

DOCKETED

Docket Number:	15-MISC-04
Project Title:	Fuels and Transportation Merit Review
TN #:	224419
Document Title:	ChargePoint - Manufacturing Merit Review
Description:	Powerpoint Presentation
Filer:	Tami Haas
Organization:	ChargePoint
Submitter Role:	Public
Submission Date:	8/6/2018 4:32:39 PM
Docketed Date:	8/6/2018



Manufacturing Merit Review

Deborah Donohue, Vice President Operations

August 6, 2018

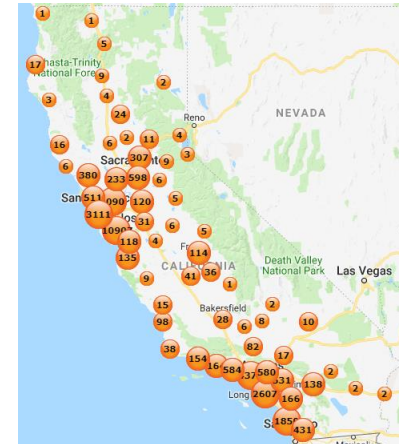
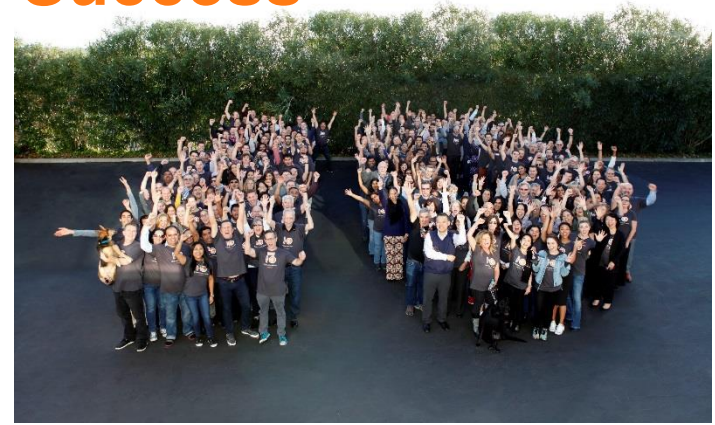
Prepared for



**CALIFORNIA
ENERGY
COMMISSION**

California Company Scaling for Success

- + Headquartered in Campbell, CA, founded 10 years ago
- + More than 300 full time CA employees as of Q1 2018
- + More than 30 patents and numerous innovations
- + 29,960 independently-owned and operated public and semi-public charging ports in CA
- + Charging stations installed by local partners, creating additional jobs



ARV-10-012 Project Goal and Objectives

- + The goal of the project was to refine manufacturing methods for the ChargePoint Communication Processor (CPCP) that would integrate with EV charging stations manufactured by other manufacturers.
- + Objectives:
 - Develop hardware and software compatible with the ChargePoint Network Operating System (NOS) and third party charging stations
 - Provide low cost, local manufacturing facilities for the CPCP
 - Provide low cost methods for vendor to develop smart charging stations

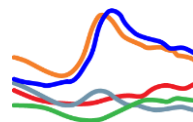
OnRamp Program



Network connectivity



Remote administration



Energy management



Access control



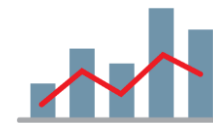
Reservations



Pricing & payments



Advertising & branding



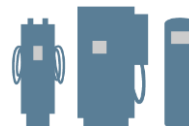
Reporting & analytics



Driver support



Host/Station support



Multi hardware

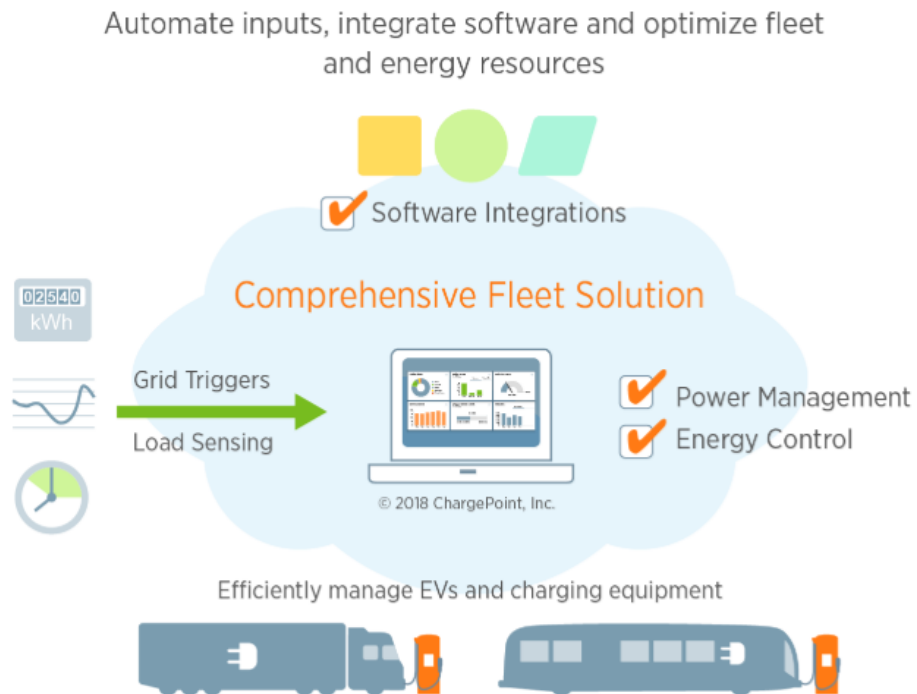


Future services

Fleetification of Everything

+ ChargePoint fleet energy solution





- Cloud or local based (Kisensum)
- Single integration point for energy & charging infrastructure
- Receives inputs from grid, vehicle scheduling & telematics, on-site meters, battery storage and solar
- Optimizes charging to ensure vehicle missions at lowest possible energy costs
- Open architecture: works with all devices, protocol and hardware
- Provides real time alerts



Fleetification Challenges and Solutions

Challenge

Solution

- | | | |
|--|---|--|
| + High demand charges at low utilization leads to uneconomical fueling |  | Intelligent charging to use all available time and smooth load; minimize capex
Controller uses on-site energy storage to load shift and smooth load curve |
| + Complex system variables: energy rates, vehicle states of charge, parking location |  | Energy solution that is route, grid, weather and vehicle aware: continuously optimizes fueling |
| + Potentially higher energy costs vs. diesel or gas costs (location dependent) |  | Energy solutions leverage micro grid and unbundled power purchase agreements |
| + Need for opportunistic charging on route |  | Ability to leverage ChargePoint and other roaming networks away from depot |

Fast Charging - Express Plus



Power Module



Power Block



Express Plus Station

+ Product Objectives

- Scale to 500kW while improving performance and efficiency
- Bring lightweight, flexible, 500A capable cooled cable to market
- Full integration with ChargePoint Energy Services
- Scale solution to all vehicle segments and use cases

Manufacturing of DC Fast Charging Stations

- + ChargePoint has leased a 27,000 sq. ft facility for assembly and test of DC products
 - Campbell, CA
- + We are doing 100% of the electro-mechanical assembly for our DC charging product line in this facility.
- + We are currently sourcing our sheet metal fabrication and Printed Circuit Board assembly to CA companies.
- + This requires 200% growth in headcount of non-production operations employees:
 - Quality Engineers, Mfg. Engineers, Materials Management, Program Management, Logistics
- + This requires 300% growth in headcount production operations employees:
 - Technicians, Assemblers, Material Handlers
- + Significant investment in manufacturing and test equipment

Manufacturing Challenges

- + We will soon run out of capacity in our Campbell facility and we are currently making plans for our future scaling
- + Challenges to scaling in CA
 - High cost of labor impacts our internal costs and material costs when we procure from CA companies
 - High cost of real estate in the Campbell area
 - If we move to another region then we will have more challenges in finding skilled labor
 - High cost to upgrade electrical infrastructure
 - In order to adequately develop and test high power charging systems we sometimes require upgrades to the utility owned infrastructure as well as the infrastructure in our buildings. The utility infrastructure especially comes at a high cost
 - Duties and Tariffs
 - Not just on imports but also the danger of retaliatory tariffs from other countries, initially Canada had included some EV charging stations in their recent tariffs but at the last minute removed them from the list

General High Power Charging Concerns

- + High Reliability: high power chargers will be used in areas like bus depots and highways that have critical uptime requirements
- + Ease of Servicing: If a charger goes down it is critical that it is easily serviced and that spare parts are readily and locally available
- + Electrical grid compatibility: Impact of power quality in large deployments. Utility requiring equipment to meet low harmonic distortion (IEEE 519)
- + Providing energy storage integration and power management features to mitigate or reduce demand chargers

General High Power Charging Concerns

- + Scaling solution to all vehicle segments: fleet operators, bus, truck and VTOL manufacturers on defining charging requirements
- + Standardization of charging connectors
 - Significant expense with w/ EVSE+PEV interoperability testing. Industry needs to accelerate development of reference based testing (equipment, test cases, process)
 - Risk in the transition from basic IP-based communications to next-gen communications (ISO 15118) which has not been implemented beyond the lab

Support of CA Policy Goals

- + Local manufacturing of DC fast chargers supports:
 - Deployment to reach Governor's Executive Order target of 250,000 EV chargers (including 10,000 DCFC) by 2025
 - Build out of statewide network to support 5 million ZEVs by 2030
 - Use of standardized connectors that can also charge electric buses in support of CA's Zero Emission Bus goals
 - Ensuring all chargers are "smart" and capable of managing charging to support SB350 goals of renewable integration

Thank You

For further information on this topic, please contact:
grants@chargepoint.com