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THE STANDARD FOR LIGHTING MANAGEMENT QUALITY SINCE 1953

Spring Seminar

NALMCO SPRING SEMINAR

Flemming Jensen

EV Charging

3/1/2023

EV Charger Industry

Trends

- **Product Lifecycle**
  - **Embryonic to Growing**
- **Open System**
  - **From Proprietary to Standard (OCPP, V2G, …)**
- **Commodity Product**
- **Lighting Industry (Business Model / Ecosystem, Project, Rebate, …)**

Trends

- **CTEP Compliance (NTEP)**
  - **Certifies output of unit**
- **Energy Star rated**
- **Payment certification**
  - **Will be the standard in California by July**
  - **Will require receipt printing on site**

TAA Compliant, Cyber Security

- BAA/TAA compliant
  - For government segment
    - 7.5 billion allocated from infrastructure law
    - Tax incentives
  - Requirements similar to BAA/TAA lighting products
- Cyber Security
  - US chips and US software important
- Customization for projects (Connection, Cable, Display, Cable Management, V2G, etc.)

EV Charger Ecosystem

- **Hardware**
  - **Power (AC / DC)**
  - **EV Charger**
  - **Mounting**
  - **Accessories**
- **Mfg/Contractor/Distributors**
  - **Produce**
  - **Instal**
  - **Maintain**

- **Software**
  - **Firmware update (OTA)**
  - **Authentication and operation (RFID or App)**
  - **Dashboard for Operation**
- **Payment**
  - **Mobile App**
  - **Credit Card**
  - **Revenue Distribution**

Levels of EV Charging

Level 1

VOLTAGE
120V 1–Phase AC

AMPS
12–16 Amps

CHARGING LOADS
1.4 to 1.9 KW

CHARGING TIME
3–5 Miles of Range Per Hour

PRICE PER MILE
2¢–6¢ per mile

Level 2

VOLTAGE
208V or 240V 1–Phase AC

AMPS
12–80 Amps (Typ. 32 Amps)

CHARGING LOADS
2.5 to 19.2 KW (Typ. 7 KW)

CHARGING TIME
10–20 Miles of Range Per Hour

PRICE PER MILE
2¢–6¢ per mile

Level 3 (DC Fast Charge)

VOLTAGE
208V or 480V 3–Phase AC

AMPS
<125 Amps (Typ. 60 Amps)

CHARGING LOADS
<90 KW (Typ. 50 KW)

CHARGING TIME
80% Charge in 20–30 Minutes

PRICE PER MILE
12¢–25¢ per mile

	Unit of Measure	Level 2	Level 2	Level 3
Tank / Battery size	kWh	50	50	50
EV Charger (Level 2)	V	240	240	480
EV Charger (Level 2)	A	32	80	156
Charging loads	V x A /1000 (kW)	7.68	19.2	75
On Board Charger (OBC)	kW	6.25	25	80
Charging speed	kW/Hour	6.25	19.2	75
Charging Time	Hours	8.00	2.60	0.67

EV Charging time

Market size data

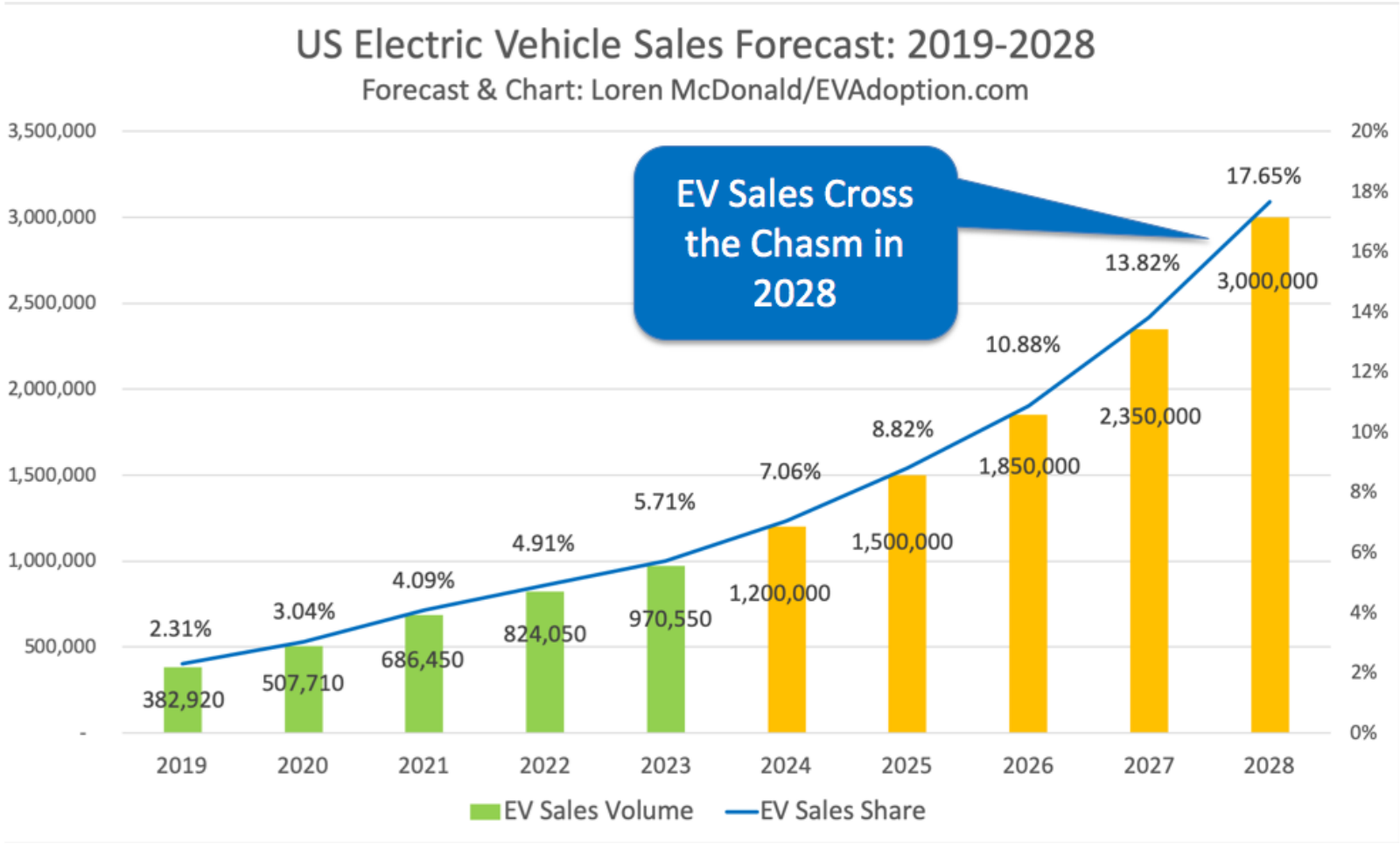
- EV
  - In Q3 2022 Electric vehicles make up a mere 6.1% of cars on the road in the U.S. up from 4.6% same time period 2021
    - EV approx. 16% of the cars on the road in California in Q3 of 2022
    - In a small number of other states this might approach 1%
    - The state with the least EV cars is South Dakota
  - Tesla models accounted for over 48% of US EV sales in 2022, down from 56% in 2021
  - EV Registrations up 66% in 2022 over same time in 2021
  - Evs on the road today approx 1.7 mill vs a total of 284 mill cars
  - *By Q3 2022 total EV sales are up by 66% versus 2021.*

- EVC
  - Public chargers currently installed in the us approx. 140K spread over 53K locations. Goal of 90K more in 2023, with a total of 500K by 2030. $7.5 billion set aside to help that happen
  - States with most ports are California 15,182, New York 3,085, Florida 2,858, Texas 2,419, Mass 2,328
  - Goal is to have 500,000 by 2030, requirement could be 1.2 million
  - ChargePoint and Tesla were the top two charging network
  - There are currently 10 different manufacturer and suppliers of charging stations in the US

EV Sales in the US - in 2022:
808,619 total vehicles up from 225,689 in 2021 – 66% increase but still only 6% of all cars sold
Expected to go to $21 mill in 2025

- **Through Q3 2022 following makers sold most**
- **Tesla:** 390,814 units
  - Model 3: 156,357
  - Model S: 23,464
  - Model X: 19.542
  - Model Y: 191,451
- **Ford**: 36,849
  - Mustang Mach-E: 28,089
  - F-150 Lightning: 8,760
- **Hyundai**: 21,310
- **Nissan** (LEAF): 1,074
- **Volkswagen** (ID.4): 11,072
- **Polestar** (Polestar 2): 6,542
- **Rivian** (R1T/R1S): 12,281
- **Chevrolet** (Bolt EV/EUV): 22,012
- **Audie:** 11,940

EV SALES IN 2022 vs 2021 IN THE US



Expected US Sales growth in EV Sales

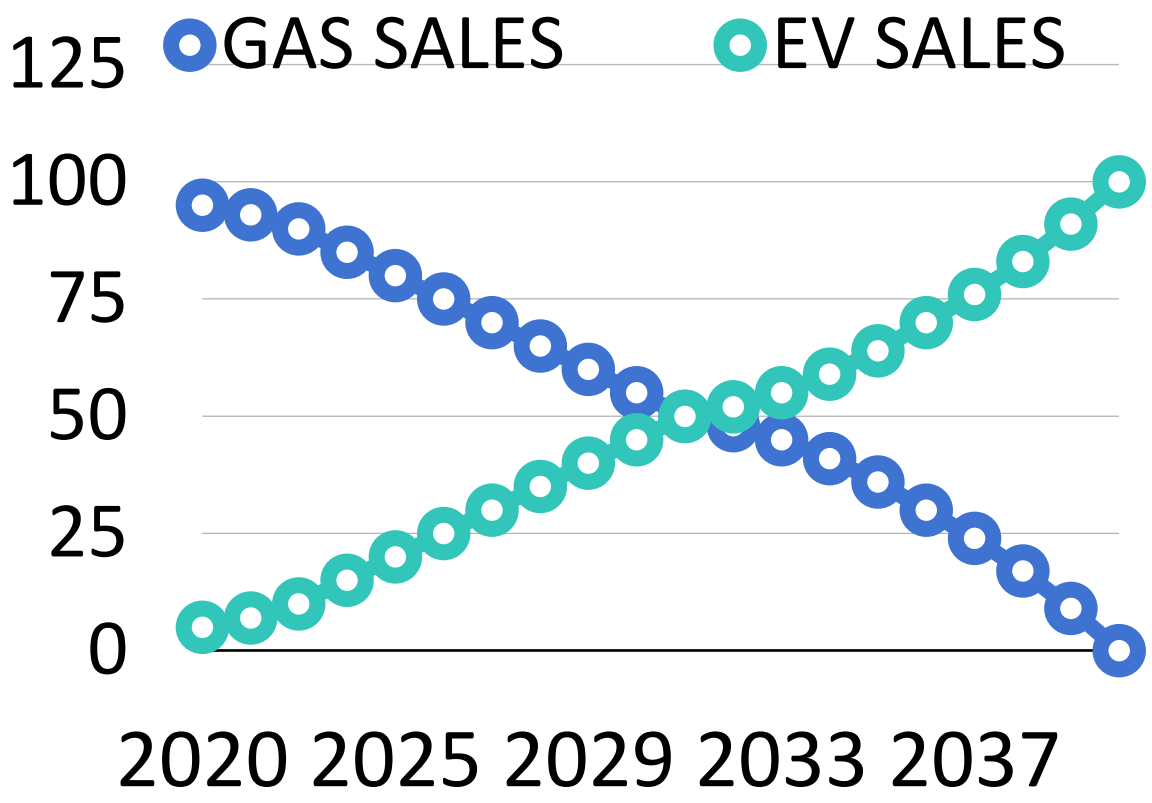
Electric Vehicle in 2030

1 out of 5

230 Million EV cars

$300 Billion sales

20 Million chargers



EV Charger market Potential

- **Single Family / Residential: 82.6 Million Units**
- **Multifamily / Residential : 46.8 Million Units**
- **Commercial / Office : 500,000 buildings**
- **Municipal : 89,000 Units**
- **Retail: 5.6 Million Units**
- **Distribution Center: 18,741 buildings**

Federal Tax Credit and Utility Rebates

50 Percent of New Cars to Be Electric by 2030

30% Federal Tax Credit

Bonus Depreciation up to 100% of Credit Base Reduced by Section 179

EPA to soon extend e-RIN carbon credit cap-and-trade program to EV Charging

$7.4B proposed in bill to electrify GSA's fleet of over 657,000 federal vehicles

EV Chargers

Level 2 (AC)

Standard - 32A
Standard + - 48A
Fleet – 80A

CTEP
OCPP
RFID

<u>Options:</u>
Cable Management
WIFI/4G
Network Enhancing System
LED Display

Level 3 (DC Fast)

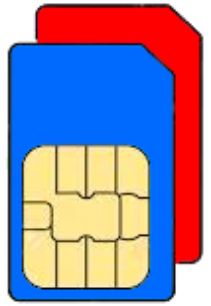
30KW
60KW
120KW
180KW
360KW
30KW Module for Cabinet

CTEP
OCPP
WIFI/4G

<u>Options:</u>
Cable Management
Cable – CCS1 / CHAdeMO
WIFI/4G
Network Enhancing System

Network Enhancing system

- Gateway to share 4G connection
- Rugged commercial grade router
- NetCloud Service for reliability and security
- Dual SIM cards, auto choose stronger signal
- Guaranteed up time 99%
- Preconfigured multiple carriers



NetCloud

Software & Network

charger station management software (CSMS)

Networking
Support OCPP chargers

Monitoring
24/7 monitoring for charger faults and network errors

Reporting
Custom report generation.

User Management
Group users & permissions

Revenue
Set fees and rate
Collect payments
Revenue sharing

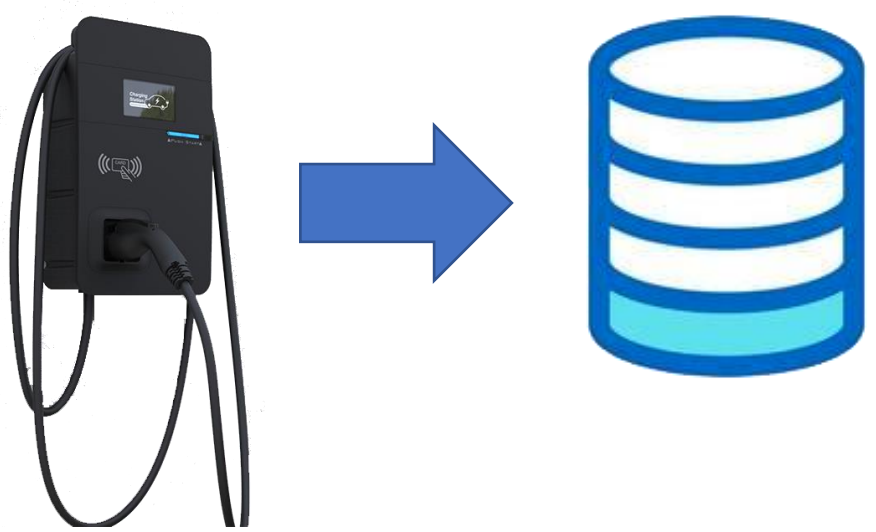
Power Management
Dynamic load balancing

Automatic Update
Charger firmware and software updates

Dashboard Access
View charging data and admin chargers

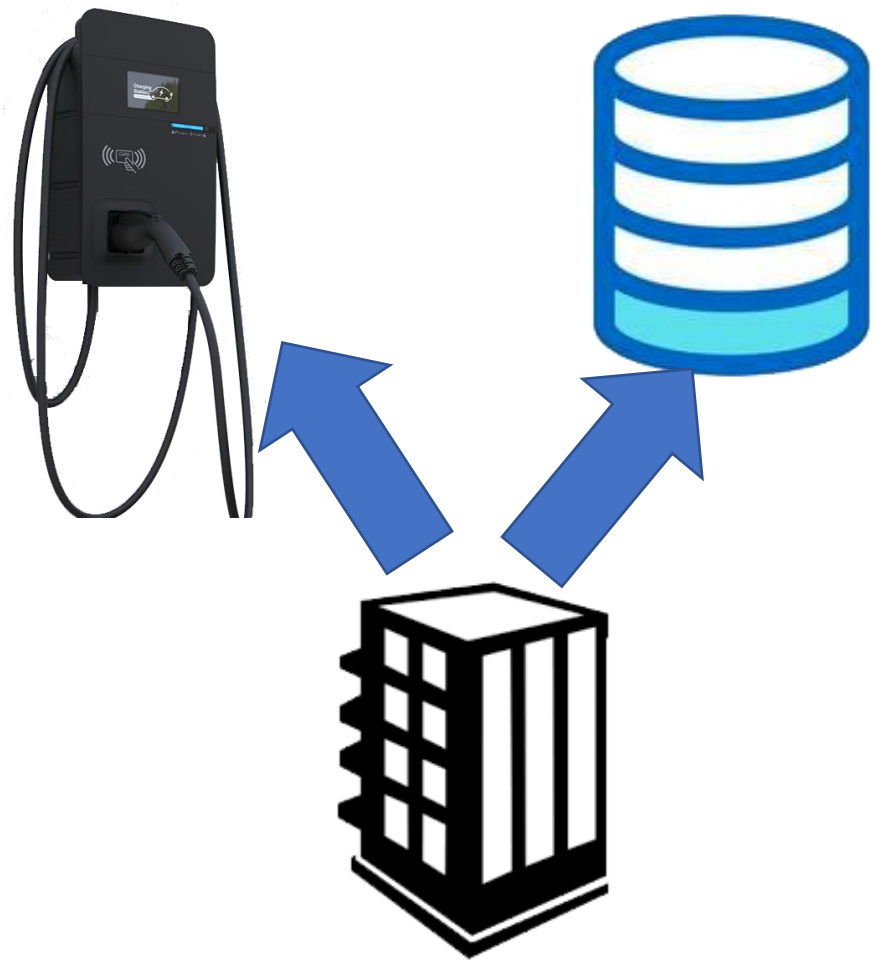
provisioning

- Add chargers to database before sales
- Identify chargers
- Model, OCPP ID, Serial No, Display ID
- OCPP ID, unique
- Display ID, used in app and on device, short



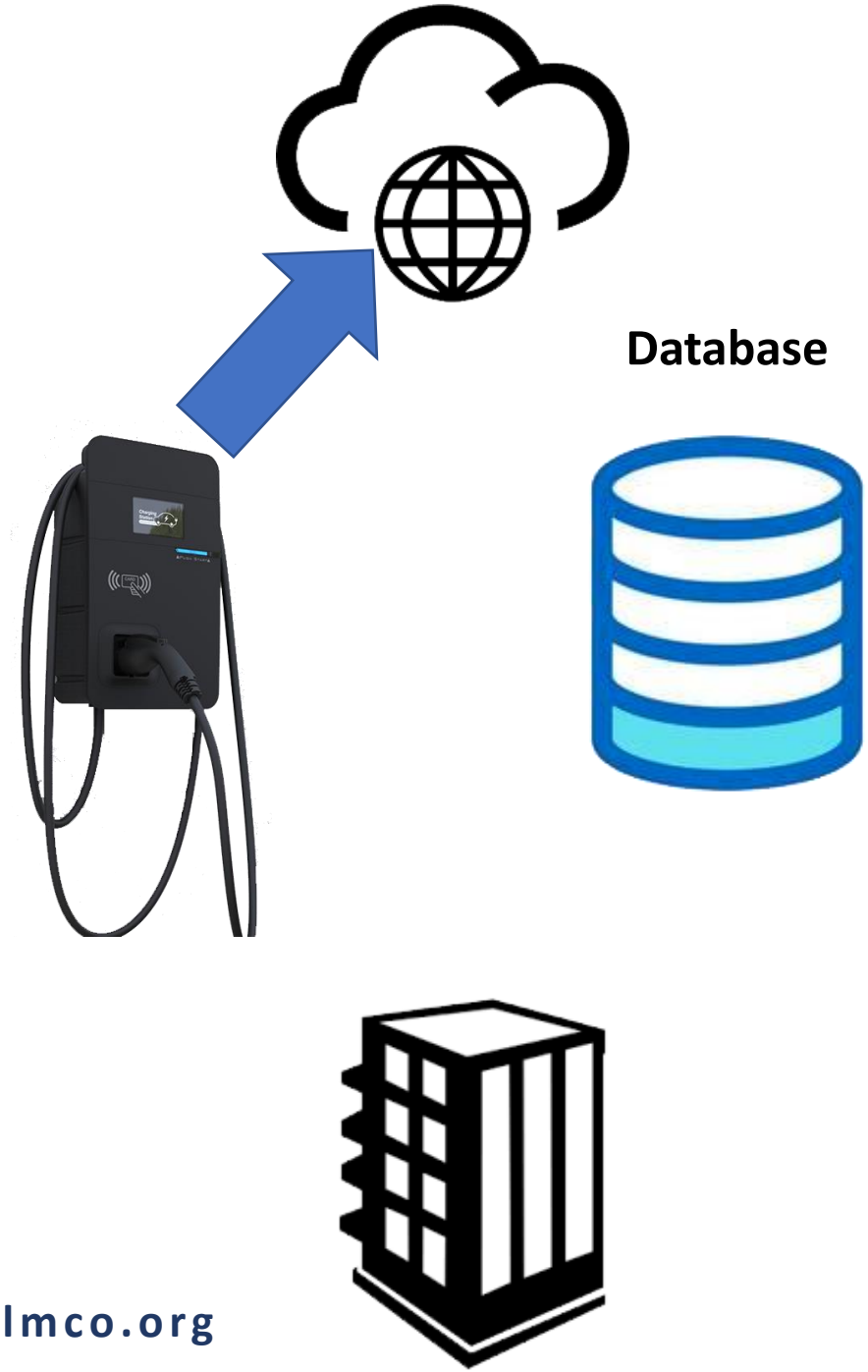
configuration

- Add job site information
- WIFI credentials
- Preferred 4G provider
- Site location



Activation

- Activate service
- Bring chargers online
- Set exact location
- Set site contact
- Set charge rate
- Set user/group rates

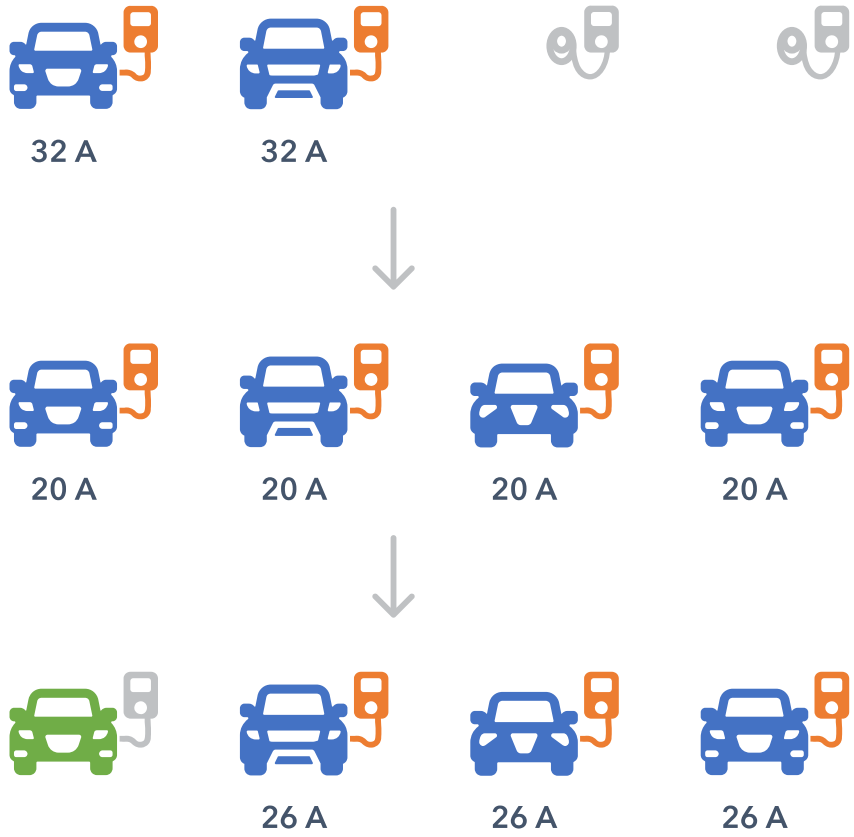


dashboard for site owners

- Intuitive interface
- Managing all your EV chargers
- User/group
- Track usage
- Download reports
- Update settings

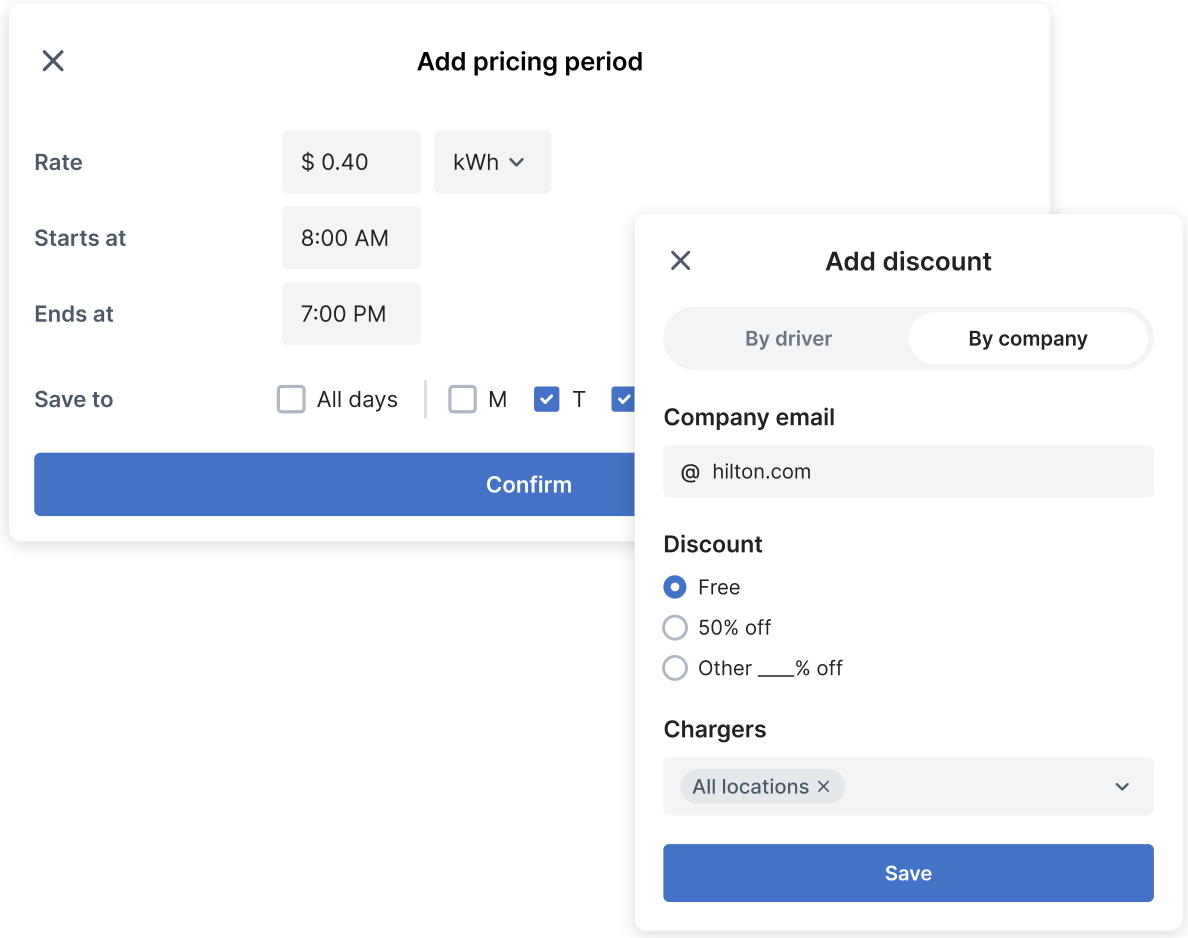
Power Management

- Load balancing
- More chargers on a limited electrical service
- Output auto adjusted
- Different strategies, average, priority, etc.



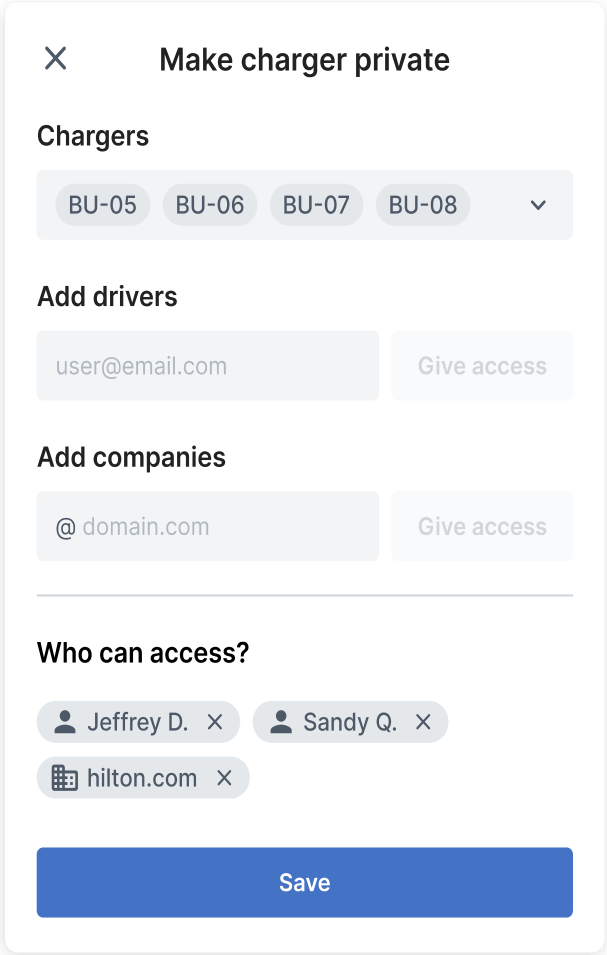
pricing Management

- Set pricing
- Set schedule
- Bill by time spent charging, time plugged into the charger, or kWh
- Add discounts for individual drivers, groups or whole companies



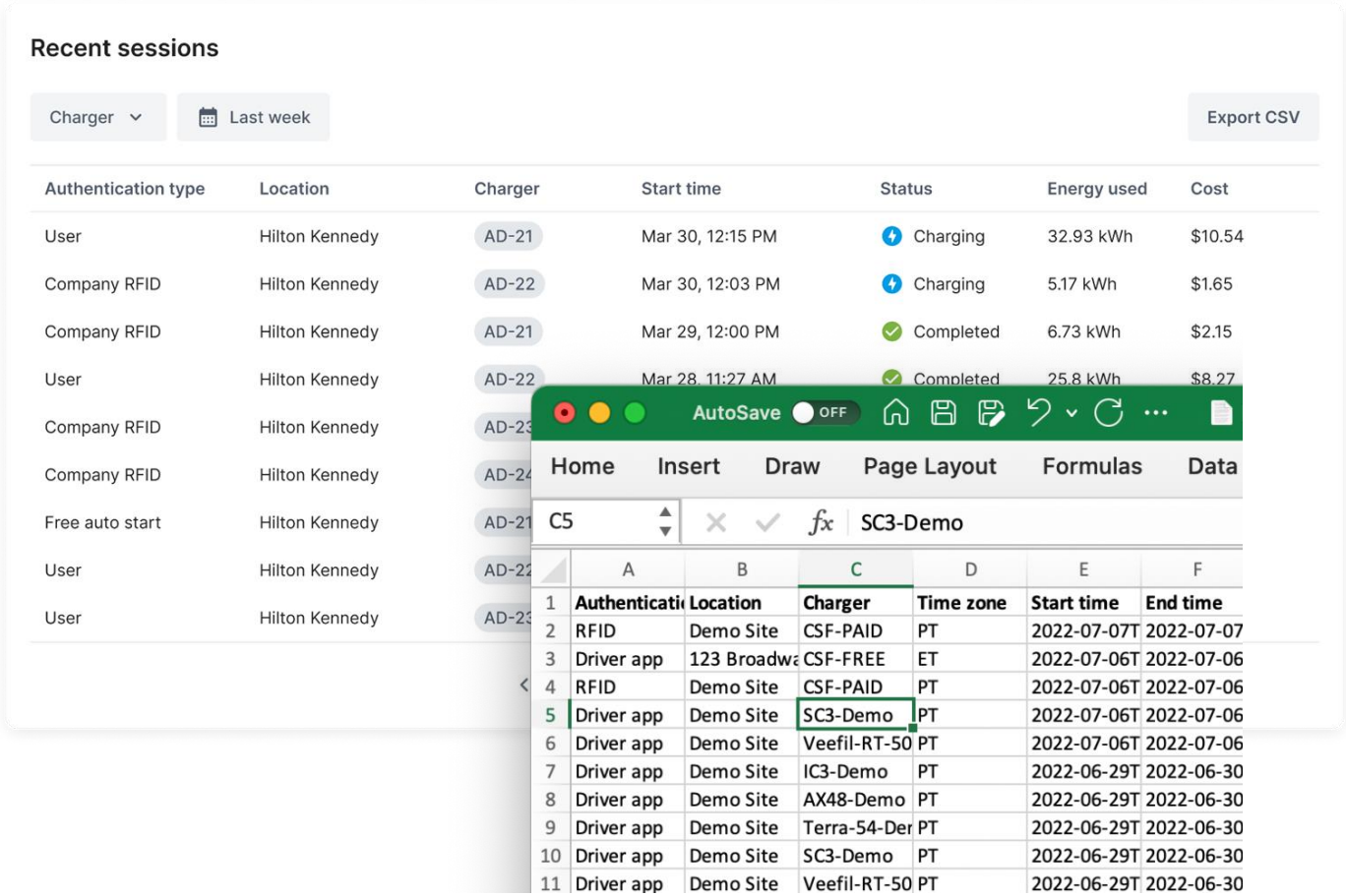
charger Access control

- Make your chargers public or private
- Control who can use your chargers based on user account or company email domain



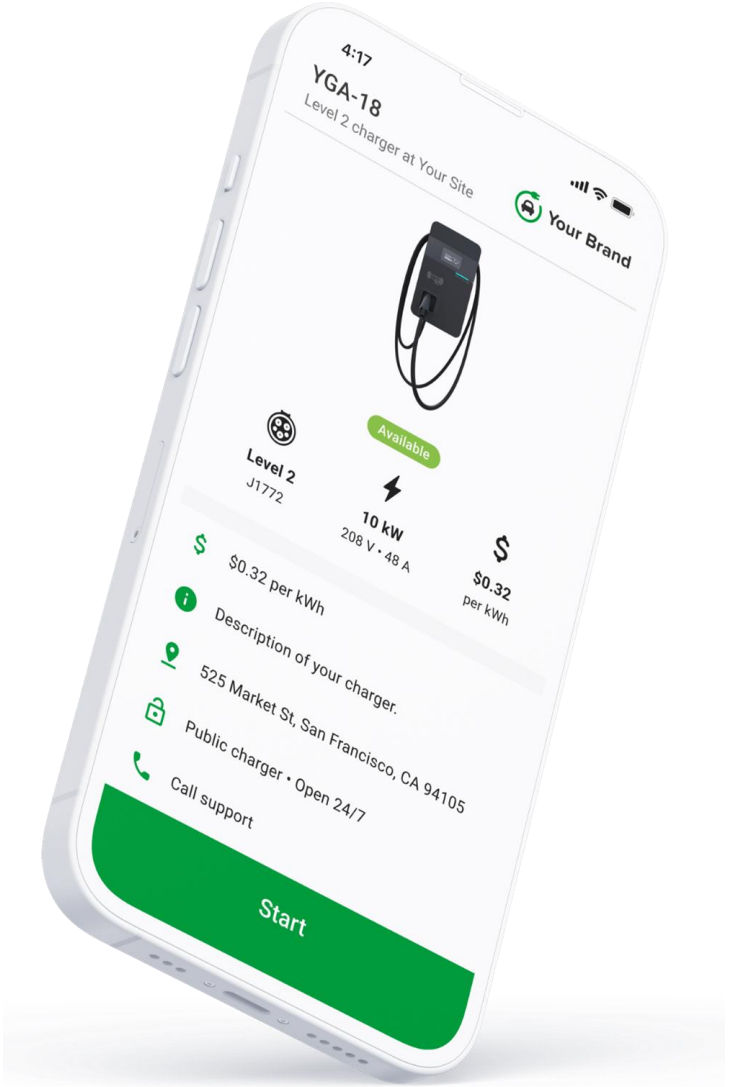
Manage & download data

- All data displayed in our site host dashboard can be exported as a CSV, giving you full control over your EV charging data and insights.



web app for drivers

- Scan QR code on charger to use directly
  - Takes you straight to the payment option
- No need to download dedicated app
  - Plugshare.com will find a charger
- Compatible with any web browsers on cellphone
- Secure payment processing
- User receives detailed receipt by email
  - Soon to require receipt to print on site
- Notification by SMS or email



Revenue Opportunities

- Maintenance Service Agreements
  - Very little being done now
- Financial Service
  - You could own the equipment
- Installation
  - Somebody has to do it
- Operation
  - Manage the network