

# Smart Charging EVSE

ECOtality North America || EV Symposium, Pluggin!

Paul Heitmann  
Utility Stakeholder Manager

Nov 30<sup>th</sup>, 2010

# Smart Grid Charging

- The Smart Grid is the increasingly “aware” electrical distribution system that can recognize and proactively manage against potential reliability impacts (ie EV clustering)
- The Smart Grid is *transactional* in nature, moving markets closer to end user’s EV and enabling rapid response to market signals.
- Smart EVSE can interconnect as “end nodes” to the Smart Grid, and thus carry out critical EV charging power level adjustments based on grid conditions monitored by the electric utility or ISO.
- Smart Grid is only as effective as the educated Smart Consumer who has automated their recharging operation to “close the feedback loop” and enable preventive action to be taken.
- Smart Grid enables smoother integration of Renewable Generation by automatically compensating for intermittency in source power outputs.
- “Genius Grid™” is achieved when EV/EVSE resources are automatically identified, authenticated, and proactively managed for bidirectional power flow while achieving individual SOC target thresholds.

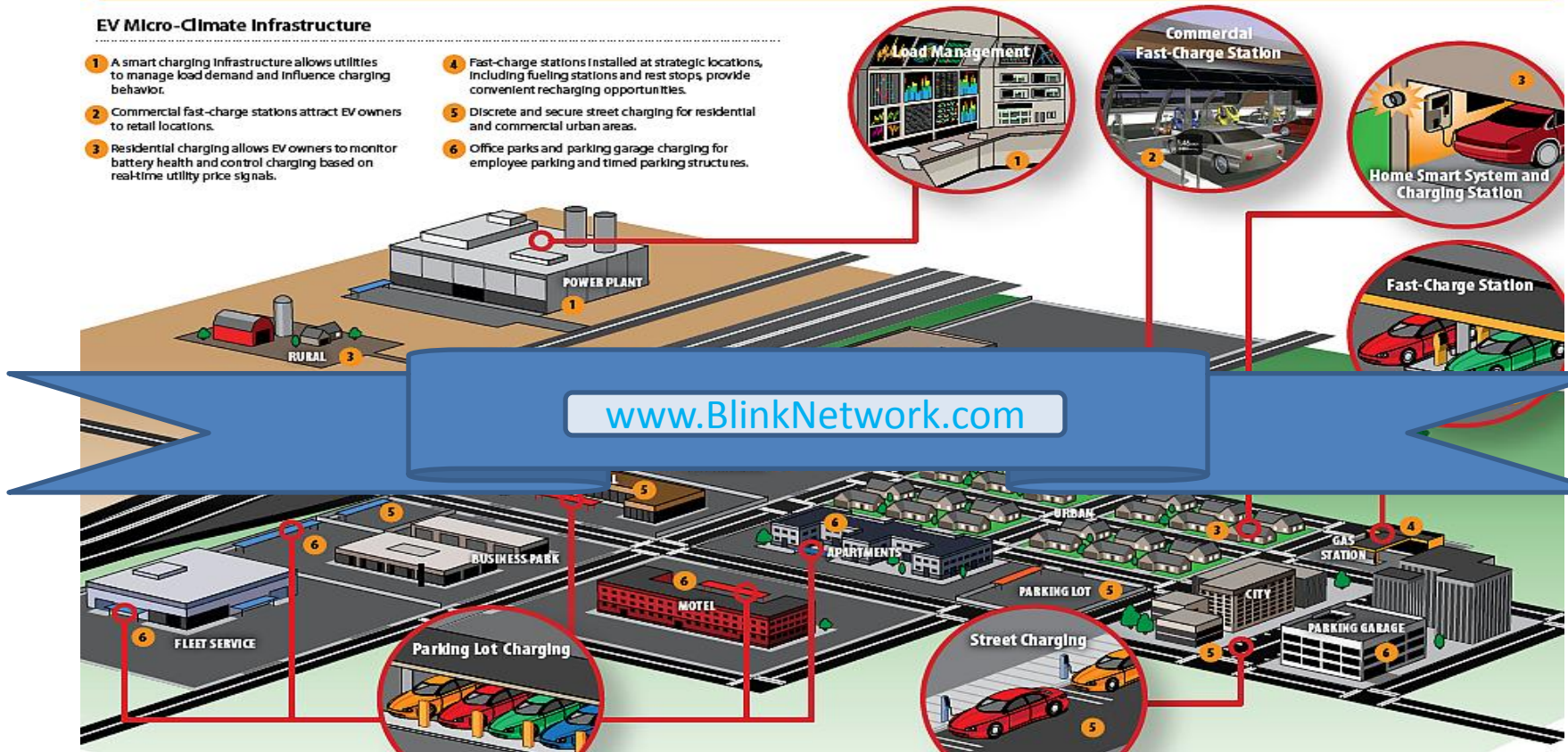
# What Can Be Achieved With Smart Charging?

- Owner of an EV Can:
  - Defer their charging session based on an internal EVSE activation timer
  - Allow charging to be reduced or delayed based TOU rates or DR events.
  - Receive mobile messaging with override opportunity to opt out of DR event
  - Locate and reserve a public charging station online while mobile.
  - Power their home from stored energy in their EV batteries
  - Let their EV connect/participate in the ISO Ancillary Services through aggregator
- Electric Utility and ISO Can:
  - Load balance (DR) during Peak Load for Emergency or Economic dispatch
  - Deliver pricing signals for incenting customer behavior change.
  - Optimally plan distribution infrastructure upgrade and maintenance
  - Balance the intermittent nature of Renewable energy
- Government Regulators Can:
  - Obtain high quality data on economic benefits of Smart Grid investment
  - Determine best places to incent EV purchases and public EVSE infrastructure investment
  - Establish meaningful Energy and Capacity markets for ensuring orderly clearing of supply/demand

# microClimate Scope

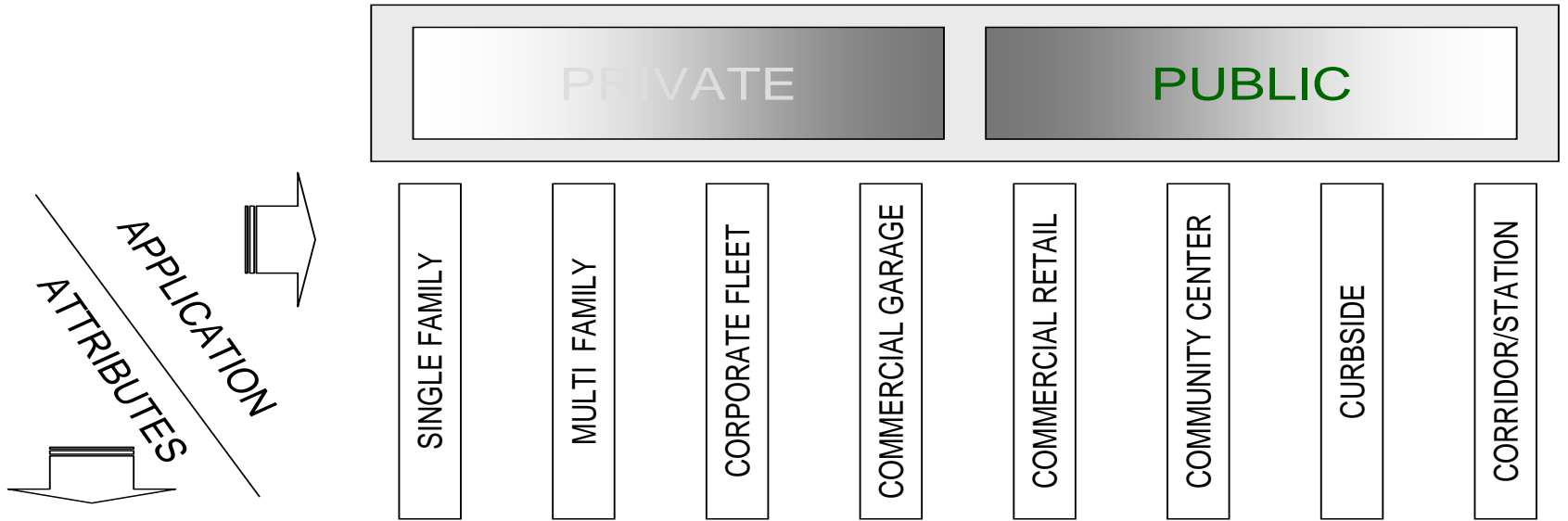
## EV Micro-Climate Infrastructure

- 1 A smart charging infrastructure allows utilities to manage load demand and influence charging behavior.
- 2 Commercial fast-charge stations attract EV owners to retail locations.
- 3 Residential charging allows EV owners to monitor battery health and control charging based on real-time utility price signals.
- 4 Fast-charge stations installed at strategic locations, including fueling stations and rest stops, provide convenient recharging opportunities.
- 5 Discrete and secure street charging for residential and commercial urban areas.
- 6 Office parks and parking garage charging for employee parking and timed parking structures.



EVSE hardware is strategically deployed and networked together for advanced utility demand management and user convenience features.

# microClimate EVSE Applications



	SINGLE FAMILY	MULTI FAMILY	CORPORATE FLEET	COMMERCIAL GARAGE	COMMERCIAL RETAIL	COMMUNITY CENTER	CURBSIDE	CORRIDOR/STATION
<b>Charging Levels</b>								
L2 Charger	✓+	✓	✓	✓	✓+	✓	✓-	✓-
DC Fast Charge			✓-	✓-				✓+
<b>Operating Aspects</b>								
Charge Cost (relative)	\$	\$\$	\$	\$\$\$	\$	\$\$	\$\$\$	\$\$\$
Site/Permit Effort	LOW	MOD	LOW-MOD	MOD-HI	MOD-HI	HIGH	HIGH	HIGH
Hours Used (typ)	6P-6A	6P-6A	6P-6A	7A-1A	10A-9P	9A-6P	9A-9P	24hrs
Daily Energy (kWhr)	20	20	40/250	80/??	50-80	30-50	30-50	25/??
EVs/Day per EVSE	1	2	1	4	5-8	3-4	6-10	10+

[ ALL EVSE ARE USABLE FOR REGULATION SERVICES AS BACKGROUND APPLICATION ]

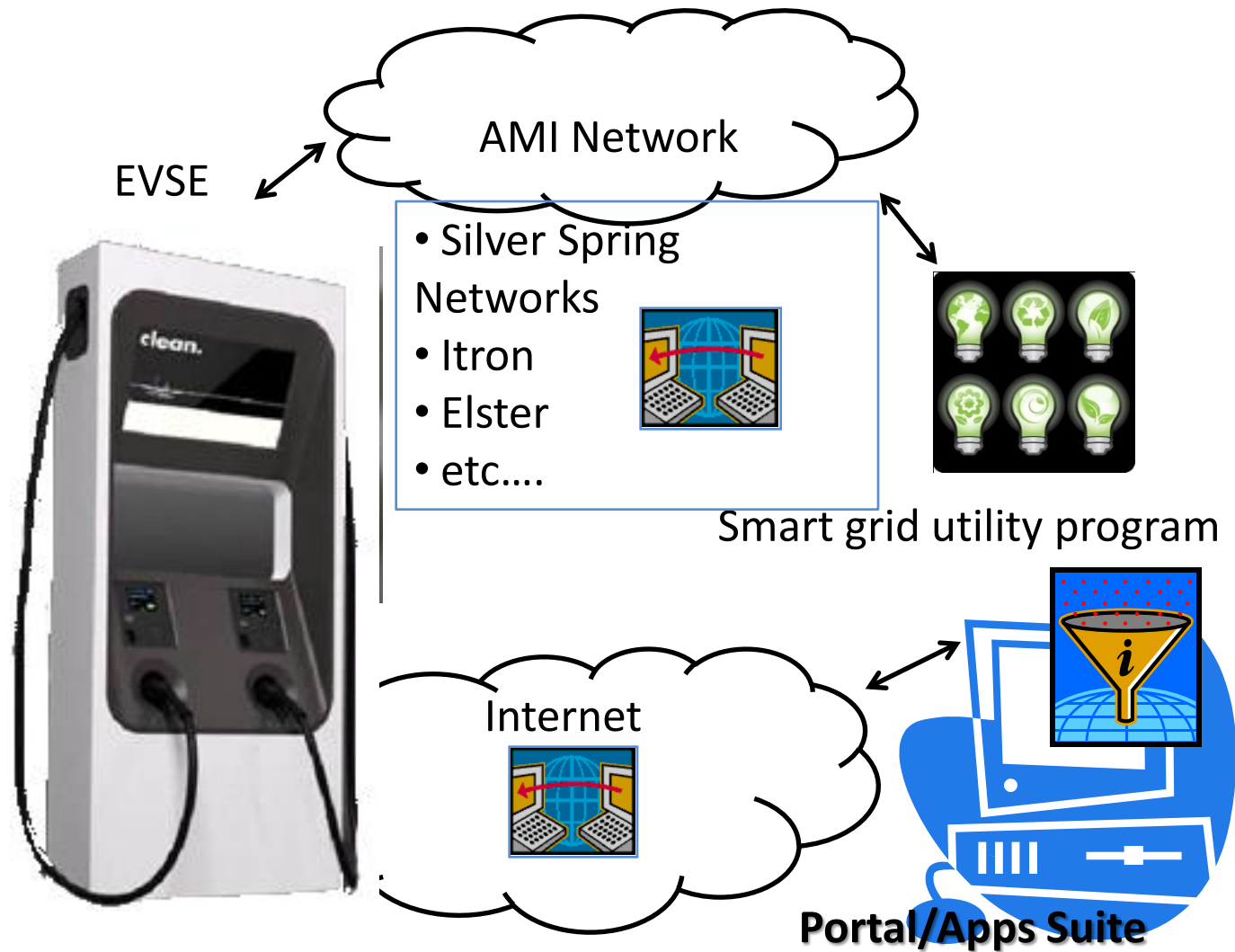


➕ Typical / more common application

➖ Less common application

# EVSE Integrated for Smart Charging:

- Integrated revenue grade energy meter
  - TOU registers
  - Multiple tariffs
  - ANSI C12.1 certification in progress
- Integrated AMI capable
  - V2G capable
  - Real time load control
  - Bi-directional comms.



# ecoTality “Genius Grid” Charging:

## Day in the Life for the Smart Electric Vehicle

### Scenario:

HAN Drive / Charge Daily  
w/ Ancillary Services

Price Cat. (Typ.):

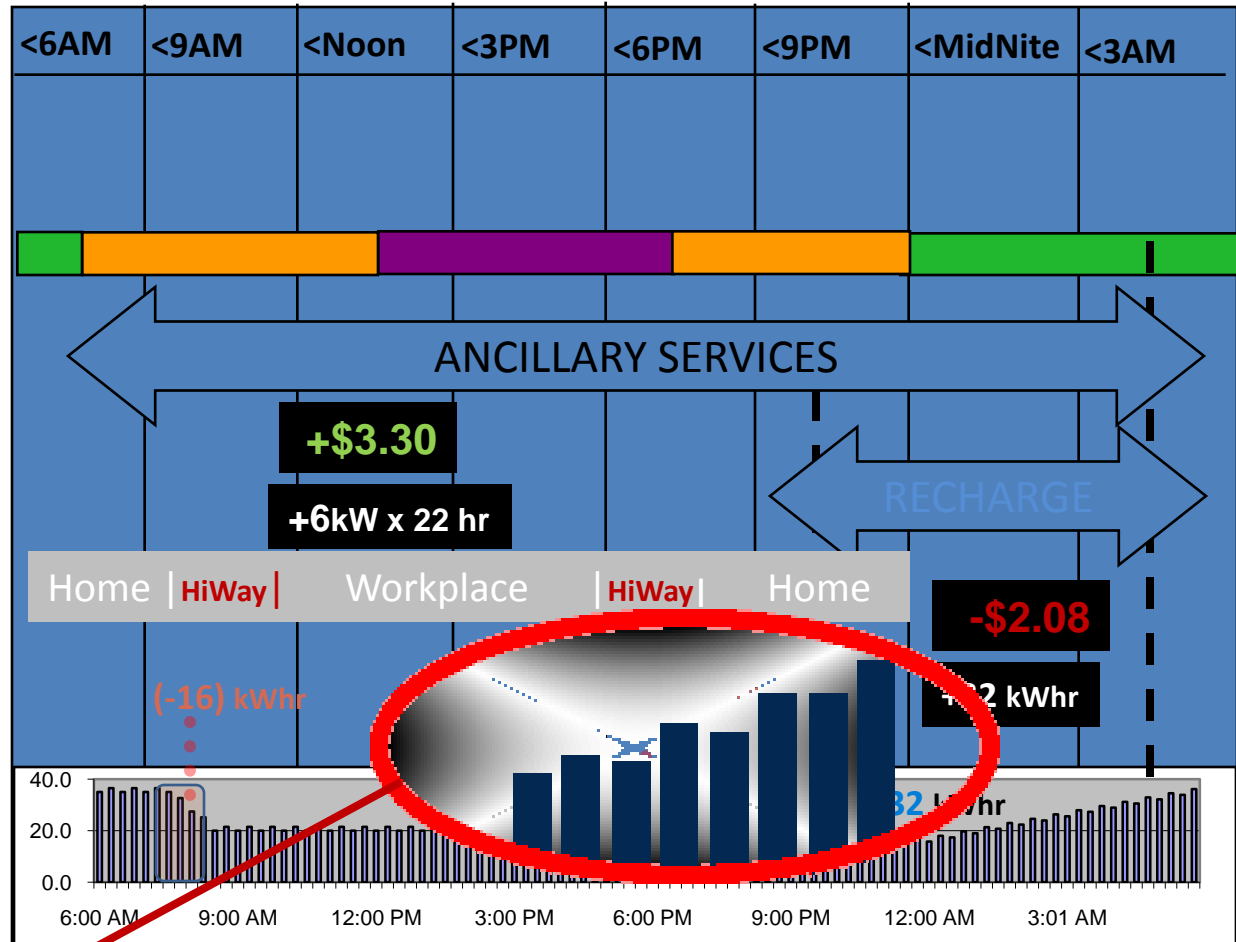
Grid Support:

Vehicle Charging:

Vehicle Location:

Energy Transfer:

Battery SOC (kW-hr):



Net Recharging while  
Varying charge rates

CE 11c MED PRICE 25c HI PRICE \$25/MW/hr REG SVCS

# CLIPPER CREEK

Mike Paritee

# AEROVIRONMENT

Peter Fontaine

**LEVITTON**

Michael DeRosa

# SemaConnect

Naly Yang