point of sale | After sale, during tax filing |
| Incentive value levels | \$2,500 for non-CARE/FERA customers, \$5,000 for CARE/FERA customers | Incentive values vary widely from a few hundred dollars to \$10,000+, with tiered levels based on vehicle type, range or battery capacity, applicant type (e.g., public fleet, business, individual), new/used vehicle status, participant geography, income level |
| Participant eligibility criteria | SCP customers | Geographic restrictions, income-based restrictions, ownership period requirements, vehicle operation requirements |
| Vehicle eligibility | Limited to two models at two participating dealerships | MSRP caps, vehicle technology restrictions, battery capacity restrictions, emissions rating requirements |
| Dealership involvement | Submit vouchers and receive reimbursement | No involvement, incentive application submission and completion |
| Leveraged parallel incentives | Manufacturer and dealer discounts and copromoted incentives for consumer charging equipment | Incentives for dealership staff, beneficial electricity rates |

Pilot Program Goals

The goals of the Drive EverGreen initiative and any future iterations of the EV incentive program may continue to evolve over time as more data and lessons learned are developed on how to best support clean transportation in Sonoma County. The initial goals of the pilot program were documented as the following.

- **Reductions in greenhouse gas emissions from transportation in Sonoma County through fuel switching**
- **Consumer participation in smart charging and demand response programs**
- **Consumer familiarity with SCP products**

Program activities and the above objectives are intended to contribute to the achievement of SCP's long-term goals of 10,000 EVs on the road in Sonoma County by 2020 and 100,000 EVs by the end of 2030. These targeted EV deployment levels support California's goal of a 50% reduction in gasoline use by 2030,⁴ an ambitious goal given the more than 300,000 automobiles registered in Sonoma County.⁵ Thus, DEG was developed with a long-term vision of a thriving EV market, clean air for Sonoma County and a community of EVs powered by local, reliable, renewable energy.

Evaluation Background

For the initial ten-week, \$1.5 million pilot stage of the incentive program, the focus of evaluation efforts was on gathering lessons learned to inform the design and administration of the DEG initiative in the future. Additionally, short-term outcomes were assessed to indicate if the program was functioning as envisioned. The evaluation focused on two primary data sources – application data and survey data – that were supplemented with additional quantitative and qualitative sources as described. The pilot evaluation activities focused on five primary areas:

1. Awareness
 - Sonoma Clean Power as a trusted brand
 - EVs in general
 - Free charger program
 - SCP's EverGreen energy plan
2. EV adoption process
 - Enablers and motivators
 - Influence of the incentive and dealer discounts
 - Total program impact on adoption
3. GHG reduction benefits
 - Conversion from gasoline vehicles to EVs
4. Lessons learned and opportunities for program improvement
5. Differences and lessons learned around serving CARE/FERA participants

The evaluation was guided by more specific evaluation questions, which appear in Table 2 along with the primary data sources used to address them. Primary data sources are described in more detail in the Methodology section. Development of the evaluation plan began close to the time of program launch. Data collection occurred during program administration (application data) and immediately following closure of the program (survey data).

⁴ Sonoma Clean Power (2015). Request for proposals: Electric vehicle program design & implementation. Retrieved from <https://sonomacleanpower.org/wp-content/uploads/2013/12/SCP-EV-Program-Design-RFP.pdf>.

⁵ California Department of Motor Vehicles (2016). Estimated vehicles registered by county. Retrieved from https://www.dmv.ca.gov/portal/wcm/connect/add5eb07-c676-40b4-98b5-8011b059260a/est_fees_pd_by_county.pdf?MOD=AJPERES.

Table 2. Evaluation questions and data sources

| Evaluation Question | Primary Data Sources |
|--|--|
| 1. What were the program’s short-term impacts on EV adoption? | |
| 1a. How many vehicles were incentivized? How many incentivized vehicles went to low-income households? How can program participants be described? | Application data, Survey data |
| 1b. What led applicants to successfully convert to EVs? What kept nonparticipants from adopting an EV? | Survey data, Dealer interviews |
| 1c. How important was the incentive in participants’ decision/ability to adopt an EV? How important were the dealer discounts? | Survey data, Dealer interviews |
| 1d. What impact did this program have in terms of increasing electric vehicle ownership in Sonoma County? | Application data, Survey data, Dealer interviews |
| 1e. How did outreach efforts stimulate certificate applications? | Application data |
| 2. What were the program’s short-term impacts on EV awareness, the SCP brand, the free charger program and EverGreen? | |
| 2a. How many participants learned about EVs as a result of the program? What other impacts did the program have on EV awareness? | Survey data |
| 2b. How many participants learned about SCP as a result of the program? | Survey data |
| 2c. What impact did this program have on the SCP brand? | Survey data |
| 2d. How many participants learned about the free charger program as a result of Drive EverGreen? How many participants received or plan to receive a free charger? | Survey data |
| 2e. How many participants learned about SCP’s EverGreen premium product as a result of Drive EverGreen? How many participants enrolled or plan to enroll in EverGreen? | Survey data |
| 2f. How did these outcomes differ for low-income participants? | Survey data |
| 3. What were the program’s short-term impacts on reductions in GHG emissions and gasoline use? | |
| 3a. What reduction in GHG emissions was achieved as a result of the program? | Application, Survey, Emissions, and registration data |
| 3b. How would participants’ transportation choices have differed without the incentive program? How many participants no longer own a gasoline vehicle? What do program participants do with displaced vehicles? | Survey data |
| 3c. To what extent did GHG emissions reductions benefit lower-income communities? To what extent did they benefit Sonoma County? | Application data, Survey data, Emissions/registration data |
| 4. What lessons were learned from the pilot administration of the incentive program, and how can the program be improved in the future? | |
| 4. What lessons were learned from the pilot administration of the incentive program, and how can the program be improved in the future? | Application data, Survey data, Dealer interviews, Administrator feedback |

III. Methodology

The evaluation team used a mixed-methods approach, collecting quantitative and qualitative data, with an emphasis placed on quantitative data. The following section details the data sources used, collection methods and analysis procedures.

Application Data

In total, 557 certificates were approved and 206 (37%) were redeemed to purchase or lease an eligible vehicle. Data from approved applications during program administration (October 27, 2016, through January 5, 2017) were used to address multiple evaluation questions. Most participants applied for only one certificate, but 33 participants applied and were approved for two certificates, and one participant applied and was approved for three certificates. In all cases, these participants redeemed none or only one of their certificates. Application data included the following information.

- Applicant address and contact information
- Applicant's CARE/FERA status
- Whether the applicant redeemed their incentive certificate
- Date of application
- Whether the vehicle was purchased or leased
- Purchase/lease date
- Lease term if applicable
- Amount of incentive and discounts
- Vehicle model

Survey Data

To collect data from individuals who were approved for an EV incentive certificate, a voluntary survey was developed that covered the following topics.

- Importance of the Drive EverGreen (DEG) incentive and discounts
- EV driving behavior
- Motivations to adopt an EV
- Perceptions and awareness of SCP and EVs
- Participation in CleanCharge
- Participation in EverGreen power plan
- Barriers faced by participants who did not redeem certificates
- Demographics and household characteristics

All survey content was developed to address specific evaluation questions. A copy of the survey appears in Appendix A.

The target population for the survey included all 522 participants who applied and were approved for an EV incentive certificate, regardless of whether they redeemed the certificate to purchase or lease a vehicle. The survey included logic to only display relevant questions to respondents based on whether they redeemed the incentive certificate.

The survey was administered online through SurveyGizmo. Invitations were distributed via email on February 14, 2017, and reminder emails were sent on February 20, 2017, and February 28, 2017. The survey remained open for a total of 20 days. As an incentive for participation, all respondents had the option to enter a drawing to receive one of five \$50 Amazon.com gift cards. A summary of usable responses received appears in Table 3.

Table 3. Summary of survey invitations and responses

| Applicant Type | Number of Invitations Sent | Number of Responses Received | Response Rate |
|------------------------|----------------------------|------------------------------|---------------|
| Redeemed Certificate | 206 | 120 | 58% |
| Unredeemed Certificate | 316 | 107 | 34% |
| Total | 522 | 227 | 43% |

Survey analysis was completed in Stata and consisted of four primary steps.

1. Cleaning and preparation of data for analysis

Survey data went through a multistep quality control procedure to ensure that data were exported correctly from SurveyGizmo. Survey data were appended to application data using an applicant ID to link individual information across the two sources.

2. Representativeness of survey data

The survey data were examined to ensure that the survey responses were representative of all approved certificate applicants. The dimensions examined were the proportion of redeemed and unredeemed certificates, CARE/FERA rate eligibility and geographic distribution measured at the city and ZIP code levels. The analysis included a series of Pearson chi-square tests to ensure the distributions of these characteristics were independent of whether the individual took the survey.

Individuals who redeemed incentive certificates were twice as likely to complete the survey. No other statistically significant associations were found between participant characteristics and survey participation. Table 4 shows the p-values⁶ obtained from the Pearson’s chi-square tests conducted to compare the respondent sample to the approved certificate population.

⁶ The authors use a 95% confidence interval to determine statistical significance. Thus, in chi-square tests, a p-value less than 0.05 indicates statistically significant association.

Table 4. Survey sample vs. total program population

| Dimension | P-value |
|-------------------------------|---------|
| Certificate redemption status | 0.000 |
| CARE/FERA status | 0.381 |
| City | 0.623 |
| ZIP code | 0.513 |

To further address representativeness, redeemed survey respondents were compared against the population of all redeemed program participants. These responses were especially important for use in GHG calculations. The dimensions examined were: vehicles purchased and leased, vehicle model, CARE/FERA rate eligibility and geographic distribution measured at the city and ZIP code levels. Table 5 shows the p-values obtained from the Pearson’s chi-square tests conducted to compare the redeemed respondent sample to the redeemed certificate population.

Table 5. Redeemed survey responses vs. redeemed program population

| Dimension | P-value |
|-------------------|---------|
| Purchase vs lease | 0.649 |
| Vehicle model | 0.085 |
| CARE/FERA | 0.073 |
| City | 0.952 |
| ZIP code | 0.933 |

These findings, along with the large portion of the population captured in the sample, suggest that the survey samples are reasonably representative of program participants, and the survey data can be used without adjusting results through post-survey weights.

3. Descriptive statistics

Where applicable, descriptive statistics (frequencies, means, etc.) were calculated for all survey questions. Results were also split by two subgroups: redeemed vs. unredeemed certificates and CARE/FERA customers vs. non-CARE/FERA customers.

4. Tests of differences between groups

Where relevant to the evaluation questions, differences between groups (redeemed vs. unredeemed certificates and CARE/FERA customers vs. non-CARE/FERA customers) were tested for statistical significance using t-tests.

GHG Calculations

GHG emissions reductions resulting from the DEG EV incentive pilot program were estimated using the Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) Tool,⁷ based on assumptions derived from application and survey data. Additionally, GHG emissions reductions were estimated based on the methodology used by the California Air Resources Board (CARB) to estimate emissions reductions for Low Carbon Transportation Investments and the Air Quality Improvement Program (AQIP).⁸

GHG Estimates based on AFLEET

The AFLEET Tool provides annualized estimates of GHG and air pollutant emissions for a specified “fleet” of vehicles input by the user. To estimate emissions reductions, two fleets of vehicles were entered for analysis: 1) the fleet of DEG-incentivized vehicles on the road at the end of the EV incentive pilot (hereafter called Adopted Fleet), and 2) the fleet of vehicles that *would have been* on the road had the EV incentive pilot not existed (hereafter called the Alternate Fleet). The difference between these two fleets provides the total annual GHG emissions reductions attributable to the pilot program. The primary steps in the analysis were as follows.

1. For each survey respondent, assign Alternate Fleet vehicle profile
2. For each incentive certificate recipient, assign Adopted Fleet vehicle profile
3. Use AFLEET to calculate annual emissions of each fleet
4. Scale up the emissions calculations for the Alternate Fleet to represent all participants⁹
5. Calculate emissions difference between the two fleets

The assigned vehicle profiles specified fuel type and the annual fuel usage of the vehicle, based on anticipated vehicle miles traveled (VMT) reported by participants and fuel economy¹⁰ estimates. Table 6 specifies how those values were assigned for the Alternate Fleet and the Adopted Fleet.

⁷ The AFLEET Tool was developed by Argonne National Laboratory for the Department of Energy’s Clean Cities Program. Based on assumptions input by the user, it produces estimates of petroleum use and greenhouse gas emissions for a fleet of vehicles. It uses data from Argonne’s Greenhouse gases, Regulated Emissions and Energy use in Transportation (GREET) fuel-cycle model and the Environmental Protection Agency’s Motor Vehicle Emission Simulator (MOVES).

⁸ The 2016-2017 AQIP Funding Plan provides a description of their quantification methodology for emissions reduction calculations at: https://www.arb.ca.gov/msprog/aqip/fundplan/proposed_fy16-17_fundingplan_appa.pdf.

⁹ Because not all participants responded to the survey, Alternate Fleet emissions estimates had to be scaled up to represent the entire program. To do this, emissions estimates were multiplied by the inverse of the survey response rate (1/0.53).

¹⁰ All fuel economy estimates were derived from EPA Fuel Economy data provided at <https://www.fueleconomy.gov>.

Table 6. Vehicle characteristic assignment

| Vehicle Characteristic | Adopted Fleet Source | Alternate Fleet Source |
|----------------------------|---|---|
| Fuel type | Application data | Based on response to survey question 11 and 12 (Appendix A) |
| Annual mileage | Calculated from response to survey question 13 (Appendix A) | |
| Fuel economy ¹² | Estimated for model specified in application | Estimated based on response to survey question 11 and 12 (Appendix A) |

The Alternate Fleet was derived from responses to survey questions 11 and 12 (see Appendix A) that asked respondents to indicate what type of vehicle they would be using had they not participated in the DEG Incentive Program. Each survey respondent was assigned an assumed fuel economy as delineated in Table 7, based on the fuel economy achieved by vehicle models of that type for model year 2017. Of survey respondents who said they would not have purchased a new vehicle without the incentive, 69% previously owned a nonhybrid gasoline or diesel vehicle and 59% of those vehicles were model year 2006 or older. Using model year 2017 in all cases is a simplification that may lead to slight underestimation of emissions for older Alternate Fleet vehicles.

Table 7. Assumed fuel economy by survey responses

| Response Selected | Fuel Economy Assumed ¹² |
|--|--|
| Purchased/leased the same all-battery EV I got through Drive EverGreen | 30 kWh/100 mi |
| Purchased/leased a different all-battery EV | 33 kWh/100 mi |
| Purchased/leased a plug-in hybrid EV | Electric mode (40%):45 kWh/100 mi Gasoline mode (60%): 33 MPG |
| Purchased/leased a conventional hybrid | 36 MPG |
| Purchased/leased a nonhybrid gasoline-fueled vehicle | 23 MPG |
| Continued using a vehicle I already owned | Varied by respondent; based on vehicle and model year specified in survey question 12 (Appendix A) |
| Other | Varied by respondent, not included in the GHG calculations (n=4) |

The cost of achieving these emissions reductions was then calculated based on total DEG EV incentive pilot program expenditure (SCP incentive dollars). The emissions saved per dollars spent over for the assumed life of the vehicles (15 years)¹¹, was calculated as:

$$\frac{\text{Estimated annual metric tons of emissions reductions} * 15 \text{ (years)}}{\text{Total SCP incentive dollars}}$$

¹¹ Aligns with assumption specified in the emissions reduction methodology in the California Air Resources Board's 2016-2017 Funding Plan for Air Quality Improvement Programs, including clean vehicle incentive programs.

For ease of comparison, the emissions reductions per dollar spent were represented as emissions reductions per \$100 spent. All emissions reductions presented in the results are for the estimated lifetime of the vehicles.

Several assumptions were made to facilitate GHG reduction estimates. These assumptions are delineated in Table 8, along with sensitivity tests performed for each assumption.

Table 8. Summary of GHG estimate sensitivity testing

| Assumption | Sensitivity Test Performed |
|---|--|
| Survey respondents provide accurate estimates of the number of miles they will be driving their incentivized EVs AND their mileage would be the same had the program not existed | ±10% annual VMT per vehicle in the Adopted and Alternate Fleet |
| Fuel economies assigned for the Alternate Fleet accurately reflect the fuel economy that would have been achieved in program’s absence | ±10% fuel economy per vehicle in the Alternate Fleet |
| Survey responses accurately reflect all certificate recipients | ±5% total GHG emissions for Alternate Fleet |
| BMW i3 REs are operated in 100% electric mode in the Adopted Fleet | -5pp electric mode per vehicle |
| PHEVs are operated in 40% electric mode in the Alternate Fleet ¹² | ±10pp electric mode per vehicle |
| Electricity Portfolio is properly represented by the AFLEET <i>Western Electricity Coordinating Council</i> input (33.8% renewable, 32.5% natural gas, 25.4% coal, 7.9% nuclear power, 0.2% biomass, 0.2% residual oil) | Adjust electricity portfolio to 100% renewable energy |

GHG Estimates based on CARB Methodology¹³

The methodology used by CARB for estimating GHG emissions reductions from AQIP investments uses the following calculation.

$$\text{Emissions Reductions} = \text{Annual VMT} \times (\text{Emissions Factor for new conventional vehicle} - \text{Emissions Factor for advanced technology vehicle})$$

The emissions factor used by CARB for a light-duty BEV is 120 gCO₂e/mi and 382 gCO₂e/mi for a 2016 light-duty gasoline vehicle. The assumptions that contributed to this estimate are specified in the 2016-2017 AQIP Funding Plan. CARB protocol compares the advanced clean vehicle to a new, conventional

¹²

Aligns with assumption specified in the emissions reduction methodology in the California Air Resources Board’s 2016-2017 Funding Plan for Air Quality Improvement Programs, including clean vehicle incentive programs.

¹³ The 2016-2017 AQIP Funding Plan provides a description of their quantification methodology for emissions reduction calculations at: https://www.arb.ca.gov/msprog/aqip/fundplan/proposed_fy16-17_fundingplan_appa.pdf.

baseline vehicle, i.e., a 2016 gasoline vehicle. CARB assumes a constant annual VMT (11,059 miles) for all vehicles.

Additional Information Sources

Additional qualitative data were obtained from two primary sources: 1) interviews with dealership and manufacturer employees and 2) documentation and comments provided by program staff. This information was primarily used to provide context to reported findings and referenced as relevant to the evaluation topics.

The interviews with staff from participating vehicle dealerships and manufacturers captured the dealer/manufacturer experience and dealer/manufacturer feedback on program successes, challenges and recommendations for future program design. The interview protocol (in Appendix C) specified the questions to be covered in a total of four interviews conducted via phone – one each with a primary contact at each of the two participating dealerships and each of the two participating manufacturers. Interviews were not recorded or transcribed, but two staff members administered each interview – one conducting the interview and one recording detailed notes. Interview themes were summarized by evaluation question.

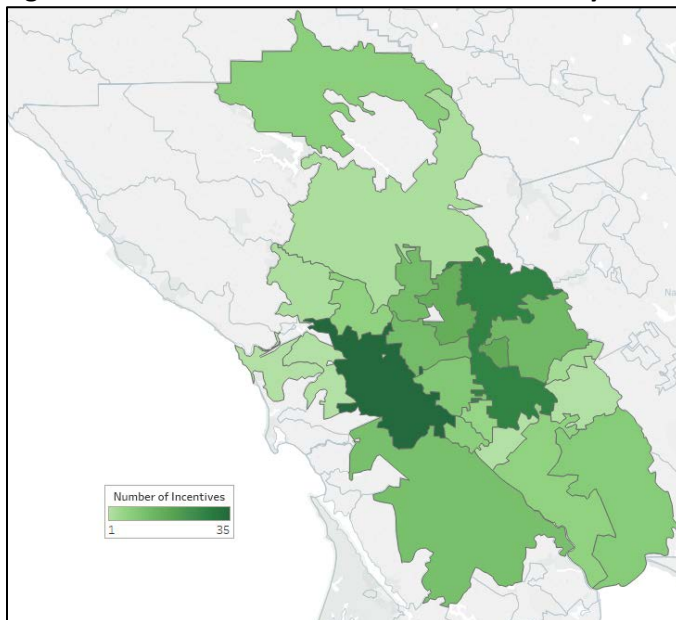
IV. Results

What were the program’s short-term impacts on EV adoption?

How many vehicles were incentivized? How many incentivized vehicles went to CARE/FERA households? How can program participants be described?

Of the 557 certificates issued, 206 (37%) were redeemed for purchases or leases. The majority (86%) of redeemed certificates went to Nissan LEAFs, with the remaining 14% going to BMW i3 vehicles. Nearly 83% of the incentivized vehicles were leased. Figure 2 shows the geographic distribution of redeemed certificates across Sonoma County by ZIP code.

Figure 2. Distribution of redeemed certificates by ZIP code

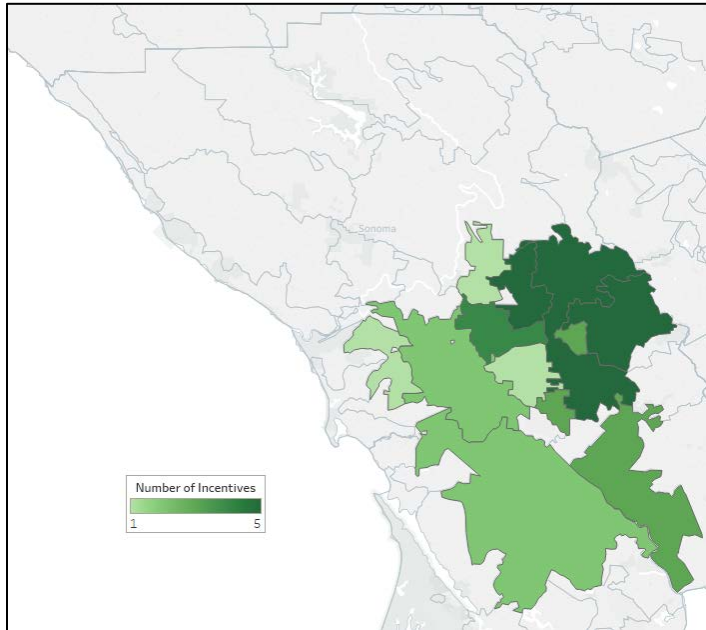


CARE/FERA participants were issued 108 certificates, 35 (17%) of which were redeemed for incentives. All 35 incentives were for Nissan LEAF vehicles, and 34 (97%) of those LEAF vehicles were leased. Most CARE/FERA applications were received in December 2016, which coincided with a targeted mailed notice to active SCP CARE/FERA customers. Table 9 shows a summary of incentives by CARE/FERA status and vehicle model. Figure 3 shows the geographic distribution of CARE/FERA participants by ZIP code.

Table 9. Incentives by CARE/FERA status and vehicle model

| Vehicle | Non-CARE/FERA Participants | CARE/FERA Participants |
|-------------|----------------------------|------------------------|
| BMW i3 | 28 | 0 |
| Nissan LEAF | 143 | 35 |

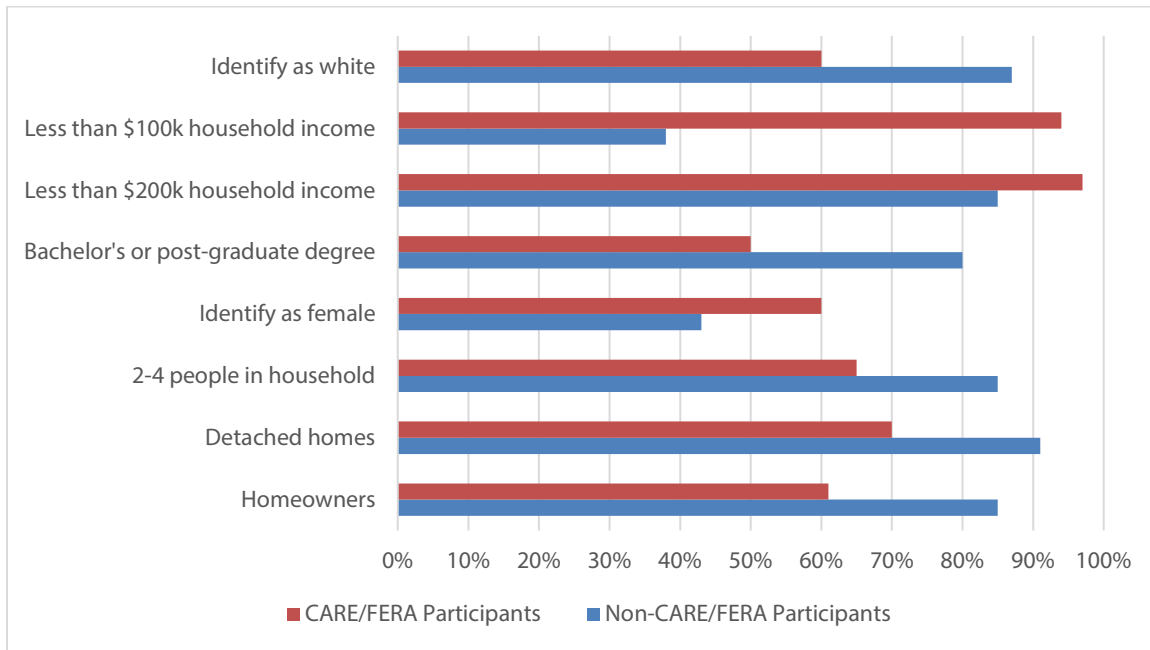
Figure 3. Distribution of CARE/FERA redeemed incentives by ZIP code



Participants who redeemed a certificate and those who did not showed no statistically significant differences by sex, income, housing ownership, age or number of occupants in the household. One significant difference was found in participant housing type. Participants who redeemed certificates were more likely to live in detached homes: 92% of respondents who redeemed a certificate lived in a detached house, compared to 83% for those who did not redeem a certificate ($p=0.029$).

However, many differences between CARE/FERA participants and non-CARE/FERA participants were found to be statistically significant. In addition to having lower income levels compared to non-CARE/FERA participants, Figure 4 indicates CARE/FERA participants were more likely to be renters of multi-unit housing with smaller households, were more likely to identify as female, were less likely to identify as white and had a lower education level.

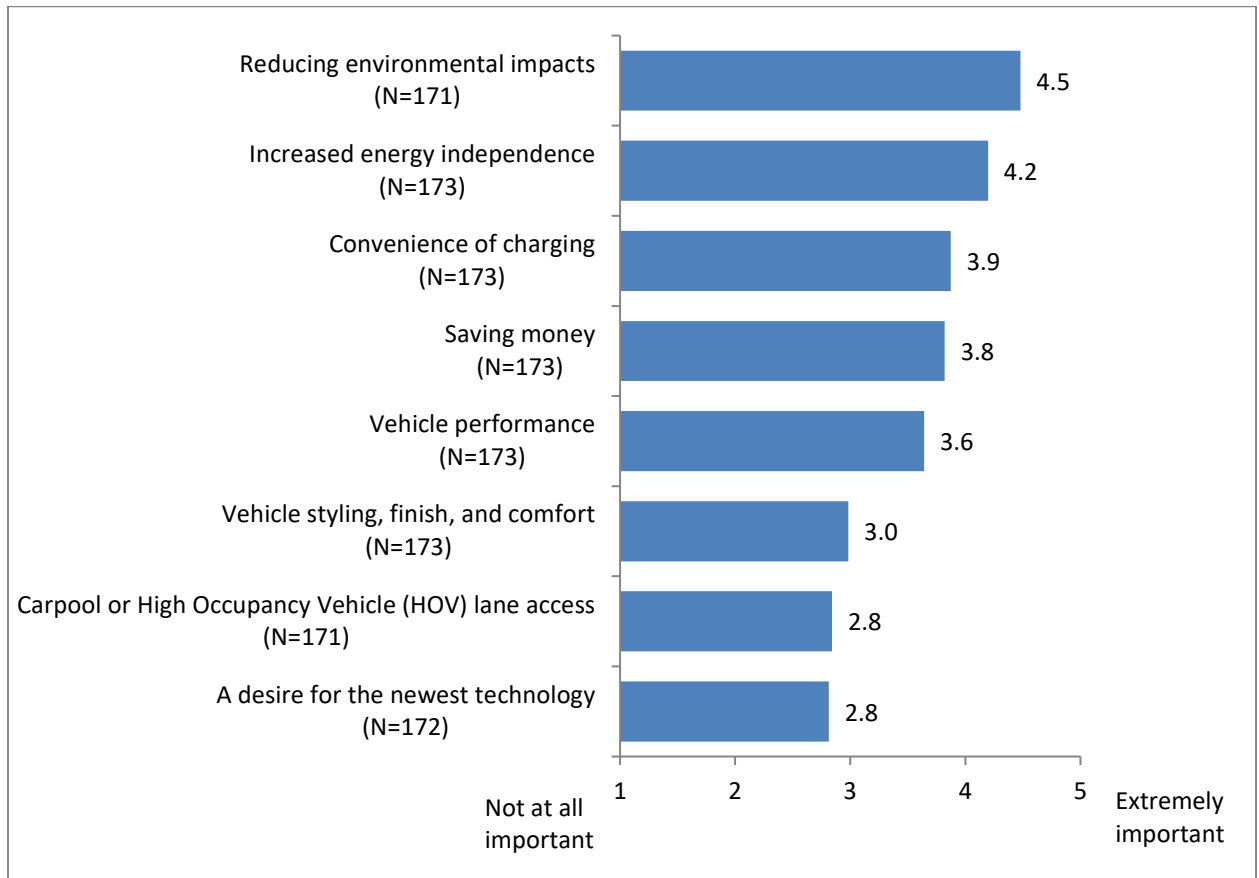
Figure 4. Demographic and housing characteristics of CARE/FERA participants vs. all other participants



What led applicants to successfully convert to EVs? What kept participants from adopting an EV?

Participants who purchased or leased an EV, or said they were most likely to purchase one in the future, were asked to rate the importance of several factors in their decision to adopt the technology. Figure 5 displays responses that show reducing environmental impacts had the highest average importance of all motivations for adopting an EV. Increased energy independence also was a highly rated motivation.

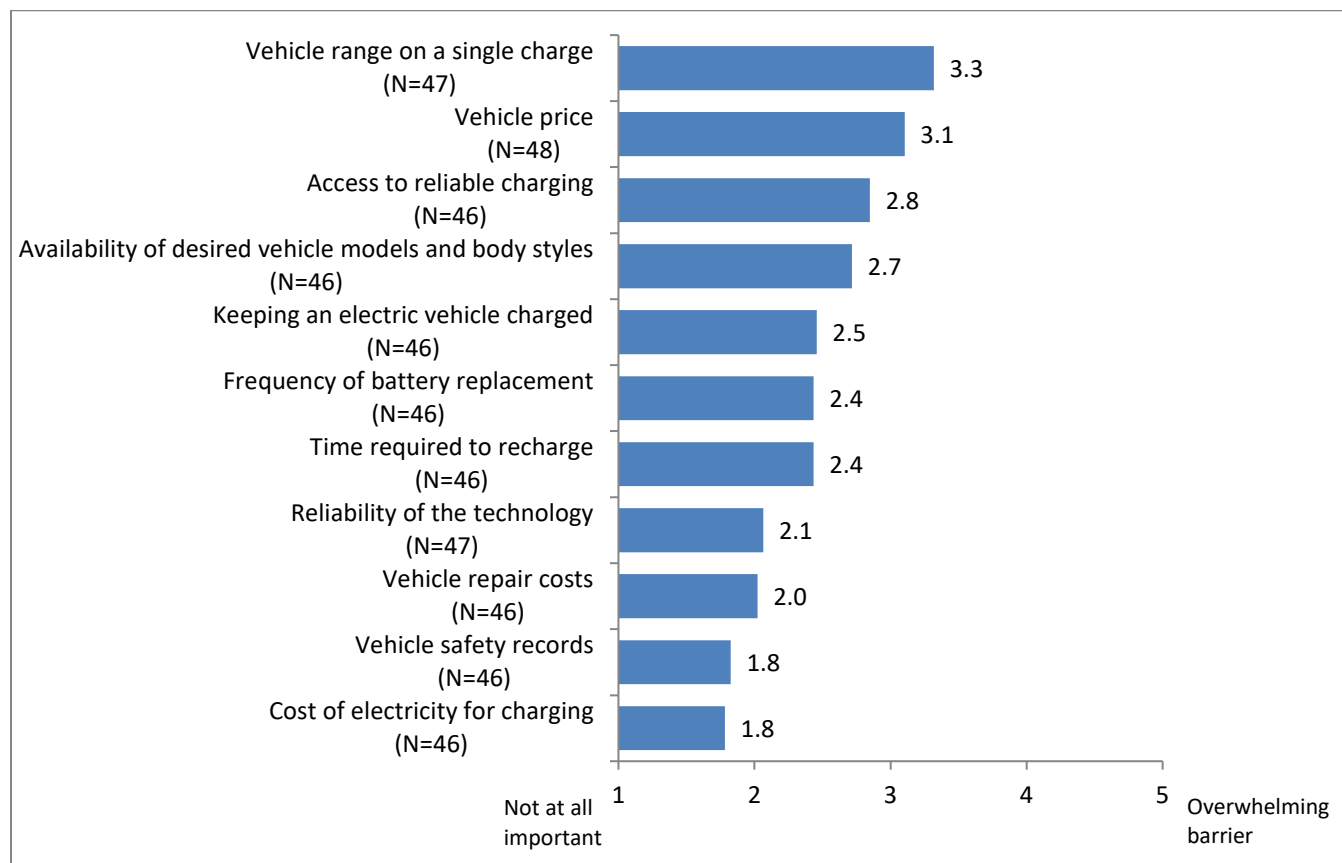
Figure 5. Rated importance of motivations for adoption among respondents who adopted an EV or were likely to adopt one in the future



Out of 20 survey respondents who did not redeem their incentives but did purchase new vehicles, 16 adopted EVs. There were no statistically significant differences between these participants and those who redeemed an incentive on an eligible vehicle at the 95% confidence interval. There were some marginal differences in the rated importance of vehicle styling, finish and comfort at the 90% confidence interval. Respondents who redeemed certificates gave vehicle styling an average importance rating of 2.9, as opposed to 3.2 among respondents with unredeemed certificates ($p=0.06$). A possible explanation for this difference is that those who did not redeem a certificate but adopted an EV anyway did not participate because the vehicle that appealed to them was not eligible for an incentive.

Survey respondents who did not purchase or lease electric vehicles or have plans to in the near future were asked to rate the significance of a list of barriers to adoption. Figure 6 lists the average severity of barriers that impeded adoption of an EV rated by these respondents. The most important concerns were range anxiety and vehicle price. Access to reliable charging and desired vehicle availability were also relatively highly rated concerns. Vehicle safety records and the cost of electricity for charging were, on average, not considered barriers.

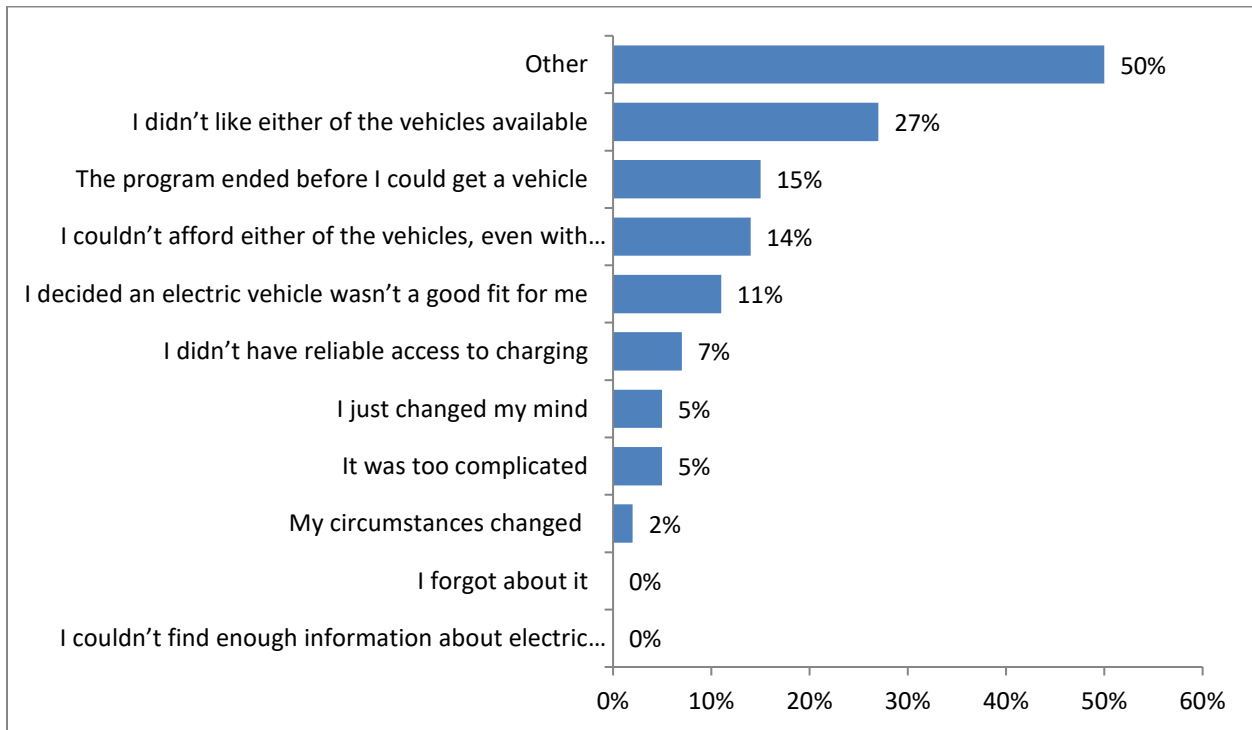
Figure 6. Rated severity of selected barriers to adoption among respondents who did not purchase or lease an electric vehicle or have no plans to in the near future



Why did participants approved for a certificate not redeem their certificate for a purchase or lease?

Survey respondents who did not redeem their certificate were asked to select the primary reason they did not redeem it. Figure 7 shows why some participants did not redeem their certificate. At 27%, the most common reason given was that they did not like either of the eligible vehicles available. This was supported in the open feedback portion of the survey as well. The most common theme was a suggestion to offer a wider selection of EVs to choose from. Respondents noted that including more model options would alleviate concerns about included models’ range and price, which were also indicated to be causes of nonredemption. Many of those who chose “Other” attributed their nonredemption to range concerns with the included models (17%), as well as deciding to buy/wait for different EVs (17%), poor dealership experience (11%) and dealership out of inventory (9%).

Figure 7. Reasons for not redeeming an approved certificate (N=107)



How important was the incentive in participants' decision/ability to adopt an EV? How important were the dealer discounts?

Survey respondents who redeemed a certificate were asked to rate the importance of the various discounts and incentives they received through the program. Respondents reported that all the major financial incentives available to Drive EverGreen (DEG) participants were very important in their decision and/or ability to adopt an EV. The DEG incentive (4.5), state vehicle rebate (4.4), federal tax incentive (4.4) and DEG dealer/manufacturer discounts (4.4) all received high average importance ratings on a five-point scale.

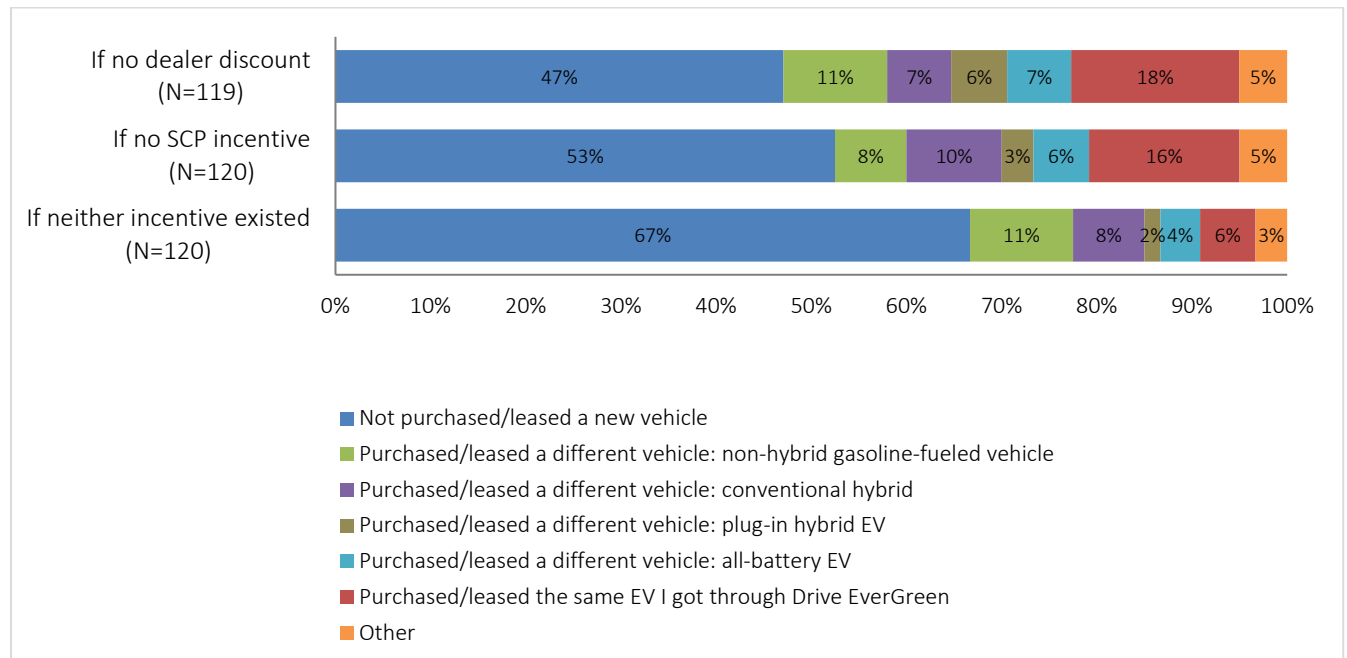
Some survey respondents indicated they had difficulty distinguishing between the different incentives provided through the program, which may explain some of the similarity in importance rating, despite differences in incentive amounts and delivery mechanisms.

What impact did this program have in terms of increasing electric vehicle ownership in Sonoma County?

Participants who redeemed certificates to purchase or lease an EV were asked a series of counterfactual questions to describe what they would have done had various aspects of the incentive not been available. Most respondents indicated that without the program they would not have purchased or leased a new vehicle. Figure 8 shows the distribution of responses. The fleet of vehicles that would have

been on the road without the incentive program will be discussed in more detail in the section on GHG reductions.

Figure 8. What participants would have done without the incentives



“Free-ridership” is a common concern among agencies offering incentives for the adoption of novel technology. It is important to contextualize free-ridership with both the goals of the program and the value of the program’s outputs. Significant levels of free-ridership may be acceptable for some programs if their output is deemed valuable enough. In the case of the DEG EV incentive program, free-ridership could be defined as high levels of program participation among participants who would have adopted an EV even if the incentive did not exist. Among respondents who redeemed a certificate, roughly 86% reported they would not have adopted an EV without the incentive and dealer discount. Applied to the number of incentivized vehicles, this means that approximately 181 EVs were added to Sonoma roads by the presence of the program. Only about 12% of respondents would have purchased an EV without the program.

This result is markedly different from other major clean vehicle incentive programs. Of California’s Clean Vehicle Rebate Project participants who adopted their vehicle between September 2012 and May 2015 and responded to a voluntary survey, 46% indicated they would not have adopted their vehicle without the rebate.¹⁴ In the Massachusetts Offers Rebates for Electric Vehicles program’s first year, 50% of participants said they would not have adopted with the rebate.¹⁵ Possible reasons for this disparity include the size of the incentive offered (there is evidence to suggest self-reported incentive importance

¹⁴ Center for Sustainable Energy (2016). Clean Vehicle Rebate Project Consumer Survey 2013-2015 (Weighted).

¹⁵ Center for Sustainable Energy (2015). MOR-EV: Year One Final Report. Retrieved from https://mor-ev.org/sites/default/files/docs/MOR-EV_Year_One_Report.pdf on 4/12/2017.

is related to the size of the incentive)¹⁶, high participation among lower-income customers and the exclusion of more expensive vehicles from the program (e.g., Tesla). Though there is no consensus on definitions or acceptable levels of free-ridership in clean vehicle incentive programs, the DEG incentive program achieved dramatically lower levels of free-ridership.

Data collected during the program were insufficient to meaningfully examine potential market spillover effects from the program. Isolating a program's spillover effect from other factors in a dynamic market is challenging, but future research and programs can seek to examine spillover using clean vehicle sales data, surveys of nonparticipants who were reached by the program via marketing efforts, or follow-up interviews with participating dealerships. Existing research suggests that the "neighbor effect" and social interactions between prior adopters and prospective car buyers may have an impact on the decision to adopt a clean vehicle.¹⁷

How would participants' transportation choices have differed without the incentive program? How many participants no longer own a gasoline vehicle? What do program participants do with displaced vehicles?

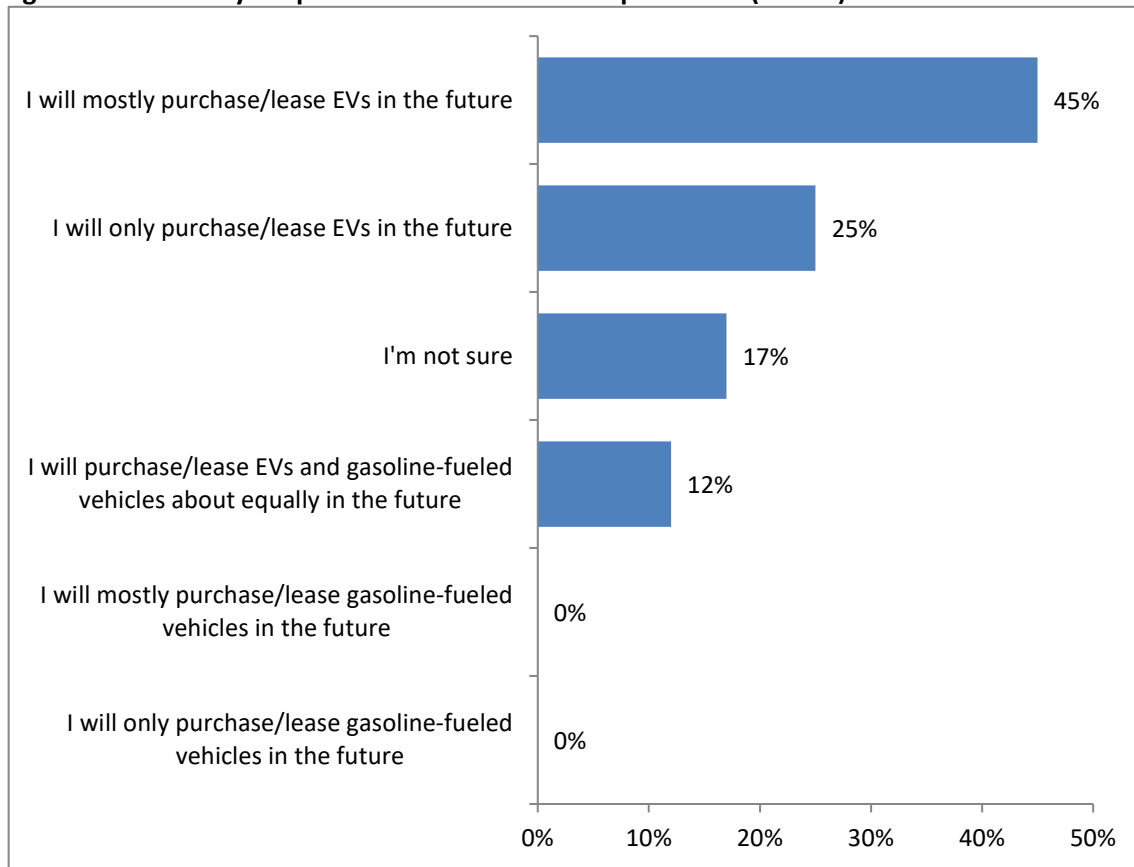
As shown in Figure 8, most survey respondents who redeemed an incentive indicated that without the program they would not have purchased or leased a new vehicle. These respondents were asked to describe the vehicle they previously owned and would continue using. Of those respondents, 69% currently owned a nonhybrid gasoline or diesel vehicle, and of those vehicles, 54% were model year 2006 or older.

Both survey respondents who redeemed an incentive and those who did not were asked to describe their vehicle acquisition plans in the future. Figure 9 shows that a majority of respondents plan to only or mostly purchase/lease EVs in the future while no respondents plan to only or mostly purchase/lease gasoline-fueled vehicles in the future.

¹⁶ Sierzchula, W., Bakker, S., Kees, M., van Wee, B. (2013). The influence of financial incentives and other socio-economic factors on electric vehicle adoption. Delft University of Technology.

¹⁷ Maness, M. and Liu, Changzheng (2016). Social adoption of plug-in electric vehicles: modeling and policy review. Oak Ridge National Laboratory. Presentation (PDF): BECC Conference, October 20, 2016. Retrieved from http://beccconference.org/wp-content/uploads/2016/10/Maness_presentation.pdf on March 23, 2017.

Figure 9. What are your plans for future vehicle acquisitions? (N=225)



Do applicants who redeemed certificates plan to get rid of any gasoline-fueled vehicles from their household?

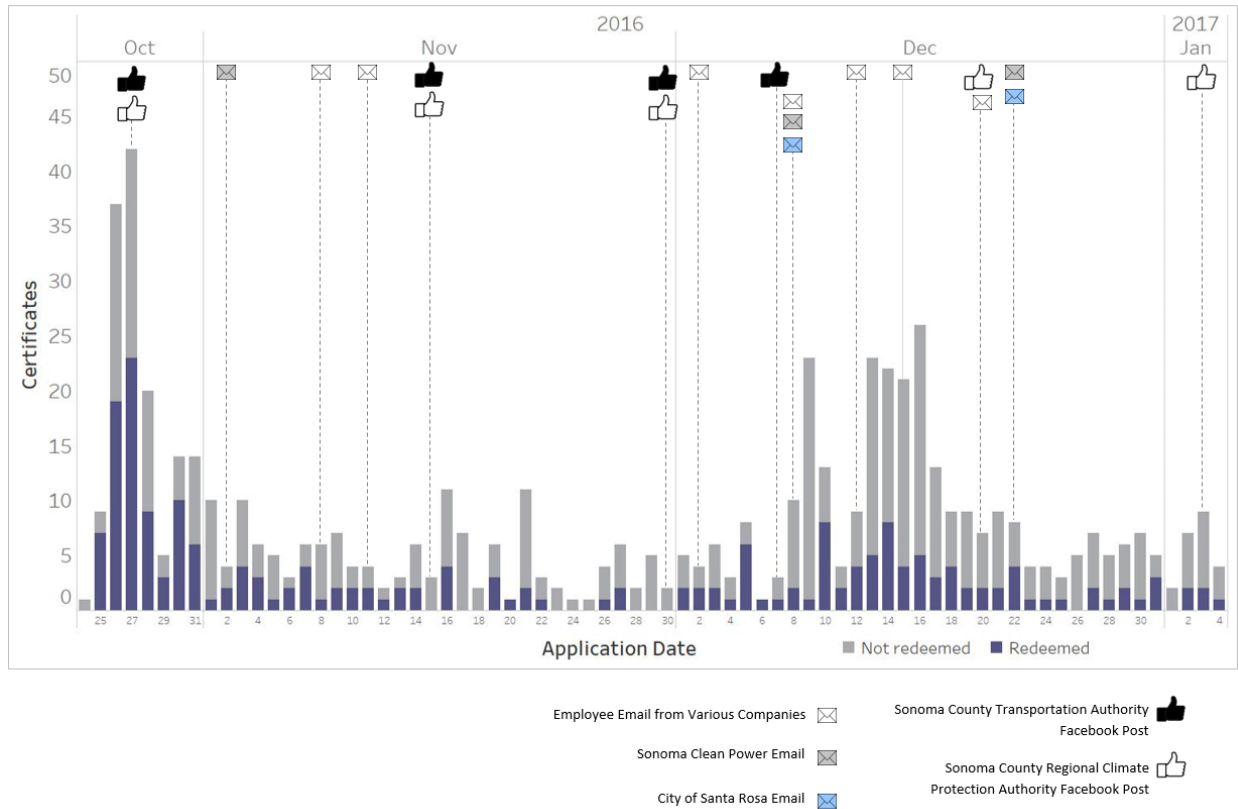
Survey respondents who redeemed incentives were asked whether they had plans to get rid of any gasoline-fueled vehicles from their household. Just over two-thirds (68%) of respondents plan to get rid of one or more gasoline-fueled vehicles, while 31% either plan to keep them or didn't have a gasoline vehicle. Respondents who plan to keep a gasoline vehicle were asked which vehicle will be their primary vehicle. Most respondents (85%) will primarily use their EV. Respondents who redeemed incentives also were asked how many gasoline-fueled vehicles they intend to have in the household six months in the future. Most respondents plan to have one to two gasoline-fueled vehicles in their household six months into the future and 15% plan not to have any.

How did outreach efforts stimulate certificate applications?

Program staff implemented several strategies to build awareness about the EV incentive program including email campaigns and social media posts. Referral codes were used to track the impact of these outreach efforts. Figure 10 provides a visual representation of applications over time with markers indicating when program outreach efforts occurred. The timing of application volume changes suggests

some email campaigns and Facebook posts may have had a significant impact. Of particular note are large increases in application volume following marketing efforts on December 8 and 12.

Figure 10. Certificate applications and marketing efforts



Email campaigns were a primary outreach method for the program. Twelve email campaigns were implemented, during which emails were sent to employees of government agencies and large private companies, as well as members of auto industry-focused organizations. For example, emails were sent to approximately 3,000 Sonoma County employees, resulting in 21 approved certificate applications and six incentivized vehicles. Table 10 below shows certificate redemption and CARE/FERA status by referral code among applicants who provided a referral code in their application.

Table 10. Summary of program marketing efforts

| Company/group | Date Sent | Estimated Distribution | Outreach Method | Total Referrals | CARE/FERA | non-CARE/FERA |
|-------------------------------------|---------------------|------------------------|-----------------|-----------------|-----------|---------------|
| County of Sonoma | 12/8/2016 | 3,000 | Email | 21 | 2 | 19 |
| City of Santa Rosa | 12/12/2016 | 1,200 | Email | 0 | 0 | 0 |
| Jackson Family Wines | 11/8/2016 | 640 | Email | 10 | 1 | 9 |
| North Bay Electric Auto Association | 11/11/2016 | 200 | Email | 3 | 1 | 2 |
| Mixed Greens Preschool | 12/2/2016 | 200 | Email | 0 | 0 | 0 |
| Graton Rancheria | 12/20/2016 | 1,500 | Email | 0 | 0 | 0 |
| City of Cloverdale | 12/15/2016 | Unknown | Email | 0 | 0 | 0 |
| City of Sebastopol | 12/15/2016 | Unknown | Email | 0 | 0 | 0 |
| Town Windsor | 12/15/2016 | Unknown | Email | 0 | 0 | 0 |
| GHD | 11/8/2016 | Unknown | Email | 0 | 0 | 0 |
| Exchange Bank | 11/8/2016 | 419 | Email | 0 | 0 | 0 |
| Burbank Housing | 11/16/16 to 12/7/16 | Unknown | Flyer | 0 | 0 | 0 |
| Sonoma County Water Agency | Unknown | Unknown | Email | 1 | 0 | 1 |
| Total | | > 7,159 | | 35 | 4 | 31 |

Social media posts were used to spread awareness of the program. Table 11 below shows Facebook posts made by the Sonoma County Transportation Authority and the Regional Climate Protection Authority along with views and clicks.

Table 11. Summary of social media promotion

| Post | Page | Published | Unique views | Link clicks |
|-------------------------|--|------------|--------------|-------------|
| Good news EV | Sonoma County Transportation Authority | 10/27/2016 | 580 | 10 |
| Good news EV | Regional Climate Protection Authority | 10/27/2016 | 693 | 11 |
| CA tops 250k EVs | Sonoma County Transportation Authority | 11/15/2016 | 54 | 0 |
| CA tops 250k EVs | Regional Climate Protection Authority | 11/15/2016 | 872 | 12 |
| eMotorWerks article | Sonoma County Transportation Authority | 11/30/2016 | 73 | 3 |
| eMotorWerks article | Regional Climate Protection Authority | 11/30/2016 | 158 | 10 |
| Fun car, zero emissions | Sonoma County Transportation Authority | 12/7/2016 | 1,013 | 20 |
| Staff with EVs | Regional Climate Protection Authority | 12/20/2016 | 2,237 | 16 |
| Study EVs 90% | Regional Climate Protection Authority | 1/3/2017 | 730 | 10 |
| Total | | | 6,410 | 92 |

It is difficult to precisely measure the effect of outreach in driving program participation because most applicants did not provide a referral code. However, these results indicate that a significant number of applicants reached the program through targeted email campaigns. Efforts to reach out to Sonoma County employees and, to a lesser extent, Jackson Family Wines were particularly effective. On the other hand, relatively few of the applicants who used outreach referral codes were CARE/FERA customers. Only four of the 35 applicants who provided referral codes were CARE/FERA customers.

What were the program’s short-term impacts on EV awareness, the SCP brand, the free charger program and EverGreen?

How many participants learned about EVs as a result of the program? What other impacts did the program have on EV awareness?

Survey respondents were asked to describe their awareness of EVs prior to participating in the incentive program. The majority (55%) claimed to have had enough knowledge about EVs to make an informed decision about getting one before the DEG program. About 44% of respondents indicated they knew about EVs, but didn’t know enough to make a decision about getting one prior to participating in DEG.

As discussed in the previous section, more than 13,569 outreach impressions were achieved during the program, potentially exposing many Sonoma County residents to new information about EVs and SCP beyond the results captured in the survey of program participants.

How many participants learned about SCP as a result of the program?

Only 12% of survey respondents had not heard of SCP before participating in the program.

How many participants learned about the free charger program as a result of Drive EverGreen?

Survey respondents who redeemed a certificate were asked whether they were familiar with the CleanCharge program to provide free EV chargers and if they heard about it as a result of their participation in the DEG incentive program. Almost all (90%) were familiar with SCP's CleanCharge program. Most of these respondents (86%) heard about it as a result of their participation in the EV incentive pilot.

How many participants learned about SCP's EverGreen premium product as a result of Drive EverGreen? How many participants enrolled or plan to enroll in EverGreen?

All survey respondents were asked whether they were familiar with SCP's EverGreen 100% renewable energy service and if they heard about it as a result of their participation in the DEG incentive program. Many (74%) were aware of the EverGreen service and 25% of those heard about it as a result of their participation in DEG. About 35% stated that they were already on the EverGreen service. Furthermore, 16% stated that they planned to switch to the EverGreen service. Since the start of the DEG program, eight participants were confirmed as new enrollees in the EverGreen service.

How did these outcomes differ for CARE/FERA participants?

There were no statistically significant differences in prior knowledge of EVs or SCP, and no differences in knowledge of the CleanCharge program between CARE/FERA participants and non-CARE/FERA participants. There also were no statistically significant differences in anticipated EV use. However, fewer CARE/FERA respondents (48%) were aware of the EverGreen service as compared to non-CARE/FERA respondents (80%) ($p=0.001$). For both groups, roughly one-quarter of respondents heard about the EverGreen service as a result of their participation in DEG.

What impact did this program have on the SCP brand?

Survey respondents were asked in an open text question to describe whether their perceptions of SCP had changed after participating in the incentive program. Out of the 199 respondents, 34% stated that their perceptions of SCP had not changed since they applied for the incentive certificate, although 21% of those mentioned that they already had a positive perception of SCP. One respondent commented that, "My perceptions have not changed—I am pleased with Sonoma Clean Power. The incentive program reinforced my sense that SCP is focused on energy independence and green/renewable energy for Sonoma County." Sixteen percent (16%) of respondents stated their perceptions changed for the

better. One commented, "Yes! This incentive certificate made me notice Sonoma Clean Power as much more than a monthly utility bill." Of those who provided feedback, only one individual had a slightly negative comment, stating that their perception of SCP shifted to "A bit less thrilled since program was so rigid." A few other individuals addressed concerns about the structure of Drive EverGreen and the lack of dealer and vehicle options. Overall, 35 percent of respondents added positive comments about either SCP or the DEG program.

What were the program’s short-term impacts on reductions in GHG emissions and gasoline use?

What reduction in GHG emissions was achieved as a result of the program?

The total reduction in GHG emissions resulting from the program is estimated to be between 7,726 and 13,640 metric tons of CO₂ equivalent (CO₂e) over the lifetime (15 years) of the incentivized vehicles. This estimated range takes into consideration sensitivity tests on assumptions made in the calculation methodology.

Table 12 summarizes calculated GHG reduction estimates by two different methods. Use of the CARB method with given emissions factors resulted in a calculated reduction of 8,953 metric tons of CO₂e for the life of the vehicles—equivalent to a per-vehicle reduction of 43 metric tons of CO₂e. The AFLEET Tool yielded a higher total estimated GHG reduction of 10,598 metric tons of CO₂e over the lifetime of the vehicles, or 51 metric tons of CO₂e per incentivized vehicle.

Table 12. Total GHG reductions over vehicle lifetimes (15 years)

| Method | Total GHG Reductions | Cost of GHG Reductions | Reductions per Vehicle |
|--------|---|---------------------------------|-------------------------------------|
| CARB | 8,953 metric tons of CO ₂ e | 1.5 metric tons saved per \$100 | 43 metric tons of CO ₂ e |
| AFLEET | 10,598 metric tons of CO ₂ e | 1.8 metric tons saved per \$100 | 51 metric tons of CO ₂ e |

What reduction in petroleum use was achieved as a result of the program?

Table 13 summarizes the program’s estimated petroleum displacement. The AFLEET Tool estimated a displacement of 29,172 barrels of petroleum over the life of the incentivized vehicles. This equates to approximately 4.8 barrels saved for every \$100 in incentive funding and 142 barrels per incentivized vehicle.

Table 13. Total petroleum displacement over vehicle lifetimes (15yrs)

| Method | Total Petroleum Displacement | Cost of Petroleum Displacement | Displacement per Vehicle |
|--------|------------------------------|--------------------------------|-------------------------------|
| AFLEET | 29,172 barrels | 4.8 barrels saved per \$100 | 142 barrels saved per vehicle |

Did GHG benefits realized from low-income incentive recipients differ from the program as a whole?

Table 14 summarizes emissions reductions by applicant type. Because of the larger incentive levels, emissions reductions associated with CARE/FERA applicants were more expensive than others. Although non-CARE/FERA participants reduced more emissions and fuel consumption per dollar, CARE/FERA participants provide larger per-vehicle reductions. This difference may be due to CARE/FERA participants being more likely to replace older vehicles and/or not purchase or lease new vehicles if the incentive program had not existed.

Table 14. Comparison of total GHG reductions by participant type (15 yrs)¹⁸

| Method | Participant type | Total GHG Reductions | Cost of GHG Reductions | Reductions per Vehicle |
|--------|------------------|---|--|-------------------------------------|
| AFLEET | Entire Program | 10,598 metric tons of CO ₂ e | 1.8 metric tons of CO ₂ e per \$100 | 51 metric tons of CO ₂ e |
| AFLEET | CARE/FERA | 2,165 metric tons of CO ₂ e | 1.2 metric tons of CO ₂ e per \$100 | 62 metric tons of CO ₂ e |
| AFLEET | Non-CARE/FERA | 8,516 metric tons of CO ₂ e | 2.0 metric tons of CO ₂ e per \$100 | 50 metric tons of CO ₂ e |

Table 15. Comparison of total petroleum displacement by participant type (15yrs)¹⁹

| Method | Participant Type | Total Petroleum Displacement | Cost of Petroleum Displacement | Displacement per Vehicle |
|--------|------------------|------------------------------|--------------------------------|--------------------------|
| AFLEET | Entire Program | 29,172 barrels | 4.8 barrels per \$100 | 142 barrels per vehicle |
| AFLEET | CARE/FERA | 5,702 barrels | 3.3 barrels per \$100 | 163 barrels per vehicle |
| AFLEET | Non-CARE/FERA | 23,642 barrels | 5.5 barrels per \$100 | 138 barrels per vehicle |

What emissions reductions take place in Sonoma County?

Survey respondents who redeemed a certificate were asked to estimate the percentage of total driving they will be doing within Sonoma County with their incentivized EV. Respondents stated that an average of 89% of their driving will be within Sonoma County. Although the impacts of GHG emissions are not locally contained, Sonoma County will be able to show leadership in emissions reductions, as well as benefit from associated reductions in other pollutants impacting local air quality.

To what extent did sensitivity testing affect the GHG emissions reductions?

Table 16 summarizes the results from sensitivity testing conducted on the assumptions made for the AFLEET emissions calculation method. Shifting the vehicle miles traveled (VMT) by 10% had the greatest impact on GHG reductions estimates. The average VMT for survey respondents was 12,414 miles per

¹⁸ CARE/FERA and Non-CARE/FERA GHG/petroleum reductions do not add up to Entire Program as a result of calculations used to scale up survey results to represent all participants

year. The 10% shift in annual VMT altered the average VMT by slightly over 1,000 miles. The second greatest impact was from shifting the assumed vehicle fuel economy by 10%. The fuel economy estimates are used with VMT to calculate fuel use and therefore have a direct impact on the GHG reductions. Overall, the assumptions have up to a 27.1%–28.7% impact on the overall GHG reduction estimates. Therefore, it is advised to represent the GHG reductions as a range and not an exact calculation.

Table 16. Summary of AFLEET sensitivity testing (15yrs)

| Assumption | Sensitivity Test Performed | Percentage Decrease in Estimate | Percentage Increase in Estimate |
|---|--|--|---|
| Survey respondents provide accurate estimates of the number of miles they will drive their incentivized EVs AND their mileage would be the same had the program not existed | ±10% annual VMT per vehicle in the Adopted and Alternate Fleet | -9% | +11% |
| Fuel economies assigned for the Alternate Fleet accurately reflect the fuel economy that would have been achieved in program’s absence | ±10% fuel economy per vehicle in the Alternate Fleet | -10% | +10% |
| Survey respondents accurately represent all certificate recipients | ±5% total GHG emissions for Alternate Fleet | -7.5% | +7.5% |
| BMW i3 REXs are operated in 100% electric mode in the Adopted Fleet | -5pp electric mode per vehicle | -0.4% | N/A |
| PHEVs are operated in 40% electric mode in the Alternate Fleet ¹⁹ | ±10pp electric mode per vehicle | -0.2% | +0.2% |
| Total possible variability achieved by combining sensitivity tests | | -27.1% | +28.7% |
| GHG reduction estimates with sensitivity testing adjustments | | 7,726 metric tons of CO ₂ e | 13,640 metric tons of CO ₂ e |

Additionally, it was assumed that the electricity portfolio presented in the AFLEET Tool from the Western Electricity Coordinating Council (WECC) accurately represented the electricity portfolio of the grid in Sonoma County. To address this assumption, CSE tested the GHG emissions reductions achieved if the grid were to be 100% renewable energy. This resulted in a 41% increase in GHG emissions reductions. Clean Start, the default service offered by Sonoma Clean Power, is 36% renewable power and the optional EverGreen service is 100% renewable.²⁰ If all of the participants were part of the EverGreen service, then the GHG emissions reductions would be improved by 41% to 14,937 metric tons of CO₂e. Given that the participants are a mix of EverGreen and Clean Start customers, the actual GHG

¹⁹ Aligns with assumption specified in the 2016-2017 AQIP Funding Plan.

²⁰ Sonoma Clean Power: Your Options. Retrieved from <https://sonomacleanpower.org/your-options/> on 4/7/2017.

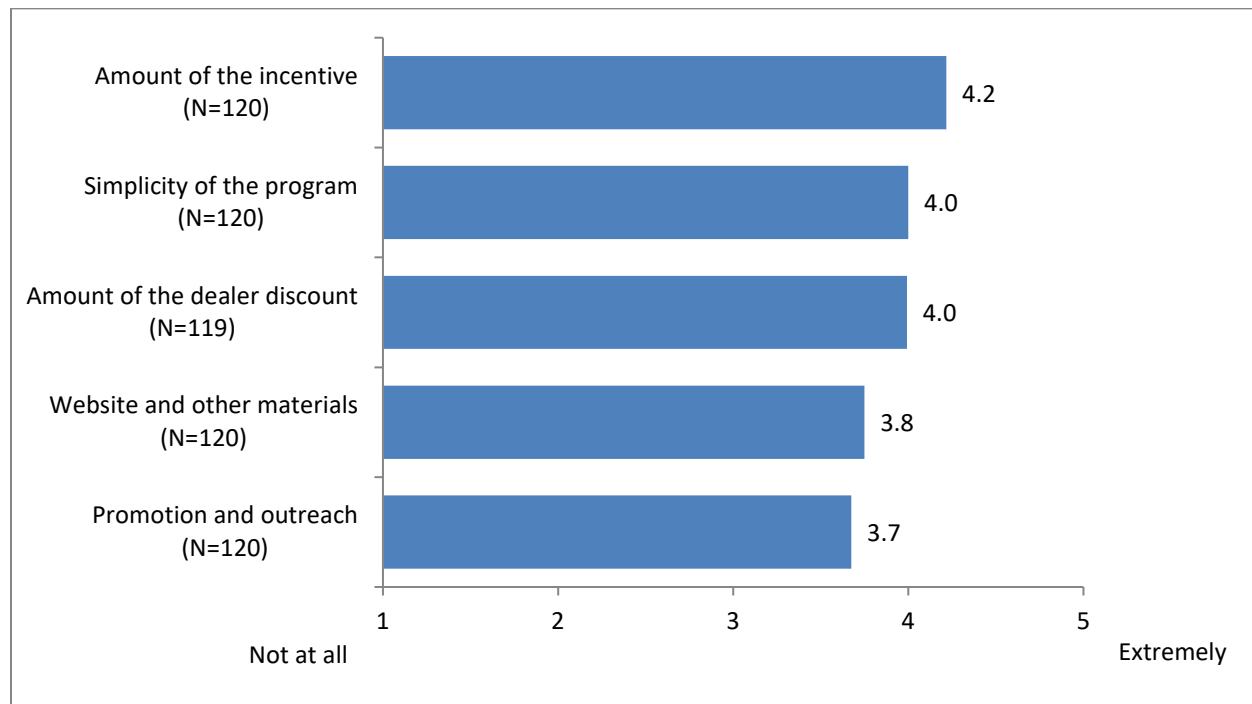
emissions reductions would fall somewhere between the standard AFLEET results and the 100% renewable energy results.

What lessons were learned from the pilot administration of the incentive program, and how can the program be improved in the future?

What did participants think of the program in general?

Survey respondents were asked to rate their satisfaction with various DEG program elements on a five-point scale. Figure 11 lists the respondents' average rated satisfaction. Respondents were on average very satisfied with most aspects of the program, while slightly more satisfied with the amount of the incentive and slightly less satisfied with outreach and the website.

Figure 11. Participant satisfaction with various features of the Drive EverGreen program



In an open, free-response question, some survey respondents indicated there was a need for more promotion and outreach and that word of mouth was a common source of awareness of the program. Another common survey response was that it was difficult to distinguish between the different incentives available. Some respondents stated that it would be helpful to have a point of contact (i.e., someone at the dealerships) to help inform customers on all available incentives. Feedback gathered through the survey as well as interactions with participants during the incentive program indicated concerns with the EV knowledge of sales staff at participating dealers.

What did participating dealers and manufacturers think of the program?

CSE staff conducted interviews with representatives from Nissan, BMW and the local participating Nissan and BMW dealers. All four representatives had positive views of the program and looked forward to participating in future iterations. The following insights are based on feedback provided through these interviews.

Manufacturer-offered discounts are typically offered to members of specific organizations rather than the general public, so this program was a relatively unique model. Discounts offered may be impacted by vehicle availability and the stage of the model year cycle. However, manufacturers are happy to participate in programs that drive increased sales and may be amenable to expanded models involving more local dealers.

Maintaining enough vehicle inventory to keep up with demand can be challenging for dealers in this type of EV promotion. Providing a transparent, fixed-cost structure with all discounts described is very different from the standard sales model, but shows promise in streamlining the process for promotional programs. An added benefit of participating in this type of program is increasing the awareness of dealership staff regarding other EV incentives. Regulations on dealer advertising make it difficult for dealerships to promote external incentives. Dealers were very pleased by a significant increase in sales but may have more concerns than manufactures in expanding the program to additional locations.

What did program staff think of the program?

CSE program staff responsible for administering the DEG incentives provided anecdotal comments and feedback on program design and operations processes. In general, staff indicated that while the simple, manual process of incentive administration made program start-up quick and easy for a small pilot, it created more work over the life of the program and lacked the sophisticated safeguards and tracking to prevent errors used in other programs. Staff also reported issues with online tools including the SCP customer look-up tool, as well as problems with emails being sent to incorrect addresses or caught by spam filters. Because participants received OEM discounts, dealer discounts and DEG incentives from SCP, the dealers' standard paperwork did not allow for all incentives to be itemized, creating issues for dealer reporting and program staff verification. Program staff also reported concerns about participating dealers reserving discounted vehicles for customers who had not applied for incentives yet. One area of success noted by program staff was the high level of support and buy in from participating dealerships. Each dealer identified a point person to work directly with program staff, which facilitated efficient communication.

V. Summary of Select Other EV Incentive Programs

Many EV incentive programs exist at the local, state and national levels. CSE has partnered with agencies to design and administer programs in California, Massachusetts, Connecticut and New York. This section provides information on other EV incentive programs as well as the evaluation approaches and results these programs have produced in order to facilitate comparison for SCP and its stakeholders and provide potential program design considerations for future programs. Three statewide incentive programs administered by CSE in Connecticut, Massachusetts and California were selected for discussion because they have the most similarities with the Drive EverGreen (DEG) program and because these programs have made the most information publicly available. Evaluations of the CHEAPR, MOR-EV and CVRP programs served as groundwork for some of the evaluation completed for SCP's pilot EV incentive. A table comparing various parameters across the four programs is available in Appendix B.

Connecticut Hydrogen and Electric Automobile Program Rebate (CHEAPR)

The State of Connecticut incentivizes the adoption of clean vehicles through the Connecticut Hydrogen and Electric Automobile Program Rebate (CHEAPR). In the CHEAPR program, dealers are expected to submit rebate applications with their customers at the time of purchase or lease. Customers have the option to assign the rebate to the dealership or receive it later as a personal check. If they choose to assign the rebate to the dealer, the dealer deducts the rebate amount from the cost of the vehicle as a line item on the purchase/lease agreement and is reimbursed within 10 days via electronic funds transfer. This "dealer assignment" option has proven popular among CHEAPR applicants. Consumers have assigned the rebate to the dealership in 81% of approved applications. Employees at participating Connecticut dealerships have reported that the point-of-sale feature allows them to immediately reduce monthly lease payments to make a competitive offer to the customer.²¹ Additionally, a separate incentive of \$300 is offered to dealerships for each eligible sale/lease to encourage dealers to participate. The nascent EV market may require special training for sales people and potentially involve a longer sales process because more customer education is necessary. More information about the volume of rebates, rebates by vehicle type and model, and geographical location of CHEAPR participants is available via an online, interactive dashboard.²²

In 2016, CSE conducted a mixed-methods research study to better understand the impact of the dealer incentive in promoting EV sales. Some preliminary results on the qualitative survey administered to

²¹ Johnson, Clair, Williams, Brett, Anderson, John & Appenzeller, Nicole (2017), *Evaluating the Connecticut Dealer Incentive for Electric Vehicle Sales*, Center for Sustainable Energy.

²² CHEAPR Statistics. http://www.ct.gov/deep/cwp/view.asp?a=2684&q=565018&deepNav_GID=2183.

dealers were presented at the Evaluation 2016 Conference in Atlanta, Georgia.²³ Most survey respondents were directly involved in the sales process. Despite high levels of awareness about the rebate program, fewer respondents knew about the additional incentives available to dealerships. More than two-thirds said the staff responsible for the EV sale did not receive any of the dealership rebate. Respondents who were aware of the incentive were moderately motivated to learn about the technology and more motivated to spend time educating customers about EVs. Sales staff noted that the minimum incentive they needed to be personally motivated to increase EV sales was, on average, \$236 per EV sale. The research also revealed that dealership staff generally had positive opinions of EVs and that negative opinions about EVs were associated with a lack of personal familiarity with the technology. Thus, there is an opportunity to boost a salesperson’s willingness to promote EVs by encouraging first-hand experience with the vehicles. Were SCP to expand the pilot to include additional vehicle makes and dealerships, a similar study would be useful to understand how dealerships are using and interacting with the incentive program. CHEAPR’s alternative point-of-sale incentive model and provision of incentives to dealers warrant consideration for future EV incentive efforts undertaken by SCP.

Massachusetts Offers Rebates for Electric Vehicles (MOR-EV)

The Massachusetts Offers Rebates for Electric Vehicles (MOR-EV) program provides rebates directly to purchasers and lessees of eligible vehicles. Applicants must first take possession of their vehicle and then apply online to receive a rebate check through the mail within 75 days of application approval.

A rebate statistics dashboard displays details on the technology type, models and location of rebated vehicles. The dashboard also includes information about the cumulative, one-year GHG emissions reductions of all rebated vehicles. These estimates are derived through the 2013 AFLEET Tool. Values are updated to reflect current rebate totals and associated reductions twice per month. As of February 17, 2017, MOR-EV’s total one-year CO₂e reductions were 9,031 metric tons.²⁴ Table 17 shows the current GHG reduction factors for eligible vehicle types. The AFLEET GHG emissions reduction calculation methodologies used to evaluate MOR-EV and SCP’s DEG EV incentive pilot are similar and yield similar per-vehicle reduction estimates.

Table 17. Annual CO₂ reduction by vehicle type in MOR-EV program

| Vehicle Type | Annual GHG Reduction (CO ₂ e metric tons) |
|------------------------------|--|
| BEV | 2.7 |
| PHEVs with > 10 kWh capacity | 2.8 |
| PHEVs with < 10 kWh capacity | 1.5 |

²³ Evaluating the Connecticut Dealer Incentive for Electric Vehicle Sales. Evaluation 2016. October 2016. https://energycenter.org/sites/default/files/docs/nav/resources/2016-10-25_Connecticut_Dealer_Incentive_EV.pdf.

²⁴MOR-EV Program Statistics. <https://mor-ev.org/program-statistics>.

MOR-EV participants are also invited to take a voluntary survey. The survey covers topics such as demographics, adoption motivations, the importance of the rebate and the dealership experience. Survey responses indicate participants' primary source for information about the state rebate program was dealers (60%), stressing how important dealer engagement is to increasing program awareness and participation. Nearly a quarter of participants learned about the rebate through the program website. A complete description of survey results and program outcomes through the second fiscal year of the program is publicly available on the program website.²⁵ These results suggest an increased focus on online resources may yield positive results for SCP in future EV incentive programs.

California Clean Vehicle Rebate Project (CVRP)

California's Clean Vehicle Rebate Project (CVRP) is one of the largest and longest-running EV incentive programs in the country. CSE has partnered with the California Air Resources Board (CARB) to administer post-purchase/lease rebates since 2010. CVRP staff has completed a wide variety of analyses on clean vehicle incentive recipients, primarily using data gathered through the CVRP EV Consumer Survey. The survey reflects data from consumers who purchased or leased their vehicles from September 2012 through May 2015, received a rebate and responded to the voluntary survey. Data have been weighted to represent the program by vehicle model, county and purchase vs. lease. A survey dashboard displaying these responses is available on the program website.²⁶

To learn more about the composition of the market in socio-economically disadvantaged communities (DACs) with high pollution, CVRP staff has completed characterizations of participants in DACs. One analysis²⁷ highlighted the importance of calibrating metrics of progress by taking into consideration the size of new car markets. Overall, DACs contain approximately a quarter of the state's population but account for only 17% of new car sales. It's also worth noting that the demographics of CVRP participants differ less from new-car buyers than the general population.

Survey results have shown the importance of the CVRP rebate as stated by survey participants is growing and is generally higher in DACs. Further work is underway to calculate the relative participation of low- and moderate-income participants in the program. This may be instructive for SCP's understanding of the local clean vehicle market in Sonoma County and calibrating expectations for reaching lower-income customers who may be less likely to purchase or lease new vehicles.

In addition to the DAC characterization, an infographic describing this population is also available online. This infographic includes a summary of participants in DACs and their vehicles, primary motivations for

²⁵ MOR-EV Year Two Final Report (May 2015 – June 2016). https://mor-ev.org/sites/default/files/docs/MOR-EV_Year_Two_Report.pdf.

²⁶ EV Consumer Survey Dashboard. <https://cleanvehiclerebate.org/eng/survey-dashboard/ev>.

²⁷ Electric Vehicle Rebates in Disadvantaged Communities: Evaluating Progress with Appropriate Comparisons. https://energycenter.org/sites/default/files/docs/nav/resources/2016-10-26_EV_Rebates_Disadvantaged_Communities.pdf. October 2016.

PEV acquisition, access to charging and household demographics.²⁸ Overall, the majority of participants in DACs make less than \$50,000, were motivated to adopt EVs to save money on fuel costs and state that having HOV lane access was very important in their decision to adopt an EV. This type of information characterizing EV adopters in DACs and low-income adopters may offer valuable insights for future programs to reach similar residents in Sonoma County.

VI. Recommendations

The following section introduces recommendations for future iterations of the EV incentive pilot based on the evaluation results, experiences from similar programs and feedback captured from program stakeholders as discussed. Recommendations are grouped by program element.

Program Design

Clarify and clearly communicate the total cost reduction provided through the program, including both dealer discounts and SCP incentives. One of the clearest findings from the survey was that many participants were confused about the sources and levels of the various discounts and incentives provided in the pilot program. This clarification may help to increase consumer confidence and understanding as well as more positively impact SCP's brand. The leveraged discounts from participating dealers and manufacturers were a key driver of success for the program. The hefty combined incentive amount likely contributed to a very low rate of free-ridership and significant GHG emissions reductions for a small-scale program. Reductions to the total incentive amount in future iterations may lead to different results.

Include vehicles of other technology types and a wider variety of models. Among survey respondents who did not redeem an incentive certificate, the most commonly identified reason was lack of vehicle choice. Adding vehicle makes and models to the program opens participation up to a wider range of SCP customers with different vehicle needs and preferences.

Consider additional program features to reach lower-income participants. Even with doubled SCP incentive levels, CARE/FERA participants made up only 17% of redeemed certificates. Additional data would be needed to compare this proportion to CARE/FERA customers' share of the new vehicle market to provide appropriate context. However, SCP has stated that providing clean mobility options for lower-income customers is a high priority for the Drive EverGreen (DEG) program. Several targeted programs have been demonstrated successfully in other jurisdictions and may provide additional models for SCP to explore. For example, CARB's Low Carbon Transportation Light-Duty Pilot Projects to Benefit Disadvantaged Communities²⁹ include programs to support car sharing and mobility projects, enhanced

²⁸ Infographic: Plug-in Electric Vehicle Owners in California's Disadvantaged Communities January 11, 2017. <https://cleanvehiclerebate.org/eng/content/infographic-plug-electric-vehicle-owners-california%E2%80%99s-disadvantaged-communities>.

²⁹ https://www.arb.ca.gov/msprog/aqip/ldv_pilots.htm.

vehicle retirement and replacement incentives for clean vehicles (including used vehicles) and vehicle financing assistance programs.

Bundle future EV incentives with the EverGreen rate plan to enhance conversion to EverGreen. For example, SCP could offer an increased EV incentive to participants willing to upgrade their utility service to the EverGreen rate or offer a limited-time discount to participants upgrading after purchasing or leasing an EV.

Secure stable, long-term funding to support a longer-term program. About 15% of survey respondents who did not redeem an incentive certificate said the program ended before they could acquire a vehicle. Securing a stable, multiyear funding source with enough resources to accomplish SCP's goals for the program will increase consumer confidence in the availability of the incentive and enable additional sales. On the other hand, dealers and manufacturers may be less inclined to offer generous discounts for an extended program as opposed to a short-term one, further increasing the amount of funding SCP would need to dedicate in order to achieve incentive levels equivalent to the pilot program.

Dealership Collaboration

Plan for a longer recruitment period for participating dealers and manufacturers in future iterations. Comments from participating dealers and manufacturer representatives indicated that the discount they offered was based on the availability of eligible models on local lots and the timing of rolling out a new generation of vehicles. Therefore, replicating the discounts offered in this pilot may require more strategic planning in collaboration with vehicle manufactures, dealers and other stakeholders. The recruitment process also could benefit from facilitation by an organization with knowledge and relationships with vehicle manufacturers and dealers and a streamlined RFP process to make it easier to participate.

Establish one point person at each dealership and scale up investments in training and resources for dealers. Program staff also provided input on managing relationships with participating dealers during program administration. Maintaining one point person at each dealership, preferably a finance or sales manager familiar with the program, was a valuable practice that should be continued in future program iterations. Especially for a longer incentive timeframe, high sales staff turnover and potentially a lack of familiarity with EV technology, could negatively impact incentive administration if not properly managed. Clear instructions, training and oversight for participating dealers will be crucial for scaling up. This would involve more time and resources dedicated to dealer training prior to launch and during administration as well as providing better tools for dealers.

Program Administration

Harmonize timing and administration of vehicle and charging equipment incentives. A streamlined approach to parallel vehicle and charging equipment incentives could be beneficial to both SCP and participants. Using the same incentive administration system and providing the incentives simultaneously may improve the customer experience and reduce administrative costs.

Devote resources to a more sophisticated information technology platform. Program staff reported that the simple incentive processing system set up for the pilot was sufficient for the volume of applications received. However, to scale up from the pilot level, a more sophisticated system would be necessary to efficiently process applications, track applicant communications and provide quality assurance. This may require a longer lead time to program launch, but if the scale is sufficiently increased, would provide economies of scale in terms of processing costs and save effort and budget on the tail end of the project for data processing and evaluation. One specific idea proposed by program staff to streamline the process was to give the applicants an option to send certificates directly to the dealer.

Outreach

Allocate additional resources for outreach. Survey responses to the question regarding satisfaction with various features of the Drive EverGreen program as well as the open response question expressed a desire for more outreach. SCP could consider increasing investments in traditional advertising in local publications, T.V. and radio as well as social media ads, earned media and ride-and-drive events. Demographic information and motivating factors gathered through the pilot survey can help target future outreach efforts for maximum effect. The inclusion of trackable links and URLs also would help to evaluate the effectiveness of various outreach channels going forward. Outreach has been at the center of many discussions and enhancements to other EV incentive programs over the last several years, especially for the CVRP. In fact, the latest fiscal year's CVRP grant specified that at least 50% of program administration funds were to be used for outreach. Awareness of EV technology as well as the available incentives is a key driver of program success that warrants additional focus in future programs.

Evaluation

Collect energy consumption data from participants. Stakeholders in Sonoma County expressed interest in understanding how the program impacted energy costs for participants. To assess this, SCP or future implementers could collect energy consumption data from participants before and after adoption of a clean vehicle. These consumption patterns and information about the adopted vehicle would enable evaluators to estimate the impact of adding a vehicle to a household's electricity bill compared to equivalent gasoline costs.

Consider additional methods for assessing direct and spillover program effects. Stakeholders also were interested in how the program might have affected clean vehicle sales in the region more broadly, both during and after the program. As discussed in the results section, the impact of the program on wider sales is difficult to assess due to the presence of numerous conflating factors, including:

- changes to statewide clean vehicle incentive programs like the CVRP
- changes in the cost of fuel
- the release of new, highly anticipated models
- changes in vehicle supply at local dealerships

Though factors like these make it difficult to identify direct effects of the program, several approaches could be taken to understand impacts and spillover effects. For example, SCP or future implementers could poll Sonoma County residents before and after implementation of its program (whether or not they participate in the program) to begin to measure changes in consumer awareness of EVs, SCP and its various programs. Additionally, acquiring vehicle registration data from a provider such as IHS Markit would enable evaluators to assess changes in vehicle registration volume, market share and distribution of clean vehicles in the county. It would be very difficult to claim any causation from a specific program, but it might be instructive for context.

Explore partnerships with research institutions. Partnering with organizations active in EV research such as University of California, Davis's Plug-in Hybrid & Electric Vehicle Research Center also may open opportunities to "oversample" Sonoma County in existing research projects to cost-effectively gather useful data on topics such as household vehicle and charging behaviors.

Use caution when comparing GHG benefits to other programs. Though this report has outlined the cost of the program with respect to GHG emissions reductions, additional evaluation of cost-effectiveness could be conducted by comparing GHG reductions per dollar spent with other SCP programs. While useful for calculating overall impact, care should be taken in interpreting similarities and differences in GHG reductions per dollar spent compared to programs administered in other areas, which can have very different electricity generation portfolios, socio-economic and consumer choice patterns and consumer preferences for various vehicle features.

Incorporate strong evaluation components into future programs. SCP should continue to conduct ongoing evaluation to optimize program design and implementation, support planning and assess impact.

Appendix A: Survey Instrument

Drive EverGreen Pilot Survey

Introduction

Logic: Hidden unless: Invite Variable "custom1" is exactly equal to "1"

Welcome to the Sonoma Clean Power (SCP) Drive EverGreen Survey! You were invited to participate in this survey because you qualified for a SCP Drive EverGreen Incentive Certificate for an electric vehicle (EV) purchase or lease. We'd like to learn more about your experience making a decision about an EV.

Your participation is voluntary. However, your input will help us design the next EV program, so we encourage you to take 5–10 minutes and try to answer all of the questions. If you complete the survey, you will have the option to enter a drawing to win one of five \$50 Amazon.com gift cards.

Your identity will remain confidential and all reported results will be anonymous. Your link is personalized and cannot be shared with others.

If you have any questions about this research project or if you experience any technical difficulties, you may contact the Center for Sustainable Energy at:

Phone: 858-634-4733

Email: transparency@energycenter.org

Logic: Hidden unless: Invite Variable "custom1" is exactly equal to "0"

Welcome to the Sonoma Clean Power (SCP) Drive EverGreen Survey! You were invited to participate in this survey because you qualified for a SCP Drive EverGreen Incentive Certificate for an electric vehicle (EV) purchase or lease. Regardless of whether or not you redeemed the certificate, we'd like to learn more about your experience making a decision about an EV.

Your participation is voluntary. However, your input will help us design the next EV program, so we encourage you to take 5–10 minutes and try to answer all of the questions. If you complete the survey, you will have the option to enter a drawing to win one of five \$50 Amazon.com gift cards.

Your identity will remain confidential and all reported results will be anonymous. Your link is personalized and cannot be shared with others.

If you have any questions about this research project or if you experience any technical difficulties, you may contact the Center for Sustainable Energy:

Phone: 858-634-4733

Email: transparency@energycenter.org

Page entry logic: This page will show when: Invite Variable "custom1" is exactly equal to "0"

Non-Participant Main Page 1

1) You qualified for a Sonoma Clean Power Incentive Certificate for an electric vehicle through the Drive EverGreen program but never redeemed it. Why not? [select all that apply]

- The program ended before I could get a vehicle.
- I couldn't afford either of the vehicles, even with the incentives.
- I didn't like either of the vehicles available.
- I didn't have reliable access to charging.
- I decided an electric vehicle wasn't a good fit for me.
- I couldn't find enough information about electric vehicles.
- My circumstances changed (e.g., income, place of residence).
- It was too complicated.
- I forgot about it.
- I just changed my mind.

[] Other, please specify: _____ *

Page entry logic: This page will show when: Invite Variable "custom1" is exactly equal to "0"

Non-Participant Main Page 2

2) What was the primary reason you did not redeem your certificate?

Logic: Show/hide trigger exists.

3) What are your vehicle shopping plans now?

- I purchased/leased a different vehicle.
- I am still planning to purchase/lease a vehicle, but haven't yet.
- I have decided not to purchase/lease a vehicle.

Logic: Hidden unless: Question "What are your vehicle shopping plans now?" #3 is one of the following answers ("I purchased/leased a different vehicle.")

4) What type of vehicle did you purchase/lease?

- Non-hybrid gasoline-fueled vehicle
- Conventional hybrid (fueled with gasoline only)
- Plug-in hybrid EV (recharged with electricity and/or fueled with gasoline)
- All-battery EV (recharged with electricity only)
- Hydrogen fuel-cell EV
- Diesel
- Other alternative fuel

Logic: Hidden unless: Question "What are your vehicle shopping plans now?" #3 is one of the following answers ("I am still planning to purchase/lease a vehicle, but haven't yet.")

5) What type of vehicle are you most likely to purchase/lease?

- Non-hybrid gasoline-fueled vehicle

- Conventional hybrid (fueled with gasoline only)
- Plug-in hybrid EV (recharged with electricity and/or fueled with gasoline)
- All-battery EV (recharged with electricity only)
- Hydrogen fuel-cell EV
- Diesel
- Other alternative fuel

Logic: Hidden unless: ((Question "What are your vehicle shopping plans now?" #3 is one of the following answers ("I have decided not to purchase/lease a vehicle.") OR Question "What type of vehicle did you purchase/lease?" #4 is one of the following answers ("Non-hybrid gasoline-fueled vehicle", "Conventional hybrid (fueled with gasoline only)", "Diesel", "Other alternative fuel")) OR Question "What type of vehicle are you most likely to purchase/lease?" #5 is one of the following answers ("Non-hybrid gasoline-fueled vehicle", "Conventional hybrid (fueled with gasoline only)", "Diesel", "Other alternative fuel"))

6) To what extent is each of the following a barrier to purchasing or leasing an electric vehicle for you?

| | Not at all a barrier | A minor barrier | A moderate barrier | A major barrier | An overwhelming barrier |
|----------------------------------|-----------------------------|------------------------|---------------------------|------------------------|--------------------------------|
| Vehicle price | () | () | () | () | () |
| Cost of electricity for charging | () | () | () | () | () |
| Vehicle range on a single charge | () | () | () | () | () |
| Frequency of battery replacement | () | () | () | () | () |

| | | | | | |
|--|-----|-----|-----|-----|-----|
| Time required to recharge | () | () | () | () | () |
| Access to reliable charging | () | () | () | () | () |
| Keeping an electric vehicle charged | () | () | () | () | () |
| Reliability of the technology | () | () | () | () | () |
| Vehicle repair costs | () | () | () | () | () |
| Vehicle safety records | () | () | () | () | () |
| Availability of desired vehicle models and body styles | () | () | () | () | () |

If you have experienced any other major barriers to purchasing or leasing an electric vehicle, please describe them in the box below.:

Page entry logic: This page will show when: Invite Variable "custom1" is exactly equal to "1"

Incentives

As a reminder, through Drive EverGreen, you received:

1. A certificate for a vehicle incentive in the amount of either \$2,500 or \$5,000, AND
2. Dealer/manufacturer discounts ranging from \$1,000 to over \$16,000

In the following questions, please consider the Drive EverGreen incentive and Drive EverGreen dealer/manufacturer discounts separately.

7) Are you familiar with each of the following?

| | No, I didn't know about this | Yes, but I have no plans to apply | Yes, and I'm planning to apply | Yes, and I already applied |
|-----------------------------|------------------------------|-----------------------------------|--------------------------------|----------------------------|
| State vehicle rebate (CVRP) | () | () | () | () |
| Federal tax incentives | () | () | () | () |

8) How important were each of the following in making it possible for you to adopt an EV?

| | Not at all important | Slightly important | Moderately important | Very important | Extremely important |
|-----------------------------|----------------------|--------------------|----------------------|----------------|---------------------|
| State vehicle rebate (CVRP) | () | () | () | () | () |
| Federal tax incentives | () | () | () | () | () |

| | | | | | |
|--|-----|-----|-----|-----|-----|
| Drive EverGreen incentive (\$2,500 or \$5,000) | () | () | () | () | () |
| Drive EverGreen dealer/manufacture discounts | () | () | () | () | () |

Page entry logic: This page will show when: Invite Variable "custom1" is exactly equal to "1"

Counterfactual Data

In the following questions, please consider the Drive EverGreen incentive and Drive EverGreen dealer/manufacture discounts separately.

9) If the Drive EverGreen incentive from SCP had NOT been available, but the dealer/manufacture discounts were, what would you have done?

- Purchased/leased the same EV I got through Drive EverGreen
- Purchased/leased a different vehicle: all-battery EV
- Purchased/leased a different vehicle: plug-in hybrid EV
- Purchased/leased a different vehicle: conventional hybrid
- Purchased/leased a different vehicle: non-hybrid gasoline-fueled vehicle
- Not purchased/leased a new vehicle
- Other, please specify: _____*

10) If the dealer/manufacture discounts had NOT been available, but the Drive EverGreen incentive was, what would you have done?

- Purchased/leased the same EV I got through Drive EverGreen
- Purchased/leased a different vehicle: all-battery EV
- Purchased/leased a different vehicle: plug-in hybrid EV
- Purchased/leased a different vehicle: conventional hybrid
- Purchased/leased a different vehicle: non-hybrid gasoline-fueled vehicle

- Not purchased/leased a new vehicle
- Other, please specify: _____ *

11) If neither the dealer/manufacturer discounts nor the Drive EverGreen incentive had been available, what would you have done?

- Purchased/leased the same EV I got through Drive EverGreen
- Purchased/leased a different vehicle: all-battery EV
- Purchased/leased a different vehicle: plug-in hybrid EV
- Purchased/leased a different vehicle: conventional hybrid
- Purchased/leased a different vehicle: non-hybrid gasoline-fueled vehicle
- Not purchased/leased a new vehicle
- Other, please specify: _____ *

Logic: Hidden unless: ((Question "If the Drive EverGreen incentive from SCP had NOT been available, but the dealer/manufacturer discounts were, what would you have done?" #9 is one of the following answers ("Not purchased/leased a new vehicle")) OR Question "If the dealer/manufacturer discounts had NOT been available, but the Drive EverGreen incentive was, what would you have done?" #10 is one of the following answers ("Not purchased/leased a new vehicle")) OR Question "If neither the dealer/manufacturer discounts nor the Drive EverGreen incentive had been available, what would you have done?" #11 is one of the following answers ("Not purchased/leased a new vehicle"))

12) Please describe the vehicle you already owned that you would have kept using.

Technology Type

- Non-hybrid gasoline vehicle
- Conventional hybrid (fueled with gasoline only)
- Plug-in hybrid EV (recharged with electricity and/or fueled with gasoline)
- All-battery EV (recharged with electricity only)
- Hydrogen fuel-cell EV
- Diesel
- Compressed natural gas
- Flex-fuel (E85 ethanol)
- Other alternative fuel

Vehicle Type

- Compact car
- Midsize car
- Fullsize car
- Small/midsize SUV
- Fullsize SUV
- Pickup truck
- Minivan

Model Year

- MY 2017
- MY 2016
- MY 2015
- MY 2014
- MY 2013
- MY 2012
- MY 2011
- MY 2010
- MY 2009
- MY 2008
- MY 2007
- MY 2006 or earlier

Validation: Min = 0 Max = 500 Must be numeric

13) On average, about how many miles do you think you will be driving your EV?

On a typical workday: _____

On a typical non-workday: _____

Validation: Min = 0 Max = 100

14) About what percentage of your total driving will you be doing within Sonoma County?

Adoption Motivations

Logic: Hidden unless: ((Invite Variable "custom1" is exactly equal to "1" OR Question "What type of vehicle did you purchase/lease?" #4 is one of the following answers ("Plug-in hybrid EV (recharged with electricity and/or fueled with gasoline)", "All-battery EV (recharged with electricity only)", "Hydrogen fuel-cell EV")) OR Question "What type of vehicle are you most likely to purchase/lease?" #5 is one of the following answers ("Plug-in hybrid EV (recharged with electricity and/or fueled with gasoline)", "All-battery EV (recharged with electricity only)", "Hydrogen fuel-cell EV"))

15) How important were the following factors in your decision to purchase/lease an EV?

| | Not at all important | Slightly important | Moderately important | Very important | Extremely important |
|---|----------------------|--------------------|----------------------|----------------|---------------------|
| Saving money | () | () | () | () | () |
| Reducing environmental impacts | () | () | () | () | () |
| Carpool or High Occupancy Vehicle (HOV) lane access | () | () | () | () | () |
| Increased energy independence | () | () | () | () | () |
| Convenience of charging | () | () | () | () | () |
| Vehicle performance | () | () | () | () | () |
| Vehicle styling, finish, and comfort | () | () | () | () | () |

| | | | | | |
|------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| A desire for the newest technology | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|

16) Which of the following best describes the vehicles you plan to purchase/lease in the future?

- I will only purchase/lease EVs in the future.
- I will mostly purchase/lease EVs in the future.
- I will purchase/lease EVs and gasoline-fueled vehicles about equally in the future.
- I will mostly purchase/lease gasoline-fueled vehicles in the future.
- I will only purchase/lease gasoline-fueled vehicles in the future.
- I'm not sure.

Awareness and Program Impressions - 1

17) Had you heard of Sonoma Clean Power before you signed up for your incentive certificate?

- Yes
- No

18) How have your perceptions of Sonoma Clean Power changed since you signed up for your incentive certificate?

19) Which of the following best describes your awareness of EVs before you learned of the Drive EverGreen program?

- I had no idea electric vehicles existed.
- I knew about EVs, but didn't know enough to make a decision about getting one.
- I knew enough about EVs to make an informed decision about getting one.

Awareness and Program Impressions - 2

Logic: Hidden unless: Invite Variable "custom1" is exactly equal to "1"

20) Are you familiar with Sonoma Clean Power's CleanCharge program that provides free EV chargers?

- No, I am not familiar with the CleanCharge program
- Yes, but I have no intention of applying
- Yes, and I applied or plan to apply

Logic: Hidden unless: (Invite Variable "custom1" is exactly equal to "1" AND Question "Are you familiar with Sonoma Clean Power's CleanCharge program that provides free EV chargers?" #20 is one of the following answers ("Yes, and I applied or plan to apply", "Yes, but I have no intention of applying"))

21) Did you hear about the CleanCharge program as a result of your participation in Drive EverGreen?

- Yes
- No, I heard about it elsewhere

Logic: Show/hide trigger exists.

22) Are you familiar with the EverGreen service (100% renewable energy) offered by Sonoma Clean Power?

- No, I am not familiar with the EverGreen service.
- Yes, but I have no intention of switching to the EverGreen service.
- Yes, and I am planning to switch to the EverGreen service.
- Yes, I am already on the EverGreen service.

Logic: Hidden unless: Question "Are you familiar with the EverGreen service (100% renewable energy) offered by Sonoma Clean Power?" #22 is one of the following answers ("Yes, but I have no intention of switching to the EverGreen service.", "Yes, and I am planning to switch to the EverGreen service.", "Yes, I am already on the EverGreen service.")

23) Did you hear about the EverGreen service as a result of your participation in Drive EverGreen?

Yes

No, I heard about it elsewhere

Logic: Hidden unless: Invite Variable "custom1" is exactly equal to "1"

24) How satisfied were you with each of the following aspects of Drive EverGreen?

| | Not at all satisfied | Slightly satisfied | Moderately satisfied | Very satisfied | Extremely satisfied |
|-------------------------------|-----------------------------|---------------------------|-----------------------------|-----------------------|----------------------------|
| Promotion and outreach | () | () | () | () | () |
| Website and other materials | () | () | () | () | () |
| Simplicity of the program | () | () | () | () | () |
| Amount of the incentive | () | () | () | () | () |
| Amount of the dealer discount | () | () | () | () | () |

Demographics and Household

In this final section we will be asking some questions about you and your household so we can learn more about the characteristics of EV adopters in Sonoma County.

25) Do you own or rent your residence?*

- Own
- Rent
- Prefer not to answer

26) What type of residence do you live in?*

- Detached house (single family home)
- Attached house (e.g., townhome, duplex, triplex)
- Apartment/condominium
- Other, please specify: _____*
- Prefer not to answer

Logic: Show/hide trigger exists. Hidden unless: Invite Variable "custom1" is exactly equal to "1"

27) As a result of getting your EV, have you gotten rid of, or are you planning to get rid of any gasoline-fueled vehicles from your household?

- No, I did not have a gasoline-fueled vehicle
- No, I am keeping my gasoline-fueled vehicle(s).
- Yes, I have or will be getting rid of one.
- Yes, I have or will be getting rid of two or more.

Logic: Hidden unless: Question "As a result of getting your EV, have you gotten rid of, or are you planning to get rid of any gasoline-fueled vehicles from your household?" #27 is one of the following answers ("No, I am keeping my gasoline-fueled vehicle(s).")

28) Will your primary vehicle be gasoline-fueled or electricity-fueled?

- Gasoline-fueled
- Electricity-fueled

Logic: Hidden unless: Question "As a result of getting your EV, have you gotten rid of, or are you planning to get rid of any gasoline-fueled vehicles from your household?" #27 is one of the following answers ("Yes, I have or will be getting rid of one.", "Yes, I have or will be getting rid of two or more.")

29) What did you do or are you planning to do with your old gasoline-fueled vehicle(s)? [select all that apply]

- Sell or trade the vehicle(s) for reuse by a new owner
- Sell or trade the vehicle(s) for parts
- Donate the vehicle(s)
- Give the vehicle(s) to someone I know
- Sell the vehicle(s) to a junk removal service
- I haven't decided yet
- Other, please specify: _____*

Logic: Hidden unless: Invite Variable "custom1" is exactly equal to "1"

30) How many gasoline-fueled vehicles do you intend to have in your household six months from now?

- 0
- 1
- 2
- 3
- 4 or more

31) How many people live in your household, including yourself?

- 1
- 2
- 3
- 4
- 5
- 6
- 7 or more

32) What is your age?*

- 16–20
- 21–29
- 30–39
- 40–49
- 50–59
- 60–69
- 70–79
- 80+
- Prefer not to answer

33) How do you prefer to describe your gender?*

- Female
- Male
- Other: _____
- Prefer not to answer

34) What is the highest level of education you have completed?*

- High school graduate or less
- Some college, no degree
- Associate degree
- Bachelor's degree
- Postgraduate degree
- Prefer not to answer

35) What is your current annual gross household income from all sources (i.e. before taxes)?*

- Less than \$25,000
- \$25,000 to \$49,999
- \$50,000 to \$74,999
- \$75,000 to \$99,999
- \$100,000 to \$124,999
- \$125,000 to \$149,999

- \$150,000 to \$174,999
- \$175,000 to \$199,999
- \$200,000 to \$249,999
- \$250,000 to \$299,999
- \$300,000 to \$399,999
- \$400,000 to \$499,999
- \$500,000 or more
- Prefer not to answer

36) How do you prefer to describe your racial/ethnic identity? [select all that apply]*

- Black or African American
- East Asian
- Latino/a or Hispanic
- Middle Eastern
- Native American or Alaska Native
- Native Hawaiian or Pacific Islander
- South Asian
- White or Caucasian
- Other, please specify:: _____*
- Prefer not to answer

Final Page

37) Please provide any feedback you have on the Drive EverGreen program in the box below. We are especially interested in how we can better support EV adoption in Sonoma County.

38) Would you recommend SCP provide other programs with discounts for SCP customers in the future?

Yes

No

Comments:

39) If you would like to be entered for a chance to win a \$50 Amazon.com gift card, please enter your contact information below, and then click "Submit." We will only use your information to contact you if you are a winner.

First Name: _____

Last Name: _____

Validation: %s format expected

Email Address: _____

Phone Number: _____

Thank You!

Thank you for taking our survey. Your response is very important to us.

Appendix B: Program Design Elements Across Major EV Incentive Programs

| Program Design Elements | Drive EverGreen | CVRP ³⁰ | MOR-EV ³¹ | CHEAPR ³² |
|--------------------------------|--|---|--|--|
| Delivery mechanism | Certificate | Rebate | Rebate | Rebate |
| Time of delivery | Point of sale | After sale | After sale | After sale or at point of sale (via dealership) |
| Amount of incentive | \$2,500 for non-CARE/FERA, \$5,000 for CARE/FERA | \$900 to \$5,000 depending on vehicle type. Additional \$2,000 available to low- or moderate-income applicants | \$750 to \$2,500 depending on vehicle type, battery capacity, and MSRP | \$750 to \$5,000 depending on vehicle type and battery capacity |
| Participant eligibility | SCP customers | CA resident, business/organization, or public agency. Income capped for private individuals. Number of rebates limited by applicant type. | Private individual, Massachusetts resident | CT resident, business/organization, or public agency. Number of rebates limited by applicant type. |
| Vehicle eligibility | Limited to two models at two participating dealerships | All-electric range must be at least 20 miles. 30-month ownership requirement. | 36-month ownership requirement. | 24-month ownership requirement. MSRP capped at \$60,000. |
| Dealership involvement | Submit vouchers and receive reimbursement | No involvement | No involvement | Application submitted at dealership and can be transferred to dealership to reduce purchase price. |
| Tandem incentives | Manufacturer/dealer discounts | None | None | \$300 dealer incentive |

Appendix C: Dealer and Manufacturer Interview Protocol

Before you begin the interview, please be sure to do the following:

1. Thank your participant and encourage them to be open and honest – their feedback is important for the development of the program.
2. Tell your participant that the conversation will **not** be recorded, but that detailed notes will be taken, which will be summarized in a report with program recommendations.
3. Remind your participant that their personal details will not be revealed.
4. Confirm that they have your contact information, should they wish to follow up for any reason.

The below questions are intended to provide guidelines for semi-structured interviews. Slight deviations from the text to maintain a conversational tone are acceptable. This might include skipping parts of a question if the respondent has adequately addressed it already, or probing for additional information if the response seems inadequate.

Interview Protocol – Dealer Employee

1. Could you start by briefly describing your role at your dealership and how you have been involved with the Drive EverGreen EV incentive program?
2. How did you teach your staff about the EV incentive program?
 - a. About how much time did these efforts take?
 - b. How easy or challenging was it to help implement this program?
3. Did you actively promote the EV incentive program to your customers? How?
4. How do you think the EV incentive program affected sales at your dealership?
 - a. Did your salespeople interact with customers any differently during the program? How?
 - b. Can you think of any examples of customers who would not have adopted an EV without the program?
5. What recommendations can you provide to improve the EV incentive program in the future?
6. Can you summarize any other lessons learned from the pilot version of the EV incentive program?
7. If Sonoma Clean Power runs a similar program in the future, how likely are you to participate? Why?
8. Do you have any other feedback or input you would like to provide at this time?

Interview Protocol – OEM/Manufacturer Employee

³⁰ Clean Vehicle Rebate Project (<https://cleanvehiclerebate.org/eng>)

³¹ Massachusetts Offers Rebates for Electric Vehicles (<https://mor-ev.org/>)

³² Connecticut Hydrogen and Electric Automobile Purchase Rebate (http://www.ct.gov/deep/cwp/view.asp?a=2684&q=561422&deepNav_GID=2183)

1. Could you start by briefly describing your role at [Nissan/BMW] and how you have been involved with the Drive EverGreen EV incentive program?
2. How easy or challenging was it to help implement this program?
3. Did [Nissan/BMW] actively promote the EV incentive program in any way? How?
4. What recommendations can you provide to improve the EV incentive program in the future?
5. Can you summarize any other lessons learned from the pilot version of the EV incentive program?
6. If Sonoma Clean Power runs a similar program in the future, how likely are you to participate? Why?
7. Do you have any other feedback or input you would like to provide at this time?



As a mission-driven nonprofit organization, CSE works with energy policymakers, regulators, public agencies and businesses as an expert implementation partner and trusted information resource. Together, we are the catalysts for sustainable energy market development and transformation.

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