DEEP CT EV ROADMAP

February 8, 2019

Technical Meeting

Navigating Demand Charges

Review of UI's Time of Use Rates

Rate Type	Volumetric (kWh) Charges	On-Peak Demand (kW) Charges	Off-Peak/ Shoulder Demand Charges	Off-Peak Begins	Off-Peak Ends	Shoulder Begins	Shoulder Ends	Daily Off-Peak/ Shoulder Weekday Hours	Daily Off-Peak Weekend Hours	Total Weekly Off-Peak/ Shoulder Hours	Percent of Available Weekly Hours
Residential Time of Day	✓	✗	✗	8PM	12PM	N/A	N/A	16	24	128	76%
General Service Time of Day < 1,560 kWh/ Mo.	✓	✗	✗	6PM	10AM	N/A	N/A	16	24	128	76%
General Service Time of Day > 1,560 kWh/ Mo.	✓	✓	In Excess of On-Peak Only	6PM	10AM	N/A	N/A	16	24	128	76%
Large Power Time of Day	✗	✓	In Excess of On-Peak Only	11PM	7AM	7AM	10AM	16	24	128	76%
						6PM	11PM				

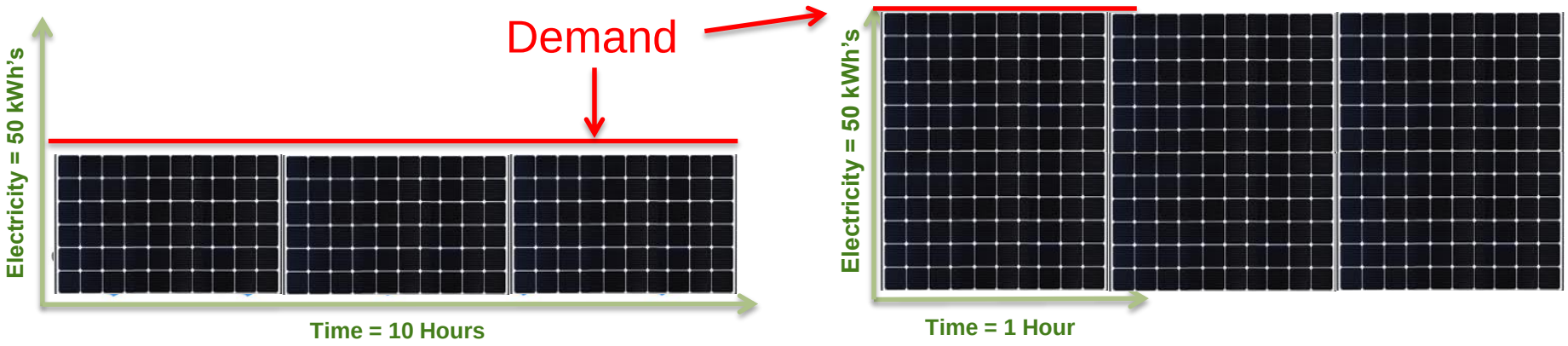
What are Demand Charges – Why Do We Have Them

- What Are Demand Charges?
  - Demand is the factor utilities use to take into account the varying nature of customer loads

	Electric Motors	Motor Load (KW)	Hours Used	Total kWh's	Total Demand
Business "A"	5	5	10	50	25
Business "B"	1	50	1	50	50

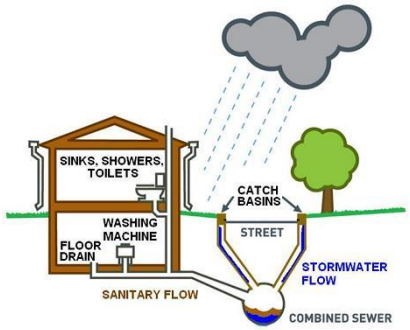
  - Put another way kWh's are the amount of electricity over a period of time, and KW is the maximum amount of electricity used at a single point in time.

- Why Do We Have Them?



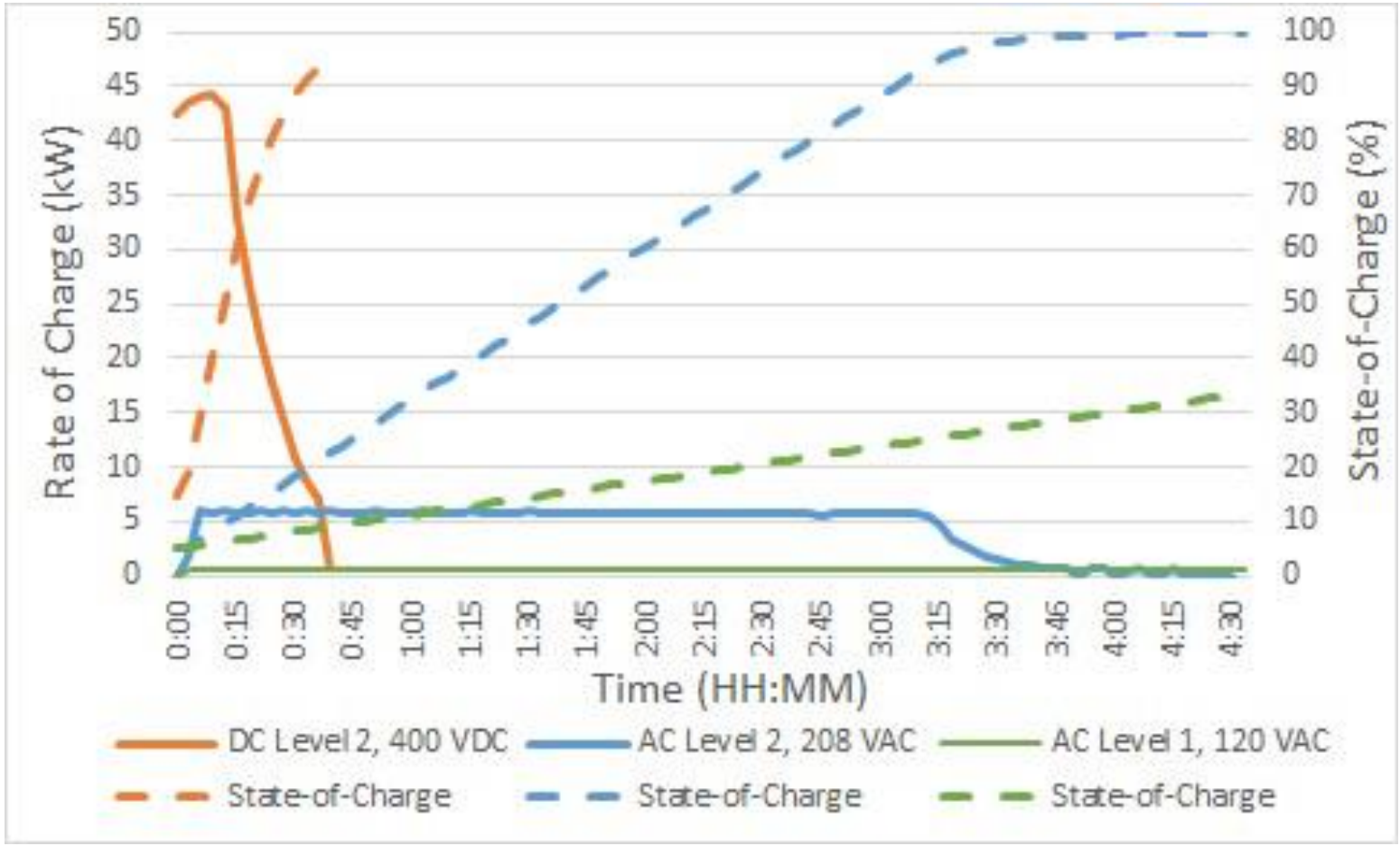
What are Demand Charges – Why Do We Have Them

- Why Do We Have Them?
  - The utility must build and maintain a distribution system capable of meeting Business “B”’s load 24 hours a day, even though it is used for only 1 hour.
    - Sewer Systems
    - Highways



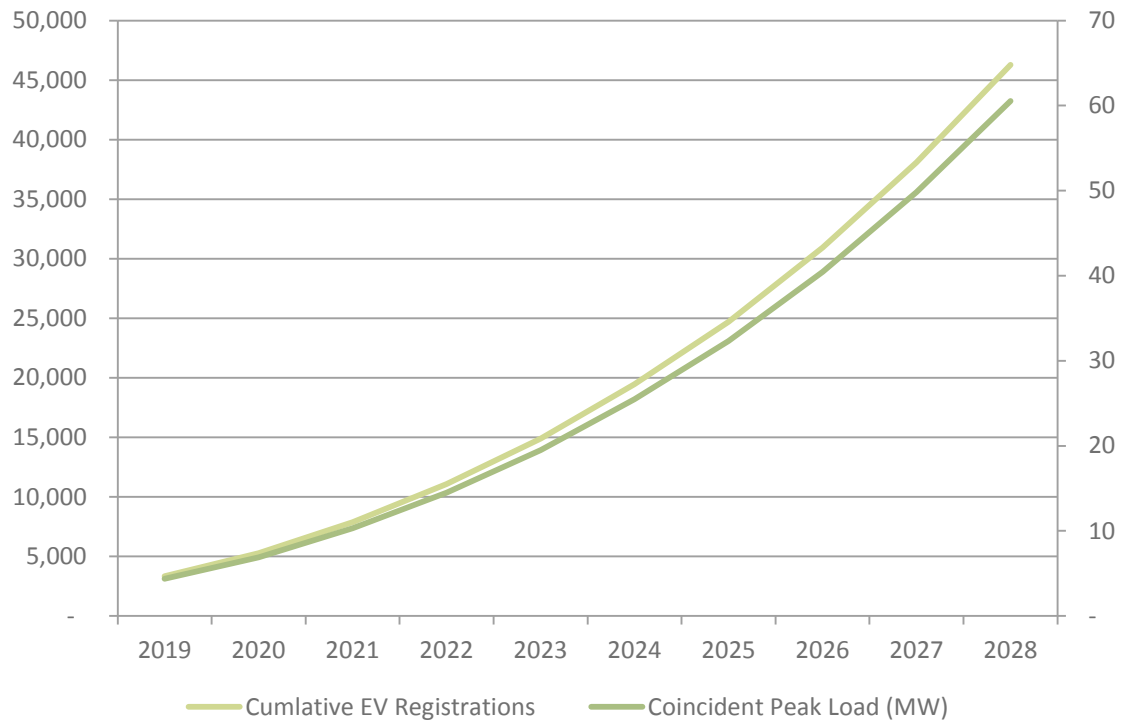
- Who Do They Impact?
  - All Commercial and Industrial customers that exceed1560 kilowatt hours per month for a single monthly billing cycle

Charging Station Operating Characteristics



Source: Electric Vehicle Transportation Center – Cost Analysis of Workplace Charging for Electric Vehicles – September 2016

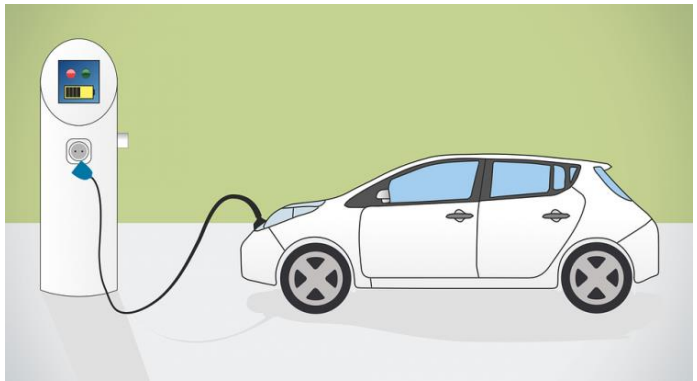
Potential System Impact



- Over 43,000 PEV's Registered in UI's Service Area by 2028
- 60.5 MW of Additional Coincident Peak Load
- Equivalent to 35,600 new homes built in the next 10 years[1]

Assumptions

- Straight line year-over-year sales growth to reach CT ZEV Goal of 15% New Car sales in 2025. Straight line growth after 2025 to reach 30% of sales by 2030
- Ratio of BEV to PHEV remains at 50%
- Level 1 Charging Load = 1.2 KW, Level 2 = 7.2 KW and Level 3 = 75KW
- 80 – 90% of Level 1 and Level 2 Charging occurs at home
- All Level 3 Charging is public, applies only to BEV and represents 10% of BEV charging load.
- 20% of Level 1 and Level 2 Home Charging is coincident
- 80% of Level 1 and Level 2 Public Charging is coincident
- 10% of Level 3 Charging is coincident



Note 1: Based on UI system peak load on August 29, 2018 at 5PM for Rate Class R (1.708 KW)

Demand Charges and EVSE Utilization

Electricity Costs for Underutilized Workplace Charging Stations

Charging Station Type and Rate Category	Session Statistics			Annual Operating Costs			Per Session Cost
	# of Vehicles/ Day	Annual Sessions	Maximum Power (KW)	Energy	Demand	Total	
AC Level 1 - R	1	250	1.3	$655	$0	$655	$2.62
AC Level 1 - GST (Non-D)	1	250	1.3	$780	$0	$780	$3.12
AC Level 1 - GST (Demand)	1	250	1.3	$408	$269	$677	$2.71
AC Level 1 - LPT (Demand)	1	250	1.3	$345	$413	$758	$3.03
AC Level 2 - GST	1	250	6	$408	$1,243	$1,651	$6.60
AC Level 2 - LPT	1	250	6	$345	$1,907	$2,252	$9.01
DC Level 3 - GST	1	250	45	$408	$9,326	$9,733	$38.93
DC Level 3 - LPT	1	250	45	$345	$14,305	$14,650	$58.60

Assumptions

- Each charging session consumes 10 kWh, enough for a daily average 35-mile work commute
- Workplace charging only occurs On-Peak (or AM Shoulder for Rate LPT) during daytime hours of 8 AM – 5 PM
- Charging station has a dedicated meter and UI current Tariffs and Standard Service Generation Rates are applied.
- Charging stations are operated 5 days per week and 50 weeks per year or 250 charges per year
- Electricity kW demand charges are based on a 30-minute averaging window that yields the highest value that occurs once per month

Table Adapted from Electric Vehicle Transportation Center – Cost Analysis of Workplace Charging for Electric Vehicles – September 2016

Demand Charges and EVSE Utilization

Electricity Costs for Fully Utilized Workplace Charging Stations

Charging Station Type and Rate Category	Session Statistics			Annual Operating Costs			Per Session Cost
	# of Vehicles/ Day	Annual Sessions	Maximum Power (KW)	Energy	Demand	Total	
AC Level 1 - R	1	250	1.3	$655	$0	$655	$2.62
AC Level 1 - GST (Non-D)	1	250	1.3	$780	$0	$780	$3.12
AC Level 1 - GST (Demand)	1	250	1.3	$408	$269	$677	$2.71
AC Level 1 - LPT (Demand)	1	250	1.3	$345	$413	$758	$3.03
AC Level 2 - GST	4	1000	6	$1,630	$1,243	$2,873	$2.87
AC Level 2 - LPT	4	1000	6	$1,380	$1,907	$3,287	$3.29
DC Level 3 - GST	16	4000	45	$6,520	$9,326	$15,846	$3.96
DC Level 3 - LPT	16	4000	45	$5,520	$14,305	$19,825	$4.96

Assumptions

- Each charging session consumes 10 kWh, enough for a daily average 35-mile work commute
- Workplace charging only occurs On-Peak (or AM Shoulder for Rate LPT) during daytime hours of 8 AM – 5 PM
- Charging station has a dedicated meter and UI current Tariffs and Standard Service Generation Rates are applied.
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Making the Business Case for DC Fast Charging

- Consensus Proposal to Encourage Statewide Deployment of DCFC Facilities for Electric Vehicles
  - The Consensus Proposal is a collaboration between the Joint Utilities, NYPA, and NYSERDA. The City of New York, the Utility Intervention Unit and LIPA.
  - It is based on fundamental shared principles and program rules
    - DCFC stations should be on the appropriate, cost-based electric rate, which include demand charges, so that operators are encouraged to manage their demand levels to manage bills (as well as electric system impacts) when incentives sunset.
    - There is no cost-basis for technology-specific rates.
    - The Proposal's goal is to provide limited-term cost relief for DCFC station operators to address the short-term economic challenges associated with initial low charging utilization levels.

Making the Business Case for DC Fast Charging

- Provides an annual declining per-plug incentive payable to qualifying public DCFC operators for up to seven years (2019-2025).

- These incentives are based on bills for modeled DCFC in each utility's territory and requires the DCFC operator to take service under a demand-based tariff.

- Pays the incentive on a per-plug basis for each plug that can dispense power simultaneously, including dual plugs that can dispense simultaneously on a single charger unit;

- Provides a higher incentive level for plugs with a minimum output of >75 kW to incent installation of faster charging plugs, consistent with production vehicles in model year 2019 and later.

Making the Business Case for DC Fast Charging

- Available only to DCFC stations placed into service after the program effective date.

- DCFC stations must be publicly accessible, defined as having access without site-specific restrictions (i.e., radio-frequency identification, security badge, or otherwise limited access). Sites may require a separate charge for parking.

Cumulative Number of Plugs by Utility by Year

	2019	2020	2021	2022	2023	2024	2025
Con Edison	400	400	400	400	400	400	400
O&R	40	40	40	40	40	40	40
NYSEG	160	160	160	160	160	160	160
RG&E	74	74	74	74	74	74	74
National Grid	100	200	300	300	300	300	300
Central Hudson	34	68	100	100	100	100	100
Total	**808**	**942**	**1074**	**1074**	**1074**	**1074**	**1074**

Making the Business Case for DC Fast Charging

JOINT UTILITIES OF NEW YORK | NYSEG | nationalgrid | Orange & Rockland | conEdison | Central Hudson | RG&E

Utility Specific Program: NYSEG

Annual Per Plug Incentive							
	2019	2020	2021	2022	2023	2024	2025
Incentive per Plug ≥ 75 kW	$8,000	$6,857	$5,714	$4,571	$3,429	$2,286	$1,143
Incentive per Plug 50kW to 74kW	$4,800	$4,114	$3,429	$2,743	$2,057	$1,371	$ 686

Utility Specific Program: RG&E

Annual Per Plug Incentive							
	2019	2020	2021	2022	2023	2024	2025
Incentive per Plug ≥ 75 kW	$17,000	$14,571	$12,143	$9,714	$7,286	$4,857	$2,429
Incentive per Plug 50kW to 74kW	$10,200	$8,743	$7,286	$5,829	$4,371	$2,914	$1,457

RG&E Integrated EV & Battery Storage Demonstration Project

DER's and EV Charging

Hypothesis	Metric	Measure of Success
A) Utilizing and dispatching a stationary battery with flexible charging load can help meet customer transportation needs while minimizing cost and system impacts.	1. Building demand reduction	Reduce incremental monthly demand and associated demand charges by >80% month over month compared with no stationary battery and flexible load.
	2. Building Load Factor Improvement	Improve existing building load factor by 10%
	3. Circuit demand reduction	<10% of maximum potential demand from EV chargers is coincident with monthly circuit peak demand.
	4. Energy arbitrage	No increase in facility energy cost due to battery operation
	5. Demand Response Performance	Participate in 100% of NYISO and RG&E events called.
	6. Cost Effectiveness	Perform benefit cost analysis based on results of one year demonstration project
B) An integrated EV & DER system will provide valuable information for ratepayers, policy makers, and utilities.	1. Inform DC Fast Charger Distribution Infrastructure Impact	Produce and publish analysis on the effectiveness of battery storage to meet distribution upgrade needs for DC fast chargers.
	2. Inform rate design	Evaluate and inform alternative rate designs for DC fast charging when accompanied by storage.

EV Fleet Charging

- UI is engaged with the CT DOT, DEEP and Eversource to evaluate potential pilot projects that will support CT Transit's deployment of EV Buses.
  - The objective of proposed pilot projects is to identify charging technologies, systems and/or practices that will enable the electrification of mass transportation on a broad scale and be replicable to other heavy to medium EV fleets.
  - The timeline for implementation of proposed pilot projects is projected to coincide with the initial deployment of CT Transit EV Buses in Q4 2020.