Date Filed: November 16, 2026

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

Question CIEC-11:

Please refer to Velez Direct Testimony at page 8, lines 1-2 and footnote 1, and page 10, lines 4-7.

a. Please describe any steps Mr. Velez took to validate or calibrate the ResStock simulated load profiles against the Company's actual residential loads, and provide the results.

b. Please provide a comparison of the simulated average annual and monthly usage of the modeled homes before heat pump installation with the Company's actual average residential usage.

c. Please provide all CAIRO model input and output files used in Velez Direct Testimony that have not already been provided in Exhibits JPV-3 and JPV-4 or in response to CIEC-1.

Response:

a. ResStock's simulated loads closely match the Company's own residential sales. ResStock models a sample of homes, and gives each one a sample weight: the number of real homes it represents.[1] I matched 3,539 of these modeled homes to the Company's service territory by location, then rescaled their sample weights so that, together, they represent the 1,212,520.95 residential customers the Company filed for the Rate Year. With that change alone, the modeled homes' total electricity use was only 0.5% higher than the Company's Rate Year residential sales forecast of 10,319,107,650 kWh. I closed that gap by scaling every modeled home's hourly use, before and after heat pump installation, by 0.995.[2] Because each factor is the same for every home and every hour, neither step changes the shape of any home's load profile.

b. The question is how the modeled fossil fuel-heated homes, which use an average of 7,211 kWh a year,[3] compare with the Company's own customers who heat with natural gas, oil or propane. The Company has no usage figures for that group, because it does not track its customers' heating sources.[4] So the best available comparison is three indirect but complementary checks, each against data the Company does have:

1. **Gas-heated homes alone.** The Company identified approximately 31,548 customers who also take Yankee Gas heating service, who used an average of 5,635 kWh in 2025. The modeled gas-heated homes use 5,707 kWh, 1.3% more.[5]

---

[1] Ex. JPV-2, Section 1, at 4 (Oct. 21, 2026) ("ResStock assigns each modeled dwelling a weight representing the number of real households it stands for."). By design, each modeled home stands in for many real homes with similar characteristics.

[2] *Id.* at 4 ("For CL&P this factor was 0.995, a downward adjustment of roughly half a percent.").

[3] Direct Testimony of Juan-Pablo Velez on behalf of Conservation Law Foundation and Sierra Club ("Velez Direct"), at 8:1–2 (Oct. 21, 2026).

[4] CL&P Response to CLF-SC-004, at 1 (Sep. 18, 2026) ("the Company does not track the heating sources of its customers").

[5] CL&P Response to CLF-SC-004(b), at 2 ("approximately 31,548 CL&P Residential customers received service under either the Yankee Gas Rate 2 Residential Heating rate or the Yankee Gas Rate 3 Residential Multi-Dwelling rate, and who therefore may

2. **Gas-, oil-, propane- and electric-heated homes together.** The Company's load research covers all of its residential customers on Rates 1, 5 and 7, whether they heat with natural gas, oil, propane or electricity. Weighted by the number of customers on each rate, it gives the average residential customer's use: 8,333 kWh a year in 2023 through 2025.[6] The same set of modeled homes (those heated with natural gas, oil, propane or electricity, plus 103 with another fuel or none) uses 8,570 kWh, 2.8% more. Table 1 gives both by month.

Table 1. Average electricity use per customer, 2023–2025 average (kWh)

Month	Modeled: gas-, oil-, propane- and electric-heated homes	Company: all residential customers
Jan	1,016	808
Feb	755	710
Mar	779	648
Apr	630	545
May	562	556
Jun	593	725
Jul	751	978
Aug	746	785
Sep	569	617
Oct	574	546
Nov	718	617
Dec	878	799
Annual	**8,570**	**8,333**

3. **Total residential sales.** As described in part (a), the modeled homes' total use came within 0.5% of the Company's Rate Year residential sales forecast.

All three checks are close, so I am reasonably confident that the modeled fossil fuel-heated homes' use is close to that of the Company's fossil fuel-heated customers.

be assumed to heat using natural gas"; their total consumption "was approximately 177,787,876 kWh"). 177,787,876 kWh ÷ 31,548 customers = 5,635 kWh.

[6] CL&P Response to OCC-479, Attachment 3, sheets 2023, 2024 and 2025 (Sep. 15, 2026) (average hourly kW per customer for Rates 1, 5 and 7). Each month's figure is the sum of that month's hours, averaged over the three years. The rates are weighted by the accounts in each rate's 2025 load research population (1,057,812, 135,885 and 610). CL&P Response to CIEC-017, Attachment 1, sheets Rate 1, Rate 5 and Rate 7, cell B8 ("Accounts in Population") (Sep. 15, 2026).

c. CIEC-11 Attachment 2 lists every file, with a description and a download link.[7] The files include:

- Model results: each modeled home's monthly and annual bills, and its bill alignment results, under each rate scenario in the testimony; and, for each model run, the rates applied, the run's settings, and the electricity use that was billed.
- Model inputs: the ResStock data for the 3,539 modeled homes in Eversource's territory, including their characteristics and their hourly electricity use before and after installing a heat pump; the hourly marginal distribution and transmission costs; the electric and gas rates and scenario settings; and the heating oil and propane prices and inflation figures used to calculate delivered-fuel bills.

The rates and scenario settings are also published with the code used to run the model.[8]

These files do not repeat what was already provided: the average fossil fuel-heated home's hourly electricity use and hourly marginal costs (Ex. JPV-3), the derivation of Rate HP (Ex. JPV-4), and the code behind each figure in the testimony (response to CIEC-1).[9]

[7] CIEC-11 Attachment 2, CIEC-11c_file_list.xlsx. Each row names the rate scenario, whether the modeled homes are before or after heat pump installation, what the file contains, and its size.

[8] Switchbox, rate-design-platform, version ct_eversource_submission, the version used for every model run in the testimony.

[9] Ex. JPV-3; Ex. JPV-4.