STATE OF VERMONT
PUBLIC UTILITY COMMISSION

Case No. 25-

Petition of Vermont Transco LLC and Vermont Electric Power Company, Inc. ("VELCO") for a Certificate of Public Good, pursuant to 30 V.S.A. § 248, for approval to install an Advanced Power Flow Controller at the VELCO Sandbar Station in Milton, Vermont	

PREFILED TESTIMONY OF WITNESS EDWARD J. MCGANN ON BEHALF OF VELCO

June 30, 2025

Edward J. McGann describes the engineering and design details related to the proposed installation of an Advanced Power Flow Controller at the VELCO Sandbar Station in Milton, Vermont. Mr. McGann also addresses 30 V.S.A. § 248(b)(2) (need).

EXHIBITS

PREFILED TESTIMONY OF EDWARD J. MCGANN
ON BEHALF OF VERMONT ELECTRIC POWER COMPANY, INC.
AND VERMONT TRANSCO LLC

Q1. Please state your name, occupation, and business address.

A1. My name is Ed McGann. I am the Director of Engineering and System Protection for Vermont Electric Power Company, Inc. and Vermont Transco LLC (collectively referred to as "VELCO" or the "Petitioner"), and I am responsible for the overall technical design of VELCO's transmission facilities. I have served in an engineering capacity since joining VELCO in 2004. My business address is 366 Pinnacle Ridge Road, Rutland, Vermont 05701.

Q2. Please describe your educational background and work experience.

A2. I received my Bachelor of Science degree in Electromechanical Engineering Technology from Vermont Technical College in 1999. Specific information regarding my work experience is detailed in my resume, attached as **Exhibit Petitioner EJM-1**.

Q3. Have you previously provided testimony before the Vermont Public Utility Commission (the "Commission" or "PUC")?

A3. Yes, I have provided testimony in the following PUC cases: Docket No. 8604, thePV20 Cable Replacement Project; Docket No. 8605, the Connecticut River Valley Project; Docket 17-3808, the St. Albans Project; Case No. 20-0444-PET, the Sandbar Station Upgrade Project; Case No. 20-3506-PET, the Irasburg Station Upgrade Project; and Case No. 23-3761-PET, the St. Johnsbury Station Upgrade Project.

Q4. Do you hold any professional licenses or certifications?

A4. Yes, I am a registered Professional Engineer in the State of Vermont.

Q5. What is the purpose of your testimony?

A5. My testimony addresses the engineering and design details for VELCO's proposal to install an Advanced Power Flow Controller (APFC) at the VELCO Sandbar Station in Milton, Vermont (the "Project"), including the related modifications to VELCO's K19 transmission line. I also address 30 V.S.A. § 248(b)(2) (need) for the APFC.

Q6. Have you prepared exhibits relating to the Project?

A6. Yes. Exhibits related to the substation include **Exhibit Petitioner EJM-2**, which contains a One-Line Diagram of the Sandbar station. **Exhibit Petitioner EJM-3** contains an aerial photograph of the station. **Exhibit Petitioner EJM-4** contains the general arrangement plan and elevation drawings for the station. **Exhibit Petitioner EJM-5** contains the overall site plan and grading details for the station. **Exhibit Petitioner EJM-6** contains Transmission Line Structure Details.

Q7. Please describe the function of the APFC and how it will work with the existing Phase Shifting Transformer.

A7. The APFC is a transformer-less, modular Static Synchronous Series Compensator (SSSC) power electronics package that employs voltage source converter technology for fast response, precise power flow control capability. The APFC will be inserted into the VELCO

PV20 line in series with the existing phase shifting transformer (PST) and will operate in a way that reduces the number of PST tap changes. See Exhibits Petitioner EJM-2, EJM-3, EJM-4, and EJM-5. With the APFC and the PST operating in tandem, the effective power flow range of the combination will be widened and operate with greater power flow control precision. The power flow controls of the APFC and PST will be coordinated such that the APFC will regulate the flows faster and more precisely than the PST, and will essentially become the primary flow control device, thus reducing the PST tap changing duty. The PST should only move when the APFC has hit its predetermined operating limits. Both devices can remain in service and operate independently if either is removed from service for planned maintenance.

Q8. Please describe why the Sandbar Station is the selected site for the APFC.

A8. Like the PST, the APFC is used to regulate power flow on the PV20 line and could be located along the VELCO owned portion of the PV20 transmission path between Grand Isle and the Sandbar Station. The Sandbar Station is the selected site because it offers economic and design benefits. The site is an existing VELCO owned property with adequate space to support construction, APFC expandability, and the existing control house can be leveraged to host the PST and APFC coordinating controls at the same location, simplifying the control system design.

Q9. Please describe the design and engineering for the installation of the APFC at the existing Sandbar Station.

A9. The APFC will consist of four (4) SSSC modules per phase for a total of twelve (12) devices operating on a three-phase system basis. See Exhibit Petitioner EJM-4. The APFC is electrically arranged in the station to be operated in series with the PST. See Exhibit Petitioner EJM-2. Disconnecting means have been provisioned to isolate and bypass the APFC for PST-only operation during planned APFC maintenance or long-term outage scenarios. Instrument transformers are included for APFC terminal voltage and current sensing as part of the protection and control design for operating and isolating the APFC.

Q10. What modifications to the existing Sandbar Station will be needed to accommodate the APFC?

A10. VELCO will expand the northeasterly side the existing station fence line approximately 187 feet to the east and 234- feet to the north to accommodate the APFC and associated bus work arrangement. Lightning masts will be included in the yard expansion for APFC protection. Sections of the existing station bus, associated bus supports and foundations will be modified to electrically place the APFC in the PV20 electrical path and two (2) station service voltage transformers will be installed to maintain station service availability during APFC construction.

Q11. Will VELCO need to perform any grading for the Station upgrades?

A11. Yes, VELCO will adjust the grading on the perimeter fence sections planned for expansion on the northeast side of the property. Additionally, grading will be adjusted to the north of the station to provide additional site access and to the southeast corner of the yard to improve site drainage. The station grading will involve approximately 136,000 square feet of soil disturbance. The average cut and fill depths to achieve final grade will be approximately 1.6 feet and 1.4 feet, respectively. Please see Exhibit Petitioner EJM-5 for the proposed grading plan.

Q12. What design standards did VELCO use to design the proposed Sandbar Station upgrades?

A12. VELCO followed its Substation Design Standards for the design of Sandbar Station upgrades. VELCO's Substation Design Standards are based on industry standards, including the National Electrical Safety Code (NESC), Institute of Electrical and Electronic Engineers (IEEE), American National Standards Institute (ANSI), and National Electrical Manufacturer's Association (NEMA).

Q13. Will installation of the APFC require modifications to VELCO's K19 transmission line? If so, please describe those modifications.

A13. Yes, the APFC yard expansion will require the existing K19 line exit to be modified. The first K19 transmission line structure "Str. 1" is a three pole, wood structure, with

horizontal phase spacing. It will be replaced with two (2) single pole, steel structures with vertical phase spacing, Str. 1A and Str. 1B.

Str. 1A will be located within the Sandbar station footprint. It will be a self-supported, galvanized steel, single pole structure, mounted on a concrete foundation, and will be approximately 76 feet tall. Str. 1B will be a guyed, galvanized steel, single pole, directly embedded angle dead-end structure, and will be approximately 59 feet tall.

A new Str. 1 will be located in the K19 Right of Way (ROW) to facilitate a vertical to horizontal phase roll to align with the existing K19 horizontal phase geometry. Str. 1 will be a guyed, galvanized steel, 3-pole, directly embedded angle suspension structure, and will be approximately 52 feet tall. See Exhibit Petitioner-EJM-6 for transmission line structure details.

Q14. Does this conclude your testimony at this time?

A14. Yes, it does.

DECLARATION OF EDWARD J. MCGANN

I declare that the testimony and exhibits that I have sponsored are true and accurate to the best of my knowledge and belief and were prepared by me or under my direct supervision. I understand that if the above statement is false, I may be subject to sanctions by the Commission pursuant to 30 V.S.A. § 30.

June 30, 2025
Date

/s/ Edward J. McGann
EDWARD J. MCGANN