VERMONT ELECTRIC CO OP

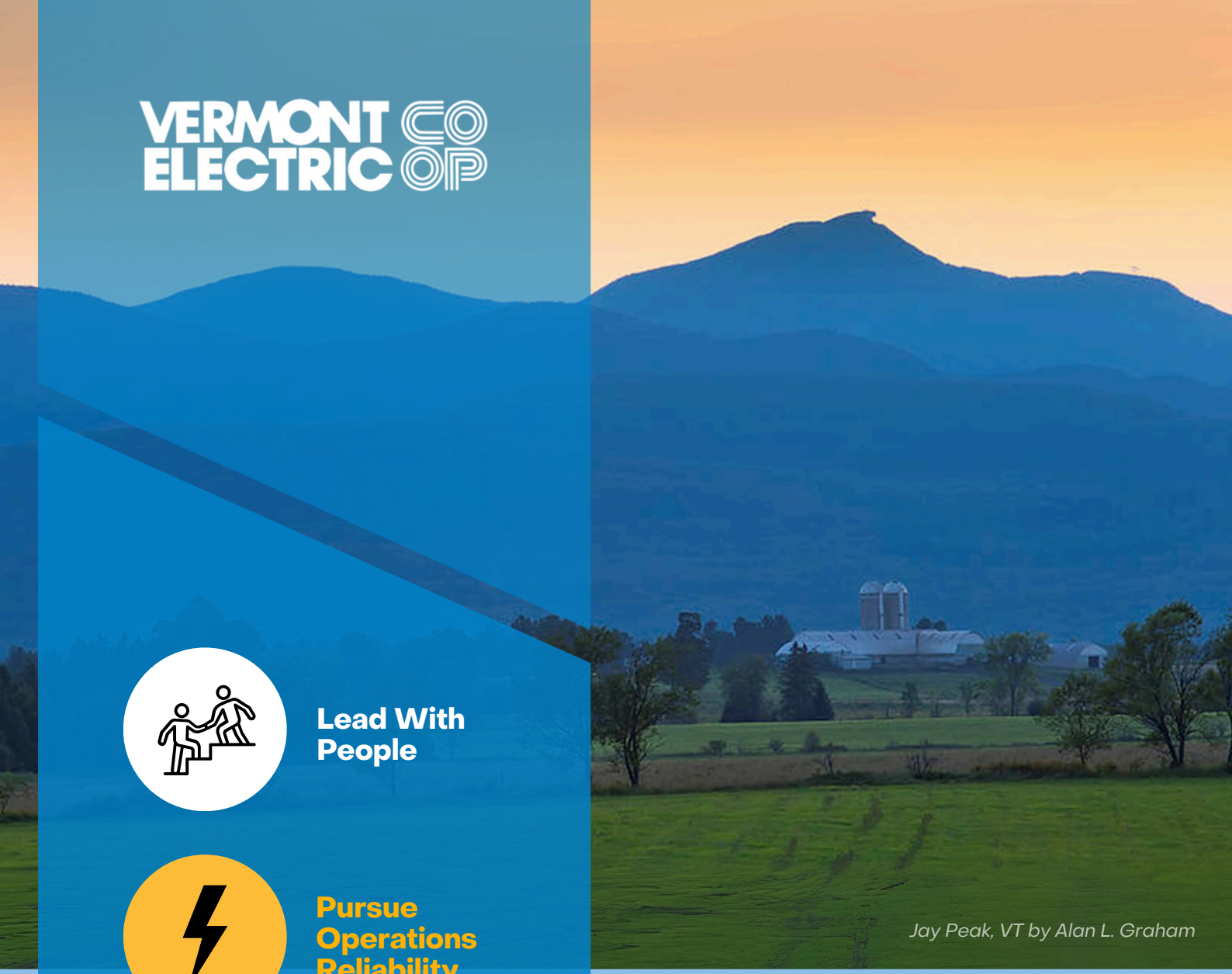
2025 Integrated Resource Plan (IRP)

Section 1 – Executive Summary

The IRP is filed every three years using guidelines identified in the Vermont DPS Appendix B: Guidance for Integrated Resource Plans and 202(f) Determination Requests

IRP drafted by Cyril Brunner, Craig Kieny, and Brian Hall with support from Efficiency Vermont, GMP, VELCO, and many VEC staff members

VERMONT ELECTRIC COOP



Jay Peak, VT by Alan L. Graham

Lead With People

Pursue Operations Reliability

Engage Members

Orchestrate Distributed Renewable Energy

Maintain Financial Strength

- ***Distribution*** *Only*
- ***100%*** *Self -Procured Power Supply*
- ***Regulated*** *by Vermont PUC*
- ***43,000*** *Meters*
- ***87*** *MW Peak Demand*
- ***100% Carbon Free*** *in 2024*
- ***>50 MW*** *of Distributed Renewables*
- ***15%*** *Heat Pump Adoption*
- ***3%*** *EV and PHEV Adoption*
- ***1.2*** *Meters per transformer*
- ***109*** *Employees*

Lighting the path to affordable clean energy, ***together***.

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Our Challenges

Decreasing Reliability

Extreme Weather, Outages from Vegetation Outside of the Right of Way, Emerald Ash Borer

Stressed Infrastructure

Limited Capital Dollars, Impacts of Electrification Load Growth and Distributed Generation

Rising O&M Expenses

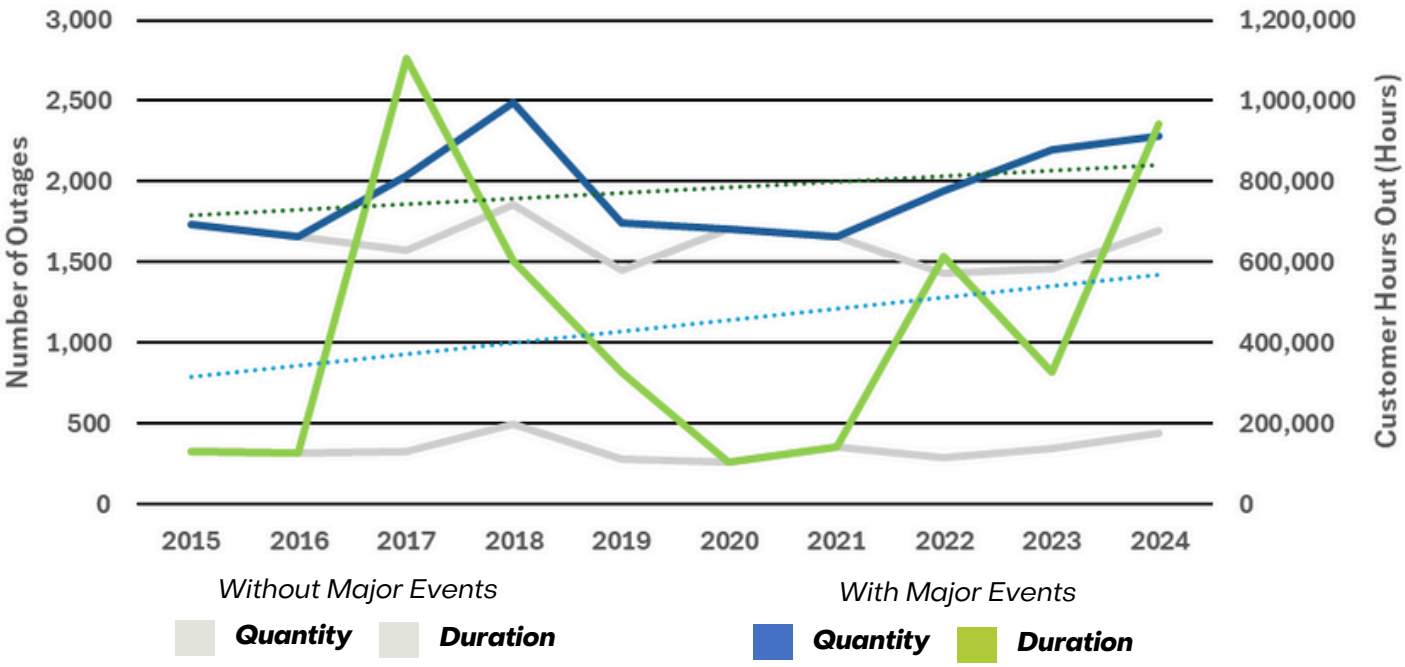
Major storms, Transmission , Vegetation Management, Labor and Benefits

Increasing Member Expectations

Reliability Needs, Energy Engagement, Affordability Challenges

Challenge: Decreasing Reliability

VEC Outage Performance with Major Events



Outage Quantity and Duration Increasing

- *Extreme weather (in particular – wind and ice)*
- *Legacy software tools to manage major events*

Vegetation Management

- *Increasing outages from vegetation outside of the Right of Ways*
- *Risks from Emerald Ash Borer (EAB) increasing*

Cost of Innovative Resiliency Solutions

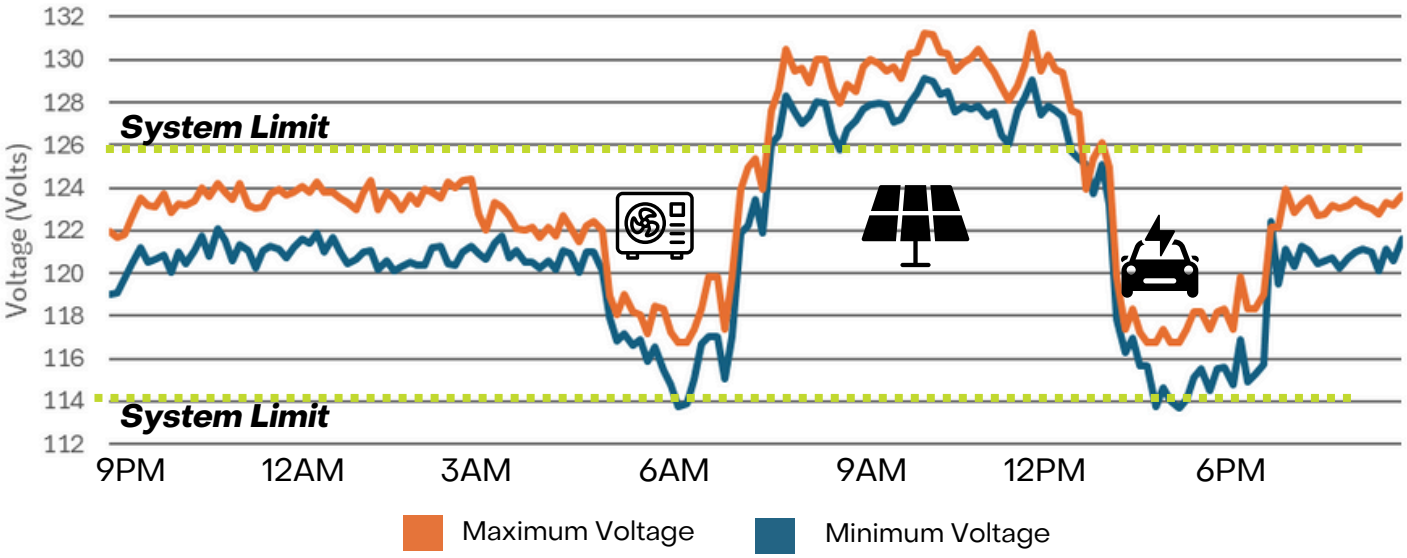
- Easement procurement, permitting, and innovative cable solutions drive cost
- *Overhead cheaper in the short term*

Investment Prioritization

- $350 million *of resiliency investment choices and $5 million annually to invest*
- *Limited geospatially relevant data on future climate impacts*

Challenge: Stressed Infrastructure

VEC System Voltage – Irasburg 42-3A Circuit



Electric Vehicles and Heat Pumps Growth

- *VEC estimates $100 million in infrastructure upgrades by 2040 – low voltage constrained end of line locations.*
- *VELCO estimates over $1 billion in upgrades needed on the transmission system due to DER growth.*
- *Residential EV load growth impacting distribution transformers today.*
- *Measured Heat pump data is limited, impacts on the aggregate unknown.*
- *DER adoption difficult to forecast.*

Grid Visibility – For Operations and Engineering Model Validation

- *Overwhelming choice of grid edge solutions.*
- *Transmission and distribution operators have the same tools, but the grid is increasingly complex.*

Distributed Generation Causing Instability

- *High voltage due to distributed generation.*
- *More severe Transmission contingencies with inverter based resources*
- *DG Hosting capacity (thermal and transient).*
- *Distribution bus load power factor out of tolerance due to distributed generation.*

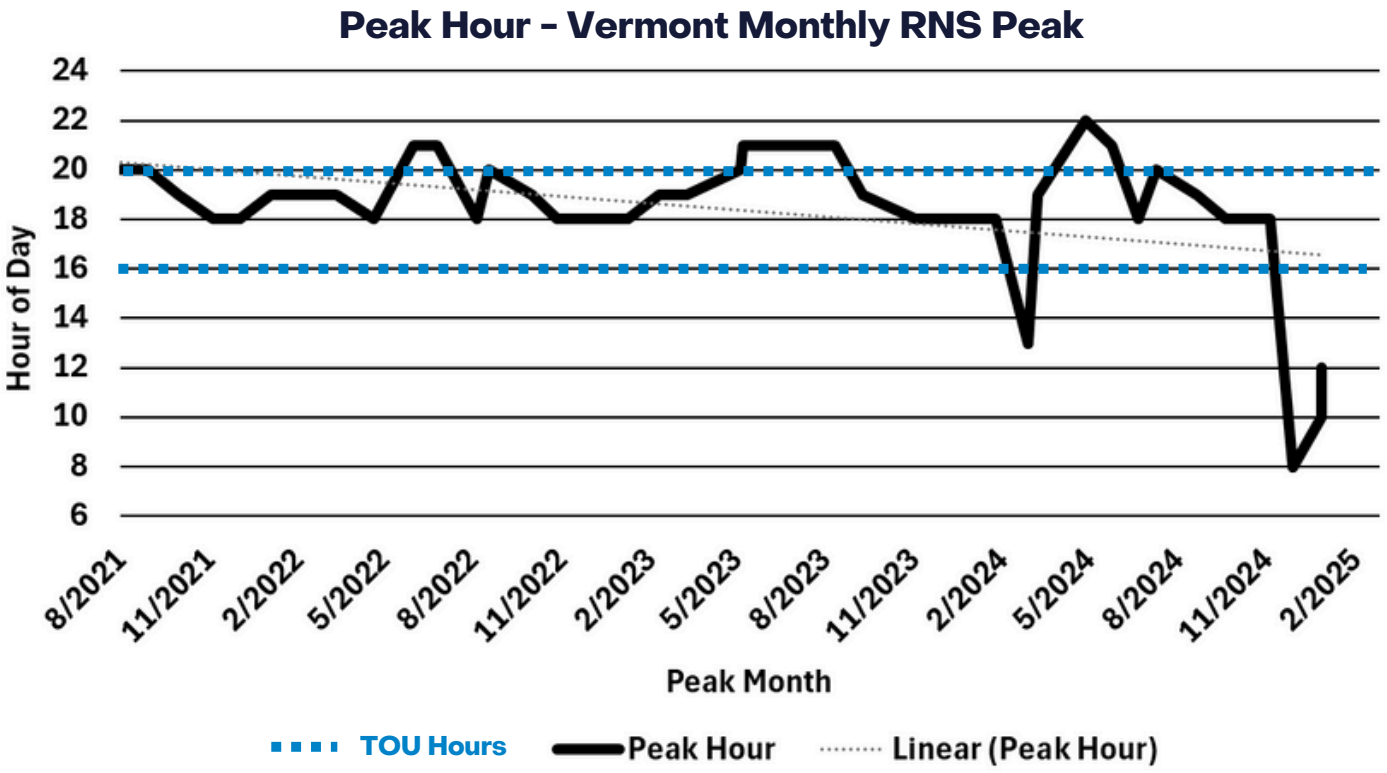
Infrastructure Assets are Difficult to Optimize

- *Limited decision making frameworks.*
- *Gap in tying engineering results to economic analysis.*

Non-Wires Alternatives Are Untested and Difficult To Model

- *Limited tested and trusted alternatives to traditional T&D investment.*
- *Slow , Uninformed, Manual Constraint Identification on Distribution System*

Challenge: Rising O&M Expenses



Transmission and Operations Costs Rising (2.4% increase on rates in 2024)

- *Transmission owners in the ISONE region replacing aging assets.*
- *Labor, benefits, vegetation management.*

Peak Forecasting Increasing in Difficulty

- *Peak is shifting from evening to morning as statewide flexible assets continue to increase.*
- *Static or scheduled/behavioral programs are not flexible enough to meet changing peak hours.*

Use Inspired Research can be Expensive and Time Consuming

- *Data sharing frameworks limit research capabilities.*
- *Federal grant dollars in flux*
- *Utility funded research is often expensive.*

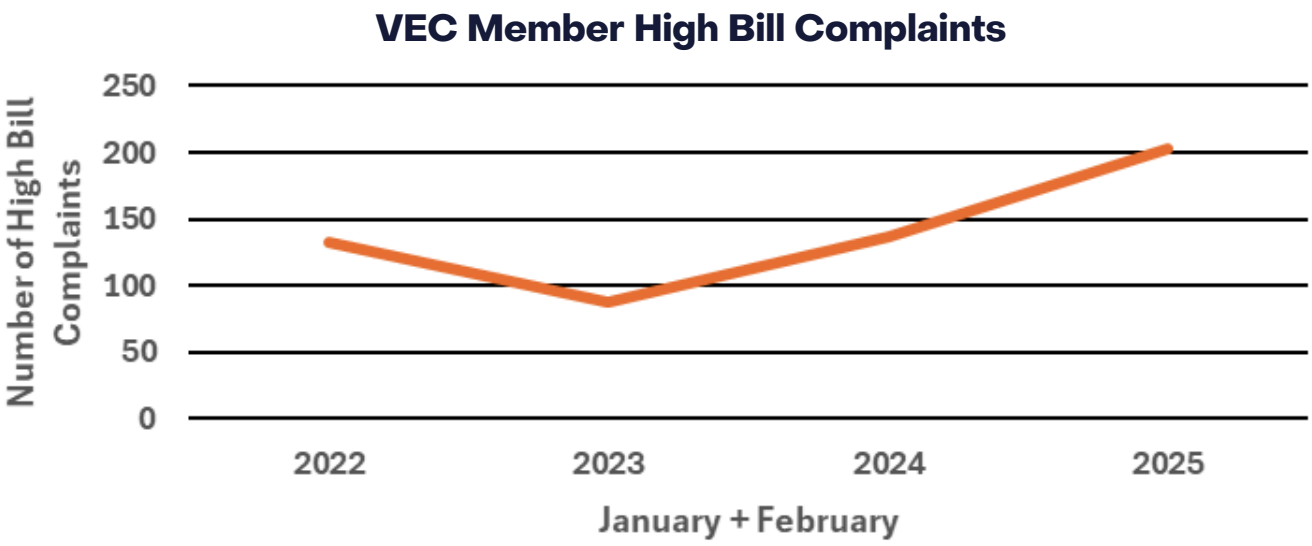
Meeting 100% Renewable Goals

- *Above market cost of net metering.*
- *In state renewable options are limited and intermittent .*
- *Offshore wind delays.*
- *Regional baseload supply costs.*

DER Management Cost Benefit

- *DER management costs can outweigh peak shaving benefits and member incentive.*

Challenge: Increasing Member Expectations



Board President Rich Goggin with two VEC members

Reliability Needs

- *Member expectations exceeding outage performance*
- *Increasing reliance on electricity for heating and transportation*

Affordability Challenges

- *High cost of regional energy*
- *Many fixed income members and high local living expenses*

Energy Engagement

- *Members are requesting increased program offerings and more involvement in their energy bill*
- *Limited understanding of intersection of member behavior and incentives*

Our Strategic Plan

Lead With People

- Maintain a safety-first culture
- Prioritize cybersecurity
- Develop a culture of innovation and learning
- Leverage data to implement Thought Partnership Projects

Orchestrate Distributed Renewable Energy

- Forecast overall load needs
- Reduce impacts of generation on infrastructure (voltage and load power factor)
- Identify affordable and reliable resources for 100% carbon free today , 100% renewable by 2030
- Explore 100% renewable on an hourly basis

Engage Members

- Build flexibility in the distribution grid to reduce electrification impacts
- Focus on affordability strategies for all members
- Support electrification through incentives and programs
- Expand and optimize VEC virtual power plant

Pursue Operations Reliability

- Proactively prevent and detect outages
- Advance event readiness and response
- Prioritize resiliency in investments
- Explore and implement innovative resiliency solutions

Maintain Financial Strength

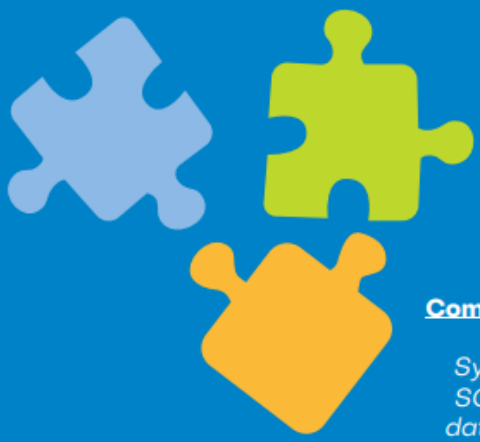
- Utilize 5 year financial forecast to understand challenges
- Explore smart rates
- Pursue grants to support investments

Section 2 – Lead with People

Safety, cybersecurity, innovation, learning, data-driven projects.

A New, Complex and Challenging Grid

Unprecedented behind the meter drastically impacting load and generation, extreme weather increasing outages, and abundant affordability pressures



Limited but Nimble Resources

Small staff and reliance on grant dollars to fund research.

Comprehensive Grid Data

Systemwide AMI, GIS, SCADA and modeling data that is readily and quickly shared with partners

VEC 2024 Innovation Report

Partner with utilities, industry, and research to make the most use of limited resources and solve complex challenges .

Focus Thought Partnership Projects on Biggest Challenges

- *Focus innovation strategy and partnerships on increasing affordability and reliability*
- *Expand strategic partnerships with rural cooperatives and participation with national organizations*

Keep our Staff and Members Safe

- *Continue collaborative, global improvements to VEC's safety program*
- *Ensure compliance with standards*

Prioritize Cybersecurity Efforts

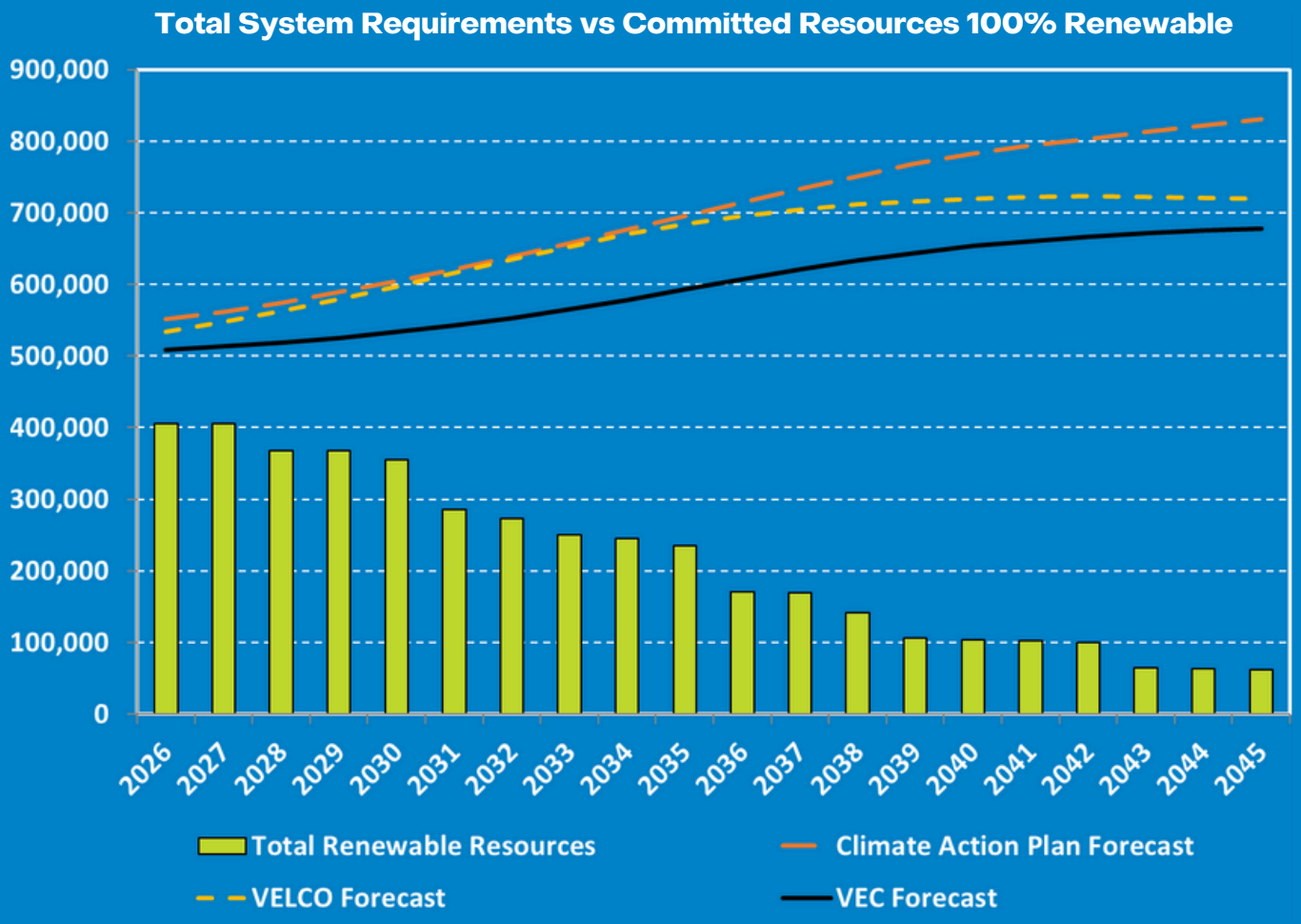
- *Dedicate resources to threat detection and management*
- *Ensure adherence to internal goals and national compliance*
- *Adhere to industry wide best practices and companywide training*

Ensure Compliance with Expanding Requirements

- *Monitor NERC/FERC compliance demands as they rise for distribution operators.*
- *Advocate with regulators for appropriate requirements, reducing where reasonable and feasible while expanding in other areas.*

Section 3 – Orchestrate Distributed Renewable Energy

Load Forecast, Power Supply, Impacts of Generation on Infrastructure



<u>100% Carbon Free 2026-2029</u>

- *Evaluate and extend existing wind and hydro contracts, including securing more renewable energy and RECs, and consider new long-term PPAs starting in 2027.*
- *Monitor REC markets for arbitrage opportunities and explore acquiring nuclear energy attributes to address carbon-free energy shortfalls.*
- *Collaborate with HQ on initiatives such as receiving RECs for block load deliveries and developing a bi-directional energy pilot to optimize cross-border resources.*
- *Analyze the impact of excess generation on the VEC system due to solar on VEC's settlement with ISO-NE as well as the stability of the VEC and VELCO systems*

<u>100% Renewable by 2030</u>

- *Participate in Request for Proposals for On-Shore Wind*
- *Participate in discussions to extend up to 20 MW PPA with Sheffield Wind*
- *Investigating trading nuclear energy and environmental attributes for renewable energy and environmental attributes*

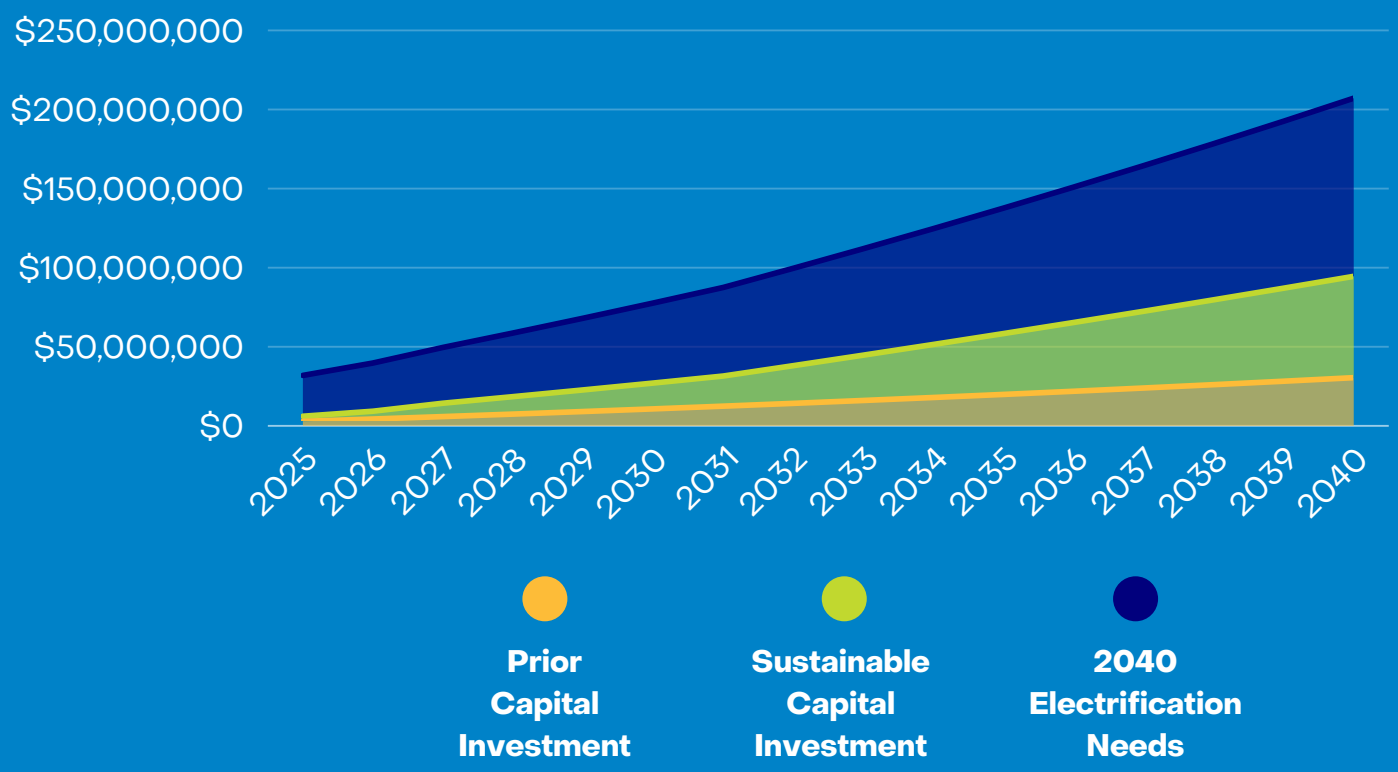
<u>Enable Distributed Generation</u>

- *Enhance the interconnection process through continued data transparency and pursue more granular hosting capacity mapping tools.*
- *Continue to explore non-wires alternatives for generation related power quality issues such as Volt/VAR controls.*

Section 4 - Engage Members

Member Engagement, Energy Equity, Virtual Power Plants

VEC Infrastructure Investment Needs 2025 -2040



Focus on Energy Equity

- *Leverage federal and state grant opportunities to support income qualified members*

Reduce or Defer Infrastructure Investment Needed for Electrification

- *Complete "support your local grid" pilot*
- *Continue to explore near real time power flow options to increase use case of grid aware DER management to primary line and substations*
- *Partner with VELCO to reduce transmission impacts identified in the VELCO Long Range Plan*

Expand and Optimize VEC Virtual Power Plant

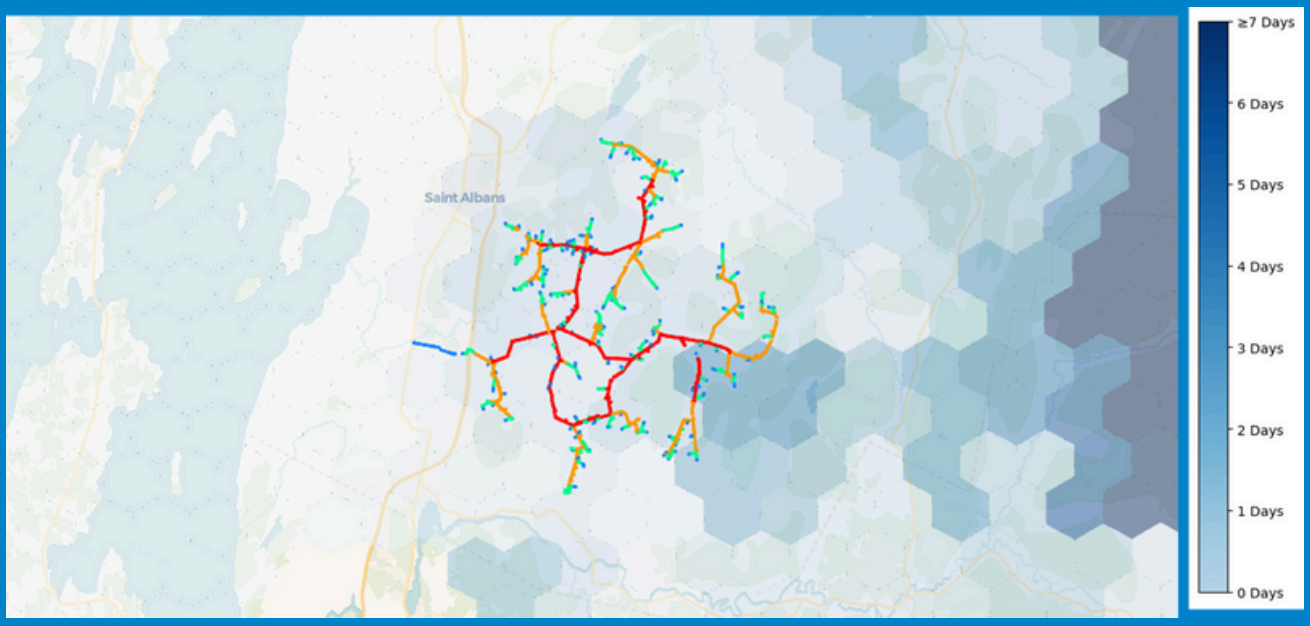
- *Expand assets under management through grant funding or additional DER devices such as heat pumps*
- Focus on peak forecasting challenges and develop new strategies to increase likelihood of hitting peaks

Support Beneficial Electrification Through Incentives and Programs

- *Consider opportunities for programs or incentives to take into consideration income levels or areas with high energy burdens*

Section 5 – Pursue Operations Reliability

Outage Performance, Resilience Strategy, T&D Infrastructure



Zone 1 : Severe outage consequence

Zone 2 : High outage consequence

Zone 3 : Moderate outage consequence

Zone 4 : Low outage consequence

Proactively Prevent and Detect Outages

- *Complete Asset Inspection Program and first cycle of Infrastructure Maintenance Cycle.*
- *Maintain 10-year vegetation management cycle.*
- *Complete AMI upgrade by 2030*

Explore and Implement Resilience Solutions

- *Invest in strategic line relocations and undergrounding solutions*
- *Use steel poles in areas most often impacted by major storms to ruggedize system*
- *Utilize close-arm construction (Hendrix), covered wire, and other robust construction options*
- *Continue to replace small wire through reconductoring*

Advance Event Readiness and Response

- *Invest in technologies that improve communication, minimize contract crew dispatch time, and reduce administrative workload.*
- *Implement an Enterprise Storm Management software application to assist driving maximum efficiency and minimal outage times*
- *Continue to train (tabletop exercises) personnel on the Incident Command System to ensure efficiencies when managing outages*

Prioritize Resilience In Investments

- *Leverage technology to more accurately forecast future climate impacts*
- *Enhance the T&D prioritization framework to optimize benefits and enhance the objectivity of capital investments.*

Section 6 – Maintain Financial Strength

Financial Performance, Rate Evolution, Grant Strategy

Financial Forecast VT007	Vermont Electric Cooperative, Inc				
ITEM	Future 2025	Future 2026	Future 2027	Future 2028	Future 2029
1. Operating Revenue and Patronage Capital	106,406,261	111,321,714	114,554,661	116,913,690	123,360,540
2. Power Production Expense	0	0	0	0	0
3. Cost of Purchased Power	44,293,347	44,484,795	44,663,669	43,925,606	46,370,481
C. Operating Revenue less Cost of Power	62,112,914	66,836,920	69,890,992	72,988,084	76,990,059
4. Transmission Expense	19,464,249	20,305,858	21,029,260	21,287,907	21,978,029
5. Regional Market Operations Expense	0	0	0	0	0
6. Distribution Expense - Operation	9,181,632	10,155,733	10,639,536	11,112,526	11,848,180
7. Distribution Expense - Maintenance	11,842,808	12,945,190	13,036,405	13,643,360	14,355,064
8. Consumer Accounts Expense	3,520,612	3,730,319	3,955,095	4,178,024	4,432,370
9. Customer Service and Informational Expense	0	0	0	0	0
10. Sales Expense	162,708	170,781	180,121	189,032	199,526
11. Administrative and General Expense	5,514,093	5,821,158	6,132,321	6,436,373	6,785,261
12. Total Operation & Maintenance Expense (2 thru 11)	93,988,449	97,613,834	99,636,408	100,772,829	105,968,912
13. Depreciation & Amortization Expense	6,835,505	7,660,182	8,257,680	8,845,075	9,428,828
14. Tax Expense - Property & Gross Receipts	992,309	1,084,829	1,121,433	1,157,129	1,223,120
15. Tax Expense - Other	0	0	0	0	0
16. Interest on Long-Term Debt	5,567,017	5,915,740	6,419,813	6,732,276	7,088,427
17. Interest Charged to Construction (Credit)	0	0	0	0	0
18. Interest Expense - Other	0	0	0	0	0
19. Other Deductions	7,380	7,380	7,380	403,437	255,744
20. Total Cost of Electric Service (12 thru 19)	107,390,660	112,281,966	115,442,714	117,910,745	123,965,031
21. Patronage Capital & Operating Margins (1 minus 20)	(984,399)	(960,252)	(888,053)	(997,055)	(604,491)
22. Non Operating Margins - Interest	6,178,163	6,490,862	6,895,838	7,300,814	7,310,938
23. Allowance for Funds Used During Construction	0	0	0	0	0
24. Income (Loss) from Equity Investments	0	0	0	0	0
25. Non Operating Margins - Other	31,991	30,185	26,838	24,580	20,469
26. Generation & Transmission Capital Credits	0	0	0	0	0
27. CFC & Other Capital Credits & Patronage Dividends	571,181	591,173	611,864	633,279	655,444
28. Extraordinary Items	0	0	0	0	0
29. Patronage Capital or Margins (21 thru 28)	5,796,936	6,151,968	6,646,487	6,961,618	7,382,360
Projected Ratios					
Equity Ratio	42.33%	42.26%	42.08%	42.40%	41.87%
Equity to Debt Ratio	88.78%	86.65%	84.29%	83.76%	81.25%
Modified Times Interest Earnings Ratio	2.0	2.0	2.0	2.0	2.0
Modified Debt Service Ratio	1.57	1.64	1.60	1.62	1.58
Projected Rate Base	$ 97,771,443	$ 101,877,180	$ 105,606,040	$ 109,706,030	$ 116,621,637
Projected Rate Increase		4.20%	3.66%	3.87%	6.30%

Keep Rates Affordable

- *Consistently achieve financial goals to maintain stability and keep borrowing rates low*
- *·Obtain least-cost power supply contracts that provide long-term stability*
- *Leverage load management tools to reduce exposure to increasing transmission expenses*

Evolve Rates With Costs and Encourage Behavior That Reduces Costs

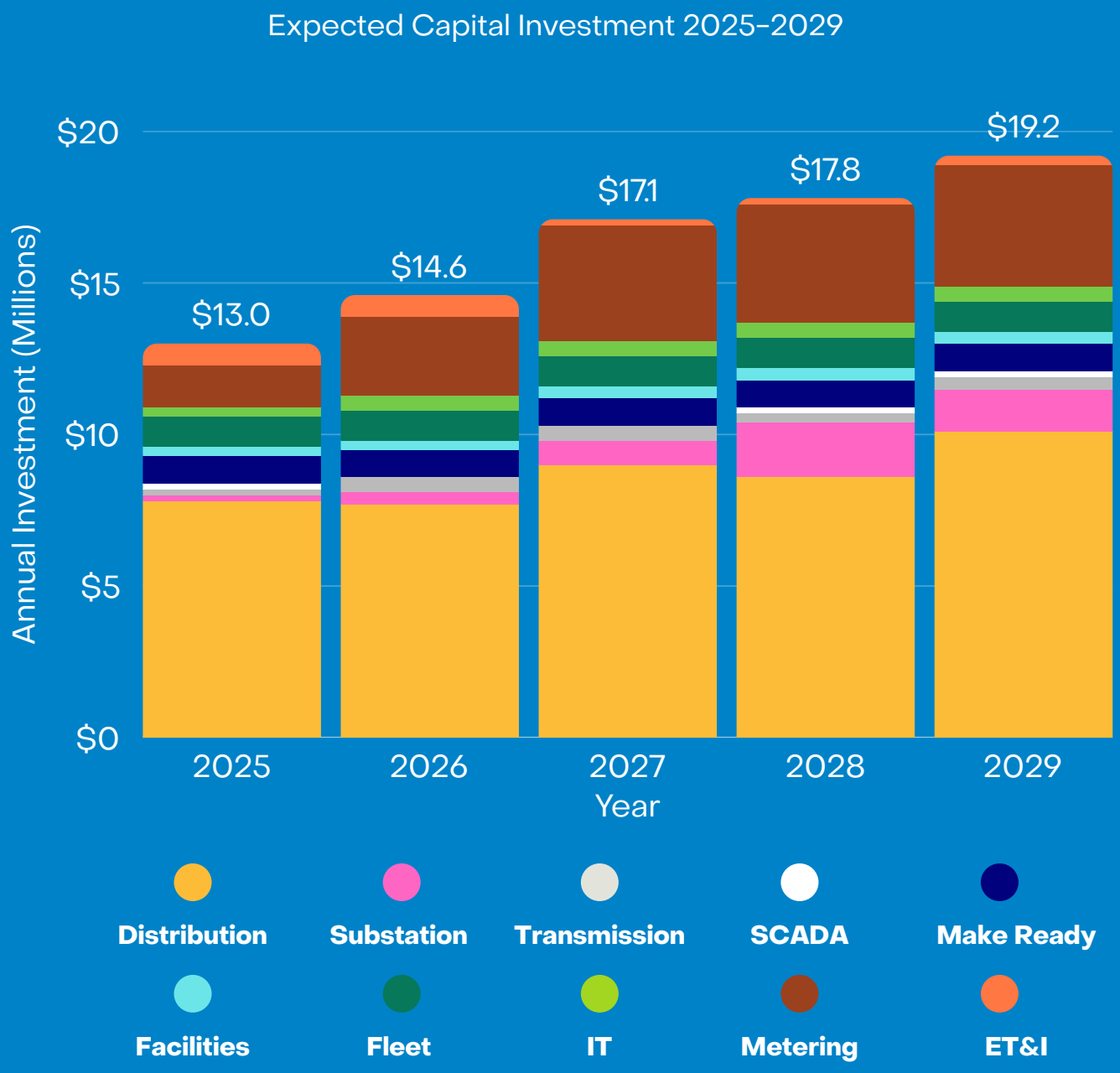
- *Complete cost of service study*
- *Leverage cost of service study results to explore alternative rate structures*

Pursue Grants

- *Continue to pursue FEMA Hazard Mitigation funding*
- *Focus federal and state grant efforts on infrastructure improvement to support reliability and electrification*

Section 7 – Action Plan

Specific Actions VEC Will Take During the IRP, Capital Investment Strategy,



Section 7 – Action Plan also identifies:

1. Key challenges for each section
2. An overview of each capital investment category
3. Vegetation management plans
4. Engineering studies

Section 8 – Appendix Summary

A – Initiative Flowcharts
B – Memorandum of Understanding Guide
C – VEC Planning Criteria
D – VEC Operating Procedure 57
E – VEC Operating Procedure 57 Appendix A
F – Transformer Purchase Tool
G – VEC Maintenance Plan
H – 101 Standard Overhead Conductor
I – Resource Projections
J – Cold Climate Heat Pump Usage Analysis
K – Electric Vehicle Usage Analysis

This information and the rest of the IRP is available on VEC's website : https://vermontelectric.coop/

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