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ENERGY COMMISSION**



**CALIFORNIA
NATURAL
RESOURCES
AGENCY**

Clean Transportation Program

FINAL PROJECT REPORT

American Red Cross Adopt-a-Charger Electric Vehicle Supply Equipment Project

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Prepared by: Grant Management Associates

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Maryline Daviaud Lewett

Bianca Arias

Primary Author

Schneider Electric, Inc.

1415 S Roselle Rd.

Palatine, IL 60067

925-596-8529

Agreement Number: ARV-12-039

Darren Nguyen

Commission Agreement Manager

Mark Wenzel

Branch Manager

Light-Duty Electric Vehicle Infrastructure and Analysis Branch

Hannon Rasool

Director

FUELS AND TRANSPORTATION

Drew Bohan

Executive Director

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PREFACE

Assembly Bill 118 (Núñez, Chapter 750, Statutes of 2007) created the Clean Transportation Program. The statute authorizes the California Energy Commission (CEC) to develop and deploy alternative and renewable fuels and advanced transportation technologies to help attain the state's climate change policies. Assembly Bill 8 (Perea, Chapter 401, Statutes of 2013) reauthorizes the Clean Transportation Program through January 1, 2024, and specifies that the CEC allocate up to \$20 million per year (or up to 20 percent of each fiscal year's funds) in funding for hydrogen station development until at least 100 stations are operational.

The Clean Transportation Program has an annual budget of about \$100 million and provides financial support for projects that:

- Reduce California's use and dependence on petroleum transportation fuels and increase the use of alternative and renewable fuels and advanced vehicle technologies.
- Produce sustainable alternative and renewable low-carbon fuels in California.
- Expand alternative fueling infrastructure and fueling stations.
- Improve the efficiency, performance and market viability of alternative light-, medium-, and heavy-duty vehicle technologies.
- Retrofit medium- and heavy-duty on-road and nonroad vehicle fleets to alternative technologies or fuel use.
- Expand the alternative fueling infrastructure available to existing fleets, public transit, and transportation corridors.
- Establish workforce-training programs and conduct public outreach on the benefits of alternative transportation fuels and vehicle technologies.

To be eligible for funding under the Clean Transportation Program, a project must be consistent with the CEC's annual Clean Transportation Program Investment Plan Update. The CEC issued PON-11-602 to provide funding opportunities under the ARFVT Program for the installation of EV charging infrastructure in San Jose at the American Red Cross Silicon Valley site to create a structure for employees and the blood donor community supportive of alternative fuels, to raise awareness of GHG emissions, and to support the American Red Cross future plan for an Electric Vehicle fleet. In response to PON-11-602, the recipient submitted an application which was proposed for funding in the CEC's notice of proposed awards 2012 and the agreement was executed as ARV-12-039 on June 3, 2012.

ABSTRACT

In the American Red Cross Adopt-a-Charger Electric Vehicle Supply Equipment Project, Schneider Electric partnered with the non-profit organization Adopt-a-Charger, to design and install two dual-port Level 2 charging stations (four charging ports) and four Level 1 charging outlets to support eight Electric Vehicle charging-enabled parking spaces in high use and visible parking areas at the American Red Cross facility in Silicon Valley. The Silicon Valley project site is a blood collection and training facility, with an emergency response center.

During the project period, Schneider collected one year of throughput, usage, and operations data from the project to analyze the data for economic and environmental impacts. From January 1, 2014 and December 30, 2014, there were a total of 1,735 accumulated sessions reported at the two dual-port Level 2 charging stations. During these sessions, there was an accumulated savings of 2,176 gasoline gallon equivalent and an accumulated savings of 7,283 kilograms of greenhouse gases.

Based on a combination of national, state, regional and local market trends as well as ongoing monitoring and analysis of usage of the charging infrastructure, additional Electric Vehicle infrastructure is planned for the future. It is likely that the American Red Cross will need to install additional charging stations to meet the demand by American Red Cross employees and the public.

Keywords: American Red Cross, Adopt-a-Charger, Electric Vehicle Supply Equipment, Schneider Electric, Level 1 and Level 2 charging, throughput, gasoline gallon equivalent, greenhouse gases.

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EXECUTIVE SUMMARY

In the American Red Cross- Adopt-a-Charger Electric Vehicle Supply Equipment Project, Schneider Electric partnered with the non-profit organization Adopt-a-Charger, to design and install two dual-port Level 2 charging stations (four charging ports) and four Level 1 charging outlets to support eight Electric Vehicle charging-enabled parking spaces in high use and visible parking areas at the American Red Cross facility in Silicon Valley. The project site is a blood collection and training facility, but also an emergency response center.

During the project period, the project achieved the following principal operational goals and objectives:

Goal 1: Increased the quality, accessibility and accountability of Electric Vehicle charging services at American Red Cross facilities:

- Addressed the current need for Electric Vehicle charging services from staff and visitors.
- Documented usage of Electric Vehicle charging station usage for both California Energy Commission reporting needs and educational experience for staff, donors, and volunteers.

Goal 2: Created a public/private partnership model for accessible, fee-free Electric Vehicle charging services:

- Provided information on the partnership model to promote its replication.
- Created a partnership model for Electric Vehicle charging installations for the American Red Cross system that could be replicated in other locations.
- Supported a dynamic partnership between Schneider Electric, Adopt-a-Charger, and the American Red Cross.

Schneider Electric, Adopt-a-Charger and the American Red Cross worked collaboratively to complete the project according to the scope, budget and terms and conditions. Administration of the project occurred jointly between Adopt-a-Charger and Schneider, with Schneider taking lead responsibility for communicating with and submitting deliverables to the California Energy Commission. Key project personnel from Schneider and Adopt-a-Charger attended Critical Project Review meetings.

Schneider, American Red Cross, and Adopt-a-Charger reported match and data collection. Schneider worked closely with American Red Cross staff and subcontractor REJ Electric to assess each site and develop the site installation plans. Schneider oversaw REJ Electric in the project installation. REJ Electric is an authorized electric vehicle installer with a highly qualified team backed by the most experienced and innovative companies in the electric vehicle charging industry.

Schneider and Adopt-a-Charger provided in-depth training to American Red Cross for complete and effective commissioning of the charging stations. Upon installation and commissioning, the American Red Cross now owns and operates the equipment. Schneider will continue maintain a two-year warranty with full replacement guarantee. Onsite service guarantee will be maintained for the Level 2 Electric Vehicle Supply Equipment.

The Adopt-a-Charger took the lead on data collection with Schneider participating. Schneider and Adopt-a-Charger prepared the data collection test plan. American Red Cross staff have been engaged in the collection and analysis process to promote education on electric vehicles

and stewardship of the sites. Schneider and Adopt-a-Charger have collected and reported data and findings on project usage, charging behavior and environmental benefits to the CEC.

Charger and usage data were collected automatically through cellular General Packet Radio Service modem. The product architecture consists of an Electric Vehicle Charging station cluster to include a minimum of one gateway unit tied to multiple non-gateway units. The gateway unit is tied to the data collection secure server using a cellular modem which draws charger and usage data from non-gateway unit through low range wireless technology based on ZigBee.

Schneider and Adopt-a-Charger took the lead on developing the data collection test plan by collecting once year of throughput, usage, and operations data from the project. Data collection gathered information on the number of vehicles using each charging station per day, the number of days per year the stations were used, the assessment of air emission reductions and the development of the project's carbon intensity values for life-cycle greenhouse gas emissions. Besides providing the basic required data for the project, the Schneider and Adopt-a-Charger partnership installed stations capable of collecting and continuously monitoring the charging station including tracking the charging session data on how long and how often the charger is used.

During a one-year period, between January 1st, 2014 and December 30th, 2014, there were a total of 1,735 accumulated sessions reported at the two dual-port Level 2 charging stations. During these sessions, there was an accumulated savings of 2,176 gasoline gallon equivalent and an accumulated savings of 7,283 kilograms of greenhouse gases.

CHAPTER 1:

Introduction

Purpose of Project 1.1

The purpose of the project was to establish electric vehicle (EV) charging infrastructure at the American Red Cross (ARC) Silicon Valley site in San Jose, to create a structure for employees and for the blood donor community supportive of alternative fuels, to raise awareness of Greenhouse Gas (GHG) emissions, and to support the ARC plan for an electric vehicle fleet.

The project achieved the following principal operational goals and objectives during the project period:

Goal 1: Increased the quality, accessibility, and accountability of EV charging services at ARC facilities:

- Addressed the current need for EV charging services from staff and visitors.
- Documented usage of EV charging station usage for both CEC reporting needs and educational experience for staff, donors, and volunteers.

Goal 2: Created a public/private partnership model for accessible, fee-free EV charging services:

- Provided information on the partnership model to promote its replication.
- Created a partnership model for EV charging installations for the ARC system that could be replicated in other locations.
- Supported a dynamic partnership between Schneider Electric, Adopt-a-Charger (AAC) and the ARC.
- Provided information on the partnership model to promote its replication.

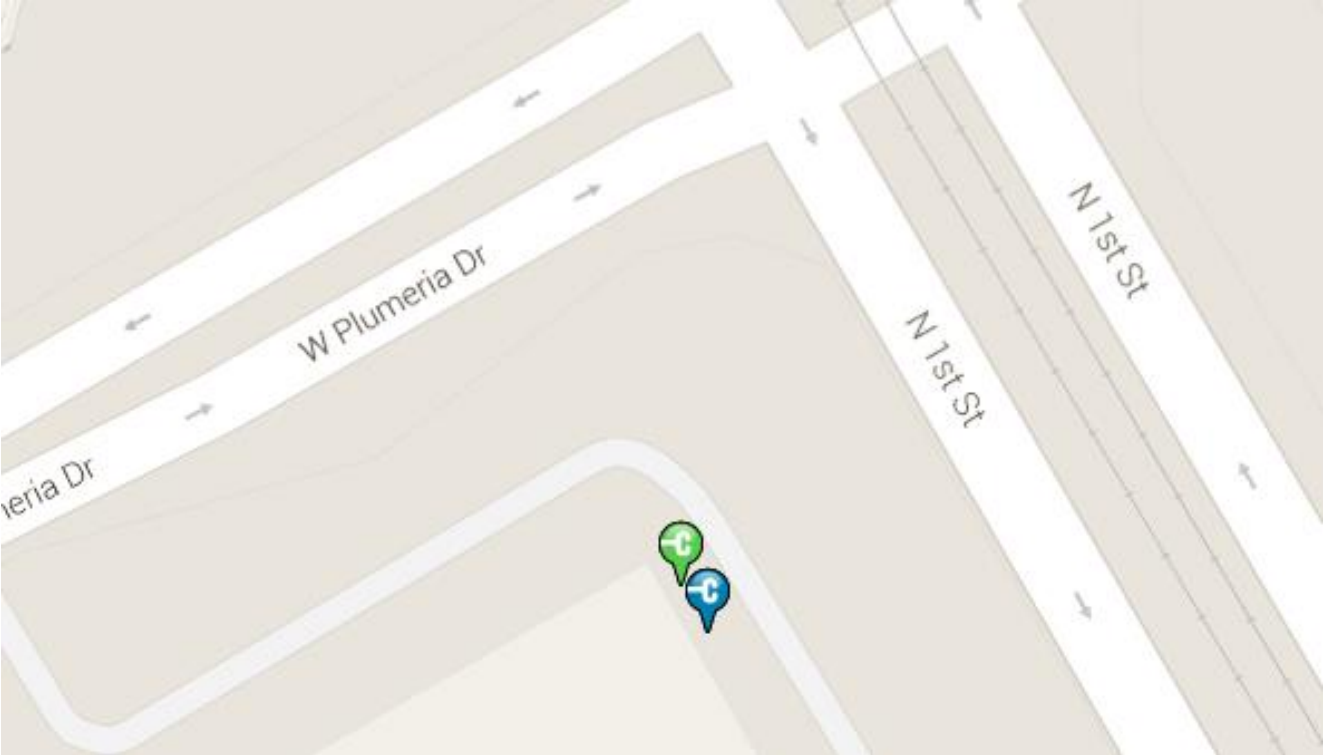
Project Approach 1.2

In the Project, Schneider Electric partnered with the non-profit organization AAC, to design and install two dual-port Level 2 charging stations (four charging ports) and four Level 1 charging outlets to support eight Electric Vehicle charging-enabled parking spaces in high use and visible parking areas at the ARC facility in Silicon Valley. The project site is a blood collection and training facility, but also an emergency response center.

ARC Silicon Valley site is located at 2731 N First Street, San Jose, California 95134. There are nearly 100 staff and volunteers on site each day, with an estimated 50-100 blood donors incoming daily. Emergency preparedness and disaster response classes are held daily, and the site population can be up to 200 individuals on any given day, including the weekends. The project has become a resource for education on alternative fuel technology. ARC Silicon Valley hosts several youth programs and has over 1,000 youth volunteers alone. The project site is located on the same street as the Valley Transportation Authority Light Rail tracks and riders see chargers every time, they pass the building. N First Street is in the middle of a very busy high technology/Silicon Valley section of San Jose which has a large and growing number of electric vehicles that are used for commuting. Before the completion of the project, the nearest Electric Vehicle Supply Equipment was 2.5 and 8 miles away.

Figure 1 shows the location of the two dual-port level 2 charging stations, which is in the ARC facility parking lot at the corner of W Plumeria Drive and N 1st Street.

Figure 1: Location of Dual-port Level 2 Charging Station



Source: Schneider Electric

Figure 2 is an image of the installed dual-port level charging station at the ARC site.

Figure 2: Image of Dual-port Level 2 Charging Station



Source: Schneider Electric

CHAPTER 2:

Results

2.1 Activities and Results

AAC and the ARC worked collaboratively to complete the project according to the scope, budget and terms and conditions. Administration of the project occurred jointly between AAC and Schneider, with Schneider taking lead responsibility for communicating with and submitting deliverables to the California Energy Commission. Key project personnel from Schneider and AAC attended Critical Project Review meetings.

All collaborators, Schneider, ARC and AAC, reported match and data collection. Schneider worked closely with ARC staff and subcontractor REJ Electric to assess each site and develop the site installation plans. Schneider oversaw REJ Electric in the project installation. REJ Electric is an authorized electric vehicle installer with a highly qualified team backed by the most experienced and innovative companies in the electric vehicle charging industry.

Schneider and AAC provided in-depth training to ARC for complete and effective commissioning of the charging stations. Upon installation and commissioning, the ARC now owns and operates the equipment. Schneider will continue maintain a two-year warranty with full replacement guarantee. Onsite service guarantee will be maintained for the Level 2 Electric Vehicle Supply Equipment.

The AAC took the lead on data collection with Schneider participating. Schneider and AAC prepared the data collection test plan. ARC staff have been engaged in the collection and analysis process to promote education on electric vehicles and stewardship of the sites. Schneider and AAC have collected and reported data and findings on project usage, charging behavior and environmental benefits to the CEC.

Charger and usage data were collected automatically through cellular General Packet Radio Service modem. The product architecture consists of an Electric Vehicle Charging station cluster to include a minimum of one gateway unit tied to multiple non-gateway units. The gateway unit is tied to the data collection secure server using a cellular modem which draws charger and usage data from non-gateway unit through low range wireless technology based on ZigBee.

Schneider and AAC took the lead on developing the data collection test plan by collecting one year of throughput, usage, and operations data from the project from January to December 2014. Data collection was gathered information on the number of vehicles using each charging station per day, the number of days per year the stations were used, the assessment of air emission reductions and the development of the project's carbon intensity values for life-cycle greenhouse gas emissions. Besides providing the basic required data for the project, the Schneider and AAC partnership installed stations capable of collecting and continuously monitoring the charging station including tracking the charging session data on how long and how often the charger is used.

The result of the project was installation and completion of two dual-port Level 2 charging stations at the ARC facility. During a one-year period, between January 1st, 2014 and December 30th, 2014, there were a total of 1,735 accumulated sessions reported at the two

dual-port Level 2 charging stations. During these sessions, there was an accumulated savings of 2,176 gasoline gallon equivalent (GGE) and an accumulated savings of 7,283 kilograms of GHG.

2.2 Data Collection

Table 1 shows a summary of the charging sessions details tracked from January 2, 2014 to December 31, 2014. From January to October, the usage and GHG/GGE savings increased by 108 percent. November and December saw a slight decrease in usage due to the holidays, also experienced by 95 percent of all EV customers during these months. In January 2015, usage increased above usage levels from October 2014 where October saw usage of 2.129 megawatt hours of energy while January 2015 usage was 2.276 megawatt hours.

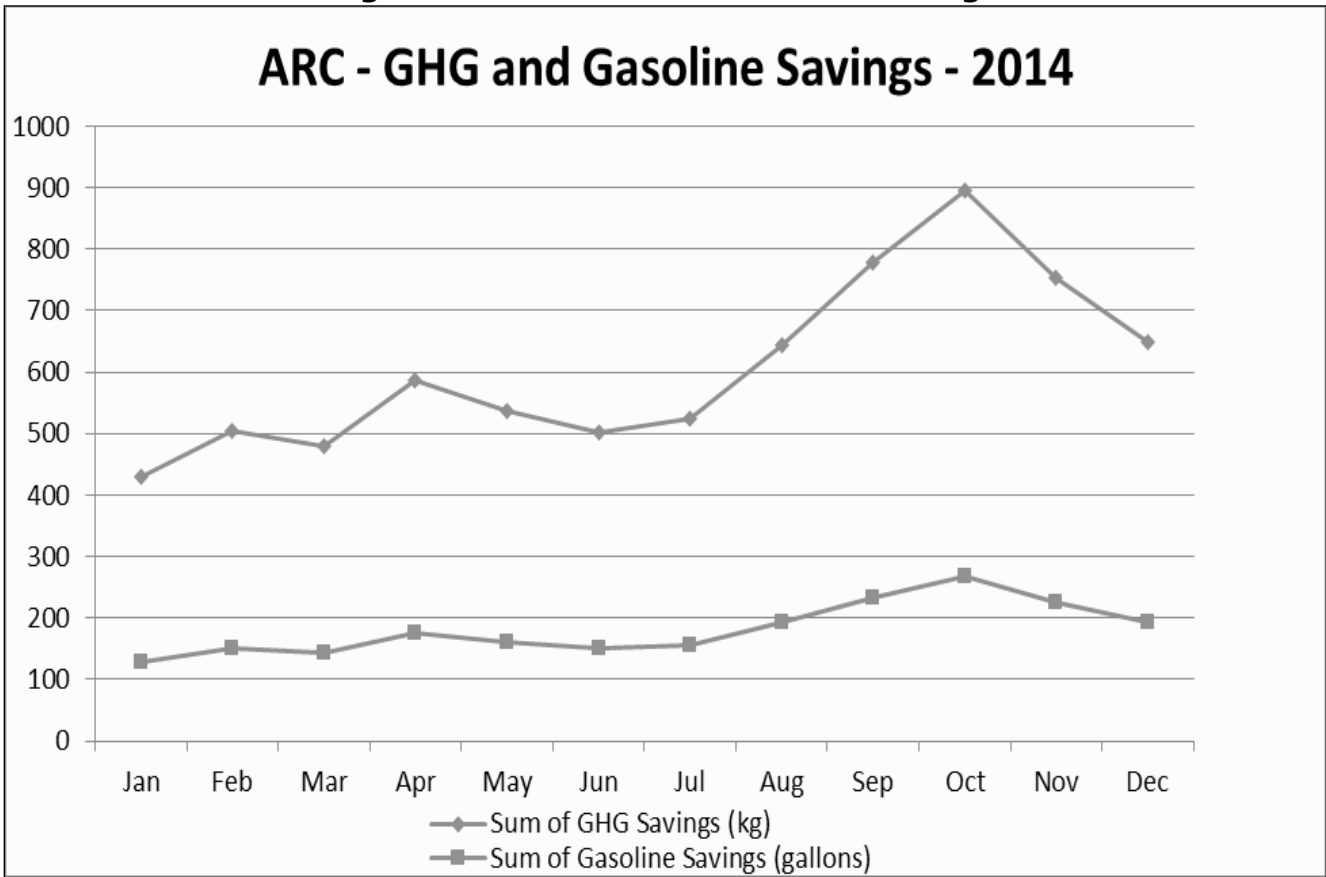
Table 1: 2014 GHG and Gasoline Savings

Month	Sum of GHG Savings (kilograms)	Sum of Gasoline Savings (gallons)
Jan	428.571	128.06
Feb	505.646	151.085
Mar	480.196	143.491
Apr	585.53	174.961
May	536.046	160.171
Jun	501.094	149.737
Jul	524.702	156.79
Aug	645.053	192.749
Sep	779.151	232.814
Oct	894.398	267.248
Nov	754.532	225.466
Dec	648.108	193.659
Grand Total	7283.027	2176.231

Source: Schneider Electric

Figure 3 shows a chart of the 2014 GHG and GGE savings. The graph shows a steady increase in savings with a steadier increase beginning in July. The decrease in usage shown in November and December is due to holiday and vacation time. If the chart continued into January 2015, the graph would show a sharp increase above the usage shown in October.

Figure 3: 2014 GHG and Gasoline Savings



Source: Schneider Electric

CHAPTER 3:

Developments

3.1 Advancements in Science

The project did not result in any specific advancements in science. However, since 2009, Schneider has worked to develop this unique EVlink charging solution for electric vehicles. Schneider's EVlink infrastructure solutions allow vehicle batteries to be charged safely and optimizes the charging load according to the vehicle's needs and the power available in the grid.

The basic EVlink product line was launched in the United States in 2011. The next generation of EVlink –networked and with communication devices- was released in June 2012. Due to the built-in telecommunications system, the chargers inform users of their availability, charging status, and energy usage and send information to the vehicle's owner as well as the Schneider database when the charging process is complete. The ARC charging stations are equipped with this next generation of EVlink, which is networked and with communication devices, and has served as a project to evaluate the new technology to continually improve the EV technology.

3.2 Public Assessment

To encourage employees to switch to electric vehicles, an "EV Rally" was held to mark the completion of the project to generate interests and awareness. The rally consisted of a ribbon cutting and an electric vehicle tour of charging facilities where local EV alliance members, representatives from the CEC, Pacific Gas and Electric, Schneider Electric and members of the community were present.

CHAPTER 4:

Conclusions

4.1 Observations & Conclusions

The ARC project installation went very smoothly, and there were no major problems experienced. Based on the data collections in 2014, usage more than doubled from completion of installation. We predict that usage will continue to increase gradually throughout 2015 as employees and the public become more educated on alternative energy and electric vehicles, as well as the public becomes aware of the charging station installation at the ARC site.

4.2 Recommendations

Based on a combination of national, state, regional and local market trends as well as ongoing monitoring and analysis of usage of the charging infrastructure, additional EV infrastructure is planned. It is likely that the ARC will need to install additional charging stations to meet the demand by ARC employees and the public.

GLOSSARY

ADOPT-A-CHARGER (AAC)– Adopt a Charger, a nonprofit organization, accelerates the widespread adoption of plug-in vehicles through the proliferation of public, fee-free electric car chargers which are “adopted” by sponsors. These sponsors, corporations, organizations and individuals, donate funds used to install and maintain EV chargers in parks, museums, beaches and other widely used public places.¹

American Red Cross (ARC)– a humanitarian organization that provides emergency assistance, disaster relief, and disaster preparedness education in the United States.

CALIFORNIA DIVISION OF OCCUPATIONAL SAFETY AND HEALTH (DOSH or CalOSHA)— Protects and improves the health and safety of working men and women in California and the safety of passengers riding on elevators, amusement rides, and tramways.

CALIFORNIA ENERGY COMMISSION (CEC)—The state agency established by the Warren-Alquist State Energy Resources Conservation and Development Act in 1974 (Public Resources Code, Sections 25000 et seq.) responsible for energy policy. The CEC's five major areas of responsibilities are:

1. Forecasting future statewide energy needs.
2. Licensing power plants sufficient to meet those needs.
3. Promoting energy conservation and efficiency measures.
4. Developing renewable and alternative energy resources, including providing assistance to develop clean transportation fuels.
5. Planning for and directing state response to energy emergencies.

Funding for the CEC's activities comes from the Energy Resources Program Account, Federal Petroleum Violation Escrow Account, and other sources.

ELECTRIC VEHICLE (EV)—A broad category that includes all vehicles that are fully powered by electricity or an electric motor.

GAS GALLON EQUIVALENT (GGE)—The total amount of alternative fuel that is needed to equal the energy output of a gallon of conventional gasoline.

GREENHOUSE GAS (GHG)—Any gas that absorbs infrared radiation in the atmosphere. Greenhouse gases include water vapor, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (NO_x), halogenated fluorocarbons (HCFCs), ozone (O₃), perfluorinated carbons (PFCs), and hydrofluorocarbons (HFCs).

¹ [Adopt-a-Charger](https://adoptacharger.org/) website is available at <https://adoptacharger.org/>