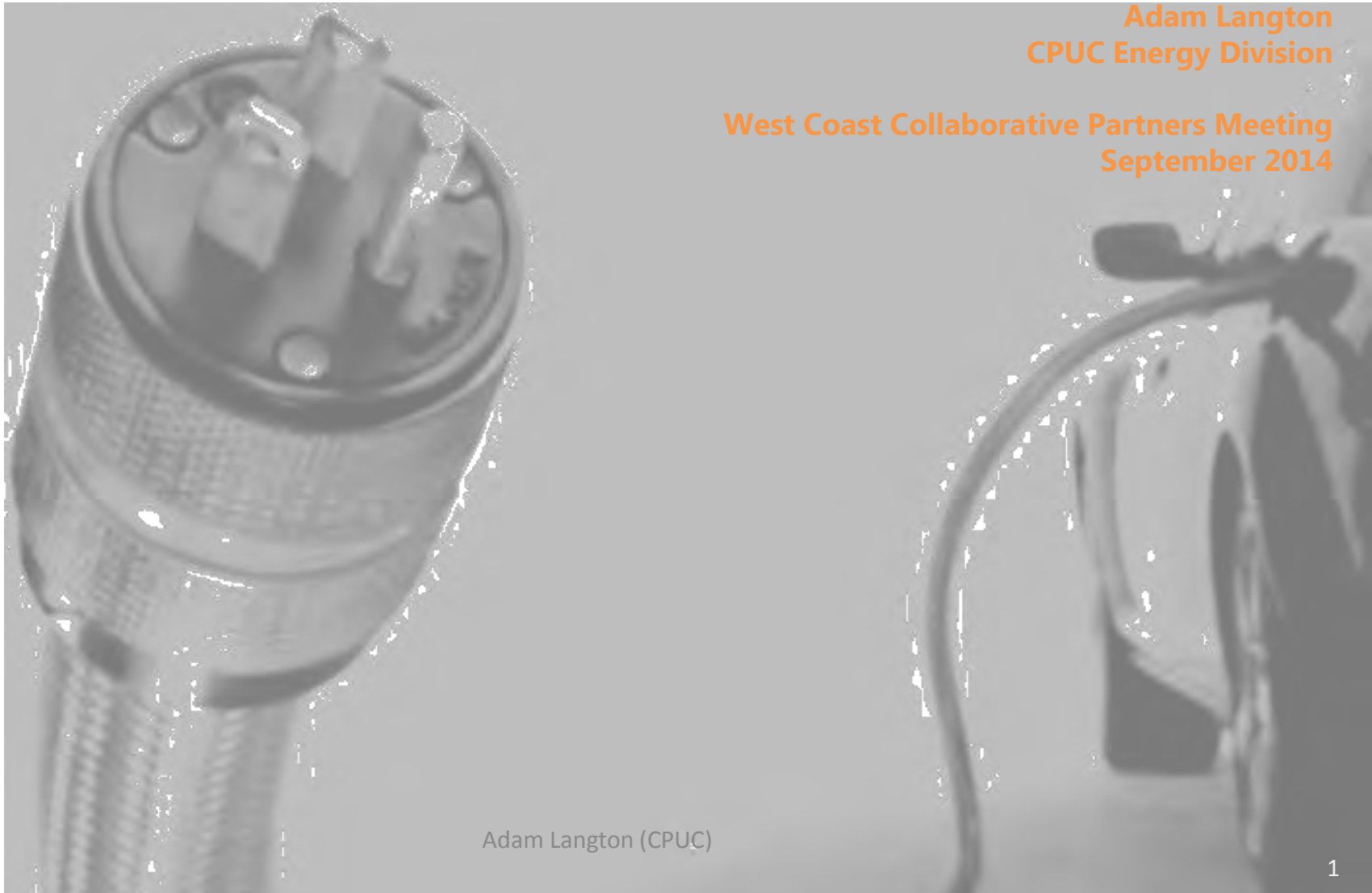


Med/Heavy Duty Truck Electrification Regulatory and Policy Issues

Adam Langton
CPUC Energy Division

West Coast Collaborative Partners Meeting
September 2014



Role of the California Public Utilities Commission

- Regulates investor-owned utilities in California
- Primary sectors: electricity, natural gas, some water, and some transportation applications
- 1,000 employees
- PEV regulatory issues:
 - electricity rates
 - utility role in infrastructure deployment
 - education/outreach
 - vehicle-grid integration



Governor's Zero-Emission Vehicle (ZEV) Action Plan

Goal: 1.5 million ZEVs on CA roads by 2025

Four Action Areas:

- Complete needed infrastructure and planning
- Expand consumer awareness and demand
- Transform fleets
- Grow jobs and investment in the private sector

CPUC Regulatory Activity to Date

- Began Regulatory Proceeding in August 2009
- Phase 1: EV charging services provider *not* a public utility but generally a retail customer – rates subject to PUC, not FERC
- Phase 2: PEV Rates and Cost Allocation, Metering, Programs
 - Utilities are not allowed to own charging stations
 - Treat residential distribution upgrade costs as a shared cost
 - Allow for customer owned-submeters for PEV load
 - Develop notification process
 - Conduct load research
- Phase 3: Implementation
 - Load Research
 - Utility Notification Plan
 - Submetering Protocols

New CPUC Proceeding (R.13-11-007)

- Initiated November 2013
- Proceeding consists of two policy tracks
 - **Vehicle-Grid Integration:** how vehicle charging and battery discharge can be used to provide grid benefits
 - **Rate Design:** How rates can be designed to encourage PEV adoption and minimize grid impacts
 - Both tracks will also explore financing opportunities to reduce the upfront costs of infrastructure installation and vehicle purchase price
- First Workshop held in December 2013
- Next Workshop in October 2013

Key Electricity Issues Facing Fleets

- Demand Charges
- Volumetric Rate
- Distribution Upgrade Costs

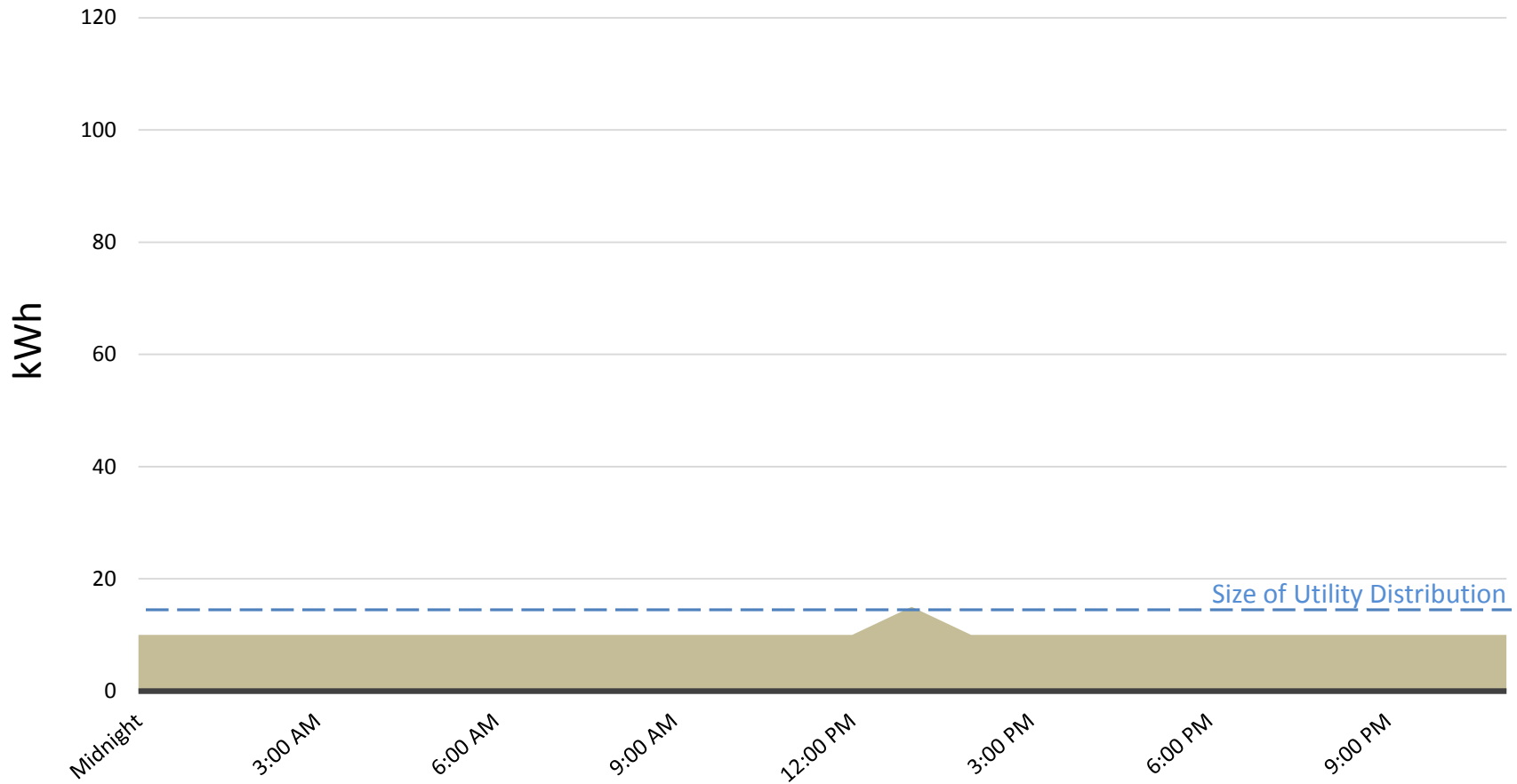
Costs to Distribute Electricity:

- Generation Costs
- Distribution Costs
- Transmission Costs
- Other Programmatic Costs

...Covered through revenue generated from:

- Volumetric rates
- Demand Charges
- Distribution Upgrade Costs

Example: Facility + No PEVs



Assumptions:

Facility that maintains constant 10 kW load except for 15 kW peak usage at 1pm

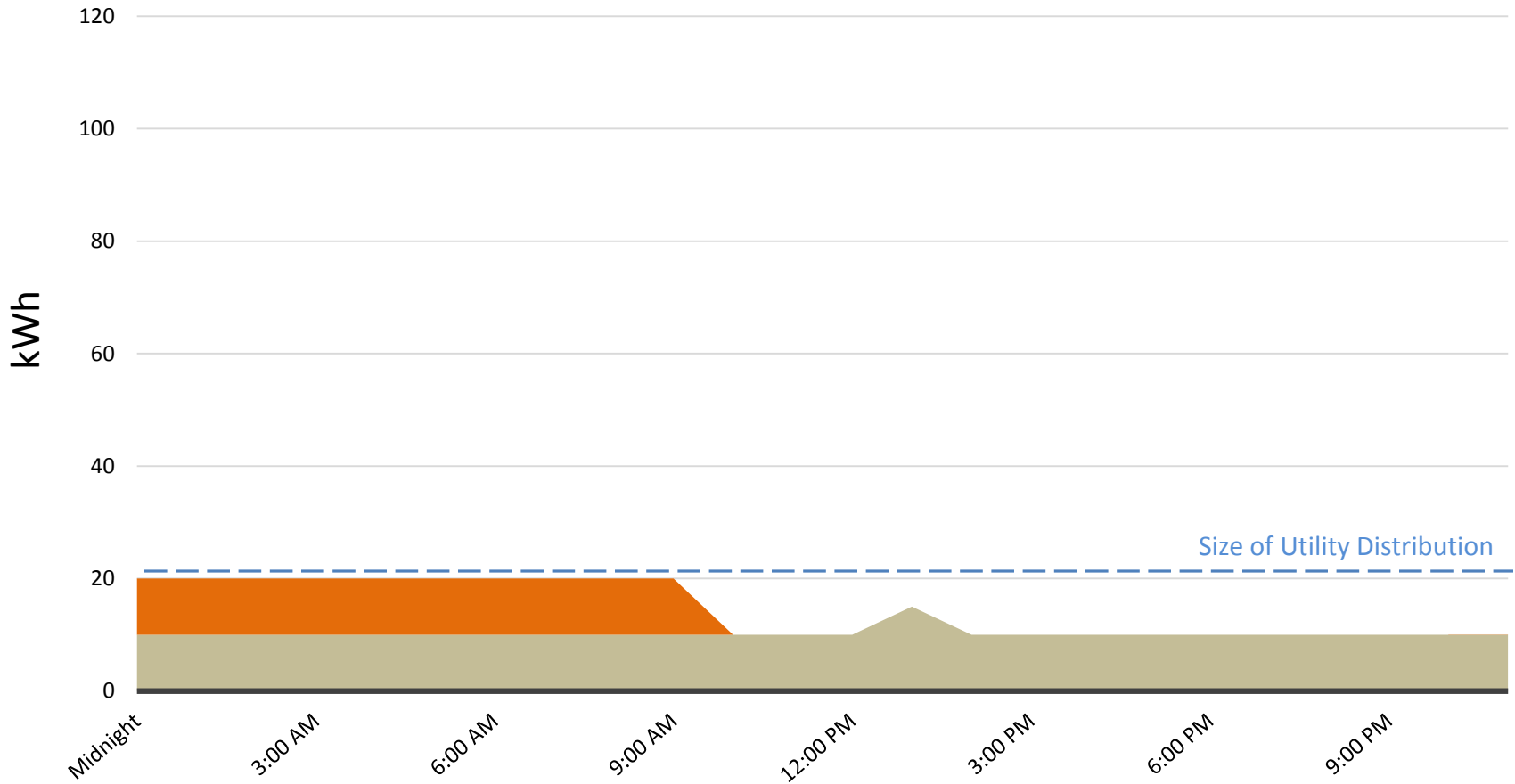
Electricity Cost: \$0.10 per kWh off peak, \$0.30 per kWh on peak

Demand Charge = \$12 per kWh

Results:

Total Usage	245 kWh
Volumetric Cost	\$39.50
Demand Charge	0
\$/kWh	\$0.16/kWh
Marginal Cost of PEVs	--

Example: Facility + 1 Nighttime Charging Med. Veh.



Assumptions:

Facility that maintains constant 10 kW load except for 15 kW peak usage at 1pm

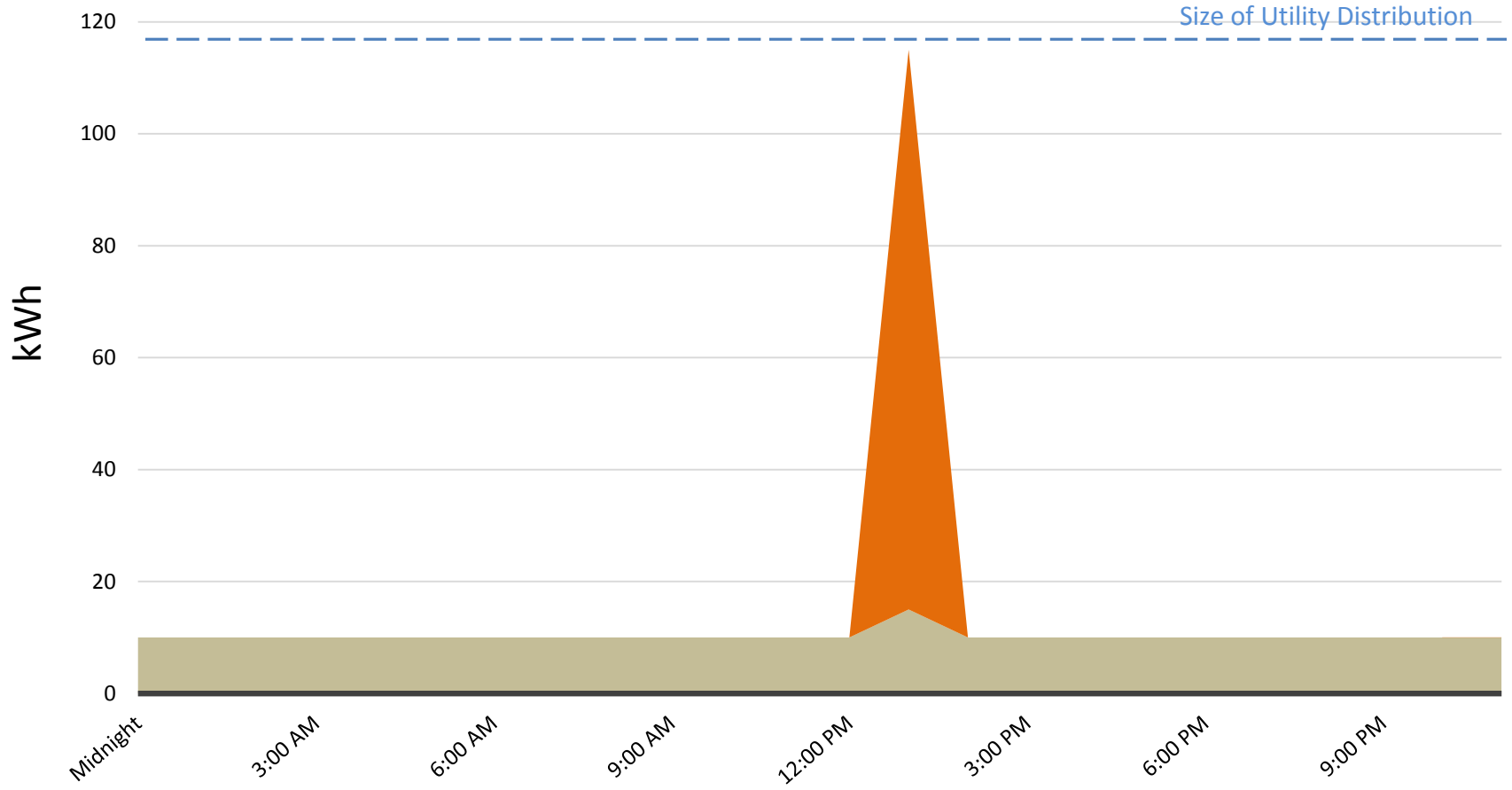
Electricity Cost: \$0.10 per kWh off peak, \$0.30 per kWh on peak

Demand Charge = \$12 per kWh

Results:

Total Usage	345 kWh
Volumetric Cost	\$49.50
Demand Charge	\$0
\$/kWh	\$0.14 /kWh
Marginal Cost of PEVs	\$0.10/kWh

Example: Facility + 1 Fast Charging Med. Veh.



Assumptions:

Facility that maintains constant 10 kW load except for 15 kW peak usage at 1pm

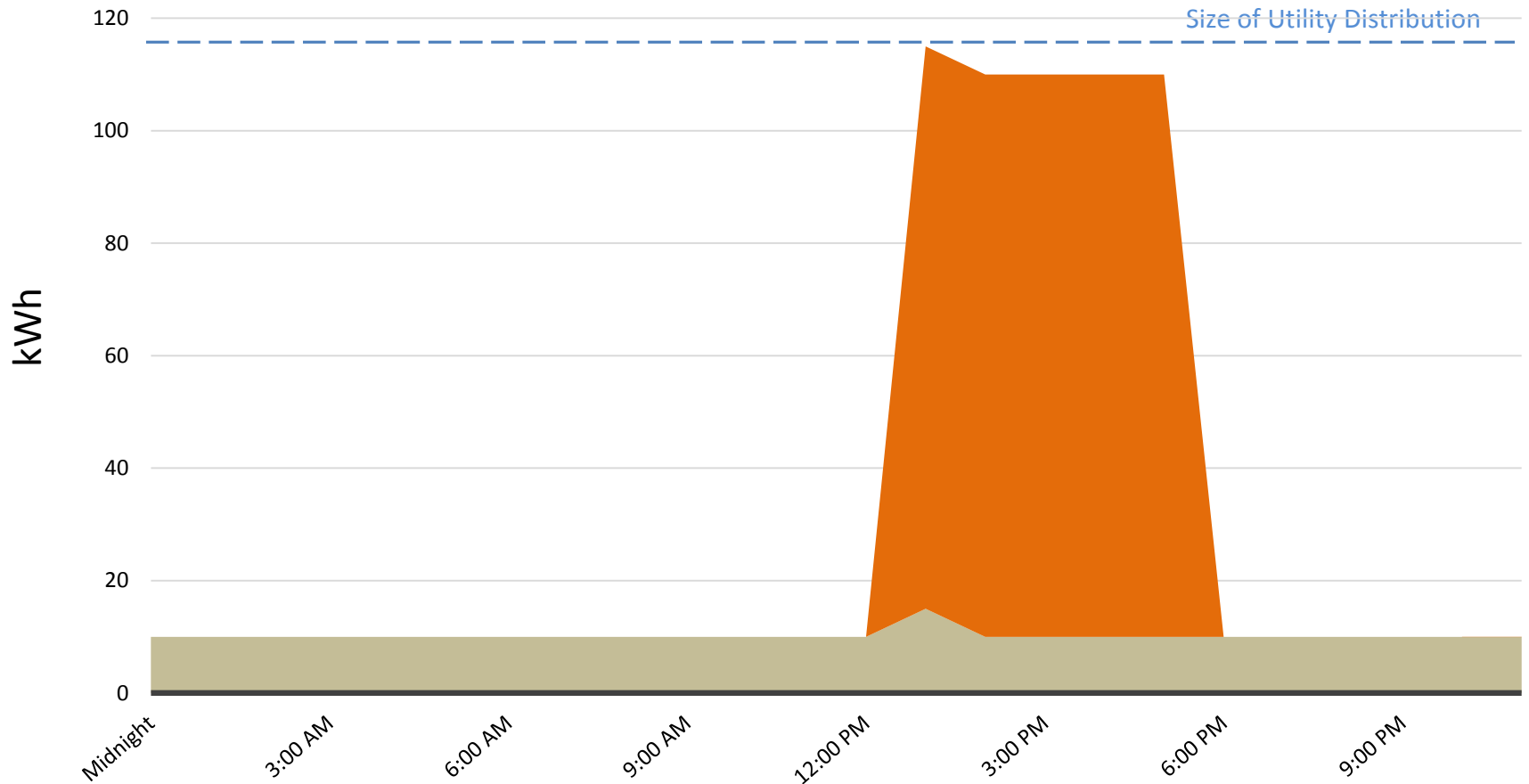
Electricity Cost: \$0.10 per kWh off peak, \$0.30 per kWh on peak

Demand Charge = \$12 per kWh

Results:

Total Usage	345 kWh
Volumetric Cost	\$69.50
Demand Charge	\$1,380
\$/kWh	\$4.20/kWh
Marginal Cost of PEVs	\$14.10/kWh

Example: Facility + 5 Fast Charging Med. Veh.



Assumptions:

Facility that maintains constant 10 kW load except for 15 kW peak usage at 1pm

Electricity Cost: \$0.10 per kWh off peak, \$0.30 per kWh on peak

Demand Charge = \$12 per kWh

Results:

Total Usage	745 kWh
Volumetric Cost	\$189.50
Demand Charge	\$1,380
\$/kWh	\$2.11/kWh
Marginal Cost of PEVs	\$3.06/kWh

Fleet Electricity Costs Comparison

Scenario	Total Usage (kWh)	Volumetric Cost (\$)	Demand Charge	Total Cost	Marginal Cost of Fleet Electricity
Facility	245	\$39.50	\$0	\$39.50	\$0.16/kWh
Facility + 1 Fast Charge Truck	345	\$69.50	\$1,380	\$1,449.50	\$14.10/kWh
Facility + 1 Slow Charge Truck	745	\$49.50	\$0	\$49.50	\$0.10/kWh
Facility + 5 Fast Charge Trucks	745	\$189.50	\$1,380	\$1,569.50	\$3.06/kWh
Facility + 5 Slow Charge Trucks	745	\$89.50	\$720	\$809.50	\$1.54/kWh

Conclusions

- Impacts of Demand Charges are unique to the utility service territory and facility load
- Demand Charges are much higher for fast charging, lower for nighttime 'slow' charging
- Demand Charges result in high marginal costs for small fleets
- Impact of Demand Charges diminishes as the fleet size increases, because it gets spread over more kWhs

What's Next?

- Scoping Memo Released on July 16th, 2014
- First Phase of the Proceeding will consider VGI implementation and Market Acceleration Actions
- October 2014 and January 2015 CPUC VGI Workshops
- Several Pilots are Underway

Questions?

Adam Langton
CPUC Energy Division

[AHL@cpuc.ca.gov](mailto: AHL@cpuc.ca.gov)