

**STATE OF NEW HAMPSHIRE
PUBLIC UTILITIES COMMISSION**

DOCKET NO. DG 19-057

IN THE MATTER OF:

**PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
D/B/A EVERSOURCE ENERGY
DISTRIBUTION SERVICE RATE CASE**

DIRECT TESTIMONY OF

**REBECCA OHLER
ADMINISTRATOR – TECHNICAL SERVICES BUREAU**

**CHRISTOPHER SKOGLUND
CLIMATE AND ENERGY PROGRAM MANAGER**

**AIR RESOURCES DIVISION
DEPARTMENT OF ENVIRONMENTAL SERVICES
STATE OF NEW HAMPSHIRE**

DATED: DECEMBER 20, 2019

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Table of Contents

I.	Introduction.....	1
II.	Overview and Summary.....	3
III.	EV Overview.....	3
IV.	Relationship Between EVs and Rates	13
V.	Conclusion	18
	Addendum RO-1	19
	Addendum CS-1	20

1 **I. Introduction**

2 **Q. Ms. Ohler, please state your name, business address and position.**

3 A. My name is Rebecca Ohler. I am employed by the State of New Hampshire,
4 Department of Environmental Services (NHDES), located at 29 Hazen Drive in Concord
5 NH, as the Administrator of the Technical Services Bureau of the Air Resources
6 Division. Included in this testimony is Addendum RO-1, a statement of my education and
7 work experience.

8

9 **Q. Please briefly describe your experience and specific knowledge or skills that**
10 **relate to your testimony in this docket.**

11 A. I have been working in the field of air pollution control since 1989 and have been
12 involved in the policy development and discussion regarding state policies aimed at
13 reducing both criteria pollutants and greenhouse gas (GHG) emissions. I have served on
14 the project proposal evaluation team for Renewable Portfolio Standard (RPS)
15 solicitations and for past Regional Greenhouse Gas Initiative (RGGI) solicitations. I
16 currently serve as the Chair of the Energy Efficiency and Sustainable Energy (EESA)
17 Board, and have served on the EESA Board's Energy Efficiency Resource Standard
18 (EERS) committee since its inception.

19 NHDES, which I represent, has, through work with our counterparts across the
20 Northeast states and through our leadership of the Granite State Clean Cities Coalition,¹
21 extensive knowledge about and access to resources relative to electric vehicles (EV) and
22 associated electric vehicle supply equipment (EVSE), including Level 2 and Direct
23 Current Fast Charging (DCFC) EVSE.

24 I currently serve as the clerk of the state's Electric Vehicle Charging Stations
25 Infrastructure Commission,² which was created by SB517 in 2018.³ Prior to becoming the

¹ New Hampshire Granite State Clean Cities Coalition, <https://www.granitestatecleancities.nh.gov/>, (Last accessed December 18, 2019).

² Electric Vehicle Charging Stations Infrastructure Commission, <https://www.des.nh.gov/organization/divisions/air/tsb/tps/msp/sb517.htm>, (Last accessed December 18, 2019).

³ Senate Bill 517, An Act Establishing an Electric Vehicle Charging Stations Infrastructure Commission, http://gencourt.state.nh.us/bill_Status/billText.aspx?sy=2018&id=1829&txtFormat=pdf&v=current, (Last accessed December 18, 2019).

1 Bureau Administrator for the NHDES Technical Services Bureau, I held a number of
2 positions in the department's Mobile Sources Section, focused on improving the state and
3 region's air quality by reducing air pollution from the transportation sector.

4
5 **Q. Have you previously testified before the Commission?**

6 A. Yes. Previously, I testified before the Commission in DE 15-137 Energy Efficiency
7 Resource Standard, and DE 12-262 CORE Electric and Gas Energy Efficiency Programs
8 for 2013-2014.

9
10 **Q. Mr. Skoglund, please state your name, business address and position.**

11 A. My name is Christopher J. Skoglund. I am employed by the State of New Hampshire,
12 Department of Environmental Services, located at 29 Hazen Drive in Concord NH, as the
13 Climate and Energy Program Manager in the Technical Services Bureau of the Air
14 Resources Division. Included in this testimony is Addendum CS-1, a statement of my
15 education and work experience.

16
17 **Q. Please briefly describe your experience and specific knowledge or skills that
18 relate to your testimony in this docket.**

19 A. I have been working at NHDES since 2008 and have been involved in planning,
20 projects, and programs across the electric power, building, and transportation sectors,
21 having worked as an energy and transportation analyst and a climate and energy analyst,
22 before assuming my current position. I have been involved in several multi-sector
23 planning efforts, coordinating the development of the: 2009 NH Climate Action Plan, the
24 2012 EESE Board Review on the Independent Study of Energy Policy Issues ("SB 323
25 (2010) Study"); and the New England Governors/Eastern Canadian Premiers 2017
26 Regional Climate Action Plan Update. In addition, I also regularly testify before the state
27 legislature and conduct energy and GHG analysis for NHDES and the State of New
28 Hampshire, inclusive of the electric power, building, and transportation sectors.

29
30

1 **Q. Have you previously testified before the Commission?**

2 A. No. However, I am an active participant in the DE 16-576 Net Metering pilot studies,
3 the IR 15-296 Grid Modernization proceeding, and the DE 17-136 EERS working
4 groups, and am presently an Intervenor in this rate case, as well as DG 17-152 Liberty
5 Gas Least Coast Integrated Resource Plan, and DE 19-064 Liberty Utilities Rate Case.

6

7 **II. Overview and Summary**

8 **Q. Please describe the purpose of your testimony, including an overview of your**
9 **analyses, conclusions, and the focus of your testimony.**

10 A. The purpose of our testimony is to recommend that Eversource include a proposal for
11 an EV time of use (TOU) rate for the residential sector, and that a separate mechanism,
12 possibly a different rate or customer class designed to overcome the disincentive for
13 investment in DCFC due to demand charges, be considered.

14 Our testimony begins (Section III) with an overview of EVs, which are part of a
15 larger, emerging trend in strategic electrification of the entire energy system. This
16 includes a summary of the current EV market and the potential environmental, energy,
17 economic impacts that EVs may incur.

18 The second part of our testimony (Section IV) addresses the role that rates can have
19 on EV adoption and charging behavior, and the potential for rates to reduce the impact
20 that EV charging can have on the grid. This includes providing support for inclusion of
21 TOU rates and a rate or customer class specific that addresses the negative impact that
22 demand charges currently have on the business case for installing and operating DCFC
23 within New Hampshire. Availability of DCFC throughout New Hampshire is
24 instrumental to more widespread adoption and use of EVs in New Hampshire and the
25 Northeast.

26

27 **III. EV Overview**

28 **Q. How do EVs compare to conventional internal combustion engines?**

29 A. Motor vehicles with conventional gasoline and diesel internal combustion engines
30 (ICE) have been around for over a century. These vehicles rely on the combustion of

1 liquid fuels to power the vehicle. EVs rely on an external power source to charge an
2 onboard battery, which powers the electric motor as well as the vehicle's electronics.
3 There are two main types: battery electric vehicles (BEVs), and plug-in hybrid electric
4 vehicles (PHEVs).

5 BEVs are pure electric. They use one or more electric motors powered by a battery
6 pack. The range of BEVs varies from 80 to 335 miles, depending on the model. The
7 range of an EV can vary based upon driving conditions, such as outside temperature and
8 high driving speeds. BEVs are plugged in to an electric power source to charge. The
9 battery also recharges during operation through regenerative braking.

10 PHEVs are much like regular hybrid-electric vehicles (HEVs) in that they have both
11 an electric motor and a gasoline engine, but unlike HEVs they can be plugged in to
12 charge, and have all-electric ranges that vary from 10 to 50 miles. PHEVs use the electric
13 motor, at times selectively, until the battery is depleted, and then the vehicle switches
14 seamlessly to the gasoline engine. Similar to regular hybrid vehicles, PHEVs also
15 recharge the battery during operation through regenerative braking.

16 According to the US Department of Energy, EVs are significantly more efficient than
17 gasoline vehicles. EVs convert over 77 percent of the electrical energy from the grid to
18 power at the wheels, whereas conventional gasoline vehicles only convert about 17–21
19 percent of the energy stored in gasoline to power at the wheels.⁴

20

21 **Q. How is the vehicle market and the vehicle fleet changing as a result of the**
22 **commercialization of EVs?**

23 A. EV technology is rapidly progressing. The price of EV batteries has fallen from
24 \$1,100 per KWH storage capacity in 2010 to \$156 in 2019. It is anticipated that costs will
25 fall below \$100 per KWH in 2024, at which point EVs will reach price parity with ICE
26 vehicles.⁵

⁴ US DOE (2019). All-Electric Vehicles, Office of Energy Efficiency & Renewable Energy, <https://fuelconomy.gov/feg/evtech.shtml>, (Last accessed December 18, 2019).

⁵ BNEF (2019). 2019 Electric Vehicle Outlook, Bloomberg NEF, <https://about.bnef.com/electric-vehicle-outlook/>, (Last accessed December 16, 2019).

1 In the United States, annual sales of EVs today are relatively low, approximately one
2 percent of passenger vehicle sales in 2018, but are projected to exceed 3.5 million
3 vehicles, more than 20 percent of annual vehicle sales, by 2030. This translates to 18.7
4 million EVs on the road in the US in 2030, up from slightly more than 1 million at the
5 end of 2018. At this point, EVs will make up about seven percent of the 259 million
6 vehicles, including cars and light trucks, expected to be on U.S. roads in 2030.⁶

7 Additionally, other segments of the transportation sector will also electrify, with light
8 commercial EV sales projected to reach 56 percent, and medium commercial EV sales
9 expected to reach 31 percent in 2030.⁷ Already, electric bus manufacturers, like Lion
10 Electric, New Flyer and BAE Systems are working with communities to deploy electric
11 transit buses and school buses.

12
13 **Q. What factors influence the rate of adoption?**

14 A. As noted, in the United States, there are over one million EVs on the road today. This
15 number will continue to rise as:

- 16 • more charging infrastructure is deployed, leading to reduced range anxiety;
17 • the cost of EVs continues to decrease;
18 • the range of EVs continues to increase, complementing the rise in public charging
19 infrastructure; and
20 • consumers become increasingly aware of the cost and environmental benefits of
21 driving electric.

22 Currently, there are around 40 different models of electric cars available for sale in
23 the U.S., including sports cars, sedans, SUVs, and minivans.⁸ Of those, 30 different EV
24 models are available today in the Northeast.⁹ Most major vehicle manufacturers have

⁶ NESCAUM (2017). Multi-State Zero Emission Vehicle Action Plan, <http://www.nescaum.org/documents/2018-zev-action-plan.pdf>, (Last accessed December 19, 2019).

⁷ BNEF (2019). 2019 Electric Vehicle Outlook, Bloomberg NEF, <https://about.bnef.com/electric-vehicle-outlook/>, (Last accessed December 16, 2019).

⁸ Plug In America, (2019). EV model availability webpage, <https://plugstar.com/cars>, (Last accessed December 18, 2019).

1 invested significantly in electrification and have announced that exciting new products
2 are on the way, including more EVs with four-wheel drive, longer ranges, and electric
3 pickup trucks.

4

5 **Q. Please describe the EV market and fleet in the broader Northeast, including New**
6 **England and Eastern Canada, whose residents visit or pass through New**
7 **Hampshire seasonally.**

8 A. Vehicle electrification is transforming transportation across the region. All other New
9 England states and many other Northeast states have adopted policies and regulations,
10 and are offering incentives, that will result in increased adoption of EVs in our region in
11 the coming years. As of 2019, more than 40,000 EVs were registered in the New England
12 states surrounding New Hampshire.¹⁰ The largest growth in EVs has occurred in New
13 Hampshire's neighbor to the North, in the Canadian province of Quebec where, since
14 2014, EVs have grown from just under 3,000 vehicles on the road to more than 43,000
15 EVs in 2019 (as of March). The 2019 registrations represent 0.83% of all vehicles,¹¹ with
16 total EV registrations rising 75 percent between 2018 and 2019.¹²

17

18 **Q. How is the Northeast regional market expected to change?**

19 A. All of the New England states except New Hampshire, as well as New York, are
20 signatories to California's Zero Emission Vehicle (ZEV) regulation¹³. In 2013, the four
21 New England states and New York agreed to a target of 15 percent of vehicles being
22 ZEV by 2025, meaning BEV, PHEV, or fuel cell.¹⁴ Recent projections for the Boston

¹⁰ NEG/ECP Transportation and Air Quality Committee 2019 Annual Report, forthcoming.

¹¹ Data provided by Ministry of Sustainable Development, Environment, and Fight Against Climate Change, Ministry of Sustainable Development, Environment, and Fight Against Climate Change, http://www.environnement.gouv.qc.ca/index_en.asp. (Last accessed December 19, 2019).

¹² Institut de la Statistique du Québec (2019). *Panorama des régions du Québec. Édition 2019*, [En ligne], Québec, L'Institut, 162 p. <http://www.stat.gouv.qc.ca/statistiques/profils/panorama-regions-2019.pdf>

¹³ NESCAUM (2018). Multi-State Zero Emission Vehicle Action Plan, <http://www.nescaum.org/documents/2018-zev-action-plan.pdf>, (Last accessed December 19, 2019).

¹⁴ Shulock, C. (2016). Manufacturer Sales Under the Zero Emission Vehicle Regulation: 2012 Expectations and Governors' Commitments Versus Today's Likely Outcomes, Shulock Consulting ,

1 Metro area, including New Hampshire and Rhode Island, estimate there will be 266,000
2 EVs on our roads by 2030.¹ However, the ZEV program targets are minimum
3 percentages. The State of Massachusetts alone has set a goal of having 300,000 EVs on
4 the road by 2025.¹⁵

5 Quebec has also set targets of 100,000 EVs on the road by 2020 and 300,000 on the
6 road by 2025.¹⁶ With New Hampshire's natural resources attracting so many visitors
7 from around the region, the economic pressure to build infrastructure to "fuel up" EVs
8 will be great.

9

10 **Q. What is the status of EV adoption in New Hampshire?**

11 A. As of the end of 2018, a little over 3,300 EVs were registered in New Hampshire: with
12 around 2,000 plug-in hybrid electric vehicles PHEVs and nearly 1,300 BEVs. This
13 represented only 0.23 percent of all vehicles in New Hampshire and 0.28 percent of the
14 light-duty vehicles in New Hampshire. However, the growth from 2017 to 2018 was 58
15 percent, up from 37 percent growth between 2016 and 2017.¹⁷ With many new models in
16 a variety of body types coming out, along with longer ranges, and falling purchase price,
17 the rate of EV adoption in New Hampshire is expected to increase.

18 As noted, electric buses are another use case. Nashua Transit recently held a ribbon
19 cutting for their two new hybrid-electric Transit Buses equipped with BAE Systems
20 HybriDrive Electric Propulsion System.¹⁸ School systems across the state have also
21 expressed interest in electrifying portions of their school bus fleets.

https://www.nrdc.org/sites/default/files/media-uploads/nrdc_commissioned_zev_report_july_2016_0.pdf, (Last accessed December 19, 2019).

¹⁵ Press Release, Governor Baker Signs Electric Vehicle Promotion Legislation, <https://www.mass.gov/news/governor-baker-signs-electric-vehicle-promotion-legislation>, (Last accessed December 20, 2019).

¹⁶ Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques. *Analyse d'impact réglementaire du règlement d'application de la Loi visant l'augmentation du nombre de véhicules automobiles zéro émission au Québec afin de réduire les émissions de gaz à effet de serre et autres polluants*. 2017, 57 p. [En ligne]. <http://www.mddelcc.gouv.qc.ca/changementsclimatiques/vze/AIR-reglement201712.pdf>, (Last accessed December 19, 2019).

¹⁷ NHDES analysis of NH DMV registration data query run December 31, 2018.

¹⁸ GSCCC (2018). Nashua Transit System and BAE Systems Partner to Bring Hybrid Diesel-Electric Transit Buses to the Streets of New Hampshire, <http://www.fuelsfix.com/2018/12/nashua-transit-system-and-bae-systems-partner-to-bring-hybrid-diesel-electric-transit-buses-to-the-streets-of-new-hampshire/>, (Last accessed December 19, 2019).

1 **Q. What are the known and potential benefits of EVs to the state’s environmental**
2 **and public health?**

3 A. EVs present economic, energy, and environmental opportunities for the state, region,
4 and nation by reducing overall energy consumption, reliance on energy imports from out
5 of state, and the emission of air pollutants.

6 The transportation sector is responsible for over half of the emissions of oxides of
7 nitrogen (NOx) and volatile organic compounds in New Hampshire¹⁹, which lead to the
8 formation of ground level ozone, a respiratory irritant that can pose a significant health
9 risk to susceptible people including children, the elderly, and those with respiratory
10 ailments such as asthma. This sector also is responsible for over 40 percent of the state’s
11 greenhouse gas (GHG emissions). Global GHG emissions are the primary contributor to
12 climate change.²⁰

13 In comparison to gasoline and diesel vehicles, EVs operating in the Northeast emit
14 fewer NOx and GHG emissions, even when factoring in the power plant emissions from
15 charging the batteries. This is in part because the electric grid in the Northeast is
16 relatively “clean” as compared to other regions, and because EVs are much more efficient
17 than ICE vehicles, using 25 percent of the energy of a conventional ICE vehicle to travel
18 the same distance. As the ISO-New England grid becomes even cleaner, through the
19 interconnection of distributed energy resources (DERs) and large renewable energy
20 projects, the net environmental benefit of EVs will grow larger. This is why
21 transportation electrification is a key strategy for achieving air quality and climate goals
22 and for integrating renewable energy into the transportation sector.

23

24 **Q. What are the known and potential benefits of EVs to state’s economy?**

25 A. The energy and economic impacts of EVs are also increasingly positive, for the
26 individual consumer and for the state and region. While the upfront costs of EVs are still

¹⁹ NHDES (2017). State of New Hampshire Air Quality - 2017: Air Pollution Trends, Effects and Regulation, <https://www.des.nh.gov/organization/commissioner/pip/publications/documents/r-ard-17-01.pdf>. (Last accessed December 19, 2019).

²⁰ NHDES (2017). State of New Hampshire Air Quality - 2017: Air Pollution Trends, Effects and Regulation, <https://www.des.nh.gov/organization/commissioner/pip/publications/documents/r-ard-17-01.pdf>. (Last accessed December 19, 2019).

1 high enough that the lifecycle costs of an EV have not reached parity with conventional
2 ICE vehicles, the operation and maintenance costs of EVs are considerably lower than
3 their counterparts. EVs are, as noted above, 77 percent efficient compared to 17–21
4 percent efficient than and gasoline ICE vehicle. This gives EVs a cost of operation of
5 \$1.53 per gas gallon equivalent²¹ compared to a New Hampshire average price of \$2.46
6 per gallon.²²

7 New Hampshire imported 16.6 million barrels of motor gasoline and 2.3 million
8 barrels of diesel fuel in 2017,²³ resulting in combined expenditures of just under \$2
9 billion.²⁴ As New Hampshire has no fossil fuel reserves, the purchase of transportation
10 fuels result in a net export of energy dollars from the state and the region as a whole.
11 Expanding the use of EVs can reduce the scale of this expenditure, a reduction that will
12 again be compounded as the state and region expands the deployment of DERs and large-
13 scale renewable energy resources.

14

15 **Q. What are the known and potential benefits and impacts of EVs to state’s energy**
16 **sector?**

17 A. While the impact of EVs on the environment and economy is likely to be a net
18 positive, the impact to the energy sector and specifically the electric sector has the
19 potential to be mixed. As the EV fleet in New Hampshire grows, it will displace motor
20 gasoline and on-road diesel consumption, reducing total energy consumption and total
21 imported energy, while increasing electricity consumption and potentially driving growth
22 in demand.

²¹ Assumes 3.5 miles/KWH in a BEV, 30 miles per gallon fuel economy in gas-powered ICE vehicles, and an Eversource residential electric rate of 0.17924/KWH. Rate obtained from Eversource website: https://www.eversource.com/content/docs/default-source/rates-tariffs/nh-summary-rates.pdf?sfvrsn=2947c862_2, (Last accessed December 16, 2019)

²² AAA Gas Prices, NH Average Gas Price, <https://gasprices.aaa.com/?state=NH>, (Last accessed December 16, 2019)

²³ EIA (2019). Table CT7. Transportation Sector Energy Consumption Estimates, Selected Years, 1960-2017, New Hampshire, https://www.eia.gov/state/seds/sep_use/tra/pdf/use_tra_NH.pdf, (Last accessed December 16, 2019).

²⁴ EIA (2019). Table ET6. Transportation Sector Energy Price and Expenditure Estimates, Selected Years, 1970-2017, New Hampshire, https://www.eia.gov/state/seds/sep_prices/tra/pdf/pr_tra_NH.pdf, (Last accessed December 16, 2019).

1 Based on NHDES calculations, it is estimated that EVs registered in the state in 2018,
2 representing 0.28 percent of the passenger vehicle population, consume 10,100 MWH. If
3 EVs rose to 30 percent of the passenger fleet, all else being equal, that could require an
4 additional 1,100 GWH of generation.²⁵

5 This growth in consumption has potential positive and negative consequence. As EVs
6 continue to increase in their share of the New Hampshire fleet and the share of vehicles
7 carrying visitors, the rise in electric power consumption has the potential, if not properly
8 managed, to increase the total ISO-NE daily and seasonal peaks, as well as New
9 Hampshire's share of that peak. This has the potential to impact all New Hampshire
10 ratepayers by increasing both the energy supply charge and the transmission charge.

11 However, the three investor-owned utilities, including Eversource, observed, in joint
12 comments on the Grid Modernization Docket, IR-296, that while EVs have the potential
13 to grow electric loads, this load growth can result in savings to all customers if forecasted
14 and managed properly. As EVs consume more electricity, there are more KWHs over
15 which to spread Eversource's and the other utilities' fixed costs.²⁶ This was
16 independently supported by Eversource analysis provided in this docket.²⁷

17

18 **Q. What is involved in charging EVs and PHEVs?**

19 A. Electric vehicles need to be charged with electricity to "fuel" their batteries. An EV
20 "charging station," typically referred to as "Electric Vehicle Supply Equipment" (EVSE),
21 utilizes an electric cord to funnel electric current to the vehicle. The actual charger,
22 typically called the "onboard vehicle charger," is a device that is located in the vehicle.
23 This onboard device receives the electric current from the EVSE and charges the battery.

24 EV drivers typically behave differently with regard to refueling than ICE drivers do.
25 Rather than waiting until the fuel gauge is near empty to refuel, EV drivers often take

²⁵ NHDES calculations, December 2019. Assumes EV-registration fraction equal to EV passenger-miles fraction and 3.5 miles per KWH.

²⁶ Page 13. Joint Comments of Liberty Utilities (Granite State Electric) Corp. D/B/A Liberty Utilities, Public Service Company of New Hampshire D/B/A Eversource Energy, And Unitil Energy Systems, Inc. Re: Order No. 26,254. http://www.puc.state.nh.us/regulatory/docketbk/2015/15-296/letters-memos-tariffs/15-296_2019-09-06_gsec_eversource_unitil_joint_comments.pdf, (Last accessed December 18, 2019).

²⁷ Eversource Response to PUC (Staff 13-013a), October 25, 2019.

1 advantage of opportunities to “top off.” While it takes longer to charge your car with
2 electricity, it can be accomplished while drivers are doing something else. While most
3 charging is typically done at home or at work (if the workplace has installed charging
4 stations for employees), public charging plays a vital role in driving EV adoption.

5 There are three levels of charging: Level 1, Level 2, and Direct Current Fast Charging
6 (DCFC). Level 1 charging consists of plugging the cord that comes with the car into a
7 standard 120-volt AC wall outlet. Level 1 typically provides about 2 to 5 miles of range
8 per hour and is best for overnight charging. Level 2 charging requires a 240-volt outlet,
9 the same kind used by a clothes dryer or electric stove, and delivers 10 to 25 miles of
10 range per hour of charging. This is best for use in homes, workplaces, fleet facilities and
11 public facilities where people park for several hours. The cost of installation is highly
12 dependent on location and existing power supply.

13 DCFC requires a three-phase 480-volt AC electric circuit, with the DCFC equipment
14 converting AC to DC, and delivers a significantly faster charge. Most existing DCFC
15 stations are 50 kilowatts (KW), delivering 60 to 80 miles of range in 20 minutes and are
16 used primarily to charge BEVs. However, there are now much faster DCFC stations,
17 including ones that deliver up to 350 KW, a wattage capable of delivering 200 miles of
18 range in 10 minutes.

19 DCFC stations are an essential component of the EV charging ecosystem. While it is
20 generally understood that DCFC is needed to facilitate long distance travel, there are
21 many DCFC applications for local EV drivers as well. DCFC stations provide a viable
22 charging option for people without the ability to charge at home, such as those who live
23 in apartment buildings, and are also used by EV drivers looking to top off their battery.

24

25 **Q. What is the status of EVSE deployment in New Hampshire?**

26 A. There are currently over 19,000 publicly accessible, non-Tesla, EV charging
27 locations in the United States, 80 of which are in New Hampshire.²⁸ These figures do not

²⁸ US DOE (2019). Alternative Fueling Station Locator, Office of Energy Efficiency & Renewable Energy,
<https://afdc.energy.gov/stations/#/find/nearest>, (Last accessed December 20, 2019).

1 include the number of Level 1 and Level 2 chargers used for home charging, which is not
2 known. It is likely very close to the total number of registered EVs and PHEVs.

3 The number of publically-accessible chargers is expected to grow as automakers
4 bring more EVs to the market and the demand for charging increases. Moreover, there are
5 billions of dollars of planned investment in EV charging equipment from electric utilities,
6 states, and private EVSE companies. Therefore, there will likely be more applications for
7 EV charging stations in the coming months and years.

8
9 **Q. How has the New Hampshire policy landscape changed recently with respect to**
10 **EVs?**

11 A. New Hampshire is behind, as compared to neighboring states, in our planning and
12 installation of infrastructure to support EV travel to and within New Hampshire, but that
13 trend is changing. In 2018, an Electric Vehicle Charging Stations Infrastructure
14 Commission²⁹ was established by SB517³⁰ to provide recommendations on a number of
15 issues related to EV charging, with the goal of making charging more accessible in New
16 Hampshire. State policies, including enabling and encouraging the development of
17 adequate EVSE in the state will help minimize the “range anxiety” that often hinders the
18 purchase of these cleaner advanced technology vehicles.

19 The Commission, which has been meeting since the fall of 2018, is timely given the
20 recent settlement agreement between Volkswagen and the Federal Department of
21 Justice.³¹ New Hampshire has received approximately \$31 million from the Volkswagen
22 Settlement, and Governor Sununu has committed 15 percent or approximately \$4.6
23 million – the maximum allowed under the settlement – to be used for EV charging
24 stations. Recently the Governor’s Office of Strategic Initiatives, New Hampshire’s VW

²⁹ Electric Vehicle Charging Stations Infrastructure Commission, <https://www.des.nh.gov/organization/divisions/air/tsb/tps/msp/sb517.htm>, (Last accessed December 18, 2019).

³⁰ Senate Bill 517, An Act Establishing an Electric Vehicle Charging Stations Infrastructure Commission, http://gencourt.state.nh.us/bill_Status/billText.aspx?sy=2018&id=1829&txtFormat=pdf&v=current, (Last accessed December 18, 2019).

³¹ United States of America vs Volkswagen AG, Docket No. 16-CR-20394, <https://www.justice.gov/usao-edmi/us-v-volkswagen-16-cr-20394>, (Last accessed December 16, 2019).

1 lead agency, released a competitive solicitation for charging along New Hampshire's
2 principal travel corridors.

3 In 2018, another bill, SB575,³² was also signed into law. This bill directed the NH
4 PUC to consider and determine whether it is appropriate for electric companies and
5 public service companies to implement any of a variety of specified rate design standards.

6

7 **IV. Relationship Between EVs and Rates**

8 **Q. How does rate design influence EV adoption and charging behavior?**

9 A. Electric rates can, based on how they are structured, influence both the adoption rate
10 of EVs, as well as their impact on the regional grid by influencing charging behavior.

11 As noted previously, EVs currently cost more than conventional vehicles. One
12 mitigating factor is that "fuel" costs can be lower for EVs, thus providing some relief
13 from the higher vehicle cost. If those "fuel" costs are lowered, such as through TOU rates
14 for Level 1 and 2 charging, or are increased due to demand charges on DCFC (which
15 currently limit the availability of DCFC), the calculus for EV adoption can be either
16 positively or negatively impacted.

17 Rates can have an even more significant influence on charging behavior, and can be
18 used to assist the utilities in reducing EV charging during peak demand periods. Just as
19 drivers shop around for less expensive gasoline, EV owners, given information and an
20 incentive, will "fuel" when prices are lower when possible. TOU rates that discourage
21 charging during peak demand and encourage charging during low demand periods will
22 send the necessary price signal to consumers to elicit this behavior.

23 This can help to mitigate the impact that rising EV numbers will have on overall
24 seasonal peak as well as New Hampshire's share of the load. By offering TOU rates with
25 strong price signals, utilities increase the likelihood that EVs will hold off on charging
26 until the daily peaks have passed. In addition, TOU rates that shift EV charging, or any
27 electric load to times of lowest demand, may also avoid or reduce the need for
28 distribution system investments. Shifting EV charging to off peak periods can have

³² Senate Bill 575, An Act Relative to Electric Vehicle Charging Stations,
http://gencourt.state.nh.us/bill_Status/billText.aspx?sy=2018&id=1828&txtFormat=pdf&v=current, (Last accessed
December 18, 2019).

1 positive impacts on seasonal peak and distribution investments, and, therefore, affect
2 energy supply, distribution, and transmission rates.

3 Another aspect of rate design, demand charges, have an enormous influence on the
4 business case, or value proposition, for owning and operating DCFC. As DCFC stations
5 increase in both number and geographic distribution across the state, they reduce the
6 range anxiety that EV drivers, from in and outside the state, may feel. Reduced range
7 anxiety can contribute to greater comfort in purchasing an EV.³³ However, NHDES has
8 heard from industry participants that the demand charges incurred by DCFC stations, at
9 current and near term levels of penetration, undermine the business case for installing and
10 operating this essential EV infrastructure. Currently, with relatively few EVs on the road,
11 a DCFC may be used by only a few vehicles each day, or in remote areas, a few vehicles
12 each week. But EVs can draw a significant amount of power and, particularly if multiple
13 vehicles are charging at the same time, result in a significant demand charge. With few
14 users to absorb this fixed cost, the cost per kWh that a station owner must charge to
15 recoup their costs is unreasonable and will discourage the use of that station. This results
16 in fewer stations being built, reducing the viability of owning an EV, reducing the
17 business case for owning DCFC, and the cycle continues. Addressing the impact that
18 demand charges can have on profitability of DCFC stations, and therefore increasing
19 their economic viability, is likely to result in a greater number of stations across the state.
20 This issue has been documented independently.^{34,35,36}

21

³³ UCS (2016). Electric Vehicle Survey Methodology and Assumptions: Driving Habits, Vehicle Needs, and Attitudes toward Electric Vehicles in the Northeast and California, <https://www.ucsusa.org/sites/default/files/attach/2016/05/Electric-Vehicle-Survey-Methodology.pdf>, (Last accessed December 15, 2019).

³⁴ Utility Dive (2019). [PG&E wants EV demand charges to mimic smartphone plans. Regulators are skeptical](https://www.utilitydive.com/news/pge-wants-ev-demand-charges-to-mimic-smartphone-plans-regulators-are-skep/563757/), <https://www.utilitydive.com/news/pge-wants-ev-demand-charges-to-mimic-smartphone-plans-regulators-are-skep/563757/>, (Last accessed December 19, 2019).

³⁵ Fitzgerald, G. and Nelder, C., (2017). From Gas to Grid: Building Charging Infrastructure to Power Electric Vehicle Demand. Rocky Mountain Institute, https://www.rmi.org/insights/reports/from_gas_to_grid, (Last accessed December 20, 2019).

³⁶ Fitzgerald, G. and Nelder, C., (2017). EVgo Fleet and Tariff Analysis: Phase 1: California, Rocky Mountain Institute, https://rmi.org/wp-content/uploads/2017/04/eLab_EVgo_Fleet_and_Tariff_Analysis_2017.pdf, (Last accessed December 7, 2019).

1 **Q. What is your position regarding TOU rates in this proceeding?**

2 A. NHDES would support the inclusion of a TOU rate for EVs by Eversource.

3

4 **Q. Has a similar rate been established elsewhere?**

5 A. The Commission does not presently mandate or regulate any specific EV programs
6 operated by the three investor owned utilities. However, EV rates already exist in New
7 Hampshire and another EV rate has been proposed. Numerous other examples of EV
8 TOU rates have been compiled from around the country.³⁷

9 The NH Electric Cooperative offers the Residential Off-Peak Electric Vehicle
10 Charging Station Program. This program enables participating members to utilize an on
11 and off-peak rate.³⁸ Liberty Utilities has proposed offering, as part of its rate case 19-064,
12 Rate D-EV, a TOU rate. This rate was approved in Docket No. DE 17-189, the battery
13 storage docket, and was designed to be technology agnostic for residential EV charging.³⁹
14 Rate D-EV would, if approved, be available as a residential rate and not available for
15 other applications.

16 Also, as noted during the Discovery Response NHDES 1-001, Eversource already has
17 a time of day rate which is available as an option for an entire service.⁴⁰ While not
18 intended for EVs at the time of development, Mr. Edward Davis with Eversource noted
19 this time of day could be applied to residential EVs charging.⁴¹

20

21

22

³⁷ SEPA (2018). Utilities and Electric Vehicles: Evolving to Unlock Grid Value, <https://sepapower.org/resource/utilities-electric-vehicles-evolving-unlock-grid-value/>, (Last accessed December 5, 2019).

³⁸ NHEC (2019). NH Electric Cooperative's (NHEC) 2019 Residential Off-Peak Electric Vehicle Charging Station Program, <https://www.nhec.com/wp-content/uploads/2019/01/2019-Residential-Off-Peak-EV-Charging-Station-Instructions.pdf>, (Last accessed December 16, 2019).

³⁹ See direct testimony of Ms. Heather Tebbetts, Bates II-239, http://www.puc.state.nh.us/regulatory/docketbk/2019/19-064/initial%20filing%20-%20petition/19-064_2019-04-30_gsec_dtestimony_tebbetts_perm_rates.pdf, (Last accessed December 16, 2019).

⁴⁰ Eversource Response to NHDES (NHDES 1-001), October 25, 2019.

⁴¹ Verbal response during questioning at DE 19-057 Technical Session at NH PUC on October 29, 2019.

1 **Q. What is your position regarding DCFC and demand charges in this proceeding?**

2 A. NHDES does not take a position on any specific rate or tariff that Eversource should
3 offer. Instead, NHDES observes that other jurisdictions have proposed DCFC-specific
4 rate classes or customer classes.

5

6 **Q. Have demand-based alternative rates been established elsewhere?**

7 A. Yes. The Connecticut Public Utilities Regulatory Authority has approved an EV Rate
8 Rider for Eversource. The EV Rate Rider eliminates demand charges by converting them
9 to a per kWh usage charge.⁴²

10

11 **Q. Why is it important to consider rates relative to EVs now, when EVs represent
12 such a small part of the total vehicle fleet?**

13 A. EVs are here and will only become more common as prices fall and drivers become
14 more familiar. EVs are having a marginal impact on daily and seasonal peak demand and
15 total generation today, but these impacts will grow as penetration rate increases. By
16 offering specific EV TOU rates now, before EV numbers increase to a significant
17 percentage of the on-road fleet and begin to register a significant impact to the grid,
18 Eversource and other utilities can better establish off-peak charging as the norm for EV
19 owners from the very beginning.

20 Also, by offering a broader class of rates now, which include EV rates, Eversource
21 will have access to data that will inform the next generation of EV specific rates; rates
22 developed based on New Hampshire specific data. This data may be used by Eversource
23 directly, or by the energy sector more broadly through the newly approved statewide,
24 multi-use online energy data platform, signed into law during the 2019 legislative
25 session. As noted in SB284 findings, “[s]uch a program of robust data is also likely to be
26 useful in local planning, conducting market research, fostering increased awareness of

⁴² The Connecticut Light and Power Company, d/b/a Eversource Energy, Electric Vehicle Rate Rider, Docket No. 17-10-46RE01, [http://www.dpuc.state.ct.us/dockcurr.nsf/8e6fc37a54110e3e852576190052b64d/78a25b4e83776981852583b50057c9d1/\\$FILE/171046RE01-030619.pdf](http://www.dpuc.state.ct.us/dockcurr.nsf/8e6fc37a54110e3e852576190052b64d/78a25b4e83776981852583b50057c9d1/$FILE/171046RE01-030619.pdf), (Last accessed December 19, 2019).

1 energy consumption patterns, and the adoption of more efficient and sustainable energy
2 use.⁴³

3 In the context of this rate case, addressing EV charging now matters because this is
4 the first base-rate proceeding that the Eversource has filed in 10 years. As noted in
5 testimony of Purington and Lajoie, “a vast sea-change has occurred in terms of the need
6 for the distribution system to be more reliable and resilient to meet the growing
7 expectations of customers; for protection from the impacts of climate change experienced
8 by customers in terms of the significant ramp-up in the frequency and severity of major
9 weather events and the imperative to reduce GHG emissions; for changes in service
10 alternatives arising as a result of the transition to a digital economy; and for options to
11 participate in climate change response through the installation of distributed energy
12 solutions and other opportunities.⁴⁴ This speaks not only to the importance of addressing
13 climate change, but also of the technological changes that have occurred across that
14 decade. To assure that the impact of a rapidly emerging market segment is addressed, at
15 least in part, it stands that this rate case should consider rate design for EVs as the timing
16 of the next rate case is indeterminate.

17 This was emphasized in September 2019, the three investor-owned utilities, including
18 Eversource, submitted joint comments on the Grid Modernization Docket, IR-296. In this
19 filing, the utilities responded to a recommendation PUC Staff Report, regarding rate
20 design in proposed Integrated Distribution Plan (IDPs). PUC Staff recommended that
21 each utility’s IDP contain a proposal for rate design and that address issues including:
22 demand charges and TOU rates, inclusive of generation, transmission, and/or distribution
23 charges.⁴⁵ The three utilities noted that, while utility rate design may be informed by
24 IDPs, they are not the most appropriate forum for redesign of utility rates. Instead

⁴³ SB284 (2019). http://gencourt.state.nh.us/bill_status/billText.aspx?sy=2019&id=1077&txtFormat=pdf&v=current, (Last accessed December 19, 2019).

⁴⁴ See direct testimony of Mr. Joseph Purington’s and Mr. Lee Lajoie’s, Bates 000391-392, http://www.puc.state.nh.us/regulatory/docketbk/2019/19-057/initial%20filing%20-%20petition/19-057_2019-05-28_eversource_dtestimony_purington_lajoie.pdf, (Last accessed December 19, 2019).

⁴⁵ PUC (2019). Staff Recommendation on Grid Modernization, IR 15-296 Investigation into Grid Modernization, http://www.puc.state.nh.us/Regulatory/Docketbk/2015/15-296/LETTERS-MEMOS-TARIFFS/15-296_2019-02-28_STAFF_REPORT_AND_RECOMMENDATION.PDF (Last accessed December 17, 2019).

1 amendments to rate design and the implementation of new rate designs should remain as
2 issues in individual utility rate cases.⁴⁶

3 Tom Frantz, the Director, Electric Division, also noted during a presentation to the
4 Electric Vehicle Charging Stations Infrastructure Commission (SB517 2018) that issues
5 related to DCFC demand chargers should be addressed in a rate case.⁴⁷

6

7 **V. Conclusion**

8 **Q. Does this conclude your testimony?**

9 A. Yes.

⁴⁶ Joint Comments of Liberty Utilities (Granite State Electric) Corp. D/B/A Liberty Utilities, Public Service Company of New Hampshire D/B/A Eversource Energy, And Unital Energy Systems, Inc. Re: Order No. 26,254. http://www.puc.state.nh.us/regulatory/docketbk/2015/15-296/letters-memos-tariffs/15-296_2019-09-06_gsec_eversource_unitil_joint_comments.pdf, (Last accessed December 18, 2019).

⁴⁷ PUC Presentation to the Electric Vehicle Charging Stations Infrastructure Commission, [Overview of Electric Utility Rulemaking](https://www.des.nh.gov/organization/divisions/air/tsb/tps/msp/sb517.htm), October 4, 2019, <https://www.des.nh.gov/organization/divisions/air/tsb/tps/msp/sb517.htm>, (Last accessed December 19, 2019).