Innovative Transportation Technology and Fleet Solutions Panel

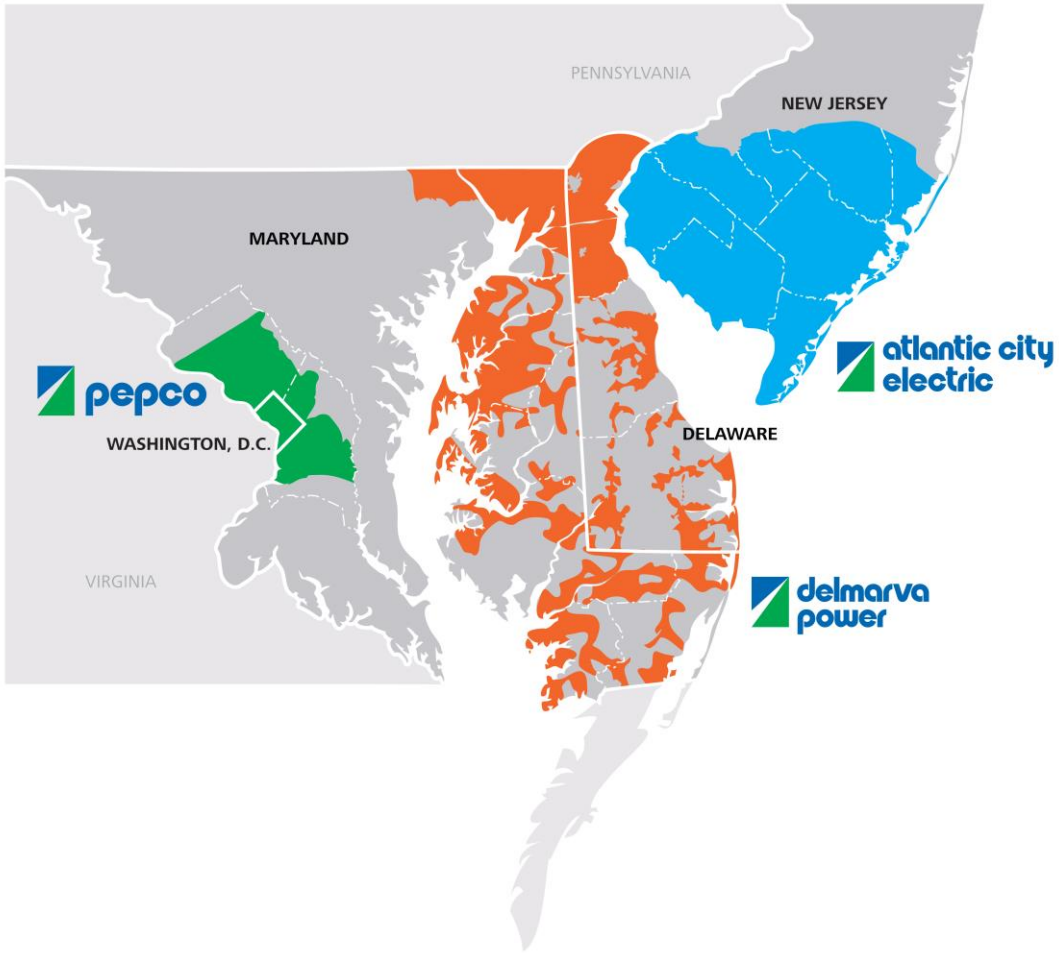
COG Climate, Energy and Environmental Policy Committee

Presented by: Robert Stewart

July 22 , 2015

Pepco Holdings, Inc. Quick Facts

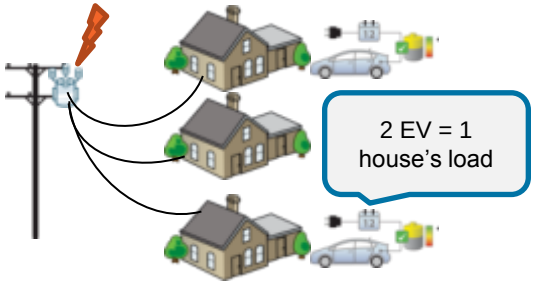
- Incorporated in 2002
- Service territory:
  8,340 square miles
- Customers served
  - Atlantic City Electric:
    - 545,000 – electric
  - Delmarva Power:
    - 506,000 – electric
    - 126,000 – natural gas
  - Pepco:
    - 801,000 – electric
- Total population served:
  5.6 million



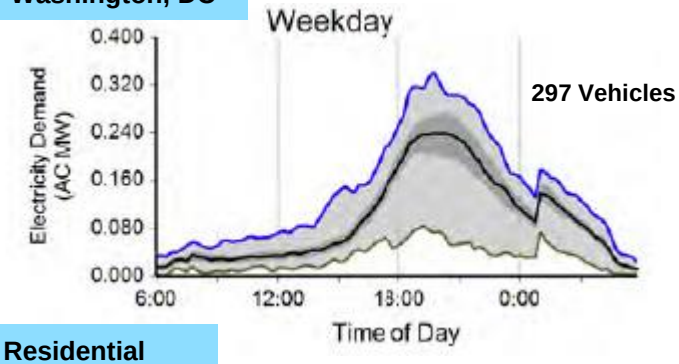
Pepco Quick Facts

- First incorporated in 1896
- Service territory: 640 square miles
- Customers served: 801,000
  - Washington, D.C.: 264,000
  - Montgomery County: 312,000
  - Prince George's County: 225,000
- Population served: 2.2 million
- Employees: 1,429
- Facilities: 9
- Substations: 150

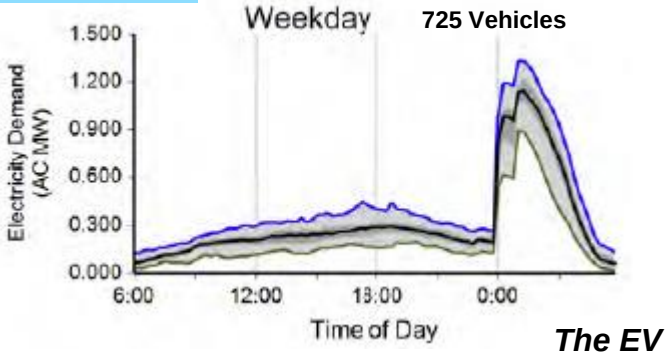
Unmanaged EV charging can create reliability problems for utilities…..



Residential Washington, DC[1]



Residential San Diego, CA[1]



Local Distribution System Impact

- EV load is equivalent to ½ of full home load, so adding EVs may overload local transformers
- Older, more established neighborhoods with higher concentrations of EVs will be particularly at risk (e.g., Montgomery County and Prince Georges's County Suburbs)

Local Peak Load Increase

- Most drivers will return home and plug in between 4-8 PM, resulting in an increase to the normal afternoon peak
- Uncontrolled charging will create the need for additional Infrastructure and result in longer and higher peak demand
- Potential for Impact to Distribution System reliability

Operational Needs

- Metering EVSE as separate load for Innovative Rates
- Back-office integration of EVSE for control, billing
- Remote diagnostics for lower maintenance costs
- Ability to manage charging in pockets to prevent stress on the Distribution System
- Need to validate the accuracy of on-board metering in EVSE in order to eliminate the need for a second AMI meter

The EV Project Report, Q1 2013, US DOE[1]

Maryland's Efforts

Maryland Senate Bill 179

Goals

- Increase reliability & efficiency of the electric distribution system
- Lower electricity use at time of high demand (peak)

Incentives

- TOU Pricing
- Credits on Distribution Charges
- Rebates on the Costs of Charging Systems
- Demand Response Programs
- Other Programs as approved

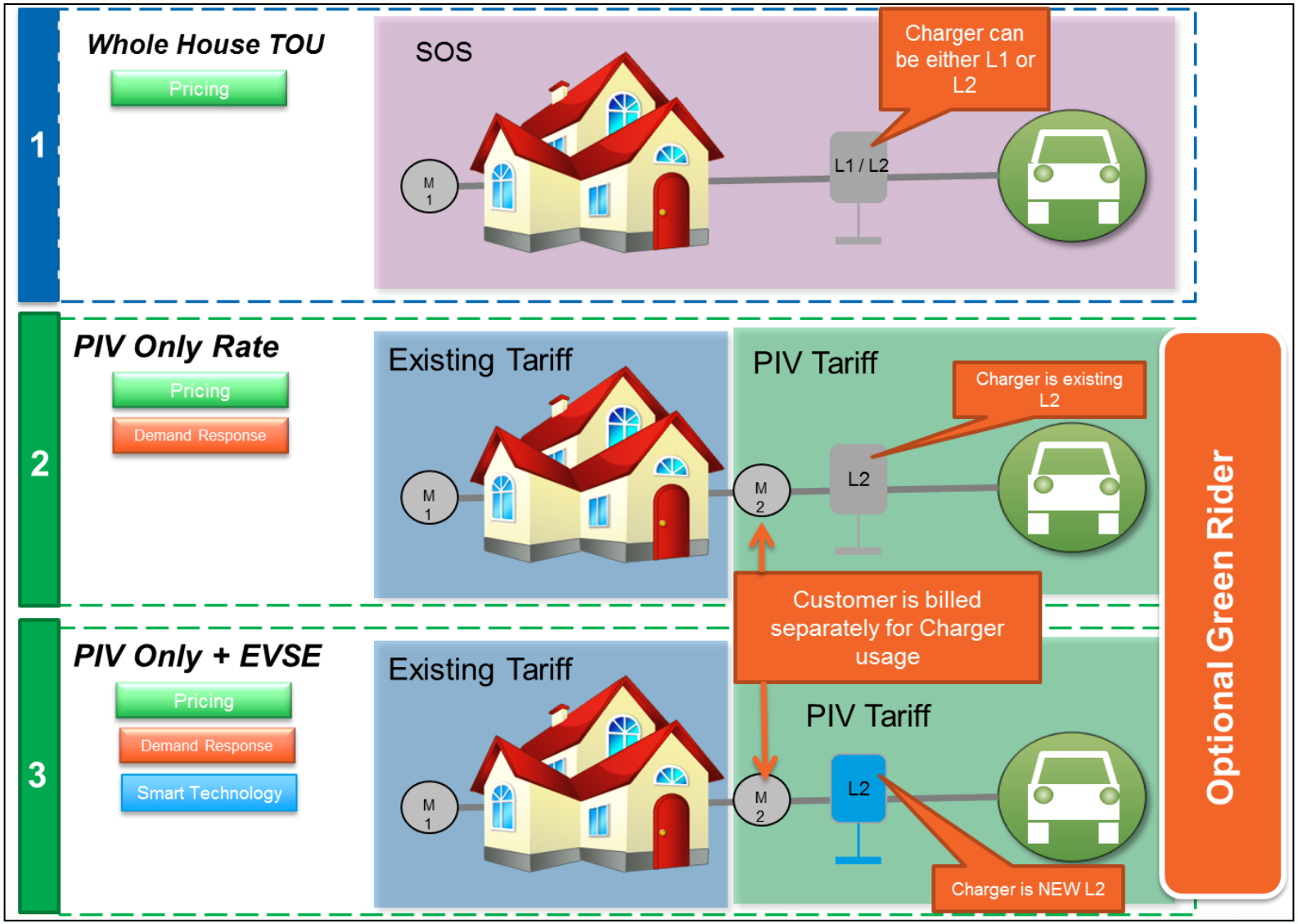
Pricing	Demand Response	Customer Education
• Ability to shift behavior • Ability to lower use at peak • Off Peak incentives • Customer communication • Scale of pricing offering • Acceptance & satisfaction • Tracking of behavior change • Participant feedback of price options	• Ability to shift behavior • Ability to lower use at peak • Facilitate DR contributions • Mitigate load imbalances • Load reduction level from participants • Viability of technology to facilitate demand response • Effectiveness of technology	• Ability to shift behavior • Ability to lower use at peak • Channel effectiveness • Participant preferences • Consumer feedback tracking • Response to various incentives and technology offerings

Smart Technology	Baseline Information
• Ability to shift behavior • Ability to lower use at peak • Demonstrate functionality • Tech & utility interconnection requirements • Accuracy of the meter within the EVSE • Installation/permitting issues • Data/communication network capability	• EV sales • Clustering implications • Energy use profiles • EVSE to installation, operation and maintenance costs

Maryland PSC Case No. 9261

- Created a Working Group with major stakeholders
- Issued the Final Report (Feb 13, 2012)
- Focused on reliability and promoting "off peak" charging
- Developed consensus for desirable elements of a pilot (Pilot Framework)

Our Program In a Picture



Rates

- Whole House Time of Use (R-PIV)
- PIV Only – Time of Use rate for the PIV
- PIV Green – Renewable Energy Adder for PIV Only

	PIV Only 1/		Whole House	
	Summer	Winter	Summer	Winter
On-Peak	$0.18822	$0.17063	$0.18230	$0.17063
Off-Peak	$0.07860	$0.06673	$0.11720	$0.10007

PIV & Whole House TOU :

Peak: 12:00 PM – 8:00 PM

Off-peak: 8 PM – 12 PM; and all hours weekends and holidays

Rates are designed to be revenue neutral

[1]PIV Only Rate will require the installation of a separate AMI meter to measure the charger consumption

Renewable Adder to PIV Only Rate

	PIV Only	
	Summer	Winter
On-Peak	$0.18822	$0.17063
Off-Peak	$0.07860	$0.06673

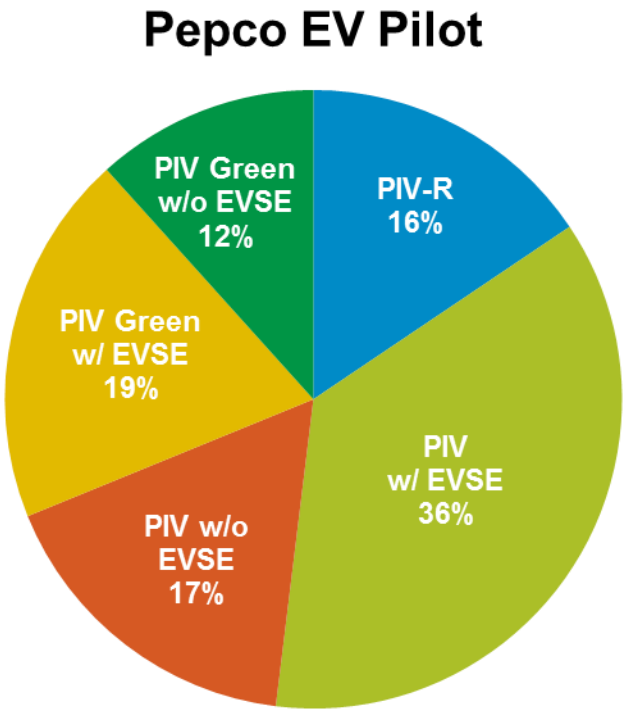
Adds $0.0179/kWh to PIV rate

	PIV Green	
	Summer	Winter
On-Peak	$0.20612	$0.18853
Off-Peak	$0.09650	$0.08463

- The purpose of this option is to test whether customers will be willing to apply savings to claim zero tailpipe emissions
- It will reduce annual savings by $25 - $35

Customers (77 total)*

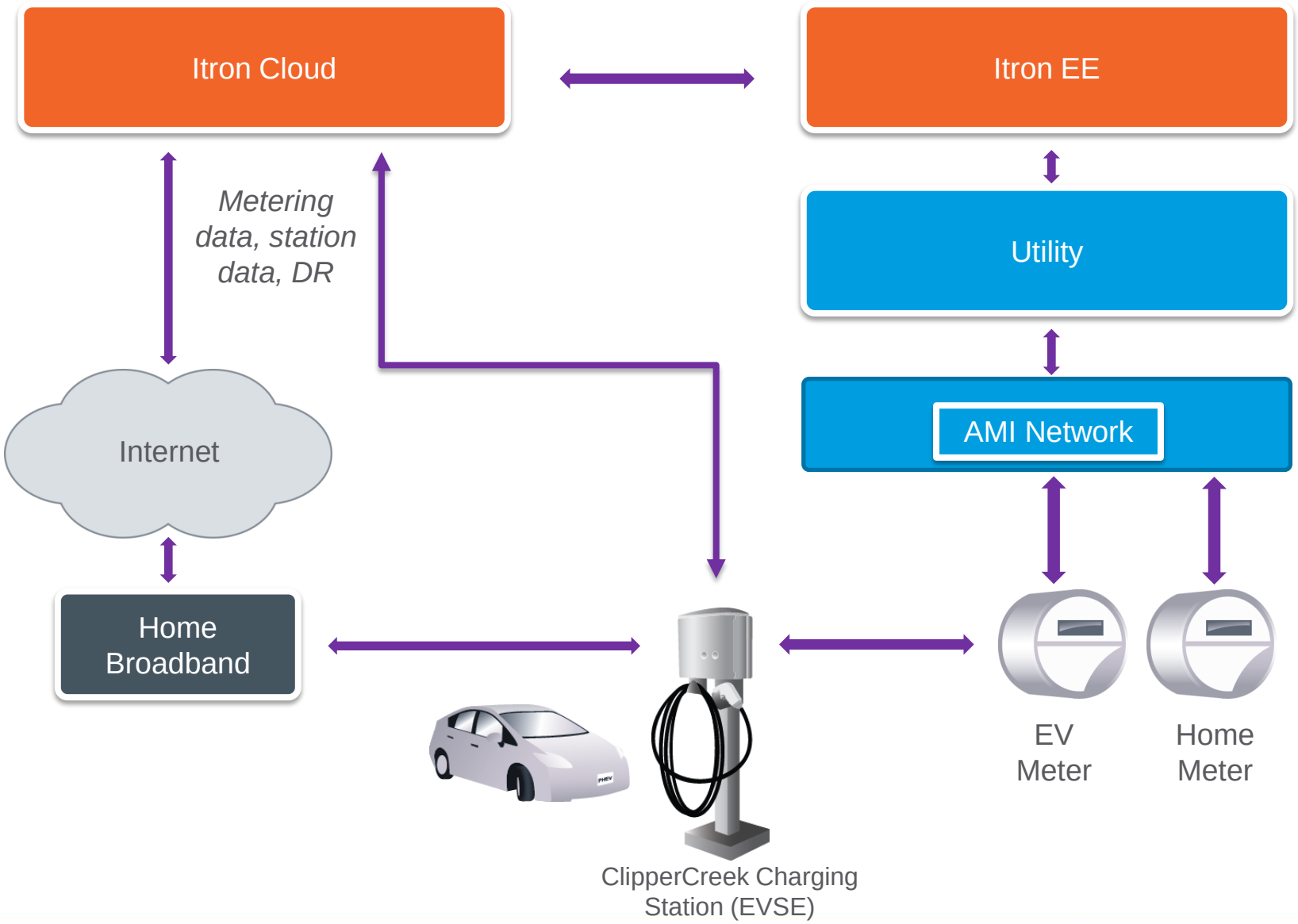
Data Categories	Pepco Rate	# of Customers
Not Enrolled in Pilot Program	SOS	68
R-PIV	Whole house TOU	12
PIV w/EVSE	PIV	28
PIV wo/EVSE (smart EVSE)	PIV	13
PIV Green w/EVSE	PIV	15
PIV Green wo/EVSE (smart EVSE)	PIV	9



*** Received 27 new application in May**

A PIV w/ EVSE Installation

Smart Charging Architecture



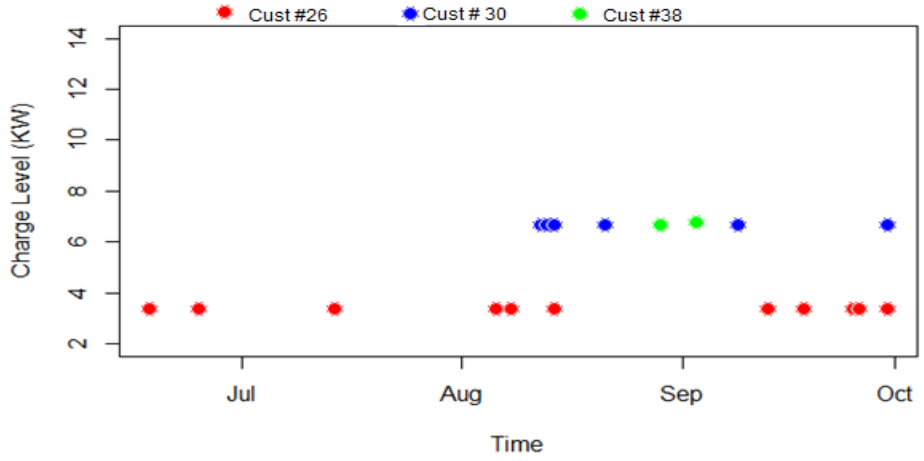
Preliminary Results

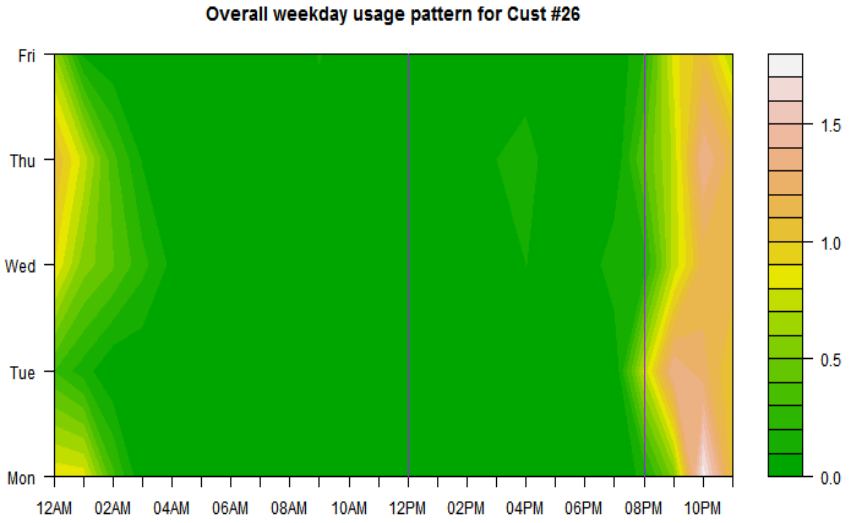
- Customers took advantage of the off-peak rates
- 90% of the time charging took place during off peak showing that rate incentives can control peak demand
- Average kWh/day changes according to seasons
- Most vehicles charge at 3.3kW or 6.6kW with some customers with Tesla charge at 10kW and 19kW
- Embedded meters reading are very similar to second meters and therefore could potentially be used for monitoring and billing PIV consumption in future
- During a period of high demand, Pepco can reduce the demand by controlling the level of charge of those customers with a smart EVSE's while giving the customer "Opt Out" options.

Customers with PIV rate and Smart EVSE

Customer #	Vehicle type	Date Vehicle Purchased	Date second Meter Installed
30.	'Leaf'	3/1/2014	8/14/2014
26.	'Volt'	12/1/2012	6/13/2014
14.	'Leaf'	2/1/2014	4/30/2014
13.	'Tesla S'	11/1/2013	7/2/2014
10.	'Focus'	1/1/2014	3/8/2014
38.	'Leaf'	7/1/2014	9/2/2014

Customer #	Overall kWh	Overall On-peak kWh	Overall Off-peak kWh	%overall On-peak	%overall Off-peak
30	1958.08	164.37	1793.71	8.39%	91.61%
26	736.59	2.21	734.38	0.30%	99.70%
14	720.31	1.35	718.96	0.19%	99.81%
13	606.28	11.13	595.15	1.84%	98.16%
10	448.53	123.59	324.94	27.55%	72.45%
38	341.68	0.56	341.12	0.17%	99.83%
Average	801.91	50.54	751.38	6.30%	93.70%





Next Steps

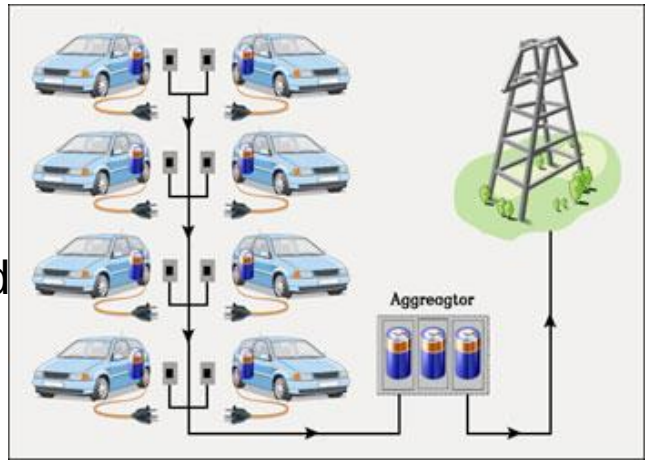
- PSC approved the extension of the program until December 2015
- Continue to increase enrollment to obtain a robust data set that can be transformed in useful program information
- Continue to work with all stake holders to support EV efforts in the State
- Working with EPRI for robust and more detail Final Report.
- Continue customer Installations
- Customer Surveys and Events
- For more information visit :
  http://webapp.psc.state.md.us/newIntranet/Casenum/CaseAction_new.cfm?CaseNumber=9261

Emerging Challenges

Vehicle to Grid Charging

- DoD Program in Pepco Service Territory
  - The project is sponsor by the Department of Defense, initially were around 7 Bases, now is only 4 bases.
  - The participation bases are in: California (700 Kw), Texas (250 Kw), Maryland (150 Kw) and NJ (South) 150 KW
  - Our customer installation will have 11 passengers vehicles (8 Nissan Leaf - on site) and 4 trucks (expect delivery in September)
    - Final Resources software upgrade to be completed in end of July
    - RTU was installed at the base and in the process of PJM signal testing
    - Operational Testing will begin by early August

- V2G in Delaware
  - Considered a Net Energy Metered Source
  - UL 1741 Does not apply if the inverter is on-board
  - SAE J3072 – How will products be certified?



Cleantech Institute


Q & A

Contact Information

Robert Stewart
Manager, New Business Advanced Technology Evaluation

Email: rsstewart@pepco.com