NARUC Electric Vehicles State Working Group

PROACTIVE DISTRIBUTION INFRASTRUCTURE NEEDS/INVESTMENTS

MAY 28, 2024, 3:00 - 4:30 PM ET

Welcome

EV SWG Chair

Commissioner Katherine Peretick, Michigan Public Service Commission

EV SWG Vice Chair

Commissioner Milt Doumit, Washington Utilities and Transportation Commission

EV Commission Staff Leads

Ryan Cheney, North Carolina Utilities Commission

Steve Olea, Arizona Corporate Commission

NARUC Staff

Danielle Sass Byrnett and Robert Bennett

Agenda

Feel free to enter questions into chat at any time

3:00 PM	**Welcome and Announcements: Commissioner Katherine Peretick** • Agenda review • NARUC DOE Leadership Debrief, Summer Policy Summit
3:10 PM	**Jeff Smith, Electric Power Research Institute (EPRI)**
3:25 PM	**Anthony Sandonato, Lawrence Berkely National Lab (LBNL)**
3:40 PM	**Cyril Brunner, Vermont Electric Cooperative**
3:50 PM	**Speaker Q&A**
4:15 PM	**Peer Sharing Discussion**
4:30 PM	**Adjourn**

EV Fact of the Week:

Hybrid Electric Vehicle Sales in the United States Grew 53% in 2023.

For more info and other facts, visit DOE FOTW webpage.

Summer Policy Summit

- 2024 Summer Policy Summit, July 14-17, West Palm Beach, Florida
  - Register here: https://www.naruc.org/summer-summit-2024/
  - ERE Panel on **preparing the Grid to meet the EV transition, Monday, July 15, 2:00- 3:00 pm ET**

NARUC DOE Leadership Dialogue

- On May 1, 2024, DOE/JOET prepared a presentation for Commissioners on EV Managed Charging
  - DOE Transportation Evaluation Impact Study (TEIS): Distribution Analysis Demonstrates the Value of Managed Charging
  - Value of managed charging, data gaps and barriers
  - See PPT slides emailed on May 20, 2024

Presentations on Distribution Infrastructure Needs

Moderator: Commissioner Katherine Peretick, Michigan Public Service Commission

Guest Speaker

- **Jeff Smith, Electric Power Research Institute (EPRI)**
  - Right-sizing the distribution system infrastructure
- **Anthony Sandonato, Lawrence Berkely National Lab (LBNL)**
  - Grid Mod Analysis: EV-related distribution infrastructure investments
- **Cyril Brunner, Vermont Electric Cooperative**
  - Vermont's Innovative Framework, Proactive grid investments and modeling, Managing DER to defer T&D investment

Pathway to Right-Sizing the Distribution System

Designing Distribution Systems to Enable Deep Decarbonization

Jeff Smith
Director
Distribution Operations, Planning, and DER Integration
jsmith@epri.com

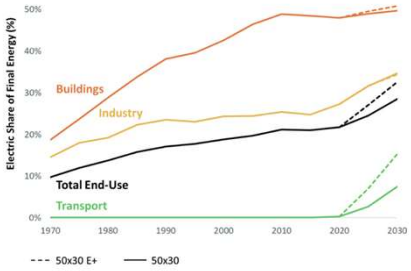
NARUC EV State Working Group

May 29, 2024

Industry Challenge

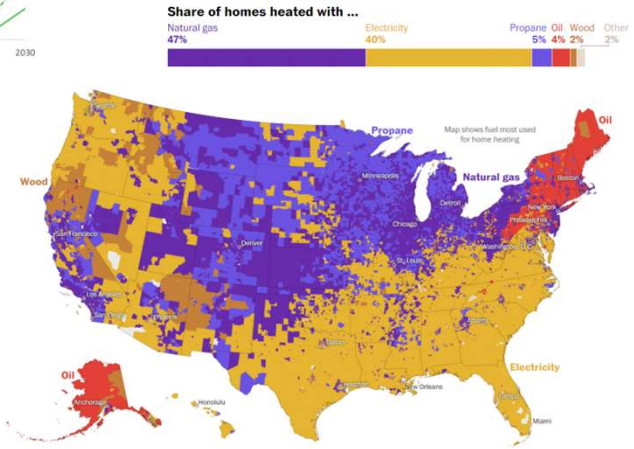
- Electrification Has Begun – Placing Increased Expectations on the Future Distribution System

EV's and Heating will be big drivers



Source: Impacts of Inflationary Drivers and Updated Policies on U.S. Decarbonization and Technology Transitions, EPRI, 2023, 3002026229

Impact of Electrification of Heat will vary



Source: 2017-2021 American Community Survey (from Washington Post)

Capacity: Demand could more than double by ~~2050~~ 2040 in some areas

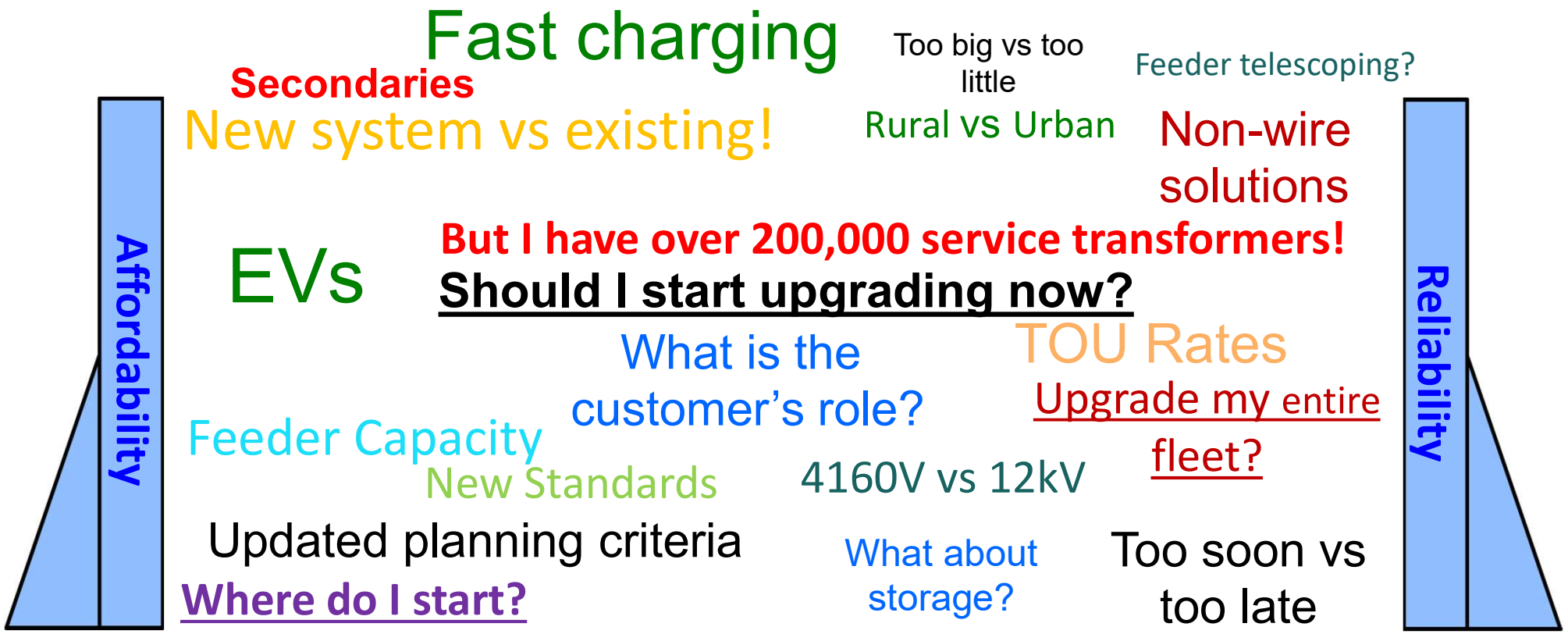
Reliability: Increasing importance as customers leverage electrically powered technologies *At home entertainment, At home office, At home vehicle charging… all dependent on the delivery of reliable power at each, and every, customer location!*

Resilience: Increasing importance as more and more critical societal services rely on electricity

Affordability and Equity: To be customer's energy source of choice!

What should we be doing now to ensure we meet these challenges?

Much to Consider…



Distribution Rightsizing = Right size + Right time + Right place

What does it mean to Right-Size the Distribution System?

- Identify mid & long-term grid service needs, designs, and operating requirements to enable deep decarbonization of the energy sector in a reliable and cost-effective manner

Moving beyond traditional planning horizon

Characteristics of a "Right-Sized" Distribution Investment

CHARACTERISTIC	CONSEQUENCE OF FAILURE
Right Size	• Too Small = degraded reliability requiring additional future upgrades • Too Big = Underutilized investment; Increasing customer costs
Right Time	• Too Late = Delayed customer connections and declining reliability • Too Soon = Underutilized investment; Increasing customer costs
Right Place	• Wrong Place = Worst Case…Degrading reliability, Underutilized investment, and Increasing customer costs

Effective Load Forecasting and Allocation will be critical …and challenging

Right-Sizing Workshop: Takeaways

- Regional **differences** in priorities/regulatory drivers - but common problems
- Widely **varying** practices and design standards
- Long-range **uncertainties** (regulatory, adoption, technology)
- Aging/legacy **infrastructure**
- Resource **limitations** (staff, forecasts, tools)

- Substations - larger, standardized
- Transformers - larger, standardized
- Voltage conversions – possible higher voltages
- Conductors – larger
- Designs – reliability/redundancy (N-1)
- Modernized monitoring and control (SCADA/AMI/ADMS/DERMS)
- Resources - staffing

Right-Sizing White Paper coming soon!

Pathway to Right-Sizing the Distribution System

Designing Distribution Systems to Enable Deep Decarbonization

Design Modernization & Standardization

Modernize and standardize distribution to affordably meet future needs

What

Investment Strategies and Planning Criteria

Refining planning criteria, design standards, and investment strategies

When

Policies and Permitting

Identify gaps and opportunities to support decarbonization transitions

How

Stakeholder Engagement & Workforce

Promote transparency, broaden education, and develop the workforce for the future

Who

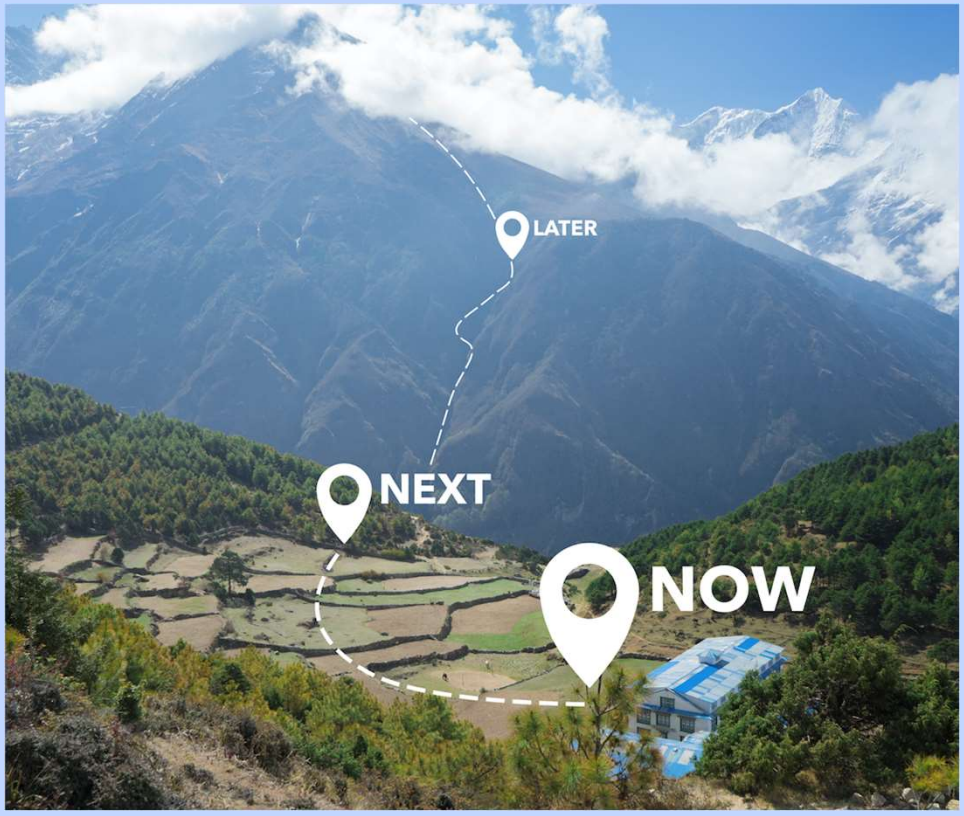
Strategic Planning Framework

Develop and demonstrate long-range Dx investment planning framework

Where

Summary

- Steps towards deep decarbonization are becoming steeper
- Industry needs to take a hard look at what can be done now to better equip the distribution system to meet future needs



Regulatory Challenges With Cost Recovery for Grid Modernization

NARUC Electric Vehicles State Working Group: May 28, 2024

Presented by Anthony Sandonato

Contributions by Lisa Schwartz

This work was funded by the U.S. Department of Energy, under Contract No. DE-AC02-05CH11231.

ENERGY TECHNOLOGIES AREA | ENERGY ANALYSIS AND ENVIRONMENTAL IMPACTS DIVISION | ENERGY MARKETS & POLICY

Agenda and takeaways

- Berkeley Lab's current research on cost recovery of proposed grid modernization investments
  - State processes and utility filings reviewed
  - Types of grid modernization investments included
  - Planning processes for developing investment proposals
  - **Today's focus:** Example cases where regulatory commissions did not approve proposed grid modernization investments or reduced recoverable costs

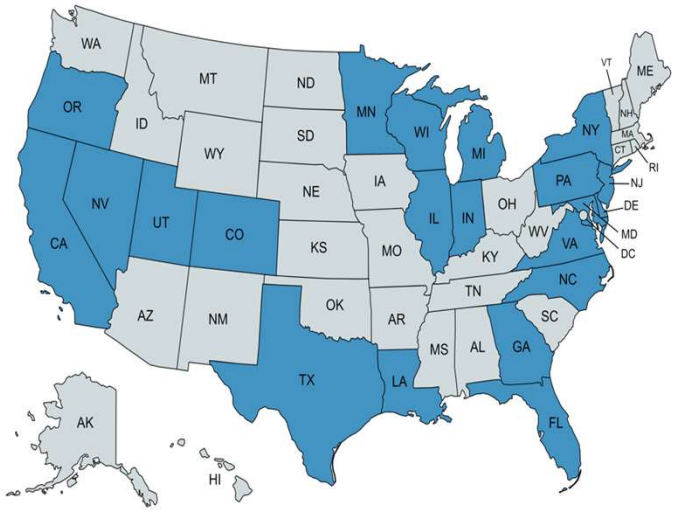
- Key takeaways from our research to date
  - Distribution system needs and regulatory feedback are driving utilities to make grid modernization investments "just in time."
  - Requirements for filing distribution plans appear to help in the investment approval process.
  - Utilities that provide detailed and up-to-date information for evaluating investments seem to fare better in cost recovery proceedings.

Methodology

State	Utility
Duke Energy	
NC	Duke Energy Carolinas
NC	Duke Energy Progress
IN	Duke Energy Indiana
FL	Duke Energy Florida
Exelon	
IL	ComEd
PA	PECO
NJ	ACE
MD	BGE
DE	Delmarva Power
Southern Company	
GA	Georgia Power
PG&E	
CA	PG&E
NextEra	
FL	FP&L
ConEd	
NY	ConEd
NY	Orange & Rockland
Ameren	
IL	Ameren Illinois

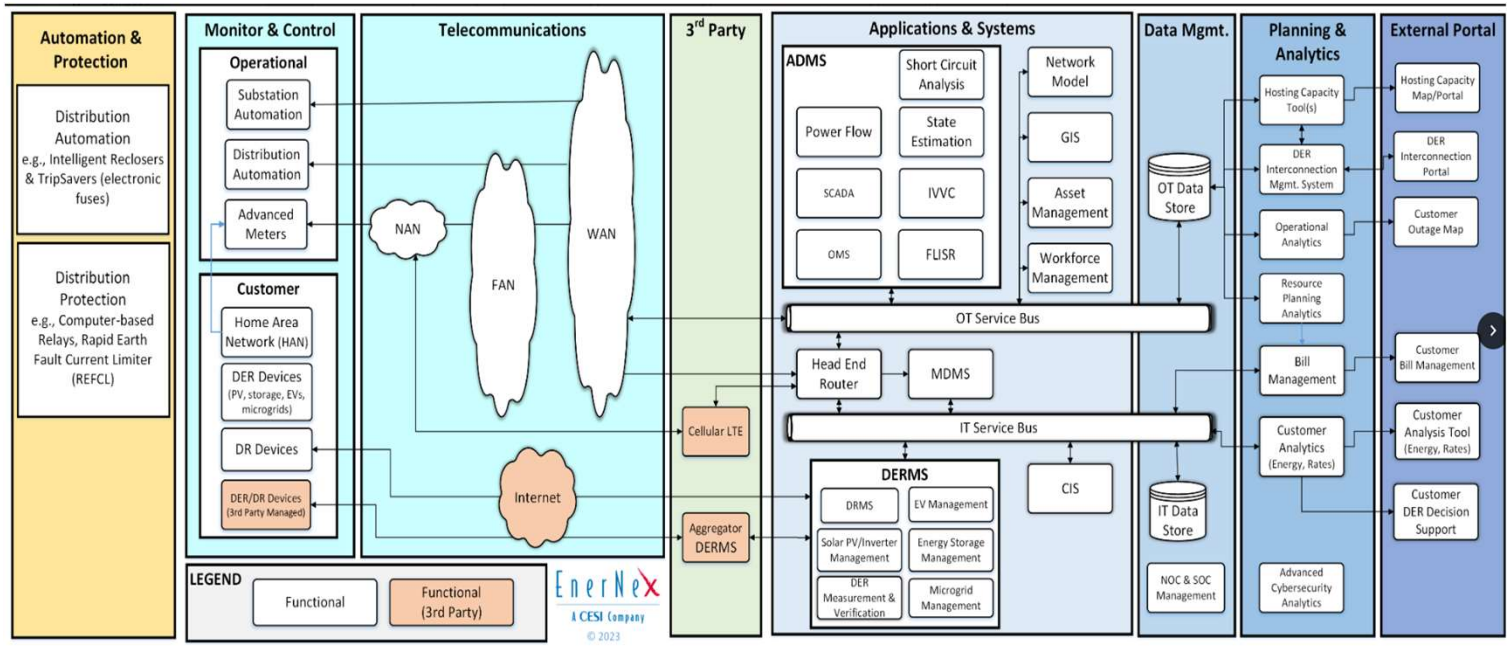
State	Utility
Entergy	
LA	Entergy
TX	Entergy
AEP	
IN	Indiana Michigan
VA	ApCo
Xcel	
MN	Northern States
CO	Public Service Colorado
WI	Northern States Power
Berkshire Hathaway	
NV	NV Energy
UT	Rocky Mountain Power
OR	Pacific Power
DTE	
MI	DTE
First Energy	
PA	West Penn Power
PA	Penelec
PA	Met-ED
NJ	JCP&L

Reviewing recent investor-owned utility filings by holding companies with annual retail sales >$400 million



Types of investments included

Utilities are investing in Advanced Distribution Management Systems (ADMS) and other technologies to lay the groundwork to optimize grid operation.



Example cases:

Regulatory disallowances for proposed grid modernization investments

Utility	State	Cost Recovery Mechanisms	Proceeding Reviewed	Related Plan Filing
ACE	NJ	Infrastructure Investment and Recovery Rules	Docket No. ER22100666	Infrastructure Investment Plan (IIP)
BGE	MD	Multi Year Rate Case	Case No. 9692	Resilience Investment Plan
Com Ed	IL	Multi Year Rate Case	Case No. 23-0055	Multi Year Integrated Grid Plan
DTE	MI	General Rate Proceeding	Case No. U-20836	Distribution Grid Plan
Georgia Power	GA	Alternate Rate Design	Docket No. 44280	Grid Improvement Plan (utility filed on its own motion)
Northern States Power Company	MN	Multi Year Rate Case	Docket No. E-002/GT-21-630	Integrated Distribution Plan
Rocky Mountain Power	UT	General Rate Proceeding	Docket No. 20-035-04	None

Types of utility planning processes

Requirements for utilities to submit distribution system-related plans varies by jurisdiction.

State	Statutorily required, but plans are not approved by regulatory commission	Statutorily required and approved by regulatory commission	No planning requirements; utility-driven plan filings
IL		X	
MD	X*		
NJ		X**	
MN	X***		
MI	X		
GA			X
UT			X

*MD statute requires the Commission to start reporting, by December 1, 2024, on distribution planning efforts.
**NJ administrative code allows the utility to file for annual or semi-annual rate recovery for projects approved for inclusion in the IIP and functioning for their intended purpose. The rates established
through the IIP are provisional, subject to refund, until a determination of prudence is made in the utility's next base rate case. The utility must file a base rate case no later than 5 years after IIP approval.
***MN statute requires Xcel Energy to file grid modernization plans, and another statute enables the PUC to certify qualifying investments for expedited cost recovery. But prudence determination
is reserved for cost recovery proceedings. In addition, the PUC requires grid modernization plans to be filed with Integrated Distribution Plans.

Timing of the investments

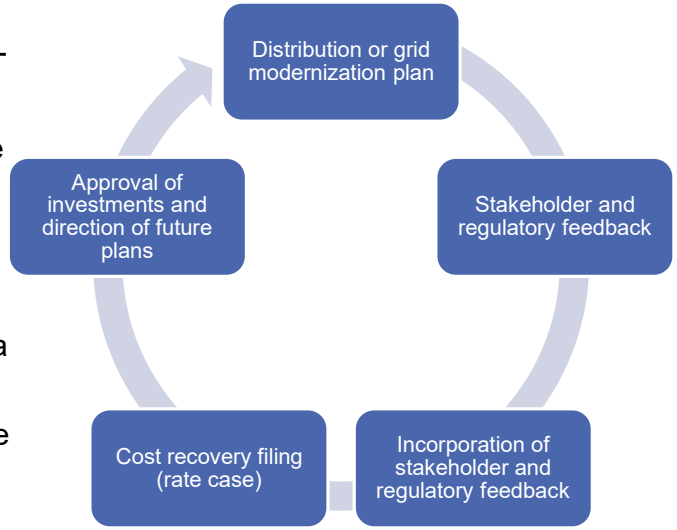
There is more agreement about the need for grid modernization, but a large debate about timing of investments.

- The Georgia Public Service Commission (PSC) approved a settlement agreement with Georgia Power not to move forward with a Distributed Energy Resource Management System (DERMS) — a 40% reduction from proposed spend.
  - Public Interest Advocacy Staff advocated that the amount of distributed energy resources on the system does not warrant the investment at this time.
- The Utah PSC disallowed costs associated with Rocky Mountain Power's proposed Field Area Network.
  - The PSC stated that the project would not be in service or "used and useful" by the time the retail rates established in the rate case go into effect.
- The Maryland PSC found BGE's resilience investment plan expenditures premature as proposed.
  - The PSC stated that a Multi Year Rate Case is not the best forum to fully consider resiliency metrics and consider input from stakeholders.
- The Illinois Commerce Commission rejected ComEd's Multi-Year Integrated Grid Plan and required refiling with clear information on project designs, objectives, timing, and costs.
  - Areas of non-compliance with requirements for the Multi-Year Integrated Grid Plan are key ratepayer protections — cost-effectiveness, equity and affordability — necessary to determine whether investments are prudent and reasonable.

Planning requirements seem to help

Regulatory commissions are aligning planning with cost recovery.

- Minnesota
  - Northern States Power must file an assessment and explanation in the next IDP of whether Integrated Volt-Var Optimization is in the public interest.
  - The Company must propose and discuss ways for the IDP process to inform financial and cost recovery issues in rate cases.
- Michigan
  - DTE must include in its next distribution system plan a detailed description of its strategies for grid hardening including alternatives containing, but not limited to, the use of distributed energy resources (DER)s, storage, energy efficiency and microgrids.
- Illinois
  - Com Ed must file a revised Multi-Year Integrated Grid Plan.



Illustrative cost recovery process for grid modernization investments

Quality of information matters

Concerns highlighted in example cases

- Outdated or stale cost estimates
- No quantified benefit-cost analysis
- Project targets that are out of line with existing utility distribution capital spend trends
- Project justification not matching utility's planning assumptions
- Asset replacement not tied to actual or imminent equipment failure

- The **Illinois** Commission found that ComEd's proposal did not provide sufficient transparency or detail regarding location of grid reinforcement projects and cited potential duplicative costs.
- Georgia Power will report back to the **Georgia** Commission in the 2025 Integrated Resource Plan on development of DERMS and the need for any further system modifications to plan for DER integration.
- The **Michigan** Commission agreed with regulatory staff that: (1) DTE's high-level estimations and historical project spending suggest significant uncertainty that projected grid modernization costs will occur and (2) the Company failed to explain its cited cost range for "other costs" and how it estimated costs.

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ENERGY MARKETS & POLICY

Contacts

Berkeley Lab: Anthony Sandonato (amsandonato@lbl.gov), Lisa Schwartz (lcschwartz@lbl.gov)

For more information

Download publications from the Energy Markets & Policy: https://emp.lbl.gov/publications

Sign up for our email list: https://emp.lbl.gov/mailing-list

Follow the Energy Markets & Policy on Twitter: @BerkeleyLabEMP

For more information on the LODGE pilot program: https://www.energy.gov/communitysolar/least-cost-optimal-distribution-grid-expansion-lodge-model

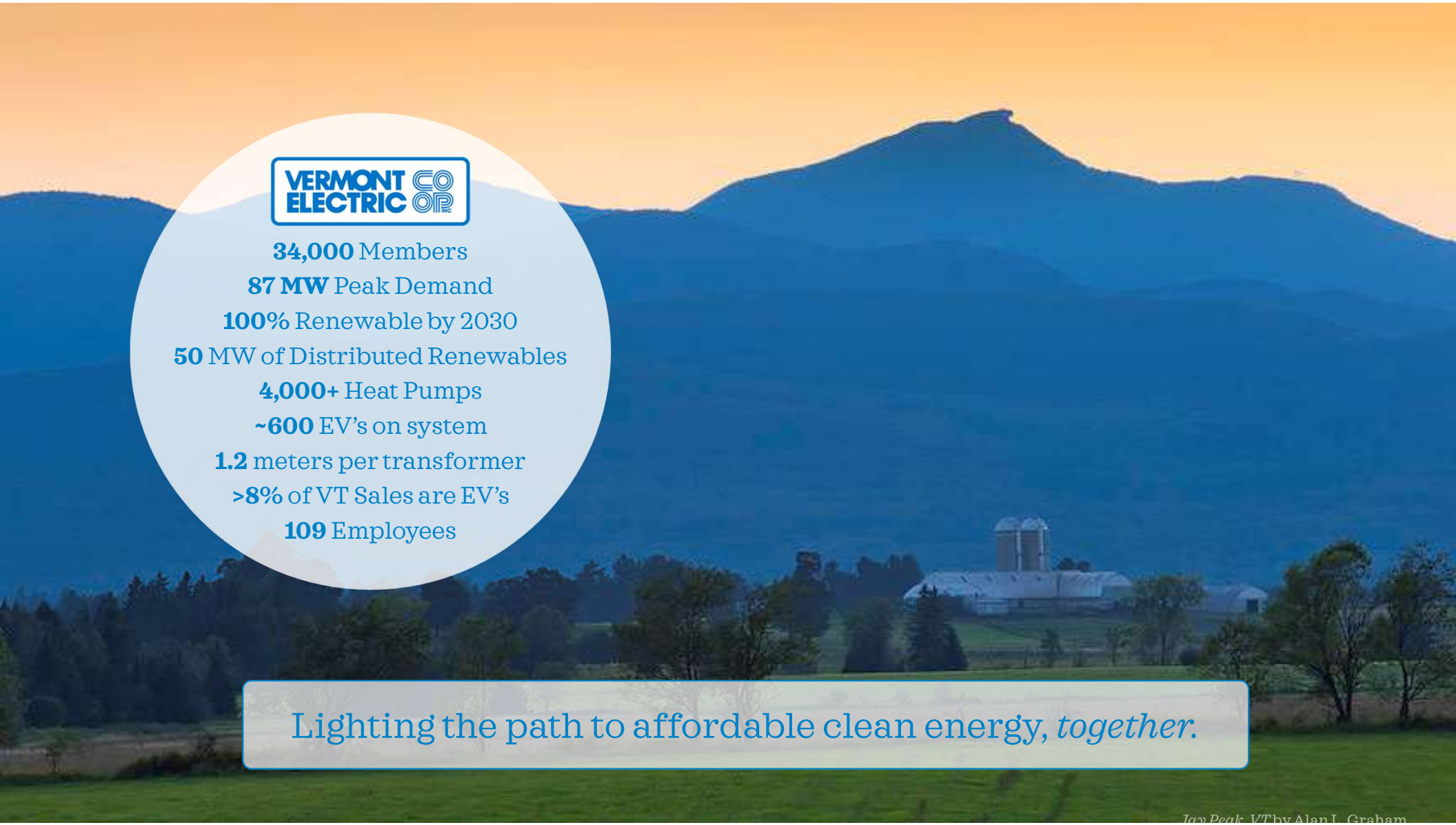
Acknowledgements

This work was funded by the U.S. Department of Energy under Contract No. DE-AC02-05CH11231.

NARUC May EVSWG Meeting

VERMONT ELECTRIC CO OP

- Who is VEC?
- Vermont's Innovative Framework
- Proactive grid investments and modeling
- Managing DER to defer T&D investment



Jay Peak, VT by Alan L. Graham

How does Vermont Innovate Quickly?

Forward thinking utilities

- 100% renewable by 2030
- Most Innovative Company in Energy (#1 -2018, #5 -2019, #2 – 2023)

First 100% renewable U.S. Utility (2014)

- 100% renewable by 2030
- 2005 AMI implementation

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Unique efficiency and transmission entities

- First statewide transmission only company
- Owned by 17 Vermont Distribution utilities

First U.S. efficiency utility (2000)

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Regulatory Alignment

PUC and Department of Public Service

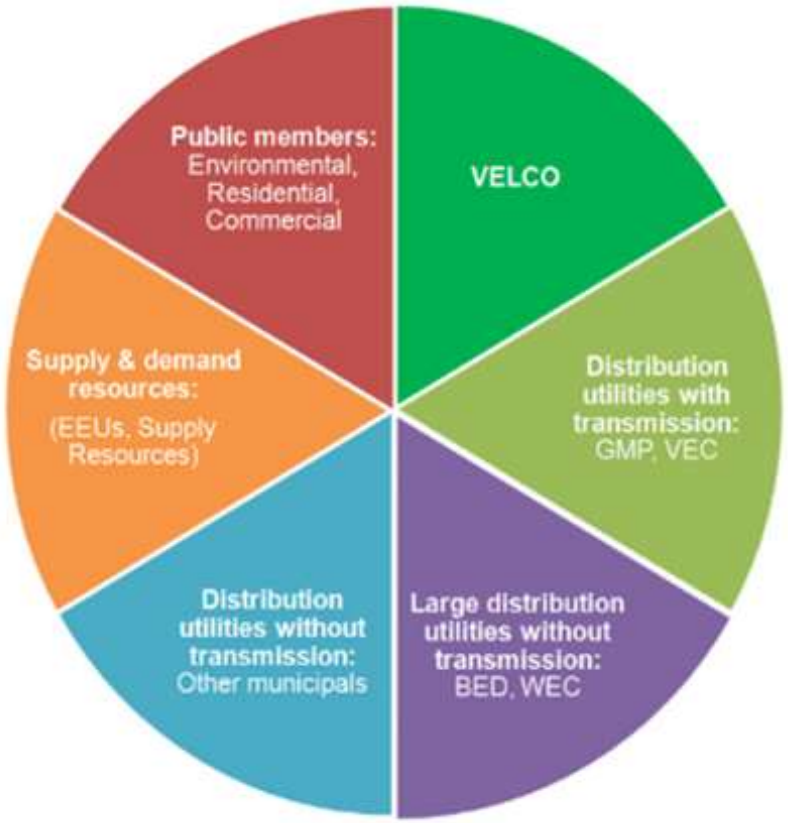
- Innovation framework
- Vermont System Planning Committee
- Integrated Resource Planning

How do VT regulators support innovation? Innovation Framework

30 V.S.A. § 218d(o) and the Vermont Public Utility Commission's ("Commission") Standards and Procedures for Innovative Rates and Services Offered by Municipal and Cooperative Electric Utilities

- Requires written notice to customers, the Department, and the Commission at least 45 days before offering an innovative rate or service.
- Needs to advance the goals of the State Comprehensive Energy Plan
- Has a duration of 18 months or less; and
- Shall not result in:
  - additions of more than two percent of the municipal company's or electric cooperative's net assets; or
  - an increase in the municipal company's or electric cooperative's overall cost-of-service by more than two percent.

How do VT regulators support innovation? Vermont System Planning Committee

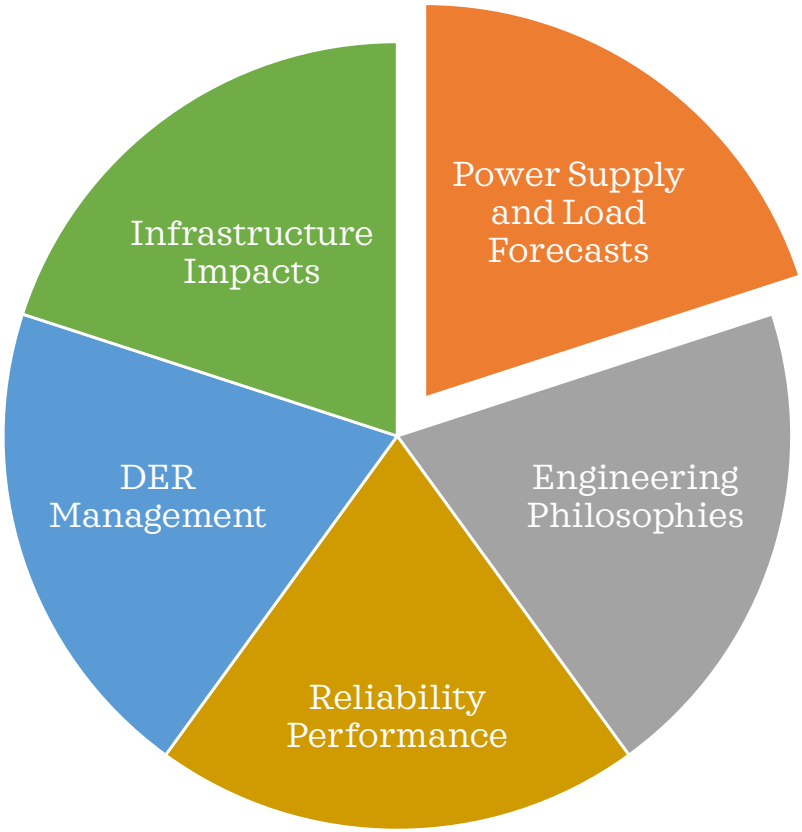


- Quarterly meetings
- Committees
  - Load Forecasting Subcommittee
  - Geotargeting subcommittee (NWA Analysis)
  - Technical Working Group
  - Flexible Load Management Working Group
- PUC appoints the public members and the supply resources representative in the Supply & Demand Resources Sector.

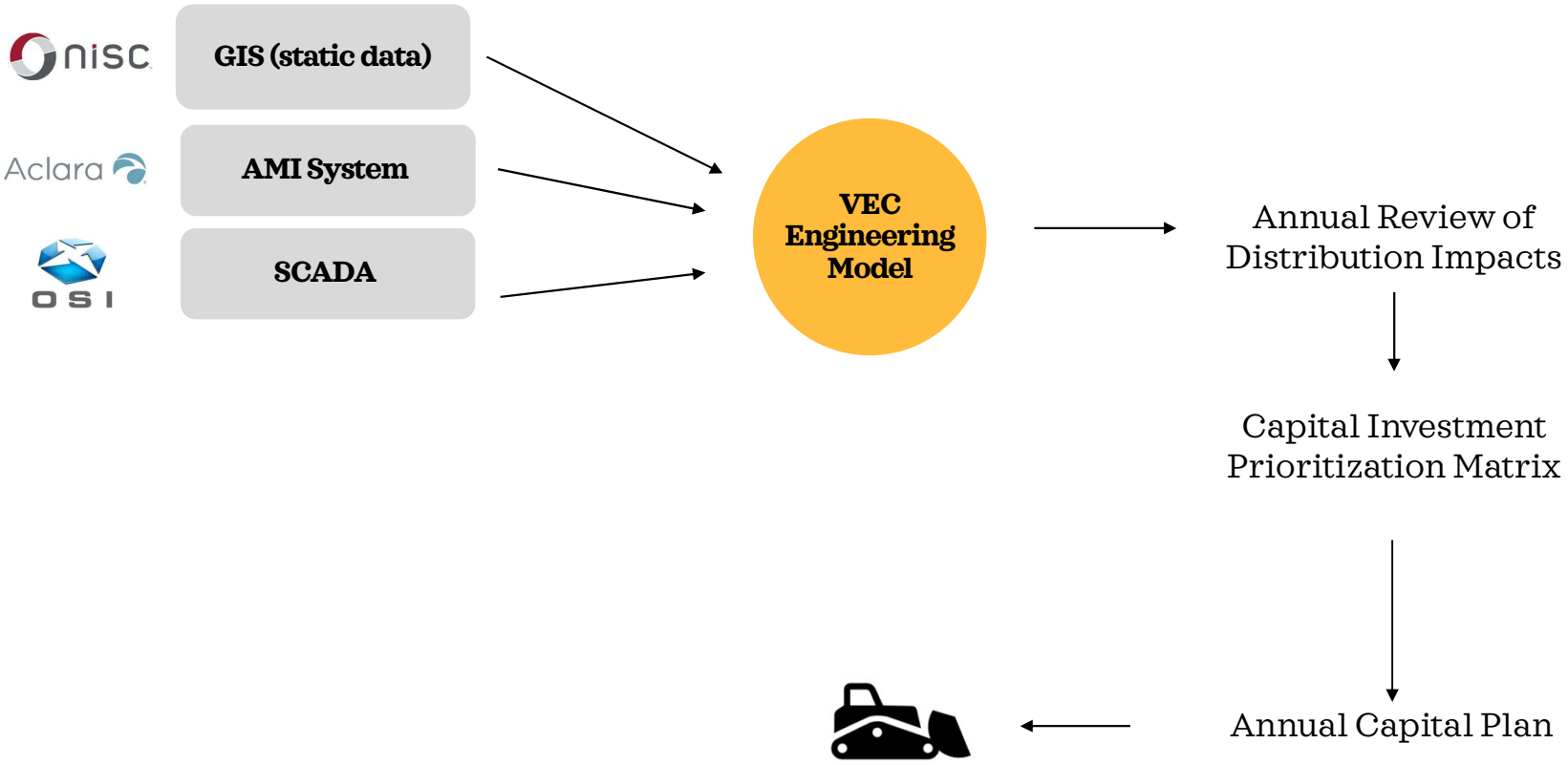
More Information Here

How do VT regulators support innovation? Integrated Resource Planning

- Distribution Utilities file every 3 years
- Cross silo conversations (load forecast needed for power supply and engineering
- Close collaboration with DPS
- Substation and subtransmission projects identified for Certificate of Public Good (CPG) process



How do we model where this impact will occur?



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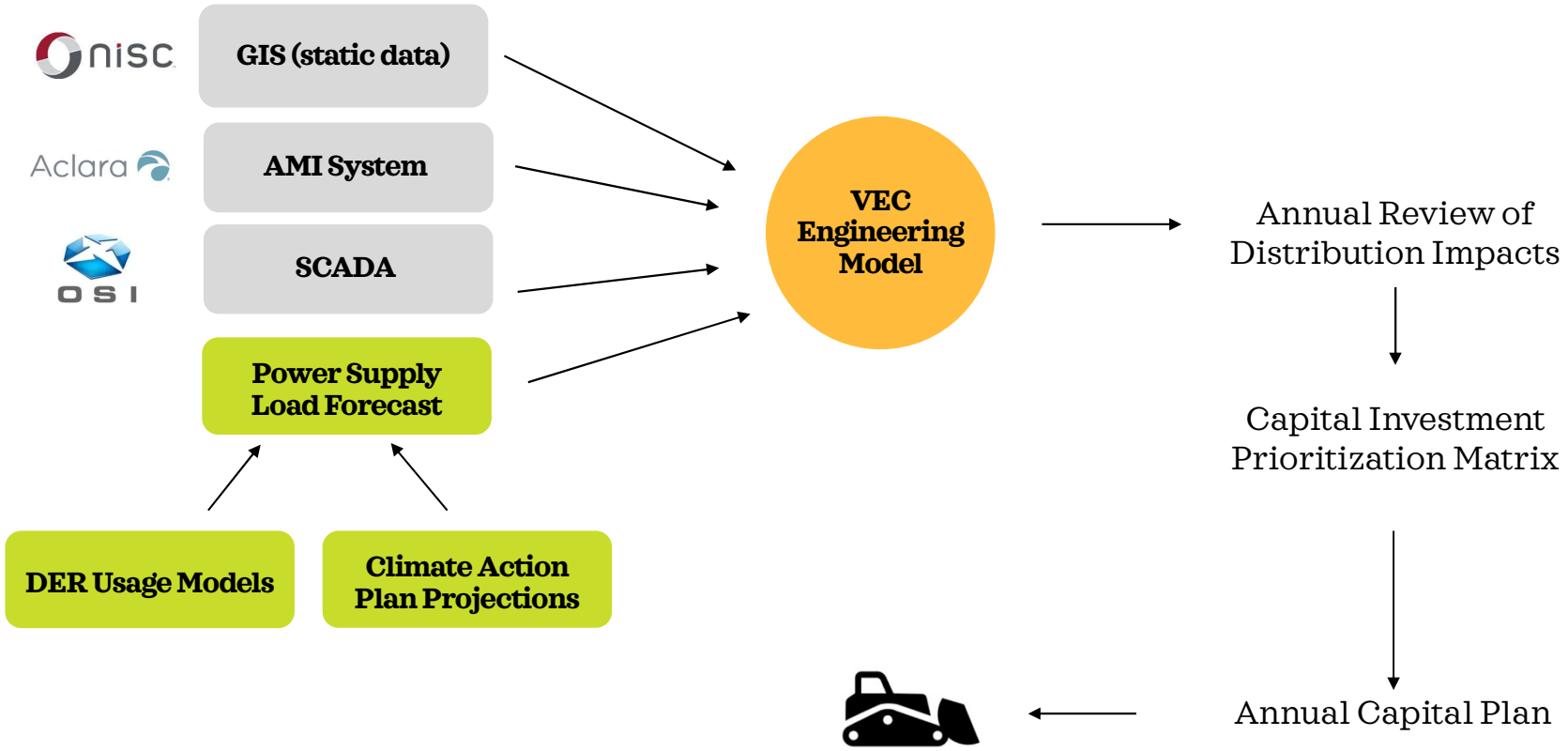

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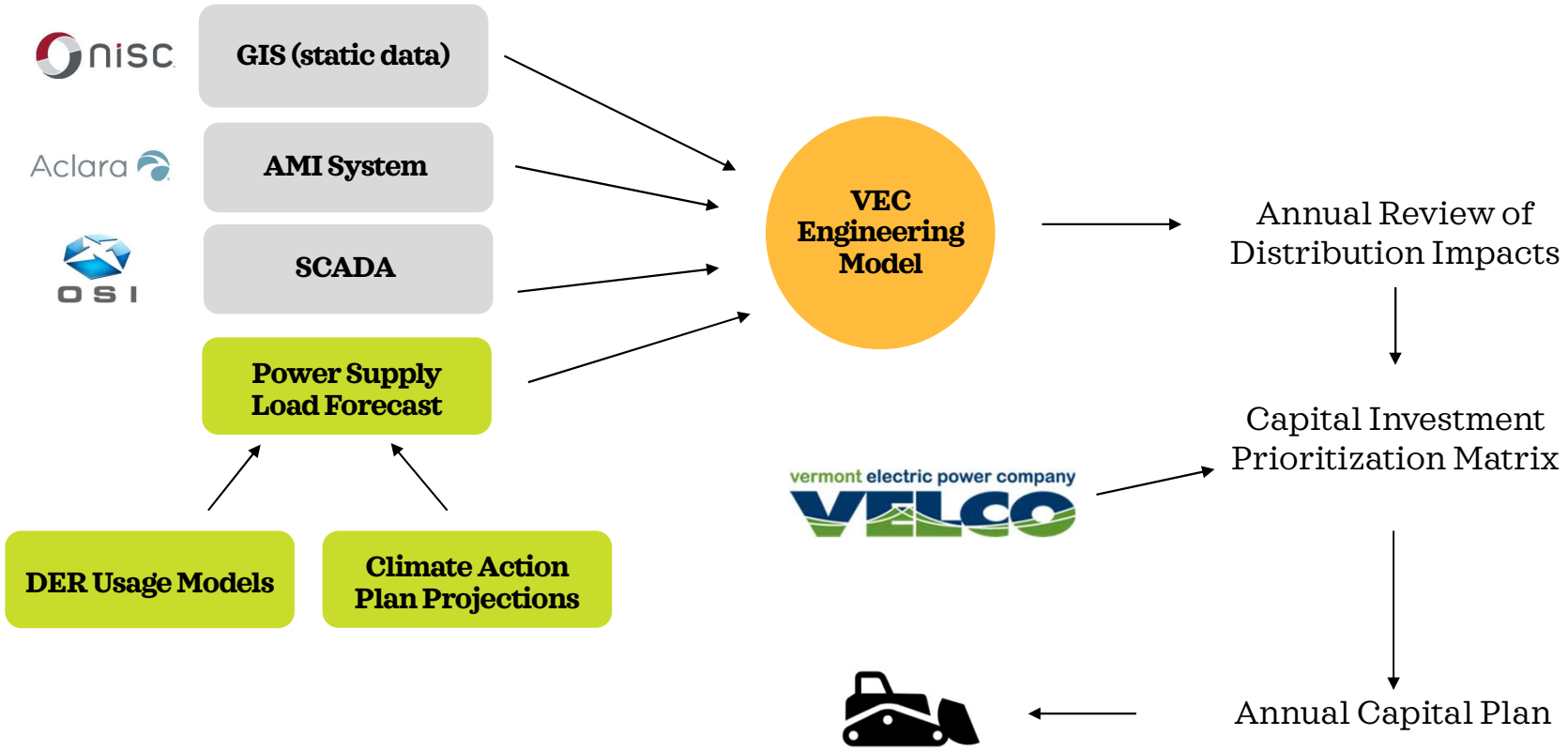
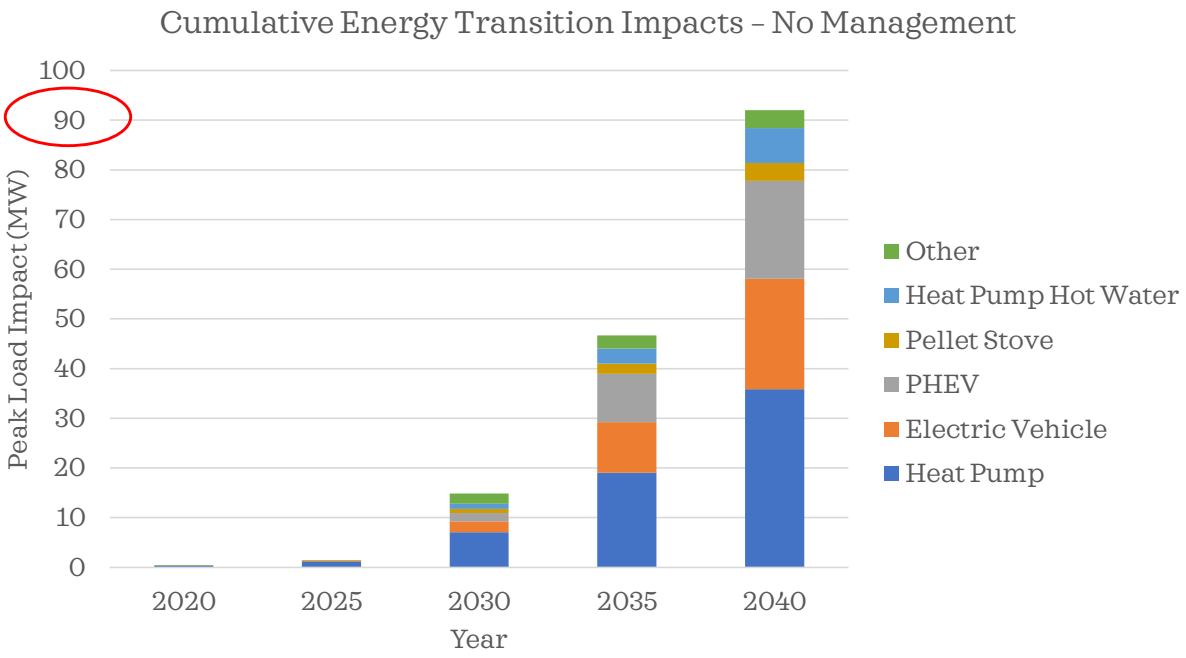
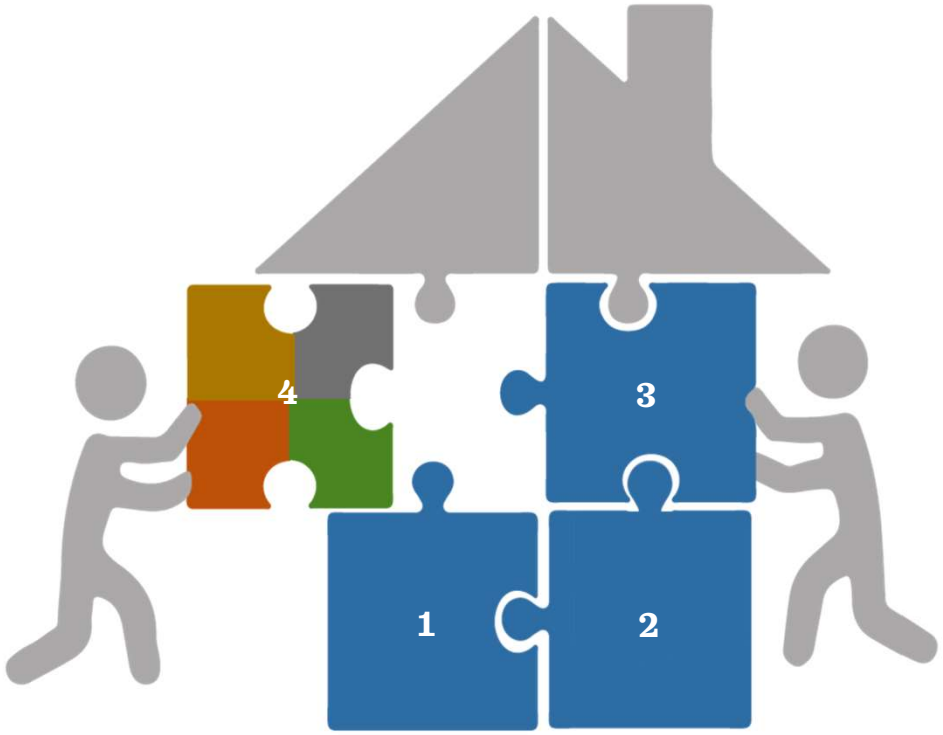


Impacts of Electrification to VEC's Distribution System



- Significant load growth expected by 2040
- kWH sales versus kW grid infrastructure impacts
- 30-40% of distribution transformers, lines and substations would be overloaded by 2040 without load management
- $100 million in grid upgrades, even more at the transmission level

Grid Infrastructure is the Foundation

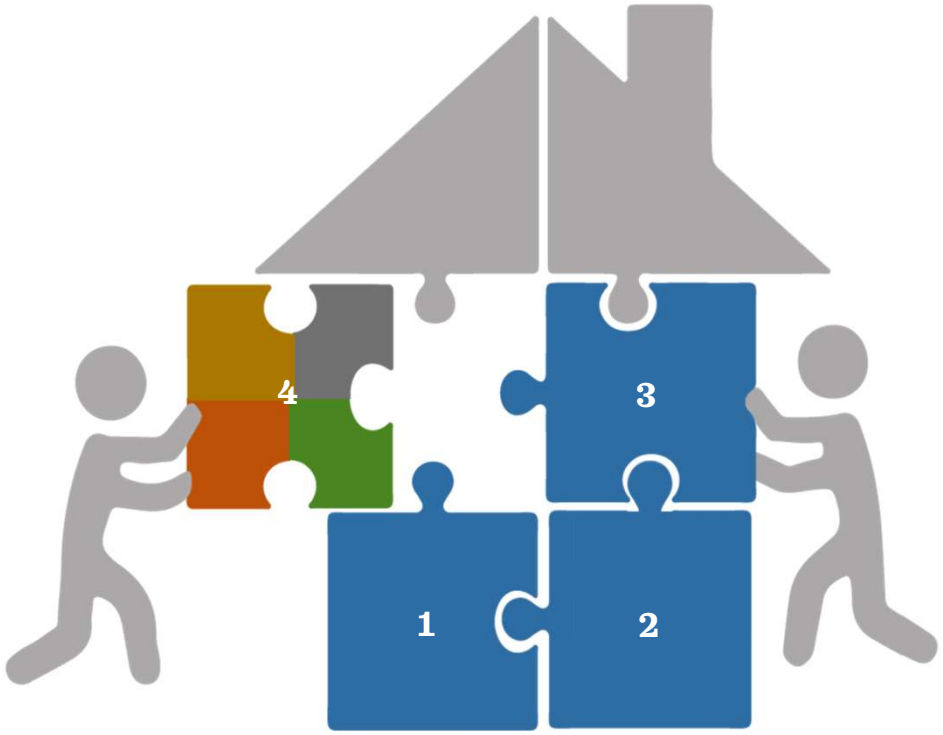


1. Maintain our existing infrastructure

2. Upgrade conditionally poor infrastructure to increase capacity and relocate or underground to improve reliability

- Annual maintenance plan to extend life of assets
- Increased standard distribution transformer from 10kVA to 15kVA
- Actively replacing 250 miles of legacy conductor (6 Steel, 8D, 6A). Currently replacing around 10 miles annually
- Seeking out grant funding to support investments (GRIP and others)

Grid Infrastructure is the Foundation



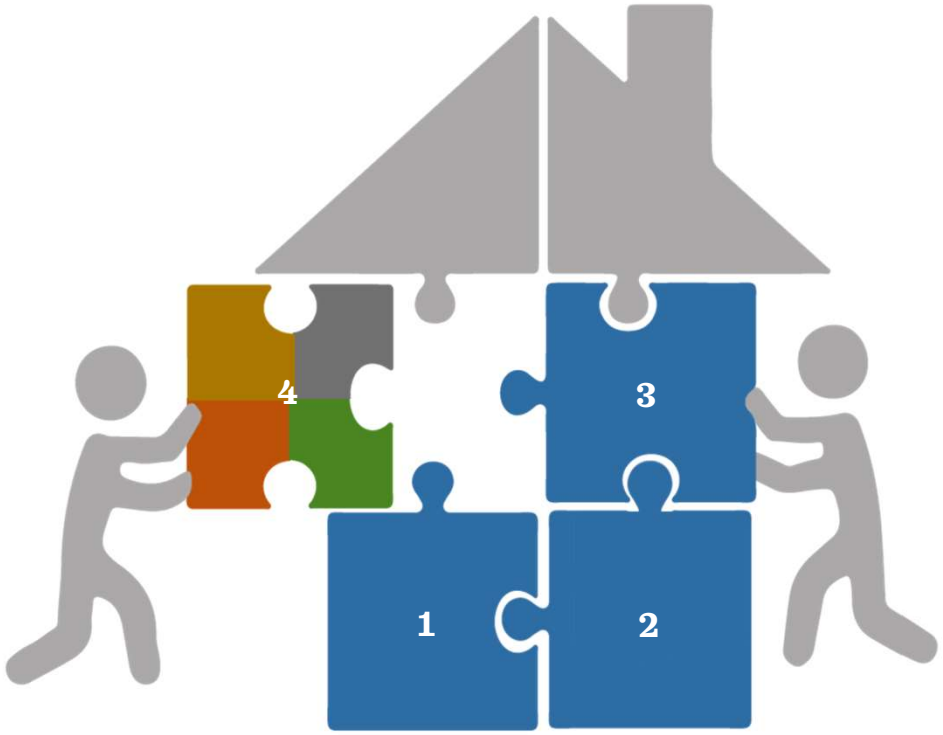
1. Maintain our existing infrastructure

2. Upgrade conditionally poor infrastructure to increase capacity and relocate or underground to improve reliability

3. Leverage existing distribution management systems (SCADA) and data sets (NISC, GIS and AMI)

- Existing data is foundational to enabling DER management for infrastructure
- Need accurate data

Grid Infrastructure is the Foundation, VPP's Will Enable More



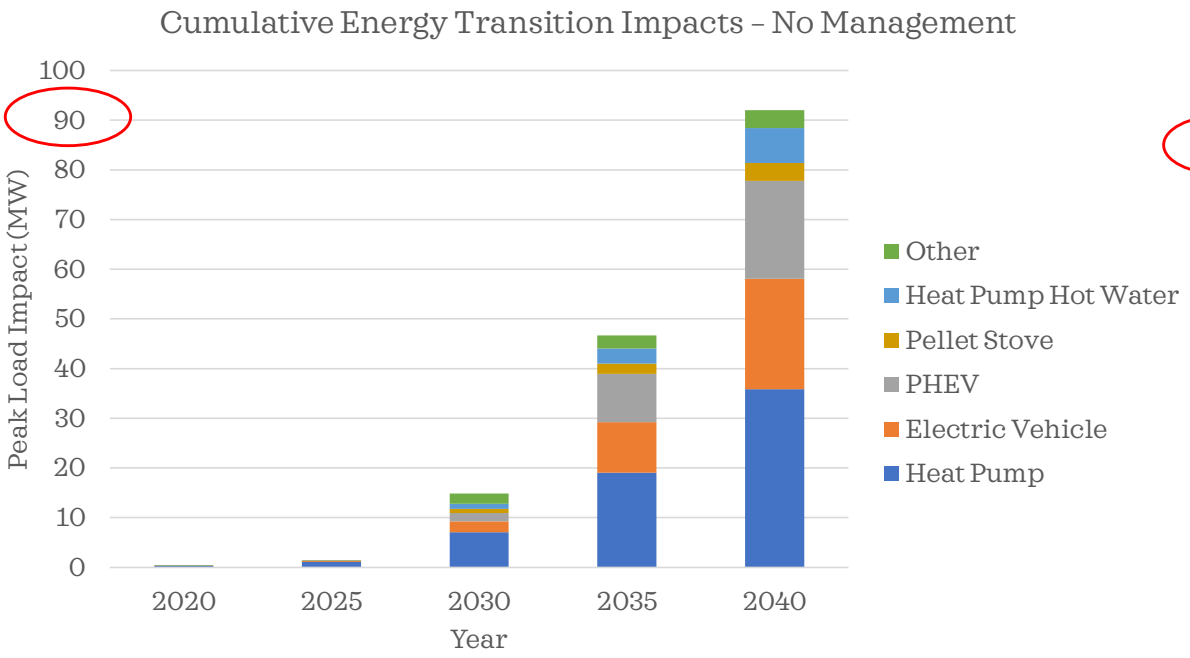
1. Maintain our existing infrastructure

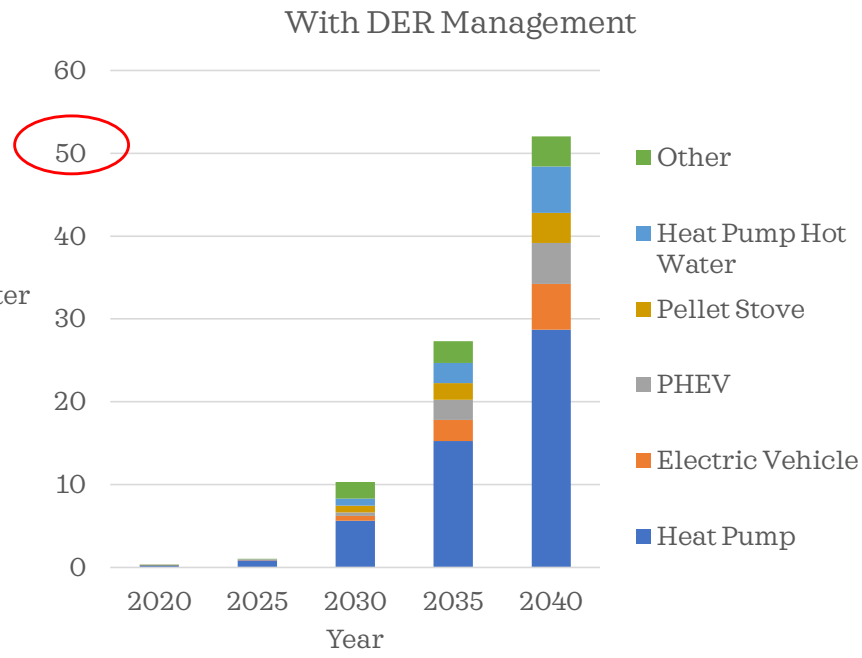
2. Upgrade conditionally poor infrastructure to increase capacity and relocate or underground to improve reliability

3. Leverage existing distribution management systems (SCADA) and data sets (NISC, GIS and AMI)

4. Create VPP's by **integrating** existing data with DER OEM's, **investing** in DER's and technology solutions, **experimenting** with pilots, and **orchestrating** devices through software built on AI

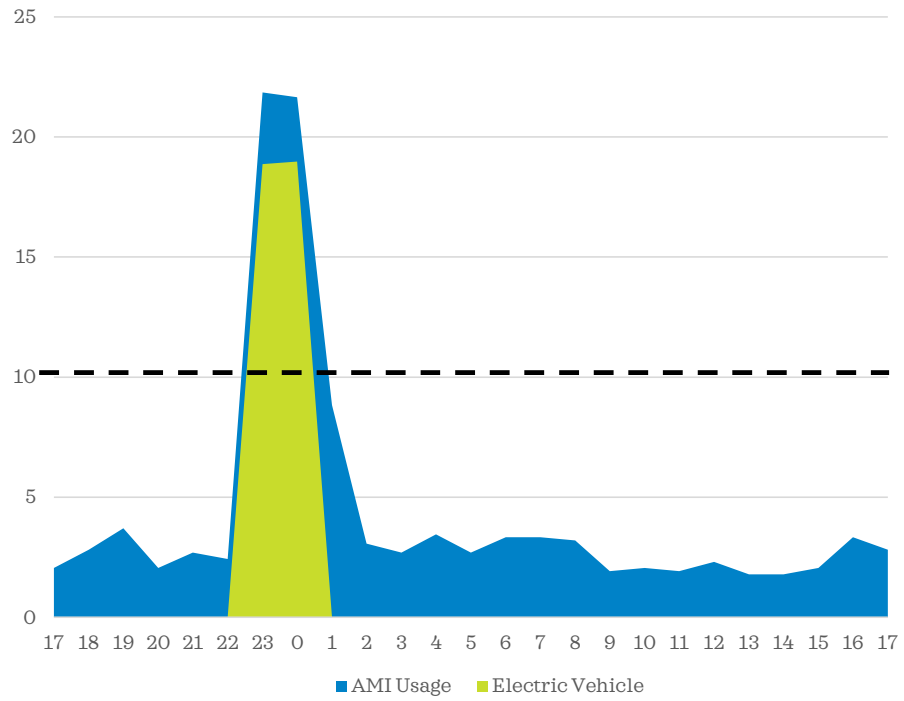
We Can Reduce Infrastructure Investment by Managing DER's



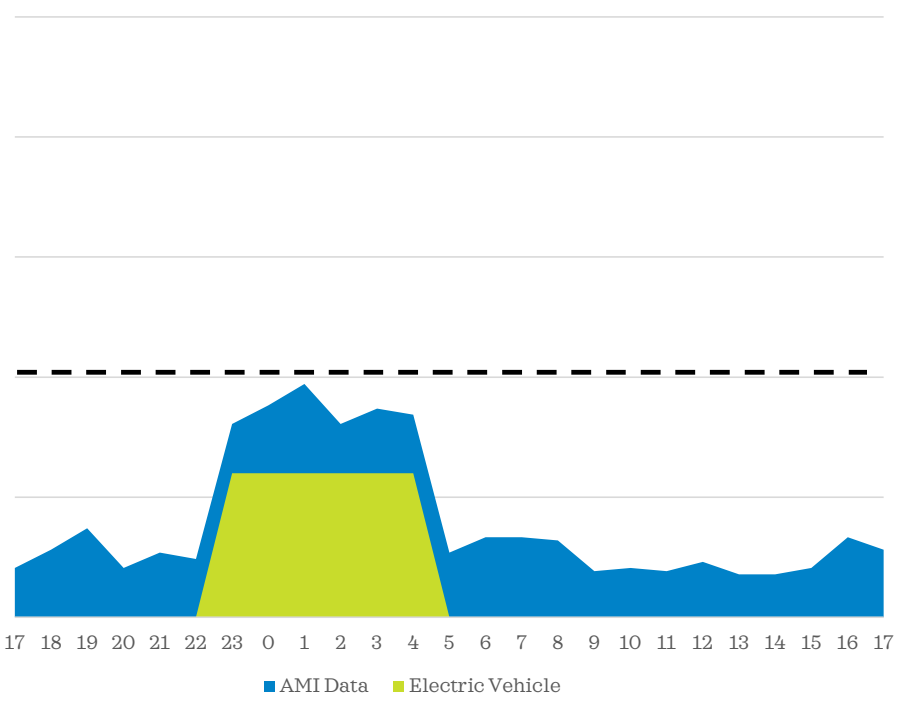


- We can save ~$50 million in Grid Investment with DER Management
- Primarily through EV management
- Working through pilots on heat pump management

2024 Pilot on Distribution Transformers

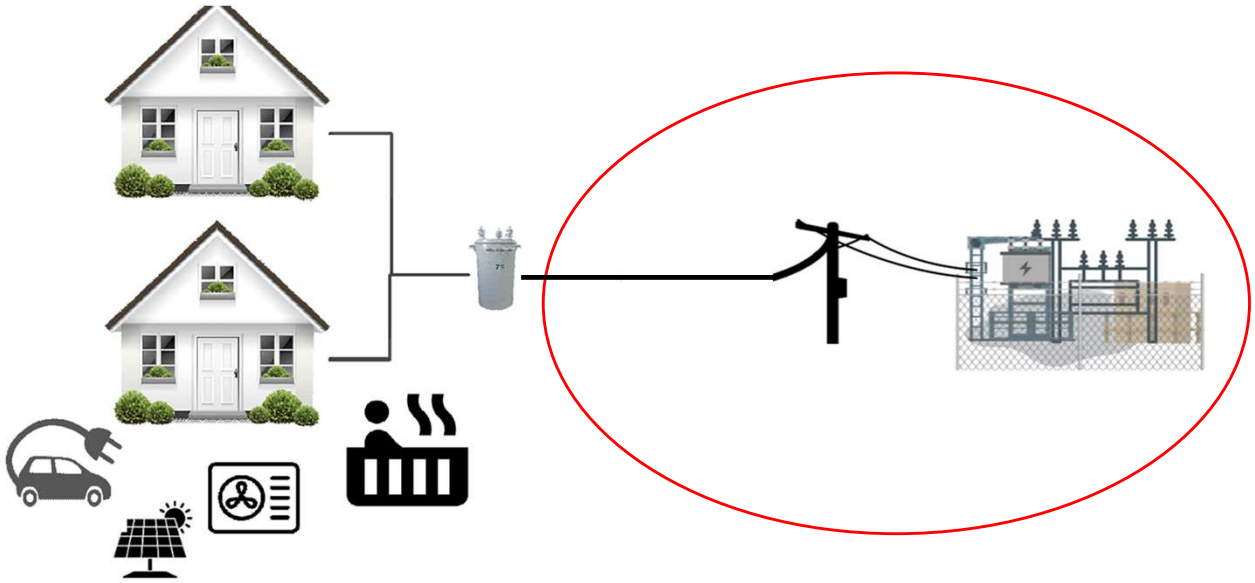


Fixed Limit – 10kVA



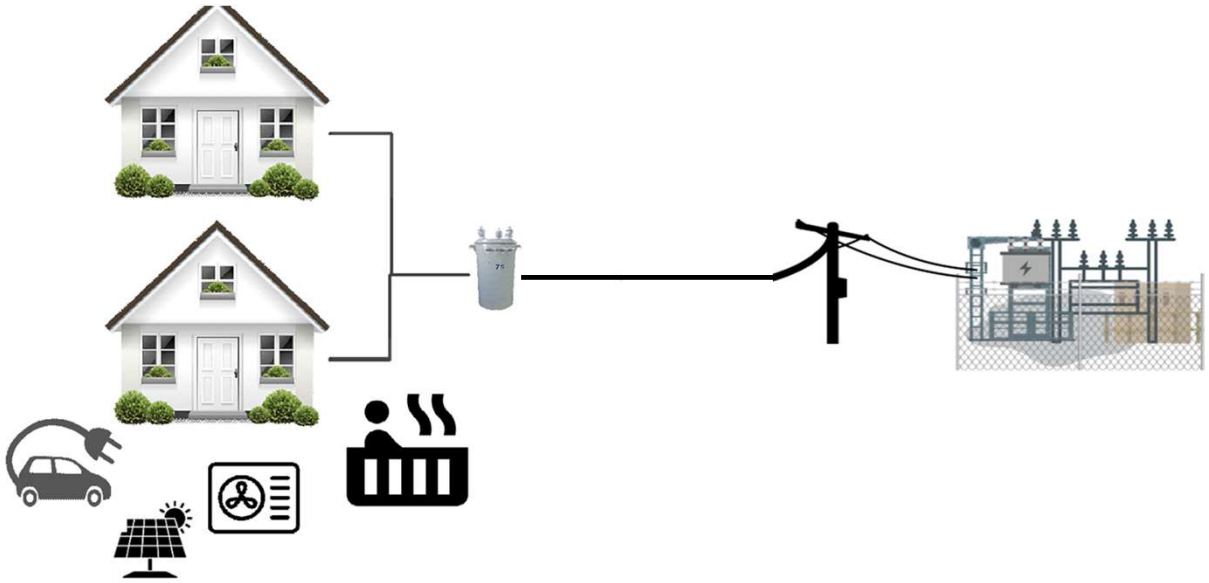
Managed charging for Fixed Limit
(Fixed Operating Envelope)

Future – Primary Lines and Substations



Primary Lines and Substations

Future – VT and Regional Transmission



Primary Lines and Substations

Transmission in VT and ISONE

Questions

Moderator: Commissioner Katherine Peretick, Michigan Public Service Commission

Guest Speaker

- Jeff Smith, Electric Power Research Institute (EPRI)
- Anthony Sandonato, Lawrence Berkely National Lab (LBNL)
- Cyril Brunner, Vermont Electric Cooperative

Member EV Roundtable

Please speak up and share the situation from your perspective:

1. Have utilities in your state identified specific distribution infrastructure needs tied to / prompted by EVs?
2. Have these needs been identified in a distribution planning, transportation electrification plan, or other forum?
3. Do you feel confident that utilities accurately understand distribution infrastructure needs in the medium-term and long- term? If not, what do you think might be missing?

Upcoming 2024 EVSWG Topic

Date (Last Tues of the month)	Future 2024 EV SWG Topics (through June)
June 25, 2024	Right sizing chargers & energizing faster
July 30, 2024	EV load forecasting / planning
August 27, 2024	Equity and access to charging

Next EV SWG meeting: June 25, 3:00-4:30 pm ET via Zoom

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