

9 Action Plan

9.1 Action Plan Summary

This section of the IRP contains VEC’s future actions and decision-making framework for its power supply portfolio, T&D improvements, and capital investments. VEC’s action plan looks out to 2030. Our evolving world will need us to stay nimble, proactive and reactive. We plan to the best of our ability then respond and shift strategies and priorities appropriately.

We focus our action plan based on the five challenges we discussed in the introduction of this IRP:



1. Decarbonizing the energy ecosystem



2. Just transitions and energy equity



3. Maintaining a reliable electric grid



4. Supporting a rapidly shifting centralized and decentralized grid



5. Providing our members with choice

A summary of the strategies to meet those challenges is listed below:

1. Decarbonizing the energy ecosystem - Develop a diverse, affordable, and reliable 100% renewable portfolio roadmap and make smart investments to expand energy transformation
2. Just transitions and energy equity - Support rural and members with high energy burdens to enable membership-wide participation in the energy transition.
3. Maintain a reliable electric grid - Invest in infrastructure upgrades and resiliency
4. Supporting a rapidly shifting centralized and decentralized grid - Develop an innovation farm where ideas grow and flourish, attract and develop excellent talent, and build a complementary technology road map
5. Providing Our Members with Choice - Expand VEC's role in the energy services sector to meet individual and membership wide needs with comprehensive energy options

9.2 Decarbonizing the Energy Ecosystem

In 2021, VEC committed to a 100 percent Carbon Free power supply portfolio by 2023 and 100 percent Renewable power supply portfolio by 2030. In addition, the Global Warming Solutions Act (GWSA) proposes an **80 percent reduction in carbon** from 1990 levels by 2050.

Strategy	Action Plan
100% renewable by 2030	<ul style="list-style-type: none"> • Develop a diverse, reliable and affordable renewable portfolio roadmap • Further integrate power supply, engineering and operations efforts • Educate and collaborate with regulators and energy stakeholders

	<ul style="list-style-type: none"> • Leverage regional hydro and wind, local biomass and solar • Procure affordable, reliable, and renewable baseload power sources to get us through intermittent generation periods
Smart investments to expand Energy Transformation	<ul style="list-style-type: none"> • Expand partnerships with Efficiency Vermont, private sector and other Vermont utilities • Educate communities on heating and transportation options and apply for grants
Invest in infrastructure for electrification	<ul style="list-style-type: none"> • Replace #6 Steel and 8D Amerductor wire by 2030 • Upgrade single phase lines • Promote free transformer and service upgrades for electrification • Mitigate supply chain constraints
Enable distributed Generation	<ul style="list-style-type: none"> • Support SHEI grid constraint mitigation, including system upgrades • Enhance the interconnection process through data transparency and new technology

Table 9.8.1.A Summary of VEC action plan for Decarbonizing the Energy Ecosystem

9.3 Just Transitions and Energy Equity

The concept and values of Energy Equity have been embraced by VEC and our sister electric cooperatives since our formation. The Cooperative Principles embody the key principle of not leaving the most vulnerable behind and knowing that when we work together we are stronger. As a not-for-profit rural cooperative, VEC has always embraced equity as a fundamental principle. Now, and in the coming years, as we participate in a once-in-a-century power sector transition, we are as acutely aware as we ever have been of our obligation to live by this tenet.

Strategy	Action Plan
Keep rates low	<ul style="list-style-type: none"> • Pilot and implement cost effective load management programs to reduce transmission costs • Support economic development strategies to attract people and industries to northern VT • Consistently achieve financial goals to maintain stability, keep borrowing rates low, and obtain least-cost power supply contracts • Seek grants to supplement VEC investment
Enable membership-wide participation in the energy transition	<ul style="list-style-type: none"> • Promote Low and Middle Income (LMI) incentive adders for electric vehicles and heat pumps • Implement on bill financing pilot projects • Seek energy equity in energy transformation programs through eligibility and incentive design
Focusing on LMI members	<ul style="list-style-type: none"> • Promote arrearage assistance funded programs • Implement rural and high energy burden pilot projects • Advocate for energy equity
Promote affordable renewables	<ul style="list-style-type: none"> • Develop an affordable and reliable renewable portfolio roadmap • Educate communities and energy stakeholders on energy issues • Develop new strategies to boost Community Solar participation

Table 9.8.1.A Summary of VEC action plan for Just transitions and energy equity

9.4 Maintaining a Reliable Electric Grid

VEC continues to see increased outages due to more frequent weather events such as wind storms, wet snow or ice, and thunderstorms. It has become ever more challenging to maintain reliability and balance investment in system resiliency. At the same time our members increasingly rely on electricity from healthcare to transportation, and expect reliable and resilient service.

Strategy	Action Plan
Invest in resiliency amid climate impacts	<ul style="list-style-type: none"> Invest in strategic line relocations and undergrounding Explore resiliency as a service with home battery and backup generator penetrations across the territory Educate, determine funding, and implement Microgrid pilots Expand feeder backup
Maintain reliability	<ul style="list-style-type: none"> Continue systemwide Maintenance Plan and condition-based assessments/replacements Explore satellite imagery Vegetation Management strategies and use of drones Expand outage management technologies and strategies for faster restoration
Prepare for transmission supply constraints	<ul style="list-style-type: none"> Implement Vermont Utilities Winter Preparedness Task Force recommendations Expand our capacity to connect to Hydro Quebec during emergencies Support cost-effective transmission level storage
Prioritize cybersecurity efforts	<ul style="list-style-type: none"> Dedicate resources to threat detection and management Ensure adherence to internal goals and national compliance Adhere to industry wide best practices and companywide training

Table 9.8.1.A Summary of VEC action plan for maintaining a reliable electric grid

9.5 Supporting a Rapidly Shifting Centralized & Decentralized grid

As DERs (Distributed Energy Resources) such as distribution generation and electric vehicles penetration levels increase we are seeing a rapid shift from a one-way and simple grid architecture to a more distributed and complex system that needs to be orchestrated. The decentralized grid will need new talent, technology and creative solutions to manage while the centralized transmission infrastructure will need to expand to meet the needs of new generation and growing load.

Strategy	Action Plan
Build a culture of innovation and learning	<ul style="list-style-type: none"> Develop an innovation strategy and establish our Innovation Farm where ideas grow and flourish Expand strategic partnerships with rural cooperatives and expand participation national organizations
Develop technology strategy roadmap	<ul style="list-style-type: none"> Empower staff with technology that enhances collaboration and enables new insights Research and implement next generation metering data platform

	<ul style="list-style-type: none"> Integrate and orchestrate operational tools and resources to ensure reliability on the distribution system
Keep our staff and our members safe	<ul style="list-style-type: none"> Continue global improvements to VEC’s safety program Ensure compliance with standards
Develop great talent	<ul style="list-style-type: none"> Train employees and provide them with broad experiences Create a working environment that is flexible, rewarding, and stimulating Pursue diversity and inclusion at all levels of the organization

Table 9.8.1.A Summary of VEC action plan for supporting a rapidly shifting centralized and decentralized grid

9.6 Providing Members with Choice

Our members are our owners and our customers, with high expectations for the role of electricity in their lives. We survey our members annually, in addition to hearing from them regularly in other formal and informal ways. We know they want clean electricity, that affordability is the most important characteristic of energy supply, and that reliability is more critical than ever as work, school and tele-health move remote and transportation and heating more frequently rely on electricity.

Strategy	Action Plan
Explore VEC's role in the energy services sector	<ul style="list-style-type: none"> Pilot innovate rate designs and incentives to support economic development, member choice and convenience Emphasize adoption of load management programs and time of use rates
Enhance member interactions	<ul style="list-style-type: none"> Continue to develop communication options for members, particularly leveraging technology Improve member interaction through SmartHub, outage information and proactive communication
Member facing data	<ul style="list-style-type: none"> Consistently seek understanding of members wants and needs Develop and implement new C&I offerings to increase visibility of usage and peak impacts Ensure member data privacy while providing proactive, actionable data

Table 9.8.1.A Summary of VEC action plan for providing members with choice

9.7 Memorandum of Understanding (MOU)

VEC has provided a guide as to where items stipulated in a Memorandum of Understanding (MOU issued February 14, 2020 in Case No. 19-3042-PET are in VEC’s 2022 IRP filing. This guide is in the Appendix.

9.8 Capital Investment Overview

Prioritizing capital investment is critical to ensure VEC’s membership receives the most reliable least-cost service. VEC’s capital investment strategy primarily focuses on reliability and asset improvements. VEC places its capital projects into specific categories listed below:

- **Distribution** – This category includes both specific distribution projects (greater than \$10,000) and annual overarching categories.
 - **Reconductoring** – Replacement or upgrade of wire size for both overhead and underground conductor.
 - **Line changes** – Movement of a line from off-road ROW to the road or from overhead to underground.
 - **Pole replacements** – Conditional or end of useful life replacements of pole assets.
 - **Transformers** – Includes distribution transformer exchanges due to outages or replacements due to condition.
 - **Ordinary replacements** – Anchor, recloser, pole top construction, regulator, or other major equipment replacements due to condition.
 - **Tier 3 CAP** – Customized opportunities to members with off-grid or underserved homes or businesses to replace fossil fuel usage with electricity.
 - **New service** – Line extensions for new service, temporary services, and retirement of lines.
 - **New construction** – New sectionalizing (reclosers, fused cutouts, sectionalizers), regulators, tie lines, adding phases, or reconductoring wire.
 - **Increase capacity** – Increasing distribution transformer capacity or voltage conversions.
 - **Other** – Security lights or LED upgrades.
- **Substation** – Substation equipment replacements and upgrades.
- **Transmission** – Transmission ordinary replacements and new construction.
- **SCADA**– Telecommunications, SCADA, Operations Technology (OT) cybersecurity.
- **Facilities** – New buildings, building enhancements, and security.
- **Fleet** – New vehicles or replacement of existing vehicles.
- **IT** – New software, software upgrades, hardware upgrades.
- **Metering** – New meter installations, meter replacements, industrial metering
- **ET&I** – Energy Transformation and Innovation. This includes items such as battery storage, heat pumps, new technology projects, etc.
- **Make Ready**- Replacement of poles due to make ready incentive or for existing NESC violations where VEC picks up the full cost.

Each VEC project estimated to be greater than \$10,000 receives a specific line item within that fiscal year’s budget (January to December). VEC also utilizes annual over-arching categories that contain miscellaneous replacements and construction. These “blankets” are too cumbersome to identify a specific line item budget as they encompass hundreds of work orders.

The following graph displays VEC’s projections until 2026.

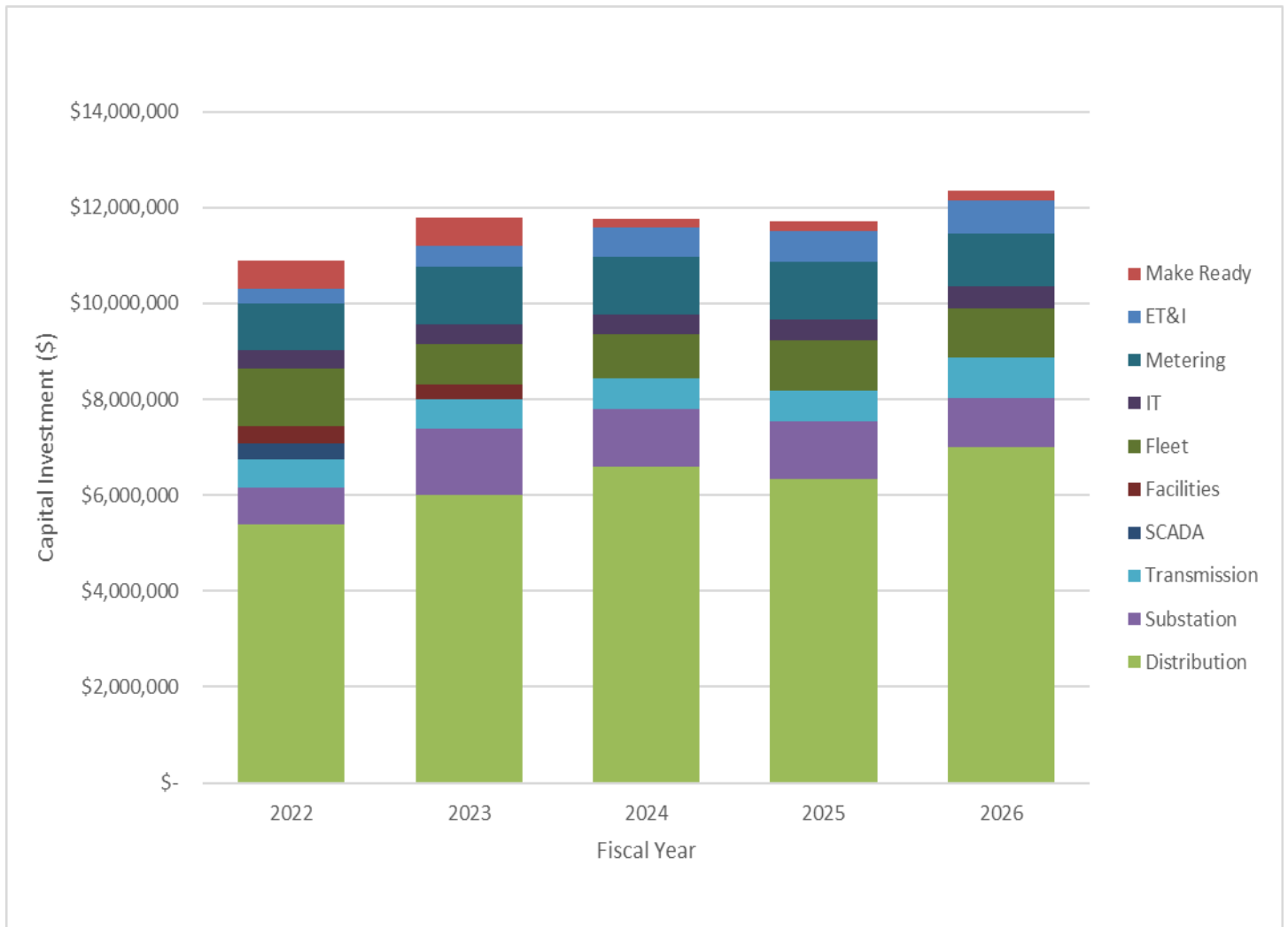


Figure 9.8.1.A VEC Capital investment 2019-2023

9.8.1 T&D Capital Investment

VEC’s Transmission and Distribution investment includes the Distribution, Substation, Transmission, and SCADA areas. Our capital investment strategy is shifting from a significant investment in substation plant to investments in distribution plant. The 2008 system assessment primarily identified a focus on substation improvements that formed the basis for VEC’s 2008-2018 capital investment plan. Since 2009, VEC has rebuilt 11 substations and invested approximately \$29 million (42% of capital available) into substation plant to address safety and reliability concerns.

Further details on all four of the components shown in the chart below (Distribution, Substation, Transmission, and SCADA) can be found in the following sections.

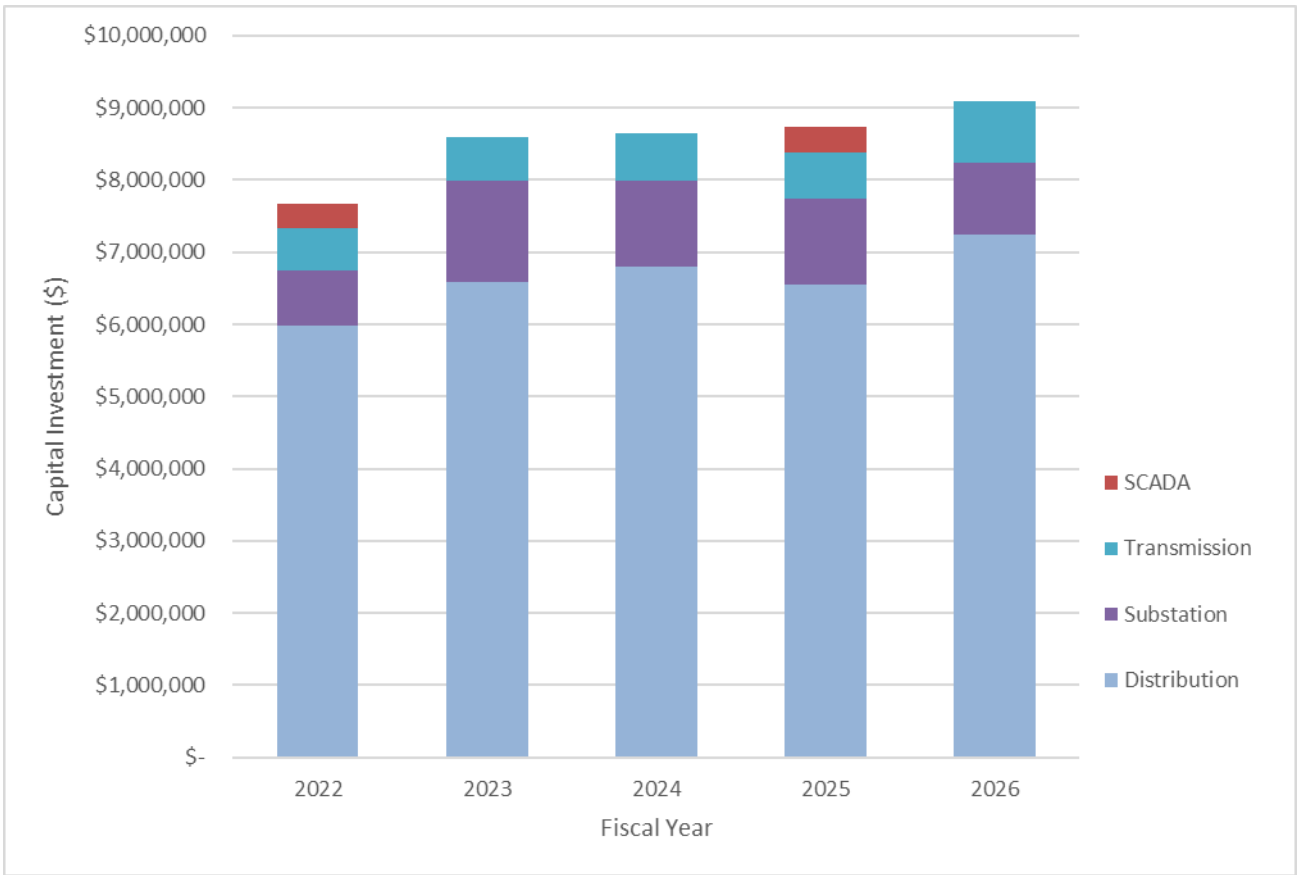


Figure 9.8.1.A Transmission & Distribution capital investment 2022-2026

Distribution Capital Investment

Looking forward, VEC’s Distribution capital investment emphasizes reconductoring, line relocations, and asset replacement. The chart below shows VEC’s expected distribution capital investment from 2022-2026.

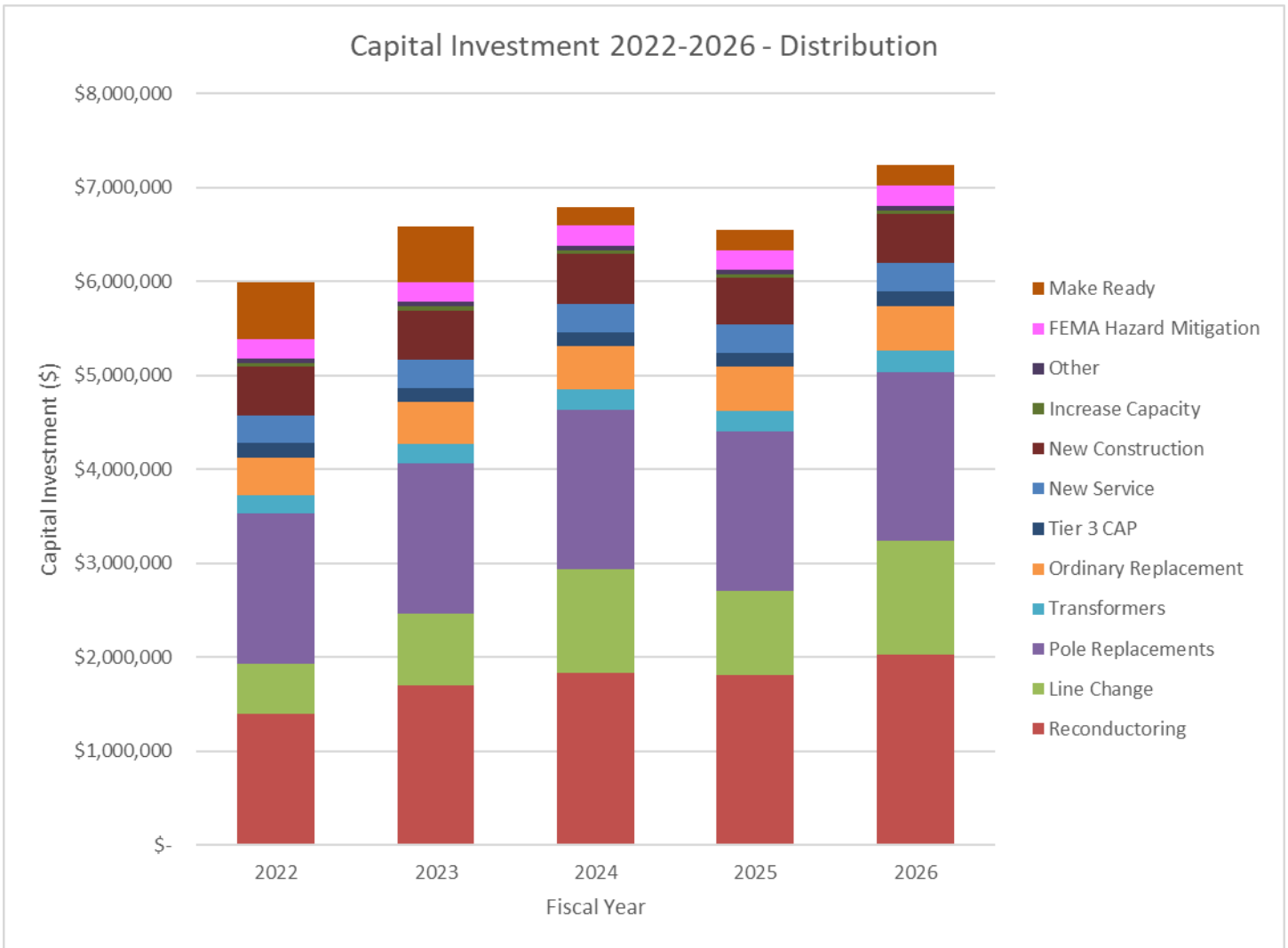


Figure 9.8.1.B Distribution capital investment 2022-2026

The distribution capital budget includes several non-discretionary components (on average 46 percent or approximately \$2.9 million) such as new services and line extensions, pole replacements due to end of useful life or pole inspections rejects, and increases in capacity due to voltage or load constraints. The remainder of the budget (54 percent or \$3.4 million) includes discretionary funds focused on reconductoring, line changes, and new construction projects.

Transmission Capital Investment

VEC uses 173 miles of transmission lines to deliver power from our transmission service providers to our distribution substations or wholesale transmission members. VEC’s 46 kV transmission lines are connected to VELCO’s 115 kV substations at Highgate, Jay, Newport, and Irasburg. VEC’s 34.5 kV transmission lines are operated as radial connections to 34.5 kV transmission lines owned and operated by GMP. The chart below shows VEC’s future expected transmission investment, which VEC expects to increase over prior years. The vast majority of capital dollars will be devoted to replacement of assets due to poor condition.

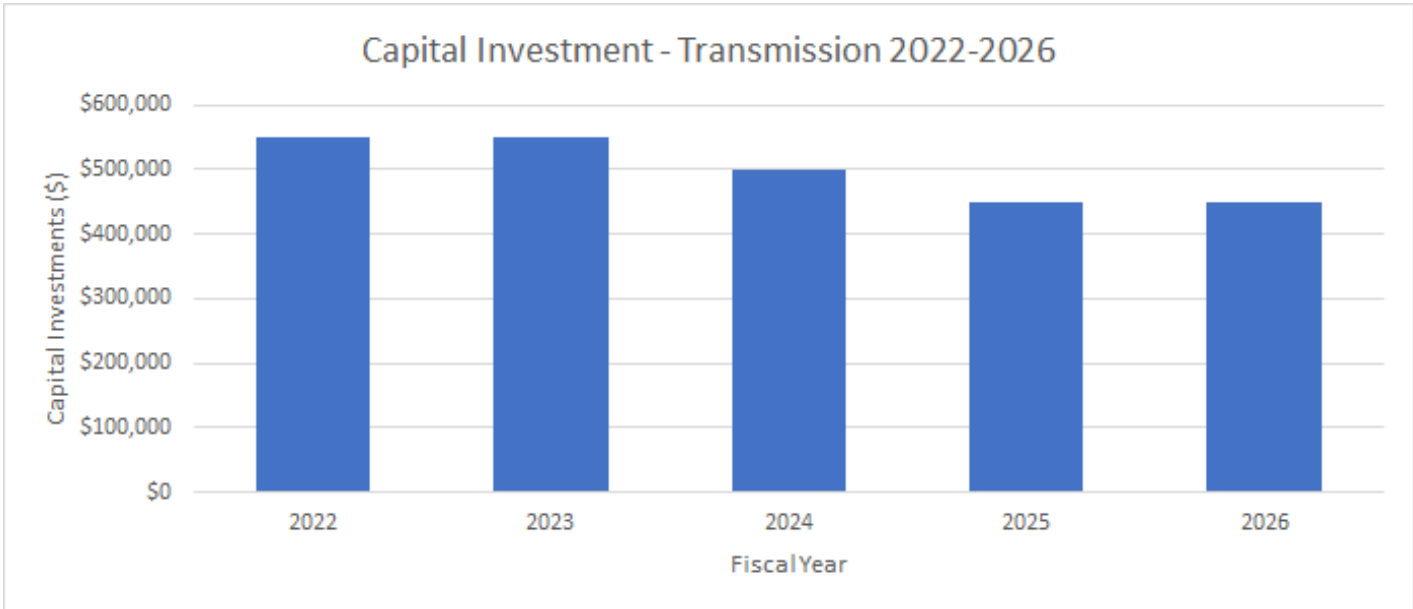


Figure 9.8.1.C Transmission capital investment 2022-2026

The sections below provide specifics on VEC’s planned transmission investment.

Miscellaneous Replacements

VEC completed a transmission pole inspection of all transmission poles in 2020 that yielded a reject rate of approximately two percent. The inspection found only 46 rejected poles and the average reject pole age was 51 years old. As with VEC’s distribution poles, most pole replacements completed outside of the inspection program are due to the condition of the pole top due to decay from water ingress. The cost of replacing a transmission pole is generally two to three times the cost of a distribution pole due to additional material and safety requirements. In addition, these poles are generally not located roadside.

VELCO 1400 and K46

VEC is working with VELCO on a joint project to replace structures and insulators on the 1400 and K46 lines that run from Richford to Mosher’s Tap in Newport. Much of this line is double-circuit and contains a single structure with both 115 kV and 46 kV lines. VELCO owns, operates and maintains the 115 kV and 46 kV assets. VEC owns and operates the 46 kV facilities and is responsible for 50 percent of the costs associated with any structure or equipment replacements including regular vegetation maintenance.

Substation Capital Investment

VEC invested heavily in substation assets from 2008 to 2016. The chart below shows VEC’s past and future expected substation investment.

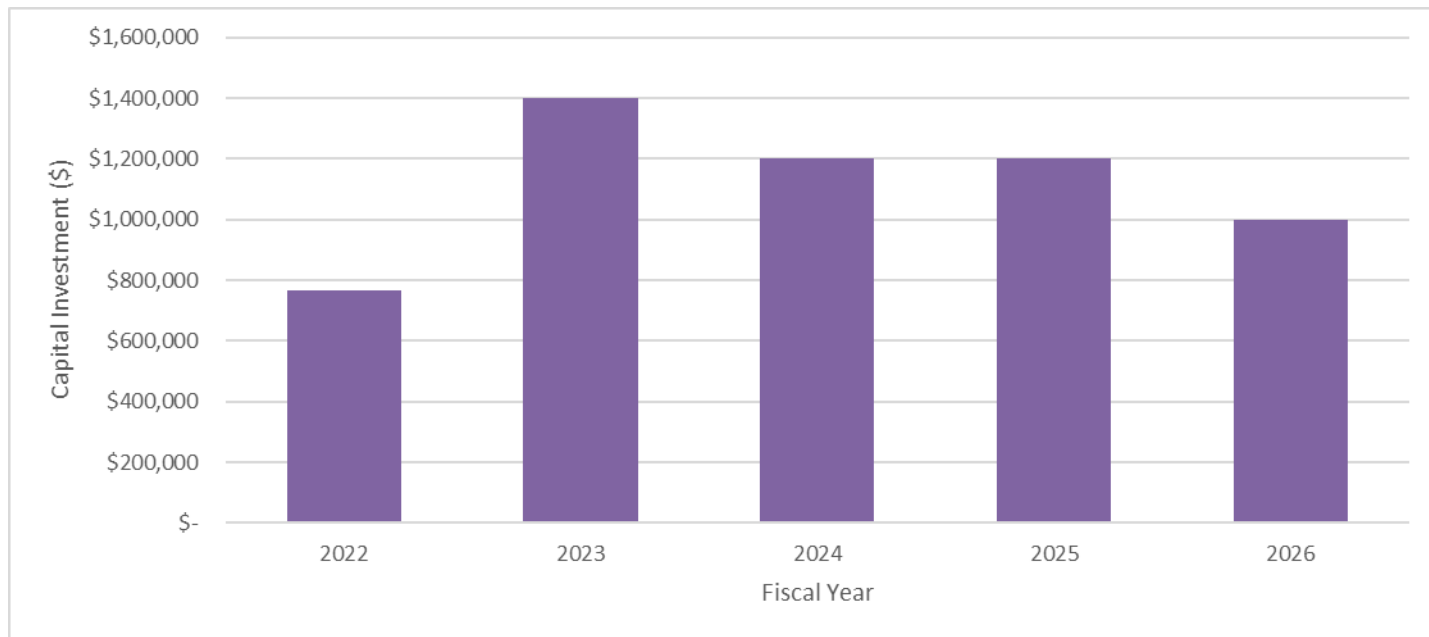


Figure 9.8.1.D Substation capital investment 2022-2026

A high-level overview of VEC’s proposed substation projects is provided below:

Sheldon Substation (Expected 2022-2024)

In late 2017, VEC received an application for a 20 MW solar project that was located approximately one-half mile from VEC’s existing Sheldon #32 substation. This application has since been withdrawn. VEC has continued to move forward with the substation upgrade to address asset condition and working clearance. The project will provide additional reliability improvements including the ability to perform switching and maintenance without outages.

The proposed design would include two 46 kV radial buses with a normally opened bus tie switch, five breakers for incoming and outgoing lines, and two power transformers to step down voltage to 34.5 kV and 12.47 kV like the existing Sheldon substation.

VEC received a CPG for this project in July of 2021 and has started construction of the project this year. The project is anticipated to be complete in 2024.

Hinesburg #19 Transformer Upgrade (Expected 2021)

In 2019, VEC installed a 2 MVA battery energy storage project located adjacent to the VEC Hinesburg #19 substation and interconnected to the VEC 19-3A 12.47 kV distribution circuit. The battery storage project creates additional load on the Hinesburg substation and causes the peak load to approach 80% of the substation transformer nameplate rating, exceeding VEC’s design criteria.

VEC will continue to monitor actual loading and evaluate the need to increase capacity at this substation. This will give VEC a clearer idea of when a substation capacity increase may be necessary. A capacity increase would upgrade

the three existing 2,500-kVA transformers to a minimum 10/12 MVA transformer to allow for future load growth. In addition, VEC will add oil containment.

VEC is reviewing this project via the guidelines for utility planning established through Docket 6290.

Eden #2 Transformer Upgrade

The Eden substation, comprised of 3 x 833MVA transformers, approaches 75% of its nameplate capacity during peak periods. VEC anticipates that modest load growth over the next several years will result in the transformers being loaded to greater than 80% of the transformer nameplate rating, exceeding design criteria.

VEC will monitor actual loading and determine when a transformer capacity increase is required. A capacity increase at the Eden substation would upgrade the three existing 833kVA transformers to a minimum 5MVA transformer to accommodate future load growth.

VEC is reviewing this project via the guidelines for utility planning established through Docket 6290.

VELCO SCAP Projects (2020-2025)

VELCO developed an evaluation protocol (Substation Condition Assessment Project or SCAP) used to conduct a condition assessment of its substations. The objective of the SCAP is to address stations within VELCO's system believed to require refurbishment. Typically, these stations are older, have not recently undergone significant capital upgrades and consist of facilities with planned replacements. VELCO first performs a comprehensive condition assessment of the facility, with the recognition that age alone does not warrant replacement, to develop the scope of work with the objective of refurbishing the station, extend the life of the assets, and improve reliability.

At several of these locations, VEC owns exclusive facilities (facilities that are as necessary for the operation and control of our system only and not required by VELCO). VEC will bear 100 percent of the cost of any exclusive facilities replacements.

The SCAP identified three substations with associated projects that are located within VEC's service territory. VELCO has not yet completed work scopes for the projects, and estimates are based on total costs of other SCAP station projects. Once the project scopes are developed, a condition assessment report will be completed along with a scoping exercise. Presently, the locations and rough timelines for these projects are listed below:

- VELCO Highgate SCAP (Expected 2023-2024)
- VELCO South Hero SCAP (Expected 2023-2025)

SCADA Capital Investment

This section of VEC’s capital budget includes any investment in telecommunications, SCADA, and Operations Technology (OT) cybersecurity. SCADA investment has since slowed with the largest recent investment being an upgrade to VEC’s SCADA system.

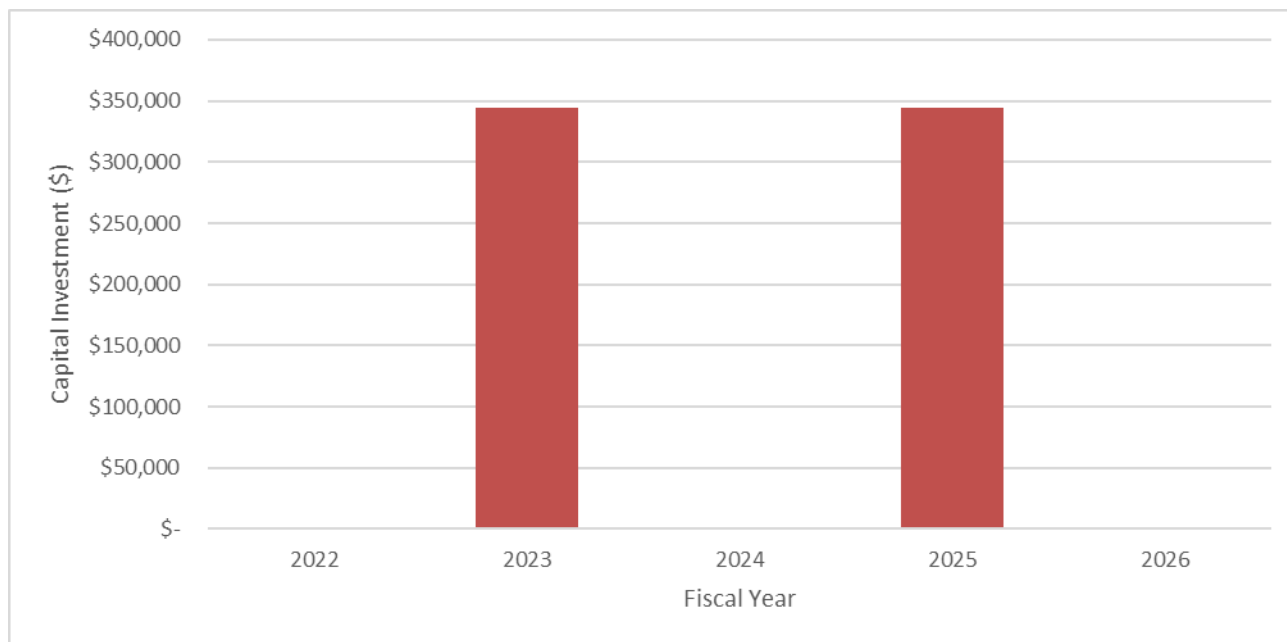


Figure 9.8.1.E SCADA capital investment 2022-2026

A high-level overview of VEC’s proposed SCADA projects is provided below:

- **SCADA System Upgrade (2023)** - We will be replacing our SCADA system in 2023. This replacement is primarily due to Windows 7 going out of support and to renew/upgrade hardware.
- **Operations Technology Cybersecurity Improvements (2024-2025)** - The VEC internal private and SCADA networks are isolated from each other for cybersecurity. VEC categorizes any cybersecurity upgrades associated with the SCADA system in this section. Upgrades to VEC’s cybersecurity posture are expected to occur on at minimum on a semi-annual basis to ensure VEC’s operational systems remain secure.

9.8.2 Other Capital Investment

The T&D section of VEC’s capital budget represents around 80 percent of total capital investment. The graph below shows the spending in the remaining categories of ET&I, Metering, Fleet, Make Ready and Facilities

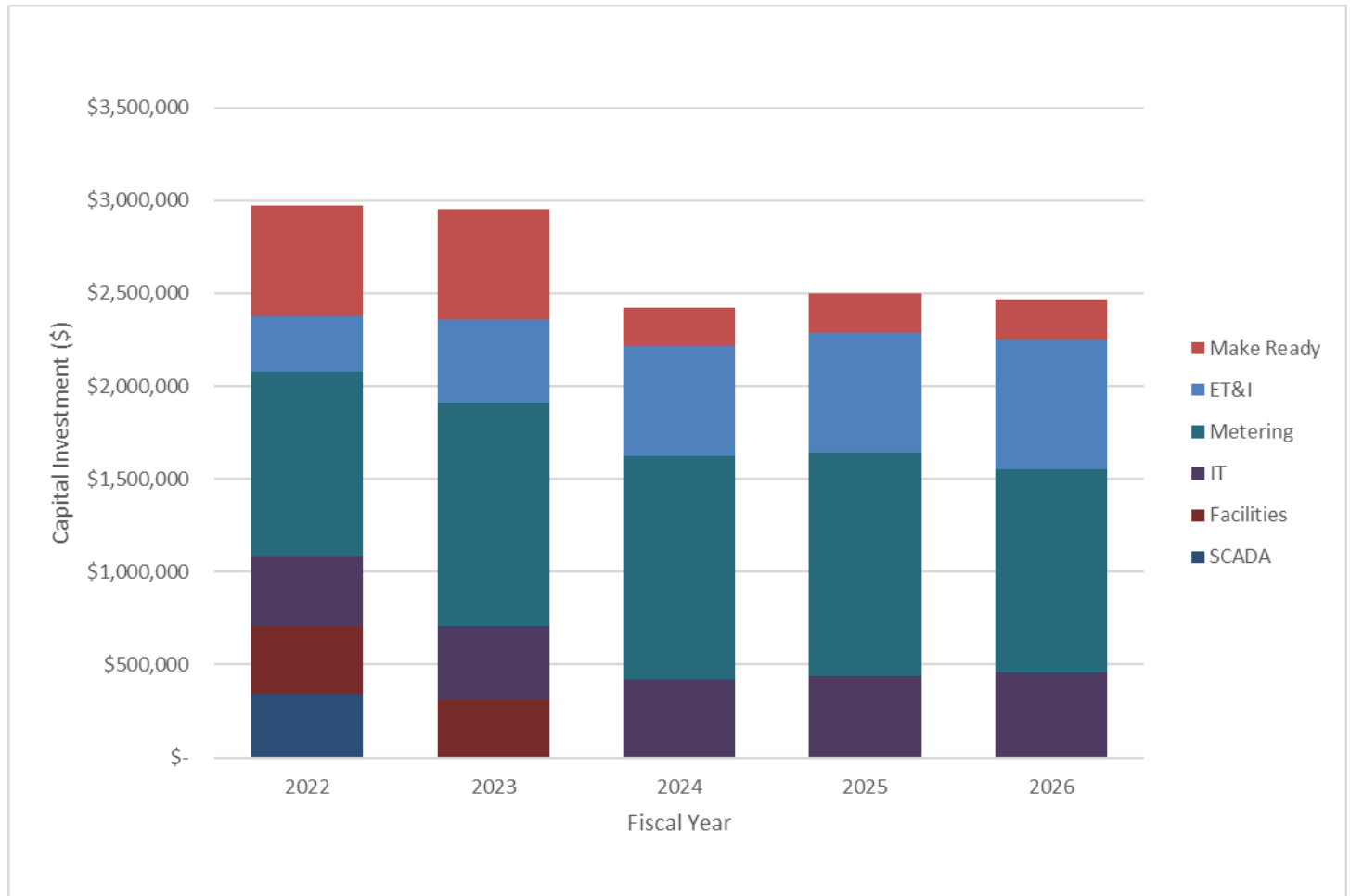


Figure 9.8.2.F Other capital investment 2022-2026

9.9 Vegetation Management and Engineering Studies

9.9.1 Vegetation Management Line Clearing

	Total Miles		Miles Needing Clearing		Clearing Cycle (Years)	
Sub-transmission	~136		~156		5	
Distribution	~2,438		~1,643		8	
	2019 (Y-2)	2020 (Y-1)	2021 (Y)	2022 (Y+1)	2023 (Y+2)	2024 (Y+3)
Amount Budgeted	\$3,080,868	\$3,965,506	\$3,528,893	\$4,313,663	\$4,752,073 ²	\$4,576,365
Amount Spent	\$3,092,276	\$4,190,947	\$3,486,602			
Miles Cleared ³	223 (12-year cycle)	309 (10-year cycle)	291 (10-year cycle)	324 ¹ (8-year cycle)	327 ¹ (8-year cycle)	325 ¹ (8-year cycle)

Table 9.9.1.A Amount budgeted, spent, miles cleared as part of vegetation management cycle

The chart above shows the plan through 2024. The goal is to be at a six/seven-year vegetation maintenance cycle between 2025 and 2027.

¹ “Miles Cleared” for 2023 and 2024 are planned/estimated and provide the basis for the amount budgeted.

² Includes an extra \$309,000 for EAB mitigation in “off-years” since we shifted to a maintenance plan that gathers assets every other year instead of annually.

³ Miles listed (either actual or planned) include both Transmission and Distribution.

9.9.2 Engineering Studies

VEC engages in several system wide reviews or studies of its power system. The following chart identifies VEC’s existing and future engineering studies:

2021	2022	2023	2024	2025
VSPC Docket 7081 and 6290 Screening	VSPC Docket 7081 and 6290 Screening	VSPC Docket 7081 and 6290 Screening	VSPC Docket 7081 and 6290 Screening	VSPC Docket 7081 and 6290 Screening
4.900 Reliability Report	4.900 Reliability Report	4.900 Reliability Report	4.900 Reliability Report	4.900 Reliability Report
System Load and Voltage Study	2022-2042 Integrated Resource Plan	System Load and Voltage Study	System Load and Voltage Study	2025-2045 Integrated Resource Plan
	System Load and Voltage Study			System Load and Voltage Study

Figure 9.9.2.A 2018-2022 VEC engineering studies

Each of these studies were identified in the system planning section of Section 8 – Transmission and Distribution