



Metropolitan Washington
Council of Governments

EV Infrastructure Planning Work Group

EV Micro-Climate Planning Lessons Learned



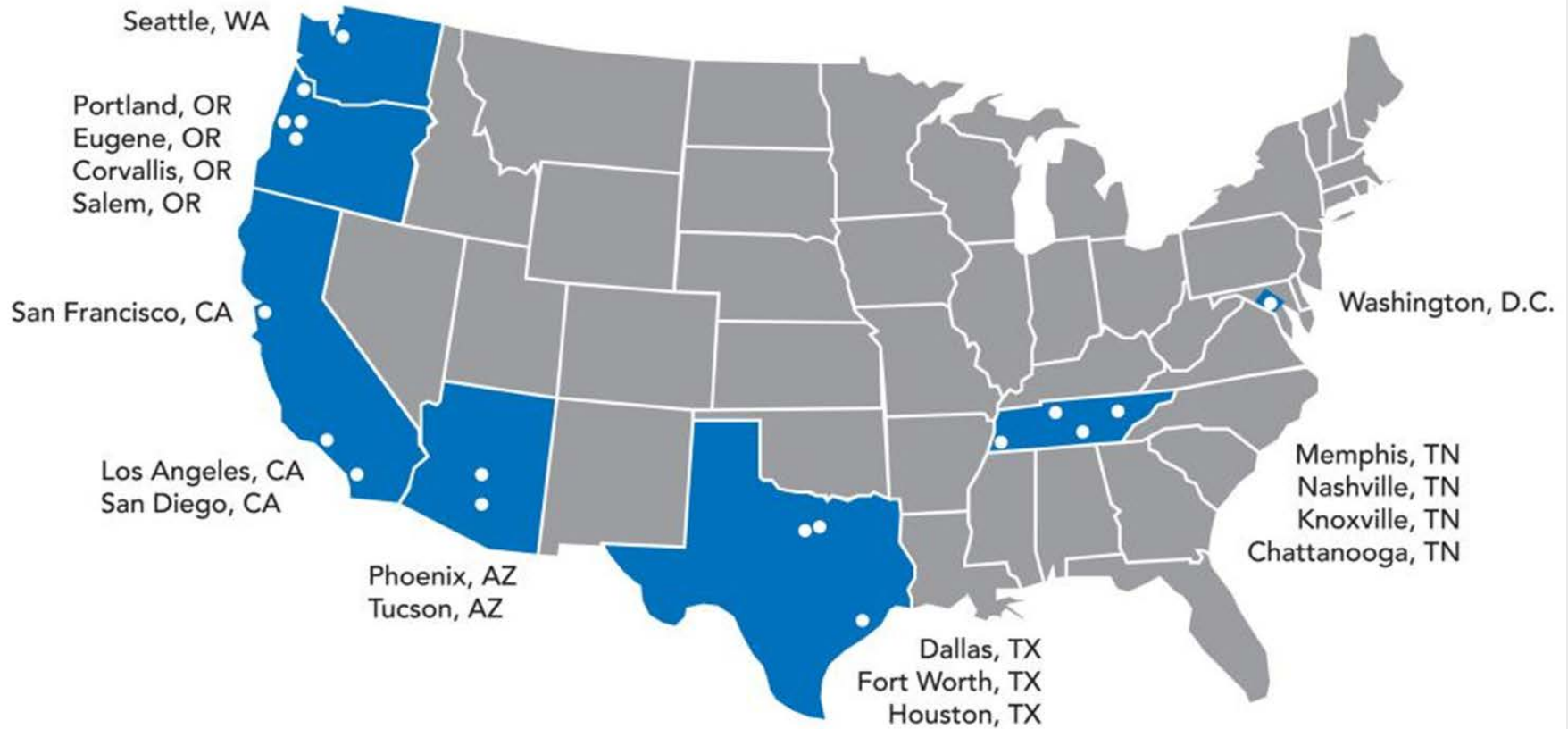
November 29, 2011

The EV Project



- **\$230 million project**
 - \$115 million grant from US Dept. of Energy
 - \$115 million match
- **Purpose: To plan, build, study, and evaluate mature electric vehicle charging infrastructure in six states plus the District of Columbia**
- **Product: Lessons learned**

The EV Project



Up to 8300 Residential EVSE (Nissan Leaf and Chevrolet Volt)
Up to 5000 Publicly Available AC Level 2 EVSE
Up to 225 Dual Port DC Level 2 EVSE

Infrastructure Planning Lessons Learned

- The EV Project Assumptions
 - EV Micro-Climate Planning Overview
 - EVSE Type and Capabilities
 - EVSE Location Planning
 - EVSE Premise Planning
 - Publicly Available EVSE
 - Workplace EVSE
 - Residential EVSE
 - Preliminary Notes on EVSE Usage
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- NOTE: The EV Project is continuing and new lessons are being learned



The EV Project Assumptions

■ **EVSE Deployment**

- Rich Infrastructure helps create EV Demand
- Government Grants cannot be counted on for Long Term Funding
- Publicly Available Charging must make Financial Sense
- Business Models need to be Developed and Tested

■ **No-Cost EVSE Charging**

- Not Beneficial in Long Run
- No support to Business models
- Encourages bad behavior
 - On-peak charging
 - Long stay time at EVSE
 - ICE vehicle drivers' ire



■ **Smart EVSE Preferred over Basic EVSE**

- Data Collection
- Utility Integration
- Remote Upgrade Capabilities

■ **AC Level 1 is Not Included**

EV Micro-Climate Planning

- **Organize Stakeholders**
 - Local Input and Interests
 - On-Site Facilitator
 - Personal Agendas
- **Plan Development**
 - Infrastructure Deployment Guidelines
 - Long-Range Plan
 - Micro-Climate Plan
- **Install Per Plan**
 - Publicly Available
 - Workplace
- **Collect Data**



AC Level 1 EVSE

- **120 VAC, typically 15 amp circuit, 1.4 kW**
 - Capable of charging LEAF in ~24 hours
- **Residential Locations**
 - Lightly traveled BEVs, PHEV
 - All night charging available
- **Workplace Locations**
 - All day charging available
- **Emergency Use**
 - Backup for Out of Range
- **No Smart Level 1 EVSE**
 - No Data Collection
 - No Utility Interface



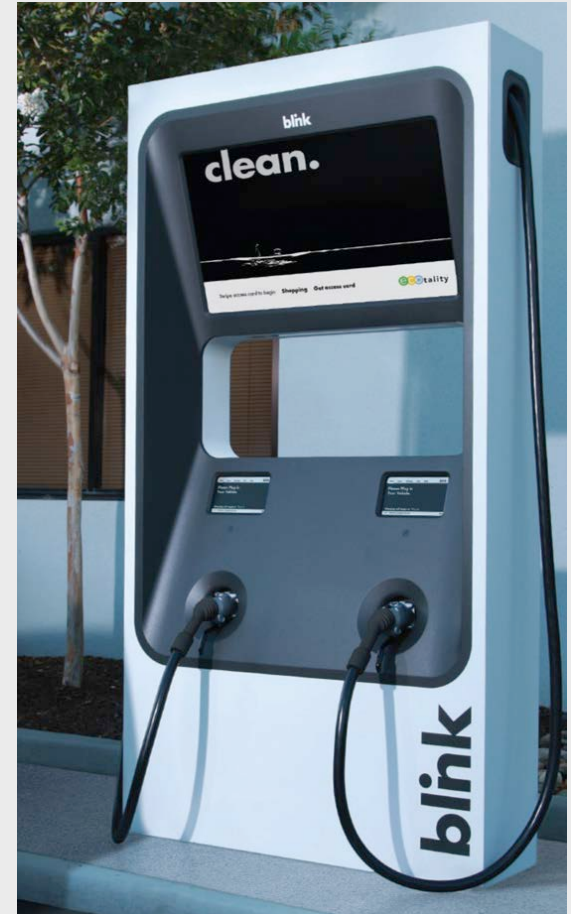
AC Level 2 EVSE

- **240 VAC, typically 40 amp circuit, 7.2 kW**
 - Capable of charging LEAF (3.3 kW Charger) in 4 – 6 hours
- **Destination Locations**
 - Where people shop, play, gather,
 - Target is 1 – 3 hour stays
- **Workplace Locations**
- **Parking Garages**
- **Expand effective operating range of the EV**
 - Allows for unscheduled trips
 - Enhance “Range Confidence”



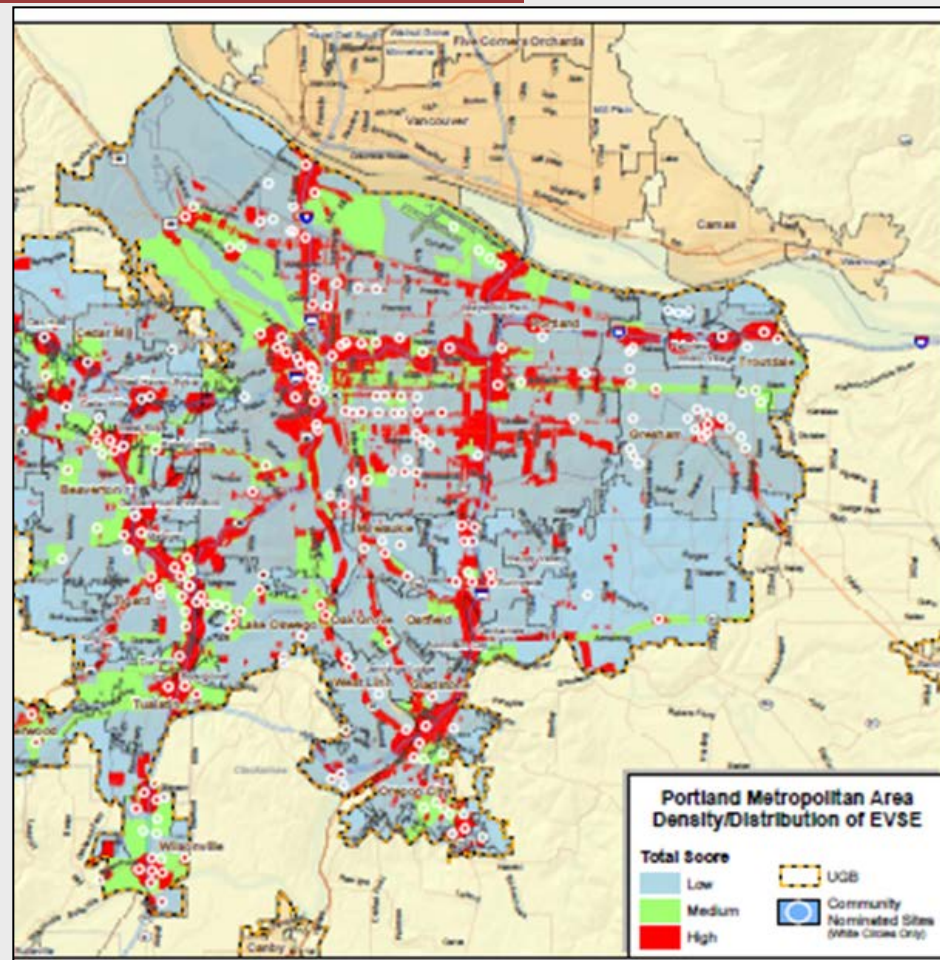
DC Level 2 EVSE

- **480 VAC, typically 50 - 60 kW**
 - Capable of charging LEAF (30%-80% SOC) in 24 minutes
- **Destination Locations**
 - Convenience Stores, Fast Food Restaurants, Rest Stops
 - Where people stay a short time
 - Target is 15 – 30 minute stays
- **“Safety Net” Locations**
- **“Garageless” EV Owners**
- **Freeway Corridors**
- **Typically High Traffic Areas**
 - Convenient Locations
 - Accessible to the greatest numbers



EVSE Location Planning

- **Site Selection**
 - Traffic Studies
 - Land Use Designations
 - Early Adopter Demographics
 - Toyota Prius Owners
 - Employment Centers
 - Regional Attractors
 - Daily/Hourly Availability
- **GIS Mapping**
 - Powerful Visualization
- **Non-Preferred Examples**
 - Curbside
 - Park & Ride
 - Airport Long-Term Parking Areas



EVSE Premise Planning

- **Site Specific Selection**
 - Visibility to EV Driver - Signage
 - No “Preferential” Location
 - ADA Requirements
 - Electrical Construction Costs
 - Smart EVSE Communications
 - Daily/Hourly Availability
 - Lighting
 - Security Checks
 - EV Charging Only
- **Non-Preferred Examples**
 - Interior or Below Grade in Parking Garage
 - At Facility Entrance
 - In Existing ADA Stalls



Publicly Available EVSE

■ Commercial Host Considerations

- Hosts want to see Vehicles
- Electrical Construction Costs
- Permit fees vary widely
- Risk/Reward
- Utilization
- Business Case
- Utility Electricity Costs
- Utility Demand Charges
- Vandalism Questions
- Corporate Image



■ It's not easy to give away free EVSE

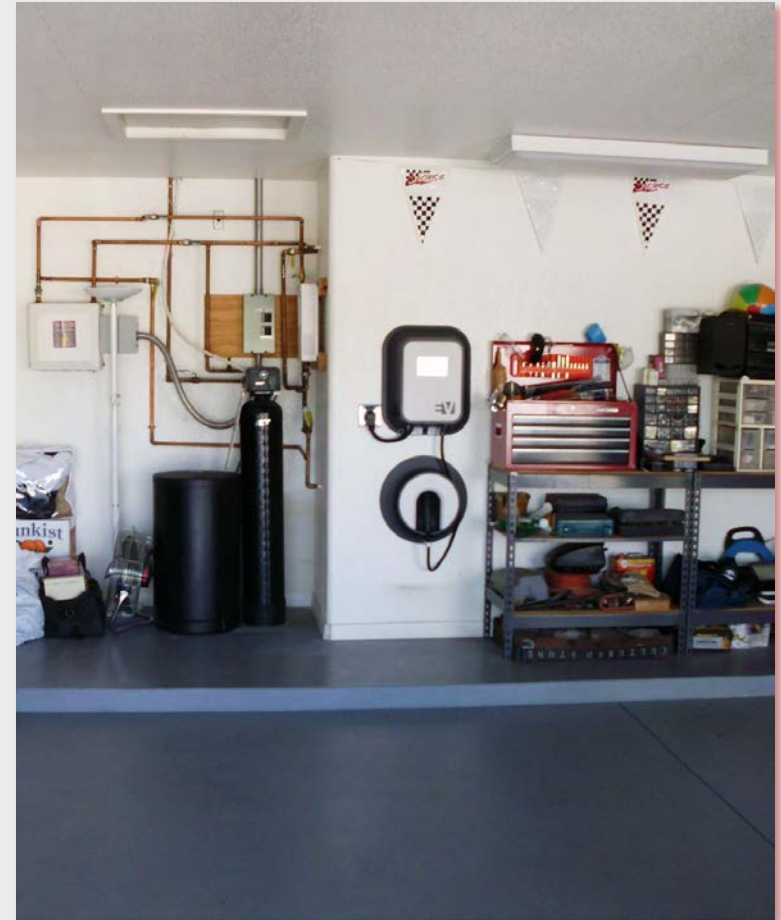
Workplace EVSE

- **Motivated Employer**
 - Adds to “green” image
 - LEED Certification
 - Encourages employees to drive EV
 - Respond to Employee Requests
- **Issues**
 - Preferential Treatment
 - Value of Service – taxable or de minimis fringe benefit
 - Where to Place – cost/convenience/preferential treatment
 - Quantity of EVSE - expansion
 - EVSE Sharing Issues
 - On-peak charging



Residential EVSE

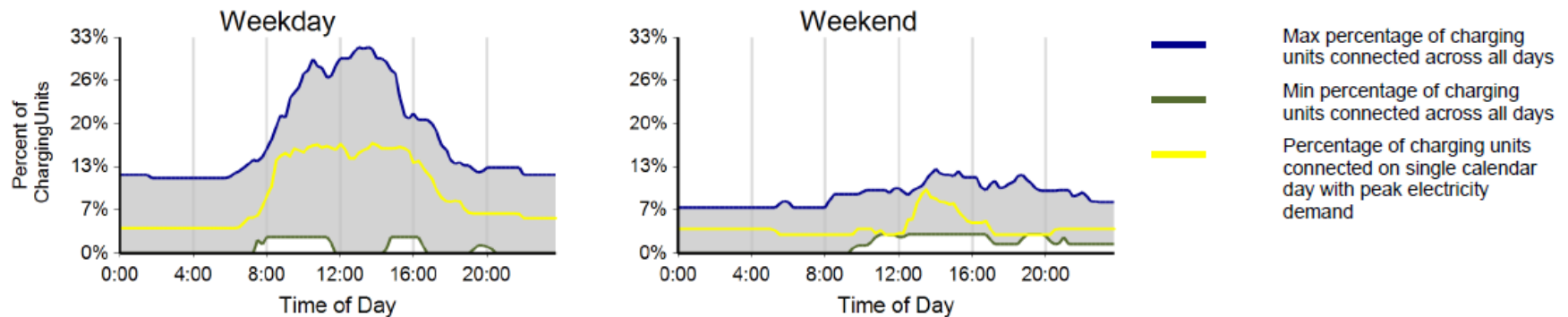
- **Garages**
 - Attached Garage is easiest
 - Lowest Cost Installation
- **Multi-Family**
 - Location?
 - Ownership?
 - Security?
 - Billing?
 - Installation costs?
 - Insurance/Liability?
- **Garageless**
 - DC Level 2?
 - Parking Garage?



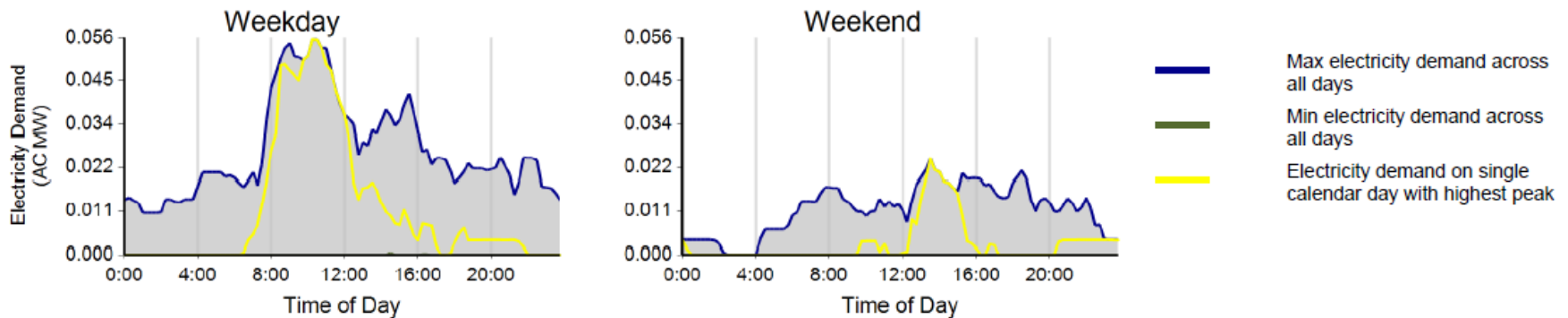
Preliminary Notes

■ 170 Publicly Available EVSE– 3rd Quarter 2011

Charging Availability: Range of Percent of Charging Units with a Vehicle Connected versus Time of Day³



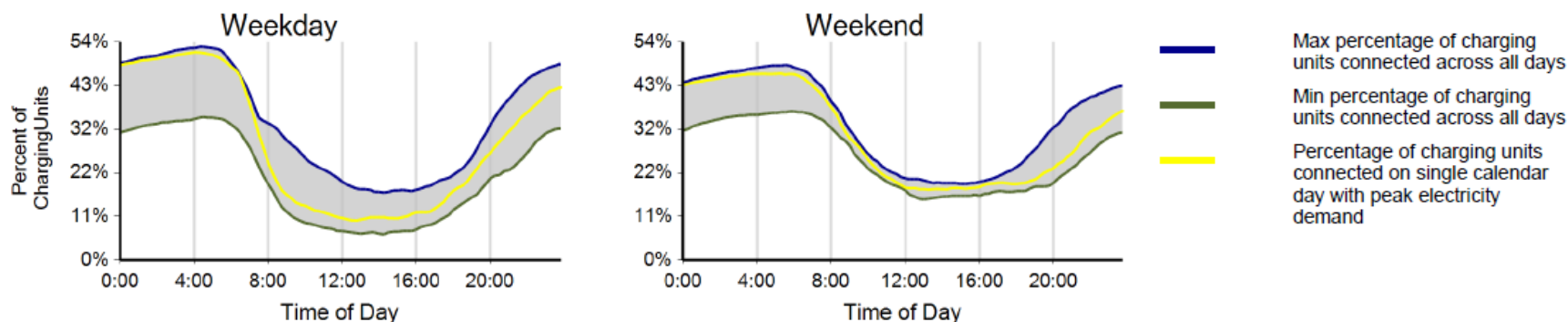
Charging Demand: Range of Aggregate Electricity Demand versus Time of Day⁴



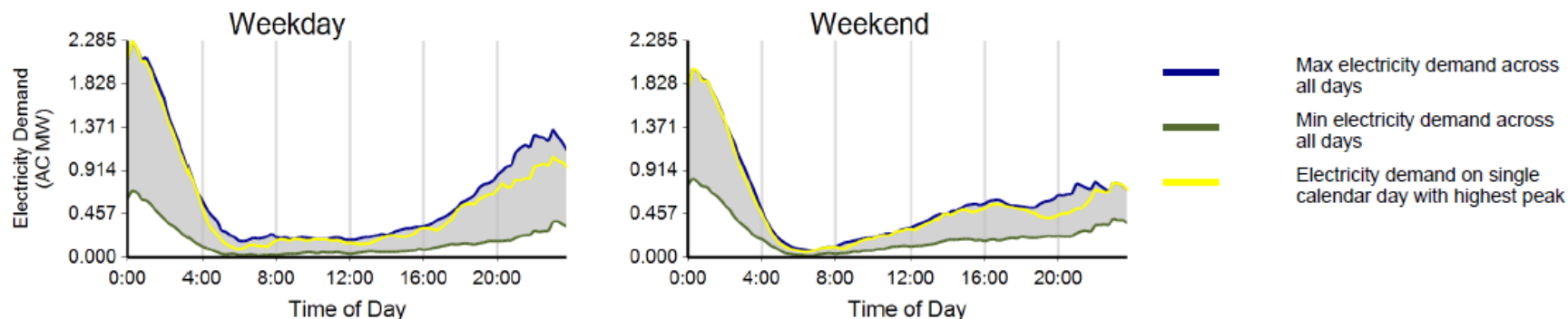
Preliminary Notes

■ 2413 Residential EVSE– 3rd Quarter 2011

Charging Availability: Range of Percent of Charging Units with a Vehicle Connected versus Time of Day³



Charging Demand: Range of Aggregate Electricity Demand versus Time of Day⁴



Thank You

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