Date Filed: November 16, 2026

Witness: **Juan-Pablo Velez**
Request from: **Connecticut Industrial Energy Consumers**

Question CIEC-10:

Please refer to Velez Direct Testimony at page 10, footnote 4; page 19, lines 4-8; and page 20, lines 5-8.

a. Footnote 4 states that the heat pumps modeled include "electric resistance backup." Please provide the modeled hourly electric resistance backup load for the average fossil fuel-heated home after heat pump installation, and identify the hours of highest heat pump and backup load in the modeled year.

b. Please explain how the incremental marginal T&D cost of $10 per year reflects heat pump and electric resistance backup load during extreme cold weather conditions more severe than those in the modeled weather year.

c. Please provide the hourly calculation underlying the $10 per year estimate in Excel format with formulas intact.

Response:

a. The modeled hourly electric resistance backup load[1] for the average fossil fuel-heated home after heat pump installation[2] is provided in CIEC-10 Attachment 1, together with the home's hourly heat pump load and whole-home load, for all 8,760 hours of the modeled year, so the hours can be ranked by any of these loads.[3] Both the combined heat pump and backup load and the backup load alone would peak in the hour beginning 7:00 a.m. on January 5, 2025 (Eastern Standard Time), when the home would use 13.2 kWh for heating, of which 10.7 kWh would be backup.[4] Over the year, backup would use 157 kWh, or 2.3% of the heat pump's own 6,690 kWh.

b. The $10.30 reflects the incremental heat pump load that actually causes new T&D costs: added cooling in summer, when the Company's feeders, substations, and the transmission system are closest to their capacity.[5]

---

[1] Direct Testimony of Juan-Pablo Velez on behalf of Conservation Law Foundation and Sierra Club ("Velez Direct"), at 10 n.4 (Oct. 21, 2026).

[2] The same average home as in the direct testimony: the weighted average of 2,831 ResStock buildings served by Eversource and heated with natural gas, fuel oil, or propane before the retrofit, scaled as in the testimony so that its whole-home load sums to the 13,643 kWh a year used there. Backup is ResStock's electric resistance element; heat pump load is the compressor and its supply fan.

[3] CIEC-10 Attachment 1, CIEC-10a_hourly_backup_load.xlsx, sheet hourly_load: one row per hour in columns A–F, and the annual totals, backup ratio, and peak hours as formulas in columns H–I. The README sheet explains each column.

[4] Hours are on the 2025 calendar used throughout the testimony (Ex. JPV-3, sheet hourly_after). ResStock models 2018 weather, shifted two days so weekdays line up; this hour reflects the weather of 7:00 a.m. on January 7, 2018. CIEC-10 Attachment 1 gives both timestamps for every hour.

[5] Velez Direct at 19:4–8.

The same $10.30 holds in extreme cold, because heat pump and backup load in winter hours, however cold, does not add to that cost. A colder winter would raise the home's load in winter hours, but added load causes new T&D costs only when it pushes the system toward its capacity, and on the Company's system winter load is nowhere near capacity, even in very cold weather.

First, the Company's own loading data show large headroom at the summer peak. As I testified, "the typical feeder has 51% headroom even at its annual peak."[6] In its response to the data request, the Company did not identify whether these were summer or winter peaks,[7] but they are almost certainly summer peaks: the Company's own marginal cost witness found from its hourly substation loads that the Company "will continue to be summer-peaking through year 2031."[8] So headroom is already large in summer, and winter headroom is very likely even larger,[9] because 82% of Connecticut homes heat with natural gas, fuel oil, or a fuel other than electricity.[10]

Second, this abundant winter headroom is reflected in the Company's marginal cost study, which found "a very small probability of peak falling on the coldest winter months."[11] Its probability-of-peak analysis is built from the Company's actual hourly substation loads for January 2022 through December 2025.[12] Those loads include every heat pump and electric resistance heating system already on the system, and they cover the coldest hours of four winters. Even so, winter hours received almost no probability of being the peak. In other words, the electric heating load already installed, in the coldest weather of recent years, is too small to drive distribution capacity investment. The marginal bulk transmission costs come from the same method applied to New England system load for 2022 through 2025, and also fall in summer.[13]

c. The hourly calculation is in Ex. JPV-3, which was filed with my direct testimony in Excel format with formulas intact.[14] Its hourly_marginal_cost sheet multiplies the average fossil fuel-heated home's load in each of the 8,760 hours, before and after heat pump installation (sheets hourly_before and hourly_after), by that hour's marginal transmission and distribution costs (sheet marginal_cost), and sums the results. Cell P4 gives the difference, $10.30 a year: $8.08 in bulk transmission cost (cell P2) and $2.22 in distribution and sub-transmission cost (cell P3).

---

[6] *Id.* at 21:7–8. The headroom is each feeder's most recent annual maximum loading (2025 where reported, otherwise 2024) as a share of its rated capacity, from the Company's response to System Data Requirement No. 2. *Id.* at 21 n.14.

[7] *Id.* at 22:1–3.

[8] Direct Testimony of Amparo Nieto, Exhibit CLP-MCOS-1, at 6:9–12 (July 14, 2026).

[9] I requested each feeder's historical winter peak (Velez Direct at 22 n.15), but the Company will produce feeder and substation loads and ratings only under a nondisclosure agreement (CIEC-9(b)) that it has not yet signed; and it has not completed a winter peak forecast (CL&P Response to CLF-SC-021, at 1: "the Company is currently in the process of developing winter peak forecasts; however, these forecasts have not been fully completed").

[10] Velez Direct at 22:6–12 and n.17. If some feeders' annual peaks were in winter, their winter headroom would still be at least what the testimony shows, because "the annual maximum is by definition higher than the winter peak alone." *Id.* at 22 n.16.

[11] Nieto Direct, Exhibit CLP-MCOS-1, at 6:12–13.

[12] CL&P Response to CLF-SC-033, at 1 (reprinting the Company's response to OCC-733: "The sum of historical hourly Substation Loads from January 2022, to December 2025 across all the distribution substations provided by the Company were grouped by hour type").

[13] Velez Direct at 15:6–16:2.

[14] Ex. JPV-3. The hourly marginal costs are derived in Ex. JPV-2, Section 3, at 6–8.