EVSE Pilot – Costs & Reliability

Rendall Farley, P.E.
EPRI Infrastructure Working Council
March 20, 2019

Electric Vehicle Supply Equipment (EVSE) Pilot

60 Public

240 Home

greenlots®

Integrated Network

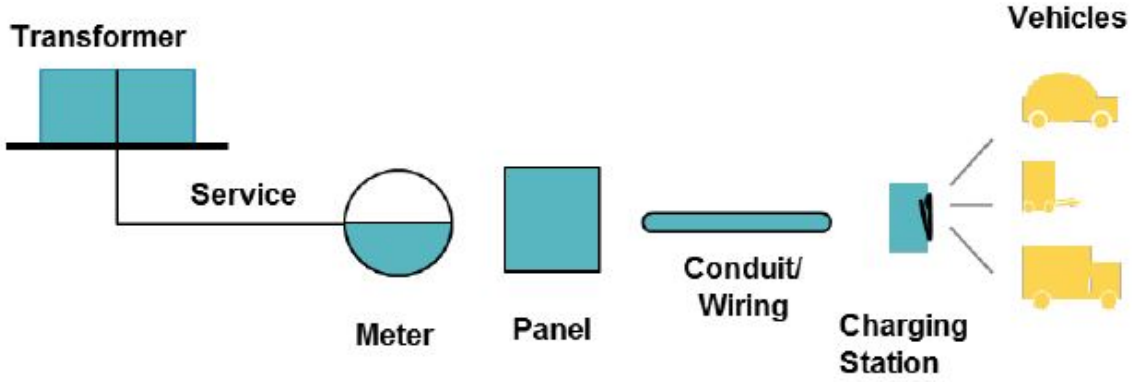
7 DC Fast Chargers

175 Work/Fleets/MUDs

User Web Portal

Utility Web Portal

AVISTA



	Service Connection	Supply Infrastructure	Charger Equipment	
1	Electric Company	Customer		*Business As Usual*
2	Electric Company		Customer	*"Make Ready"*
3	Electric Company	Customer	Electric Company	*Charger Only*
4	Electric Company			*Full Ownership*


NO PARKING
EXCEPT FOR
ELECTRIC VEHICLE
CHARGING
4 4


Chevron
Deer Park Bowl


4 HOUR LIMIT
ELECTRIC VEHICLES CHARGING ONLY
ORANGE OR GREEN PERMIT REQUIRED
PLEASE MOVE VEHICLE WHEN CHARGE IS COMPLETE
EV
NO PARKING
EXCEPT FOR ELECTRIC VEHICLE CHARGING


EV
NO PARKING
EXCEPT FOR
ELECTRIC VEHICLE
CHARGING
RESERVED
FOR DCFS


SIEMENS


SIEMENS


EV
NO PARKING
EXCEPT FOR
ELECTRIC VEHICLE
CHARGING

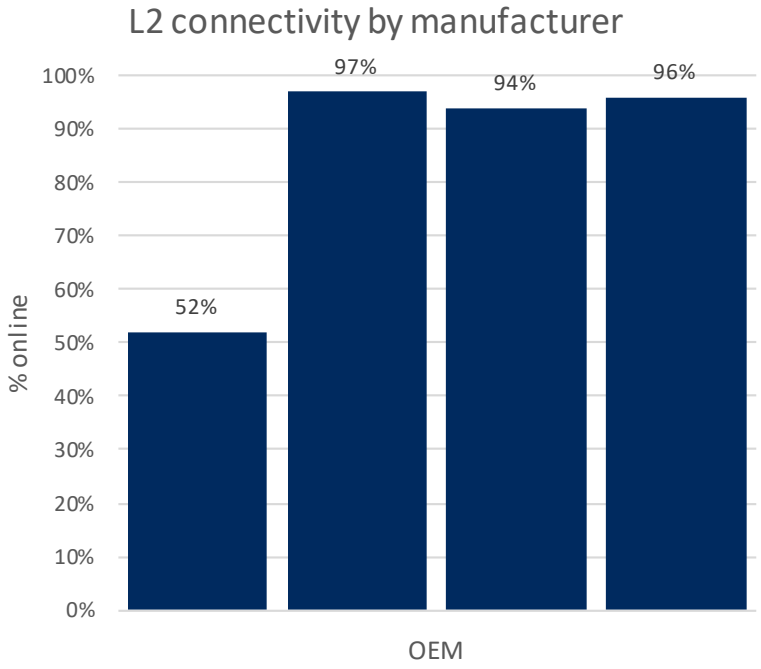

efacec
AVISTA
electric vehicle
fast charger

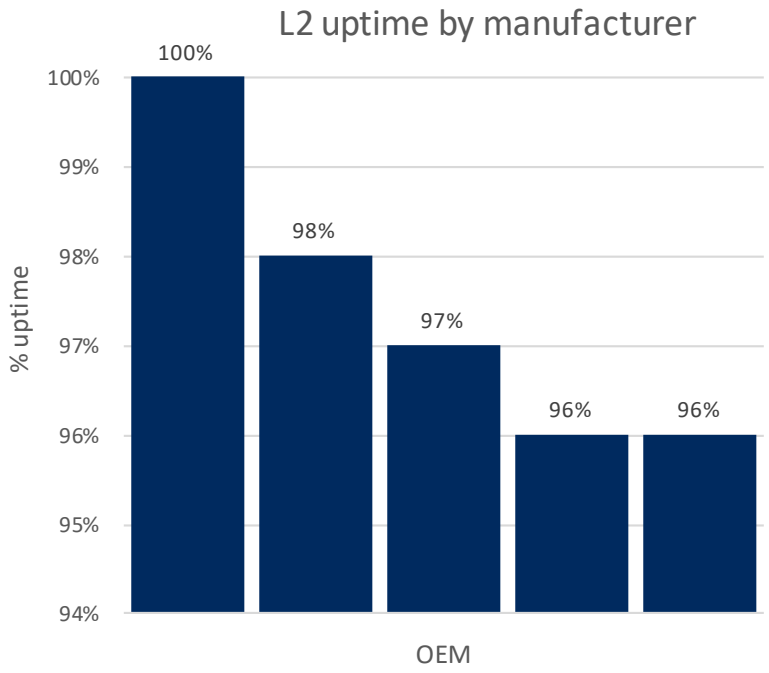
Reliability & Operational Metrics

- Notification lead time
- Corrective lead time
- Spares & maintenance costs
- Corrective costs
  - Warranty
  - Non-warranty
- % online
- % uptime

- Mean time between failure (MTBF)
- Root-cause analysis & Continuous Improvement

Priority	corrective lead time goal (days)	Criteria
Urgent	1	No backup ports. Critical, high use location. DCFC.
High	2	One other back up, high use location, remote location.
Medium	5	Still safely functional, moderate customer inconvenience
Low	7	Still safely functional, minor customer inconvenience





Avista EVSE summary								
OEM	L2				DCFC			
	Units	Ports	% online	% uptime	Units	Ports	% online	% uptime
	97	97	NA	100%	0	0	-	-
	109	109	52%	98%	0	0	-	-
	15	15	97%	97%	0	0	-	-
	9	18	94%	96%	3	3	100%	100%
	38	76	96%	96%	3	3	89%	89%


EV
NO PARKING
EXCEPT FOR
ELECTRIC VEHICLE
CHARGING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STEAM PLANT
Debra
HOMELESS
UGM
UNION GOSPEL MISSION
LAMAR
TRACY
JEWELERS
LAMAR
STEAM PLANT SQUARE


Railroad Alley
ONE WAY

DCFC Site Design

Phase I – 50kW CHAdeMO + dual L2
Phase II – 150kW + two 50kW dispensers

DCFC Site Installation Costs

High	Low	Item
$ 30,000	$ 26,000	50kW DC fast charger
$ 4,700	$ 2,100	Dual port AC level 2 EVSE
$ 5,000	$ 1,000	Site acquisition
$ 7,100	$ 1,500	Engineering & Design
$ 5,300	$ 3,500	Project Management
$ 72,900	$ 51,000	Contractor Labor & Materials
$ 36,300	$ 14,000	Utility Labor & Materials
$159,300	**$100,200**	**Total**

DCFC Annual O&M Costs

$ 525 network license, software support & cellular fees
$ 400 planned maintenance
$ 500 unplanned troubleshooting & repairs
$ 250 minor offsite/onsite connectivity restoration
$ 200 tests & inspections
$ 200 site maintenance (snow plowing, trash, etc)

$1,550 annual total, each DCFC

+ electricity billing net of user fees

issue	frequency/ year	material cost	hrs labor & travel	labor cost	total cost	expected annual cost
CHAdeMO/CCS connector/cable replacement	0.06	$1,500	4	$360	$1,860	$112
fuse replacement	0.14	$50	3	$270	$320	$45
push button replacement	0.06	$100	3	$270	$370	$22
screen replacement	0.08	$700	4	$360	$1,060	$85
credit card reader	0.02	$300	3	$270	$570	$11
PC board replacement	0.12	$1,000	4	$360	$1,360	$163
other electronics diagnostics and repair/replacement	0.1	$200	4	$360	$560	$56
					expected annual cost	**$494**

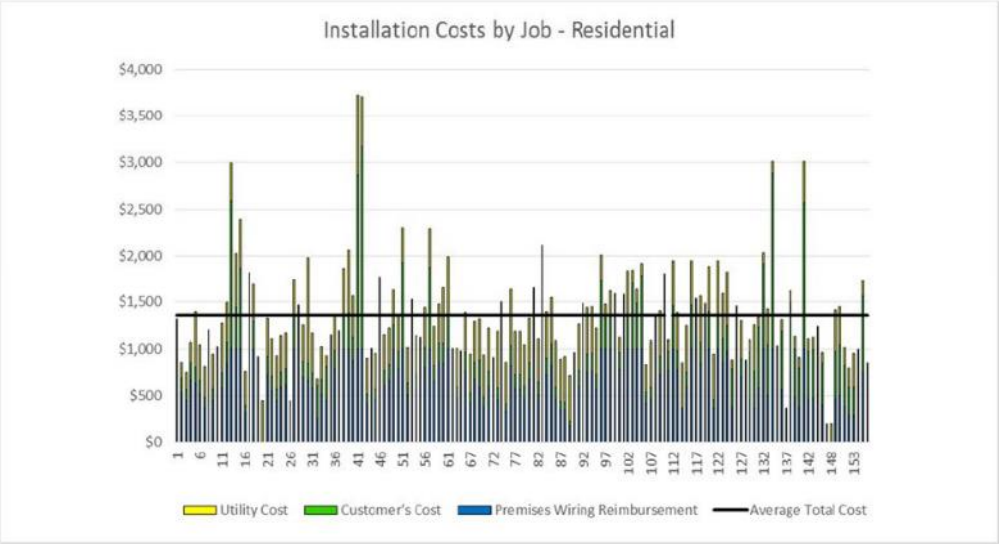

Table 3 – Networked Residential Installations (114 ports installed)

Premises Wiring Reimbursement	Customer's Cost	Utility Hardware & Installation Cost	Total Installation Cost	EVSE Cost	Total Costs Installation + EVSE
$659	$437	$266	$1,362	$1,061	$2,423

Table 4 – Non-networked Residential Installations (41 ports installed)

Premises Wiring Reimbursement	Customer's Cost	Utility Hardware & Installation Cost	Total Installation Cost	EVSE Cost	Total Costs Installation + EVSE
$603	$205	$491	$1,299	$551	$1,814

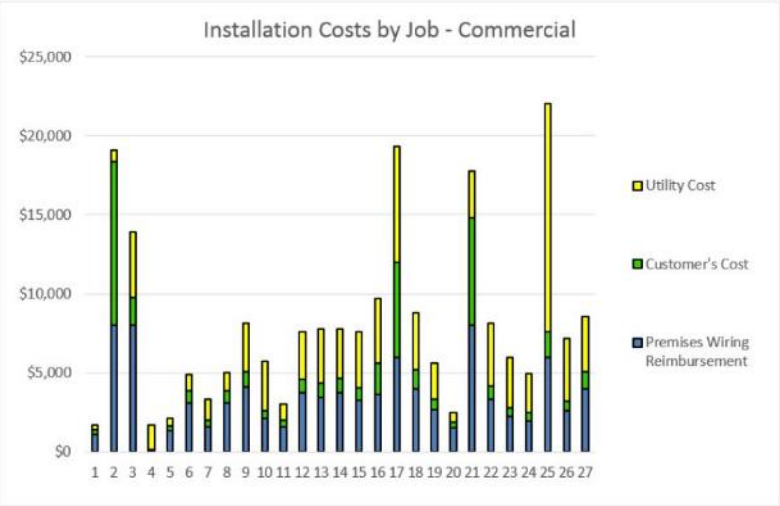

Table 5 – Networked Installation Costs (49 job sites, 110 ports installed)

Premises Wiring Reimburse-ment	Customer Cost	Utility Hardware & Install Cost	Total Install Cost	EVSE Cost	Total Cost EVSE + Installation	Avg. # Ports	Total Cost per Port
$3,516	$1,616	$2,904	$8,036	$5,238	$13,273	2.2	$5,913

Table 6 – Non-networked Installation Costs (9 job sites, 16 ports installed)

Premises Wiring Reimburse-ment	Customer Cost	Utility Hardware & Install Cost	Total Install Cost	EVSE Cost	Total Cost EVSE + Installation	Avg. # Ports	Total Cost per Port
$1,679	$1,428	$2,756	$5,864	$1,943	$7,807	1.8	$4,391

Networked L2 Annual O&M Costs per Port

$	436	network license, software support & cellular fees
$	0	planned maintenance
$	100	unplanned troubleshooting & repairs
$	75	minor offsite/onsite connectivity restoration
$	100	tests & inspections
$	100	site maintenance (snow plowing, trash, etc)
$	811	annual total (per port, assuming dual port station)

+ electricity billing net of user fees

issue	frequency/ year	material cost	hrs labor & travel	labor cost	total cost	expected annual cost
Display screen	0.02	$250	2.5	$225	$475	$8
Cable replacement	0.10	$253	2.5	$225	$478	$48
PCB replacement	0.02	$420	2.5	$225	$645	$11
RFID reader	0.02	$286	2.5	$225	$511	$9
Energy meter / breaker / contactor / power supply	0.02	$200	2.5	$225	$425	$7
					Per dual-port station	$82
					per port	$41

Transportation Electrification

Next Up: 5-year Electrification Plan

- EV Infrastructure
- Commercial Fleets
- Education & Outreach
- Community & Low-Income
- Grid Integration / R&D