

Potential EV Charging Stations in Los Alamos County

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Introduction

As the popularity of electric vehicles (EVs), and plug in hybrids (PHEVs) increases, the infrastructure to support them needs to increase accordingly. The difficulty is choosing public charging stations that are both convenient, and compatible with the types of vehicles that customers are driving.

There are three different levels of electric vehicle charging stations:

Level 1:

This is plugging the vehicle in to a standard 120V wall outlet. It is the slowest method of charging an electric vehicle, and will fully charge a Tesla Model S P100d in 4 days [1]. These chargers typically charge at around 1kW and are more commonly used for plug-in hybrids or EVs with smaller batteries. [2]

Level 2:

These are 240V electric car charging stations. They use the J-1772 plug, which is standard in the United States [2] and can charge with 3-20kW[2]. They will charge a Tesla Model S P100d in 6-30 hours depending on the output of the station [1].

Level 3:

These are 480V “fast charging” stations also known as DC Fast Chargers (DCFC). Not all vehicles are compatible with level 3 stations, especially PHEVs. They typically charge with 50kW of power [2]. There are two different connectors used by Level 3 charging stations CHAdeMO, typically used by Asian manufactured EVs, and SAE combo, typically used by American and European manufactured EVs. Tesla uses its own standard connector. Level 3 stations will charge a Nissan Leaf from dead to 80% charge in 40 minutes [3].

Tesla Superchargers:

Tesla superchargers are the fastest chargers currently available, but are only compatible with Tesla vehicles. They will give a Tesla up to 170 miles of range in 30 minutes of charging [1].

Charging Station Solutions

Level 2 chargers are preferred for Los Alamos County due to their comparatively low cost, availability, and compatibility with all commercial EVs. These chargers will charge EVs quickly enough to be useful, and are more common than DC Fast Chargers. There are two main categories of public EV chargers; networked, and non-networked. Networked chargers are part of large networks that use their own pay system. Charging networks collect data and manage customer payments, as well as monitor station status. There are 14 different EV networks. These have been narrowed down to three potential networks for Los Alamos County based on availability in the US and ability to set our

own pricing system. The three networks with the most relevance for Los Alamos County are:

- SemaConnect
- ChargePoint
- Greenlots

Non-networked stations are not part of a network, and are privately owned and operated. Brands of non-networked charging stations that offer a payment system are:

- EMotorwerks JuiceStation (not yet available)
- EVSE LLC

SemaConnect:

Features:

- Ability to pay per kilowatt hour
- 24/7 Driver Support
- Connect via cell network for station monitoring
- SemaConnect does not take any driver revenue
- Drivers start charging via an RFID card, website, or mobile app
- Mobile app allows drivers to be notified when the vehicle is done charging and to see if the station is available
- 1 year full replacement warranty

Costs:

- \$3190 + install for a single station
- \$6380 + install for a dual station
- \$600 for optional cord management system
- \$240 per plug per year service charge
- 3% bank processing fee on driver revenue

ChargePoint:

Features:

- Ability to pay per kilowatt hour
- 24/7 Driver Support
- Connect via cell network for station monitoring
- Sourcewell (NJPA) member
- Ability to set multiple rate systems
- Drivers start charging via RFID card or ChargePoint App

Costs:

- \$10,000 + install for dual station and 60 months of service charge
- \$280 per plug per year service charge
- ChargePoint takes 10% of driver revenue for administrative costs

EVSE LLC:

Features

- Ability to charge per kilowatt hour
- Customers are charged using their credit card
- Optional software to collect data on usage
- Modular-ability to replace individual parts
- Ability to add payment module later
- RFID cards to charge fleet vehicles

Costs

- \$200 per plug per year for optional software

Greenlots:

Features

- Open Charge Point Protocol (OCPP) compliant
- Ability to charge per kilowatt hour
- Different hardware options
- Can use a different software without changing hardware
- Charging via credit card reader, RFID card, phone app, or call to start charging
-

Costs

- \$4500 for station
- \$150 per year per station data connection fee
- \$425 per year per port software fee
- \$150 one time commissioning fee

EV Infrastructure Currently in Los Alamos County

There are currently three public EV charging stations in Los Alamos County in addition to the private LANL stations.

Location	Level	Network	Plug Type	Cost	Plugs
Del Norte Credit Union	2	Non-Networked	J-1772	Free	1
MUNI Building	2	Non-Networked	J-1772	Free	6
Los Alamos Nature Center	2	Non-Networked	J-1772	Free	2
LANL	2	Chargepoint	J-1772	\$.50/hr	N/A

The stations that have been put in place outside the MUNI building are Schneider Electric EV Link EV230PDRs. They have been discontinued and not replaced with a later model [4]. The Schneider Electric EV230PDRR is still available for \$4600, but require RFID cards and is designed for fleet charging, not public use. There is no payment system for the current units.

LANL uses two different types of EV charging stations: the Schneider Electric EV230PDRR for their fleet vehicles, and Chargepoint stations of public use. For the public charging stations LANL charges \$.50 per hour parked.

EV Infrastructure in Cities Surrounding Los Alamos

There are 19 charging stations in Santa Fe, and 23 in Albuquerque. Of these, 4 are networked in Santa Fe, and 10 in Albuquerque. The networks used are as follows

Santa Fe

- 1 EVgo
- 1 Blink
- 2 Chargepoint

Albuquerque

- 3 Greenlots
- 7 Chargepoint

Potential EV Charging Sites

A good location for EV charging sites meets the following criteria:

- Locations where a person is likely to stay an hour or more
- Locations that have access to retail/tourist locations
- Locations where vehicles are likely to park

Level 2 chargers will probably be best for the following sites, due to the long times that people stay. This will enable people to use the spots for parking as well.

Los Alamos:

Mesa Library

- People stay for long periods of time
- Park n Ride – Potential Federal Funding

Ashley Pond Park

- Downtown access
- Tourist area

White Rock:

Visitors Center-Bandelier National Park

- Tourist area
- People stay for long periods of time
- Already has power hookups for RVs

White Rock Library

- People stay for long periods of time
- Local White Rock traffic

Potential Sources of Funding

Surface Transportation Block Grant Program:

The Surface Transportation Block Grant Program (STBG) is a federal fund set up to address state and local transportation needs. Funds from this program provide for the construction of EV charging stations associated with truck parking facilities and fringe and corridor parking facilities.

Sourcewell (NJPA):

Los Alamos is a member of Sourcewell (formerly National Joint Powers Alliance). Chargepoint is also a member, and offers discounted pricing for Sourcewell members. Due to the nature of cooperative purchasing, the project would also not have to go to bid, because of the cooperative purchasing program.

Revenue

There are two ways to charge customers, per kWh of electricity used, or per hour spent plugged into the station. Charging customers per hour spent plugged into the station would discourage customers from spending extended periods of time plugged into the station even when their vehicle finishes charging. If customers decide to remain plugged into the station, they will be charged for the time another EV driver could potentially be using the station.

At this time, it is not possible to predict revenue accurately without placing stations in Los Alamos County to collect usage data. For this reason, calculations have been completed using the LANL rate of \$.50/hr, and a conservative usage rate of 3 hours per plug per day. The calculations also assume that the vehicles are charging at a constant rate of 7.6kW per hour, which is on the higher end of what most EVs and PHEVs charge with. DPU paid 4.4 cents per kWh of wholesale electricity in 2017, and that number has been used for this calculation.

$$(3 \text{ hrs/day})(365 \text{ day/yr}) = 1,095 \text{ hours of plug usage per year}$$

$$(1,095\text{hrs})(\$0.5) = \$547.50 \text{ of plug revenue per year}$$

$$\$547.50 - (7.6\text{kW})(1,095\text{hrs})(\$0.044) = \$181.33 \text{ per plug per year}$$

The station revenue of \$181.33 will pay for most of the software and data fees. While it will not pay for the cost of infrastructure, installing stations now will place Los Alamos County in a position to support electric vehicles in the future.

Recommendation

Car manufacturers have released statements of plans to release many new models of electric cars by 2020. As the percentage of electric vehicles on the road increases, LAC needs to add infrastructure to support these new vehicles. By placing trial stations and collecting usage data, LAC will be able to determine how best to support the growing number of EVs in the future.

Works Cited

- [1] <https://www.pluglesspower.com/learn/tesla-model-s-charging-home-public-autonomously/>
- [2] <https://chargehub.com/en/electric-car-charging-guide.html>
- [3] <https://www.nissanusa.com/vehicles/electric-cars/leaf/range-charging.html>
- [4] <https://www.schneider-electric.us/en/product/EV230PDR/evlink-level-2-pedestal-mounted-dual-7.2kw-exterior-charging-station/>
- [5] <https://www.plugshare.com>

Works Consulted

<https://www.plugshare.com/>

<https://evobsession.com/electric-car-charging-101-types-of-charging-apps-more/>

<http://www.plugincars.com/ultimate-guide-electric-car-charging-networks-126530.html>

<https://chargedevs.com/features/proceed-with-caution-charging-for-ev-charging/>

<https://www.energy.gov/sites/prod/files/2016/07/f33/Guide%20to%20Federal%20Funding%20and%20Financing%20for%20PEVs%20and%20PEV%20Charging.pdf>

<http://www.govtech.com/fs/Building-Out-Electric-Vehicle-Infrastructure-Where-Are-the-Best-Locations-for-Charging-Stations.html>

<https://www.ijcai.org/Proceedings/15/Papers/377.pdf>

<https://www.fhwa.dot.gov/specialfunding/stp/>

<https://luskin.ucla.edu/sites/default/files/Non-Residential%20Charging%20Stations.pdf>

<http://evsellc.com/solutions/payment-solutions/>

<https://emotorwerks.com/products/charging-stations/juicestation>

Appendix A: Maps of Existing Stations

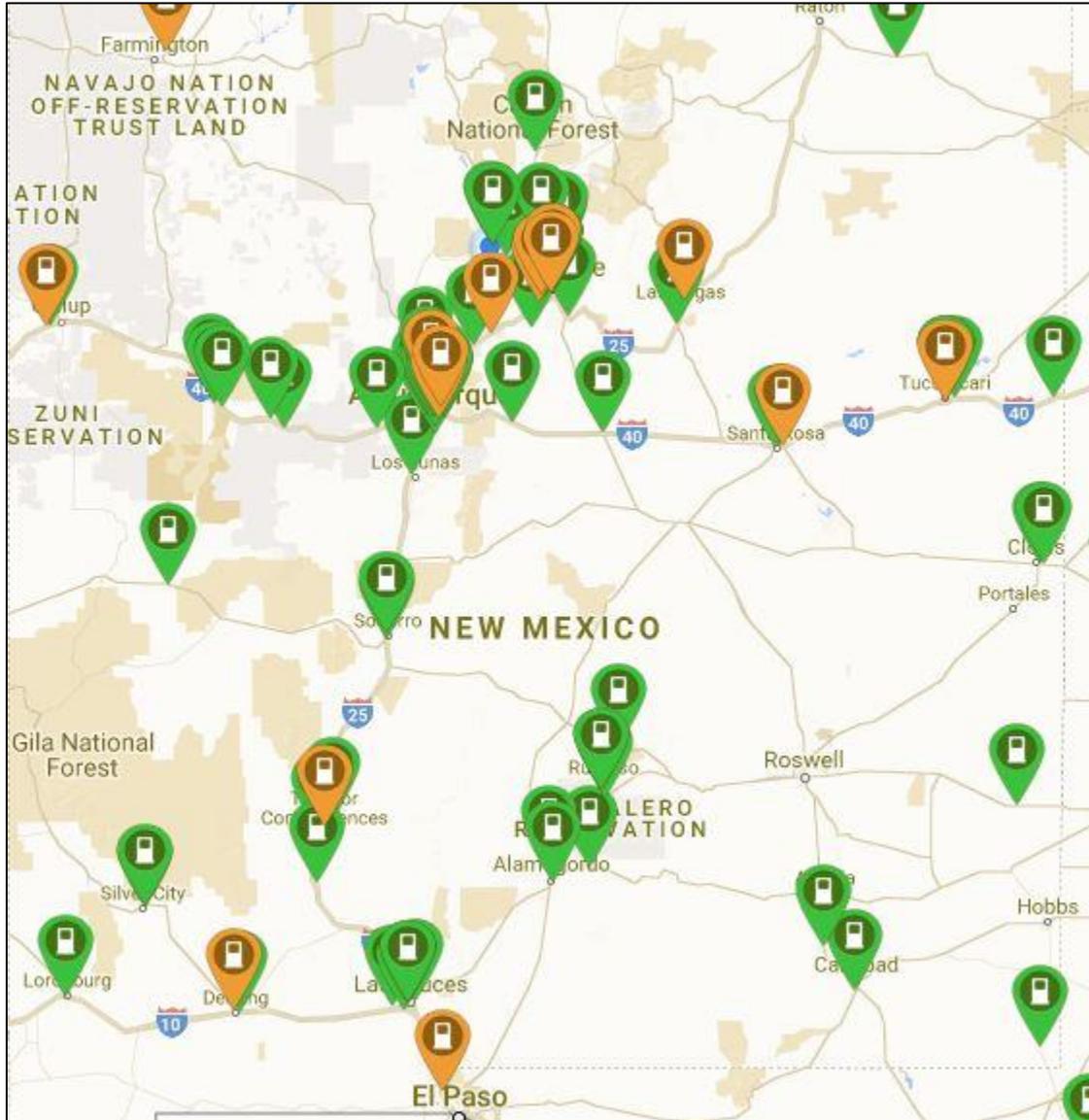


Figure 1: Map of all EV Charging Stations in New Mexico

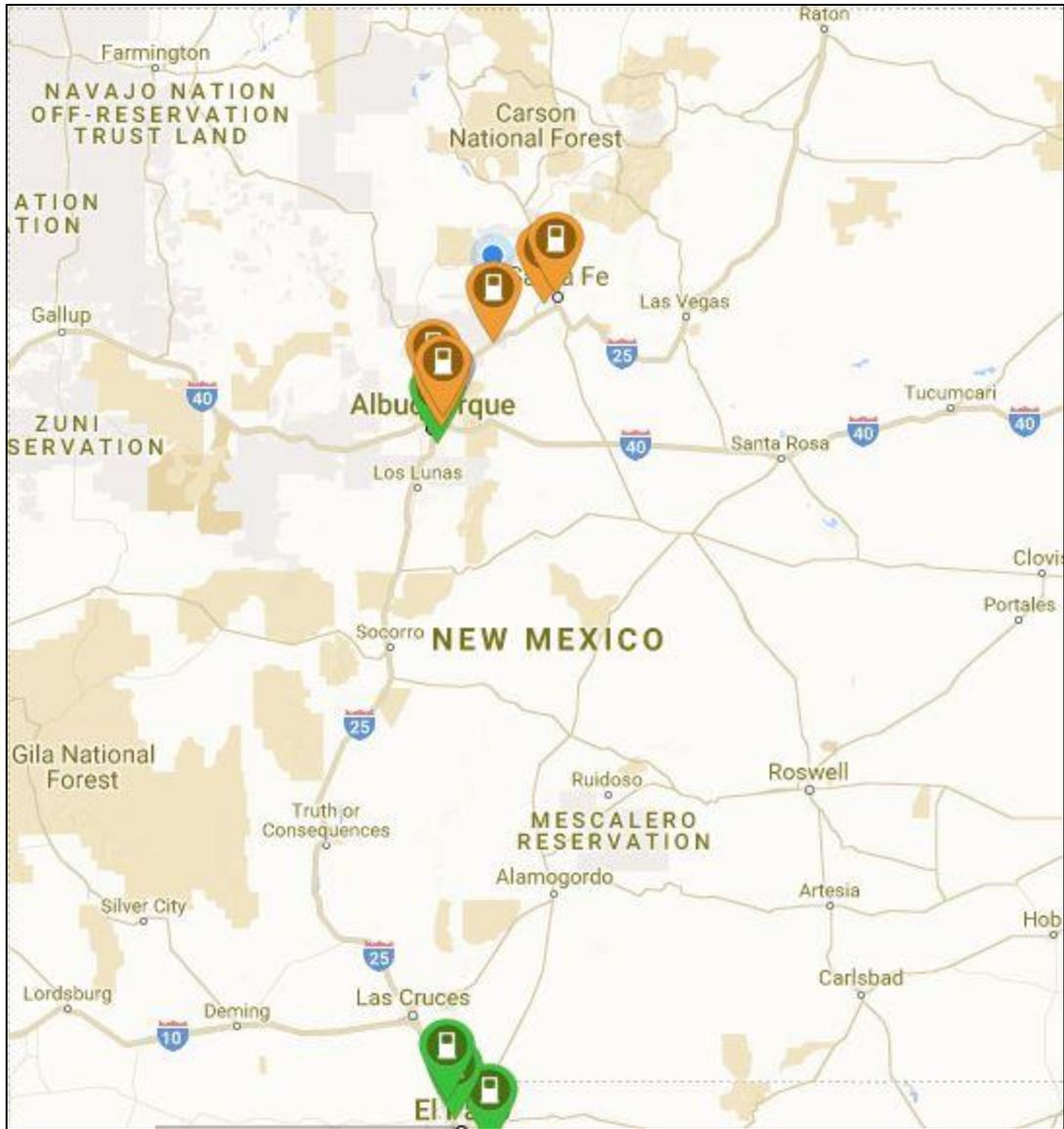


Figure 2: Map of Networked Stations in New Mexico

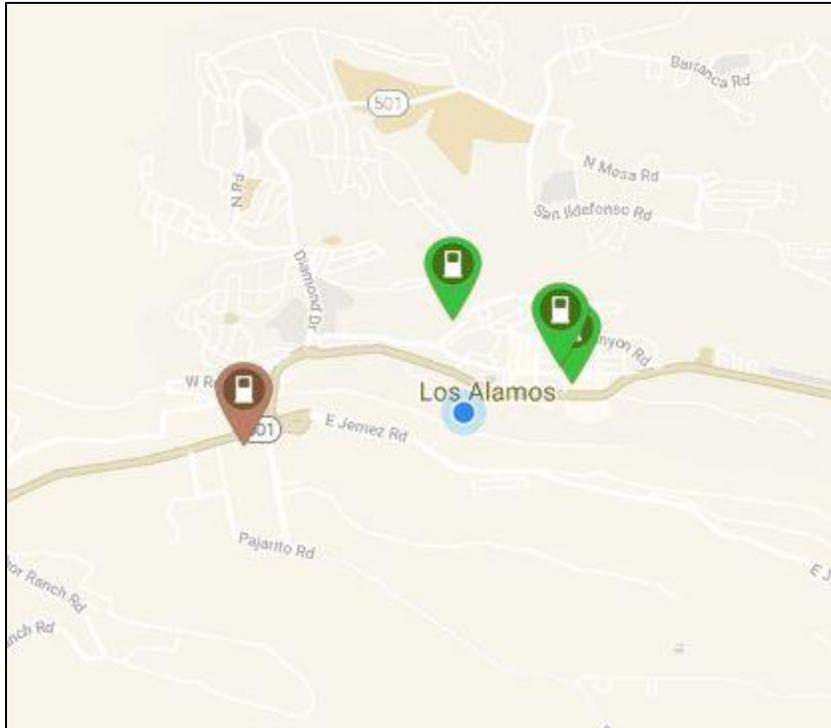


Figure 3: Stations in Los Alamos

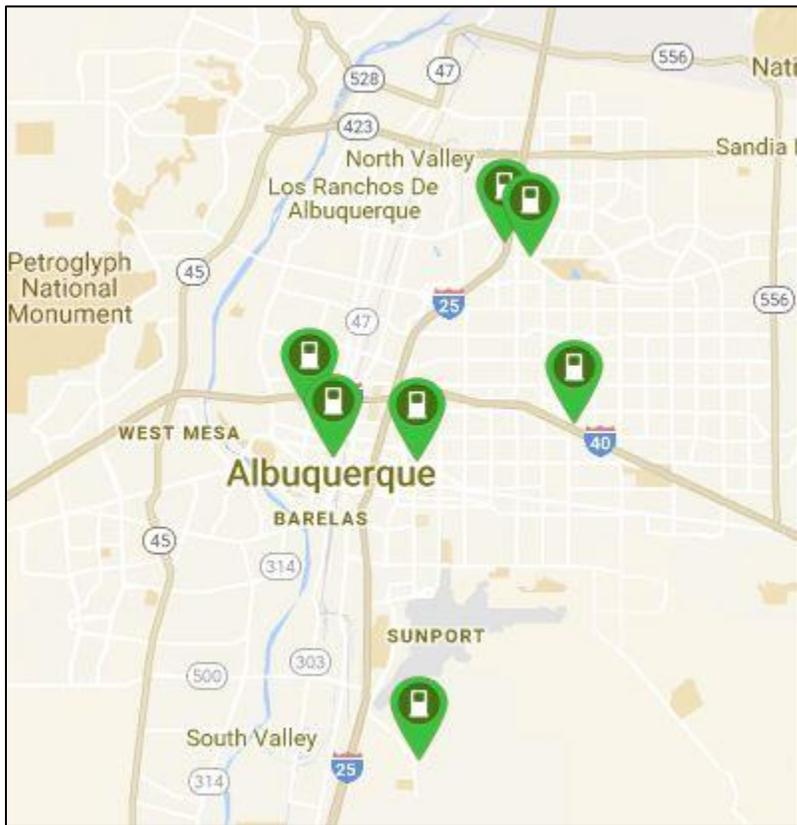


Figure 4: Chargepoint Stations in Albuquerque

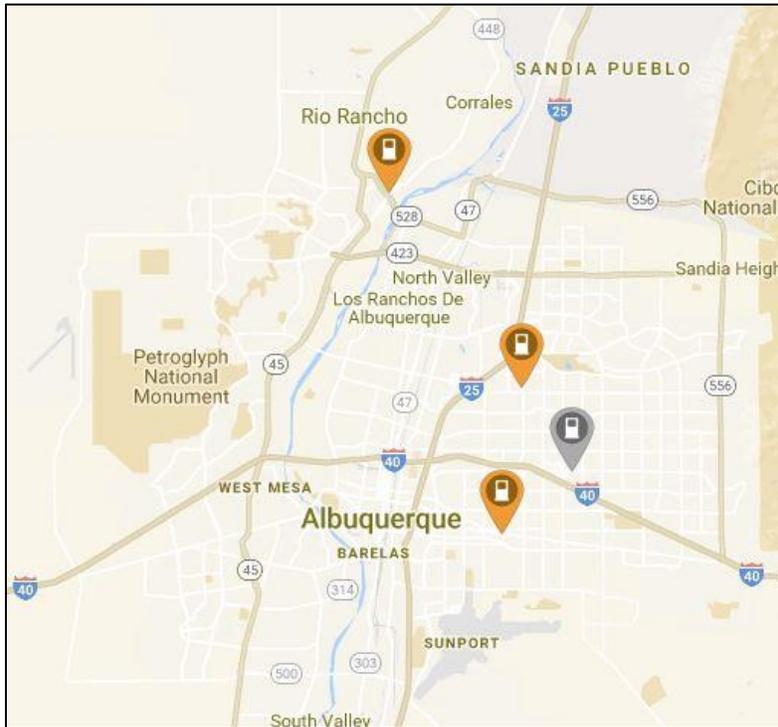


Figure 5: Greenlots Stations in Albuquerque

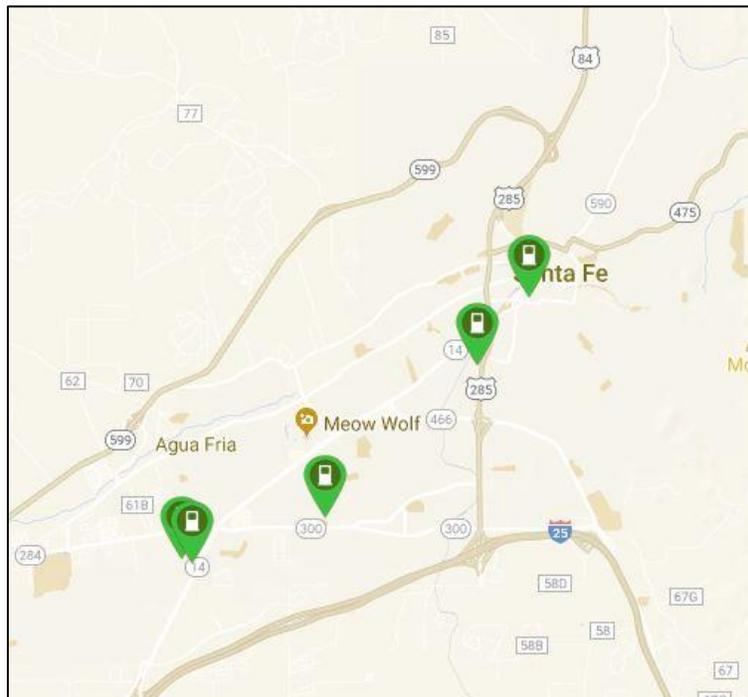


Figure 6: Chargepoint Stations in Santa Fe

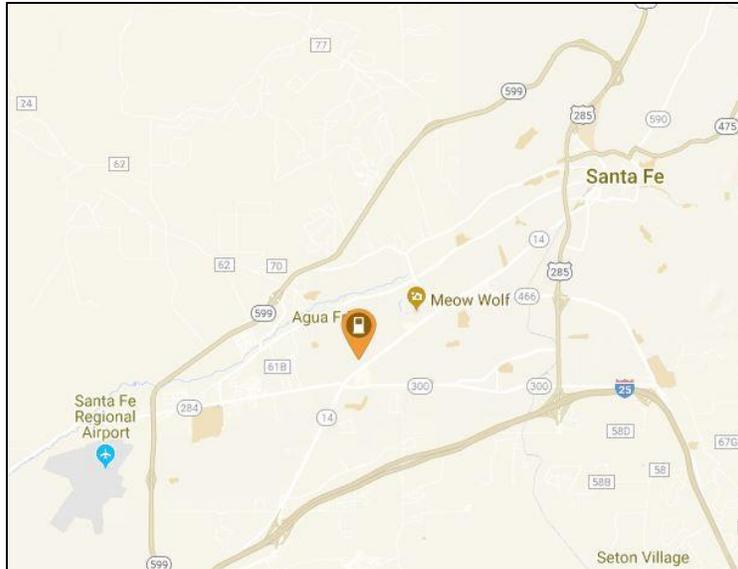


Figure 7: Greenlots Stations in Santa Fe

Appendix B: Photos of Current Infrastructure



Figure 1: Del Norte Credit Union Station

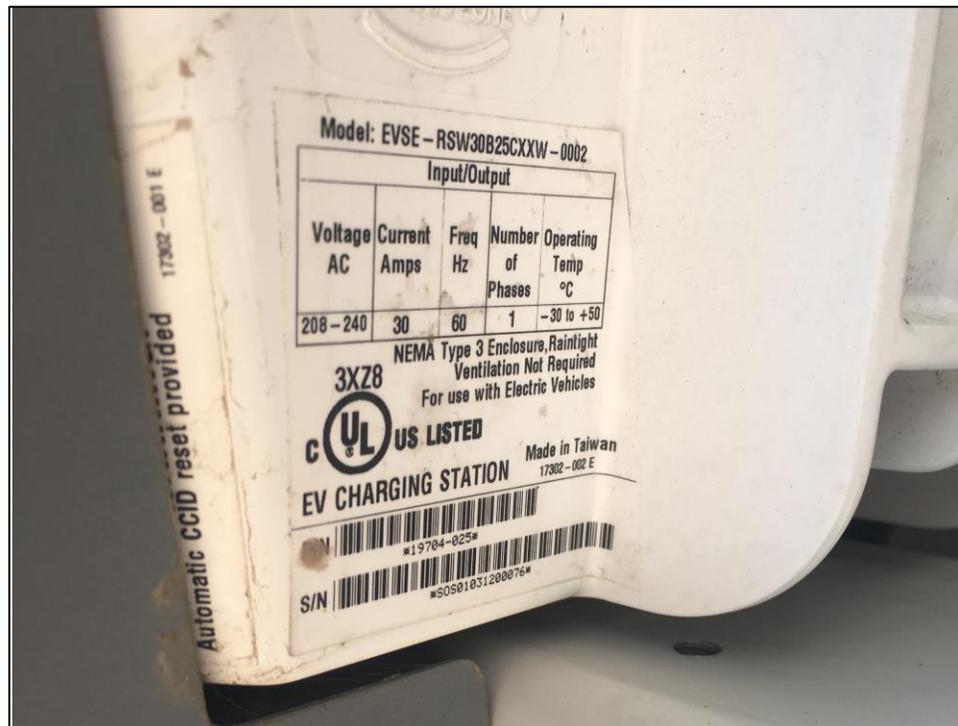


Figure 2: Del Norte Credit Union Station Information



Figure 3: Nature Center Charging Station



Figure 4: Nature Center Charging Station Information



Figure 5: LANL Chargepoint Stations



Figure 6: LANL Schneider Electric Station



Figure 7: LANL Schneider Electric Information

Appendix C: Charging Station Information



CT4000 Level 2 Commercial Charging Stations

Specifications and Ordering Information

Ordering Information

Specify model number followed by the applicable code(s).
The order code sequence is: **Model-Options, Software, Services** and **Misc** are ordered as separate line items.

Hardware

Description	Order Code
Model	
1830 mm (6') Single Port Bollard Mount	CT4011
1830 mm (6') Dual Port Bollard Mount	CT4021
1830 mm (6') Single Port Wall Mount	CT4013
1830 mm (6') Dual Port Wall Mount	CT4023
2440 mm (8') Dual Port Bollard Mount	CT4025
2440 mm (8') Dual Port Wall Mount	CT4027
Options	
Integral Gateway Modem - USA	-GW1
Integral Gateway Modem - Canada	-GW2
Misc	
Power Management Kit	CT4000-PMGMT
Bollard Concrete Mounting Kit	CT4001-CCM

Software & Services

Description	Order Code
ChargePoint Commercial Service Plan	CTSW-SAS-COMM- <i>n</i> ¹
ChargePoint Service Provider Plan	CTSW-SAS-SP- <i>n</i> ²
ChargePoint Assure	CT4000-ASSURE <i>n</i> ²
Station Activation and Configuration	CPSUPPORT-ACTIVE
ChargePoint Station Installation and Validation	CT4000-INSTALLVALID

Note: All CT4000 stations come with 1 year of ChargePoint Assure coverage at no charge for qualified installations. Other conditions apply. All CT4000 stations require a network service plan.

¹ Substitute *n* for desired years of service (1, 2, 3, 4, or 5 years).

² Substitute *n* for the duration of the additional coverage (1, 2, 3, or 4 years).

Order Code Examples

If ordering this	the order code is
1830 mm (6') Dual Port Bollard USA Gateway Station with Concrete Mounting Kit	CT4021-GW1 CT4001-CCM
ChargePoint Commercial Service Plan, 3 Year Subscription	CTSW-SAS-COMM-3
ChargePoint Station Installation and Validation	CT4000-INSTALLVALID
2 Additional Years of Assure Coverage	CT4000-ASSURE2
1830 mm (6') Single Port Wall Mount Station	CT4013
ChargePoint Commercial Service Plan, 5 Year Subscription	CTSW-SAS-COMM-5
4 Additional Years of Assure Coverage	CT4000-ASSURE4
Station Activation and Configuration	CPSUPPORT-ACTIVE



CT4021



SemaConnect 6 Series Charging Station

The perfect EV Charging solution

The electric vehicle generation is happening now. With the SemaConnect Station, you won't be a part of the green movement.

You'll lead it.



semaconnect.com | 1(800) 663-5633

Appendix D: Sample Quotes



Electric Vehicle Charging Station Order Form

Prepared By	Connie Meehan	Quote Name	City Stations
Email	connie.meehan@semaconnect.com	Quote Number	Q-08261
Phone	(970) 420-0391	Created Date	6/11/2018
Bill To Name	Los Alamos County-Department of Public Utilities	Phone	676-322-8627
Contact Name	Tyler Mabraten	Email	tyler.mabraten.work@gmail.com
Bill To	tbd Los Alamos, NM	Ship To	tbd

SemaConnect is pleased to extend this offer of Electric Vehicle Charging Station products and services. By signing this document you are committing to order the charging station solution as defined below.

Product and Services Description

- SemaConnect Commercial-Grade Smart EV Charging Station(s) with Mounting Device(s)
- Full Service Program Includes:
 - Network Service Program: Cloud-based management software, 1-800 driver support, dedicated cellular data communications and 24x7x365 state-of-health monitoring.
 - Warranty Program: Full Replacement Service with no repair cycle

Product	List Price	Discount \$	Quantity	Subtotal
SemaConnect S6 Charging Stations w/ One Year Full Service - Dual Pedestal	\$7,180.00	\$800.00	1.00	\$6,380.00
Network Service Fee Per Month \$40				
Total Price	\$6,380.00			

Note: Network Service Fees begin after Full Service Program is complete

Delivery Schedule Delivery within 3 week(s) of placing the Order

This signed document shall serve as a Purchase Order for the proposed project

Price does not include shipping fees or sales tax
Quoted price is valid for 30 days from Created Date

- Shipment within 60 days of Order: Invoice for 100% of project price upon shipment with Net 30 day terms
- Shipment 60 days or greater of Order: Invoice for 25% upon order placement, 75% upon shipment with Net 30 day terms

Accepted by:
 Name: _____
 Title: _____
 Signature: _____
 Date: _____



Product Name	Product Description	Qty	List Price	Disc%	Unit Price	Total Price
CPSUPPORT-SITEVALID	Customer works with their own contractor to perform the construction and station installation. CPSUPPORT-SITEVALID is used to validate that a customer installation has been performed per ChargePoint published requirements. The on-site validation of electrical capacity, transformers, panels, breakers, wiring, cellular coverage and that the station installation meets all ChargePoint published requirements and local codes. A site is defined as a group of stations all connected to the same gateway station. CPSUPPORT-SITEVALID is priced per gateway station and used when the customer is not using an O&M Partner or self-validating Channel Partner to install their stations. Note that a failed Site Validation will incur a second validation fee to repeat the validation after the site deficiencies are corrected. A successful Site Validation is a prerequisite to purchase ChargePoint Assure.	1	USD 599	0	USD 599	USD 599
CT4021-GW1	Dual Output Gateway Option USA, Bollard Unit - 208/240V @30A with Cord Management	1	USD 7,210	20	USD 5,768	USD 5,768
CT4001-CCM	CT4000 Bollard Concrete Mounting Kit. Bolts: 5/8 - 11 x 9" F1554 Grade 55 hot-dipped galvanized threaded bolts - 3 ea. Nuts: 5/8 - Heavy Galvanized Hex Nuts (DH Rated) - 12 ea. Washers: Galvanized Washers (ASTM F436) - 9 ea. Plastic Template - 1 ea	1	USD 95	0	USD 95	USD 95
CT4000-ASSURE1	1 prepaid year of ChargePoint Assure.	1	USD 740	0	USD 740	USD 740

Quote Total: USD 8,111.00
Shipping and Handling: USD 160.00
Grand Total: USD 8,271.00

Sales tax in applicable states (AZ, CA, FL, GA, MA, NY, PA, TX, WA) and shipping fees will be applied to invoice.



Product Name	Product Description	Qty	List Price	Disc%	Unit Price	Total Price
CPSUPPORT-SITEVALID	Customer works with their own contractor to perform the construction and station installation. CPSUPPORT-SITEVALID is used to validate that a customer installation has been performed per ChargePoint published requirements. The on-site validation of electrical capacity, transformers, panels, breakers, wiring, cellular coverage and that the station installation meets all ChargePoint published requirements and local codes. A site is defined as a group of stations all connected to the same gateway station. CPSUPPORT-SITEVALID is priced per gateway station and used when the customer is not using an O&M Partner or self-validating Channel Partner to install their stations. Note that a failed Site Validation will incur a second validation fee to repeat the validation after the site deficiencies are corrected. A successful Site Validation is a prerequisite to purchase ChargePoint Assure.	1	USD 599	0	USD 599	USD 599
CT4021-GW1	Dual Output Gateway Option USA, Bollard Unit - 208/240V @30A with Cord Management	1	USD 7,210	20	USD 5,768	USD 5,768
CT4001-CCM	CT4000 Bollard Concrete Mounting Kit. Bolts: 5/8 - 11 x 9" F1554 Grade 55 hot-dipped galvanized threaded bolts - 3 ea. Nuts: 5/8 - Heavy Galvanized Hex Nuts (DH Rated) - 12 ea. Washers: Galvanized Washers (ASTM F436) - 9 ea. Plastic Template - 1 ea	1	USD 95	0	USD 95	USD 95
CT4000-ASSURE1	1 prepaid year of ChargePoint Assure.	1	USD 740	0	USD 740	USD 740

Quote Total: USD 8,111.00
Shipping and Handling: USD 160.00
Grand Total: USD 8,271.00

Sales tax in applicable states (AZ, CA, FL, GA, MA, NY, PA, TX, WA) and shipping fees will be applied to invoice.



Quotation

ChargePoint, Inc.
Driving a Better Way™
chargepoint.com

Sales Representative: Andrew Croll
E-Mail: andrew.croll@chargepoint.com
Telephone: 9093005587

Quote Number: Q-30937-1
Date: 6/19/2018
Expires On: 6/19/2019

Primary Contact: Tyler Mabraten

Bill To Address
Los Alamos County
1000 Central Ave
Los Alamos NM 87544
US

Ship To Address
Los Alamos County
1000 Central Ave
Los Alamos NM 87544
US

SOURCE WELL (NJPA) PRICING
60 Months Network / 60 Months Assure

Product Name	Product Description	Qty	List Price	Disc%	Unit Price	Total Price
CPSUPPORT-ACTIVE	Initial Station Activation & Configuration Service Includes activation of cloud services and configuration of radio groups, custom groups, connections, access control, visibility control, pricing, reports and alerts. One time initial service per station.	1	USD 349	100	USD 0	USD 0



Product Name	Product Description	Qty	List Price	Disc%	Unit Price	Total Price
CPSUPPORT-SITEVALID	Customer works with their own contractor to perform the construction and station installation. CPSUPPORT-SITEVALID is used to validate that a customer installation has been performed per ChargePoint published requirements. The on-site validation of electrical capacity, transformers, panels, breakers, wiring, cellular coverage and that the station installation meets all ChargePoint published requirements and local codes. A site is defined as a group of stations all connected to the same gateway station. CPSUPPORT-SITEVALID is priced per gateway station and used when the customer is not using an O&M Partner or self-validating Channel Partner to install their stations. Note that a failed Site Validation will incur a second validation fee to repeat the validation after the site deficiencies are corrected. A successful Site Validation is a prerequisite to purchase ChargePoint Assure.	1	USD 599	100	USD 0	USD 0
CT4021-GW1	Dual Output Gateway Option USA, Bollard Unit - 208/240V @30A with Cord Management	1	USD 7,210	20	USD 5,768	USD 5,768
CT4001-CCM	CT4000 Bollard Concrete Mounting Kit. Bolts: 5/8 - 11 x 9" F 1554 Grade 55 hot-dipped galvanized threaded bolts - 3 ea. Nuts: 5/8 - Heavy Galvanized Hex Nuts (DH Rated) - 12 ea. Washers: Galvanized Washers (ASTM F436) - 9 ea. Plastic Template - 1 ea	1	USD 95	0	USD 95	USD 95
CPCLD-COMMERCIAL-S	5yr Prepaid Commercial Cloud Plan. Includes Secure Network Connection, On-going Station Software updates, Station Inventory, 24x7 Driver Support, Host Support, Session Data and Analytics, Fleet Vehicle Management and Integration, Fleet Access Control, Valet Dashboard, Power Management (Circuit, Panel, Site Sharing), Scheduled Charging, Driver Access Control, Pricing and Automatic Funds Collection, Waitlist, Videos (on supported hardware).	2	USD 1,105	0	USD 1,105	USD 2,210



Product Name	Product Description	Qty	List Price	Disc%	Unit Price	Total Price
CT4000-ASSURE5	5 prepaid years of ChargePoint Assure.	1	USD 2,495	0	USD 2,495	USD 2,495

Quote Total: USD 10,568.00
Shipping and Handling: USD 160.00
Grand Total: USD 10,728.00

Sales tax in applicable states (AZ, CA, FL, GA, MA, NY, PA, TX, WA) and shipping fees will be applied to invoice.

Quote Acceptance

- All pricing is confidential between Customer and ChargePoint.
- All prices are FCA ChargePoint warehouse(s).
- Customer to be invoiced at time of shipment.
- All invoices are Net 30 days. Credit checks are required for new customers.
- Pricing does not include installation or mounting services unless specifically quoted above.
- Additional Purchase Terms and Conditions can be found at <http://www.chargepoint.com/termsandconditions>
- Purchaser confirms that the shipping and billing information provided in the Quotation is accurate for ChargePoint's shipping and invoicing purposes.

By signing this quote I hereby acknowledge that I have the authority to purchase the product detailed on this document on behalf of my organization. Furthermore, I agree to the above terms and conditions and that this signed quote shall act as a purchase order.

Signature :

Title :

Name (Print) :

Date :

Company Name :

Requested Ship Date :

AP Contact Name :

AP Contact E-Mail :