California Regional EV Ecosystems: *Strategic Challenges & Innovations*

Presentation for the California Air Resources Board

July 15, 2014

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EV Alliance Group

MISSION

- **Accelerate mass adoption of EVs powered by clean energy**

ORGANIZATIONS

- **EV Communities Alliance (regional)**
- **California EV Alliance (state)**
- **EV Alliance (national)**
- **Vehicle-Grid Integration Alliance (EV/ES/PV/AS)**

Alliance Strategies & Projects

1. DEVELOP EV LEADERSHIP COALITIONS

- California's regional EV Council network
- Bay Area EV Strategic Council
- New York State EV Council (2015 launch)

2. BUILD REGIONAL EVSE NETWORKS

- EV Corridor Project (340 ports with ABAG, CPI)
- Bay Area & Central Coast Charge Ahead (225 L2)
- SF CityCharge (70 MUDs - EVSE/PV/AES - Powertree)

3. DEVELOP EV READINESS PLANS & POLICIES

- *"Ready, Set, Charge California"* EV Guidelines
- EV & AFV Plans - SF, Monterey, Central Coast
- *"Experience Electric"* Ride & Drives for Bay Area MTC
- Santa Clara County EV Readiness Policies (BACC, SGC)

4. ADVANCE VEHICLE GRID INTEGRATION (VGI)

EV Ecosystem Development Goals

- **Mitigate range anxiety**
- **Provide charging for MUDs**
- **Integrate EVSE with PV, AES, grid services**
- **Develop sustainable financing**

Range Anxiety Status – Bay Area

LEVEL 2

- ~1400 L2 now vs. ~16K EVs - congestion & gaps a problem
- Goal = 100K EVs by 2020 -- BEV/PHEV split now 55/45
- ICF estimates 1000-2000 more L1/L2 needed in 2014
- Cost Factor: $1M - $5M depending on levels
- CEC to cover ~300 ports?

FAST CHARGE

- ~50 FC now, ~120 FC expected by 12/14
- ICF estimates need for up to 170 DCFC by 2020
- High-rate AC charging (22kW) bridges L2/FC gap

LEVEL 1

- Underutilized - savings limited due to install $, metering

EVSE Ecosytem – Key Opportunities

FUNDING

- MTC -- $180M over 20 years -- input from EV Council
- BAAQMD -- ~$12M+ for EVSE, EVs, buy-back
- More public/private/regional funding leverage needed
- MUD will require much more public investment

FAST CHARGE

- High-rate AC (22kW) may help bridge L2/FC gap
- New funding models needed – better ROI possible with integration of fixed storage, solar, demand mg't, DR
- "Super Plazas" needed – where DCFC/L2 is guaranteed

LEVEL 1

- Underutilized – yet savings modest (install, metering $)

ALL LEVELS

- Need for independent planning for large public sites
- Need for more pre-wire mandates (e.g. PA, Sunnyvale. SCC)

MUD & EVSE Innovation

- ROI Opportunity
  - **Integrated PV, Storage, EVSE**
- Two Demo Projects
  - **Battery-backed solar Fast Charger (Benicia)**
  - **Powertree MUD deployment (SF)**
- Powertree Model
  - **Deploying in ~70 MUDs in SF serving ~10,000 residents**
  - **70 amp Eaton chargers** (high-rate 20kW AC charging)
  - **Public access during day, residents at night**
  - **Theory of action:** "build EVSE and they will buy EVs"

Powertree Deployment

- **Each install =** 2.4kW solar, 48kWh AES
- **Solar net metered** during normal ops
- **During grid outages**, PV array provides energy to fixed batteries
- **UPS for emergency services**
- **Meets 500kW threshold** per SUB-lap for CAISO wholesale services
- **Begins building solar-powered** fueling (UC Davis/BMW research)
- **Provides revenue to pay owner** for spaces (AND provide free solar & EVSE)

DCFC Innovation: City of Benicia

CHALLENGES BEING ADDRESSED

- ✓ **Weak revenue**
  - ✓ **Need for multiple benefit streams**
  - ✓ **e.g. solar, storage, & UPS for emergency ops**
- ✓ **High demand charges**
- ✓ **Chademo vs. Combo 2 issue**

Benicia "Eco-Station" Demo

WHAT: Solar-integrated, battery-backed, dual compatible

WHERE: Near 980/80 junction, near Safeway, City Hall

FUNDING: $147K – via CEC, SGIP, foundations

- ✓ **Supplement charging with grid services revenue** (via use of battery in wholesale Regulation market)
- ✓ **Provide battery back-up for EVSE & building systems**
- ✓ **Mitigate demand charges** via peak shaving w/battery
- ✓ **Provide BOTH Chademo and Combo 2 compatibility**
- ✓ **Document value prop to reduce public $ requirement**

Eco-Station Charging Revenue

- At $5/charge, one charge a day = $1870/year in charging revenue
- 2 Fast Charges per day = $3740
- TOU energy mg't via battery will result in $1800 savings in electricity
- At one charge/day, City can cover energy and operational costs

Funding Issues - Regional Perspective

NEW PUBLIC FUNDS NEEDED - BEYOND CEC

- AQMDs
- SGIP – 60% of grid-tied energy storage
- Transport $
  - (e.g., MTC - $180M/20 yrs/$16M by 2014)

NEW BUSINESS MODELS

- EVSE + Solar Net Metering + Energy Storage @ 500 kWh scale = potential ancillary services $

NEED FOR FOCUS ON MUD

- (50%+ in key cities)

Recommendations for CEC/CARB

- **Independent site planning $** for large sites (40 to 400+ EVSE)
- **Capacity upgrade funds** for key bottlenecks (e.g., SF, Palo Alto)
- **SuperPlaza concept** – guaranteed charging at key hot spots – e.g., 12 DCFC + 25 L2
- **Complete inter-regional DCFC** networks and monitor congestion