

# House Energy & Technology Committee Intro to VELCO

January 25, 2019

vermont electric power company



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# ABOUT VELCO



# Mission, Vision & Values

## Our mission

VELCO's mission is to serve as a trusted partner.

## Our vision

VELCO's vision is to create a sustainable Vermont through our people, assets, relationships and operating model.

## Our values

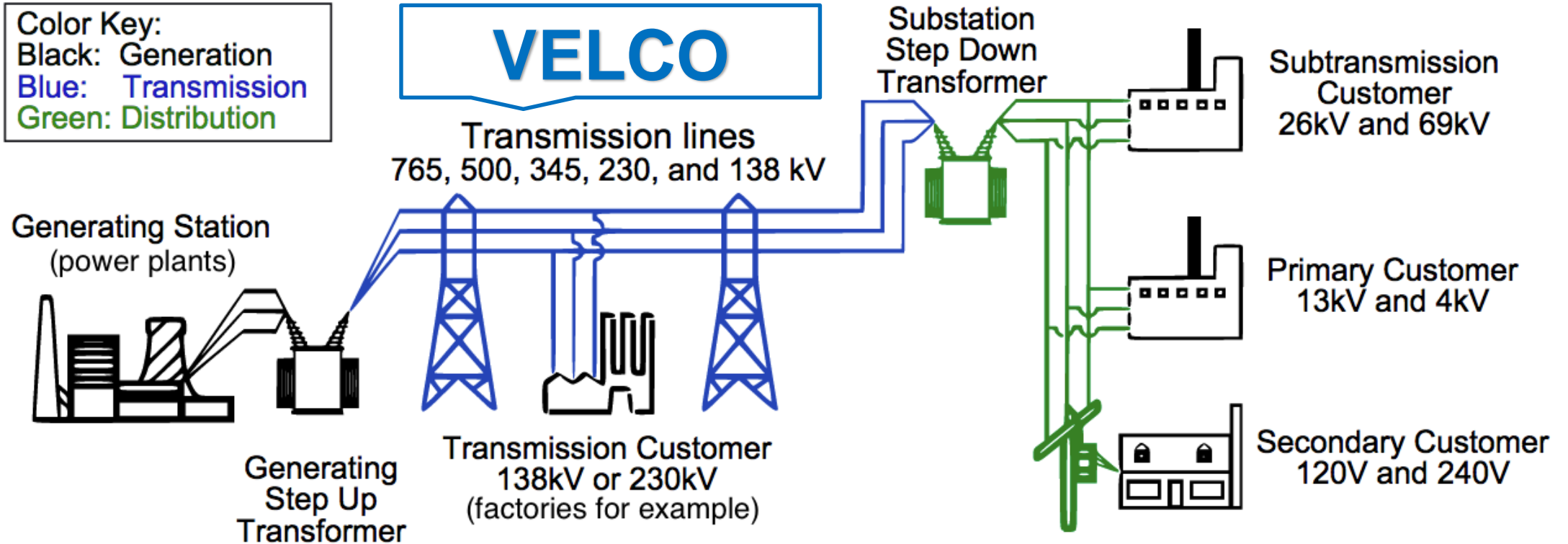
VELCO values people, safety, sustainability, creativity and great work.

To live our values we...

- Treat everyone with respect.
- Respond with urgency and care.
- Unconditionally support and empower one another.
- Share information.
- Think outside the box.



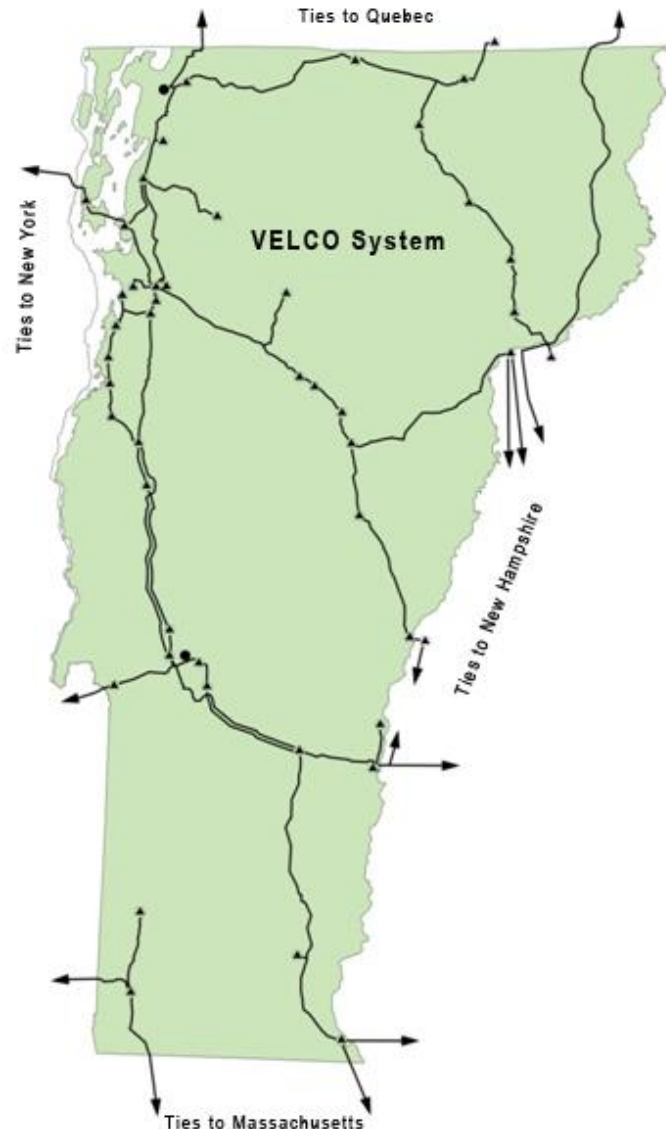
# Transmission's Role in the Electric System



# Quick facts about VELCO

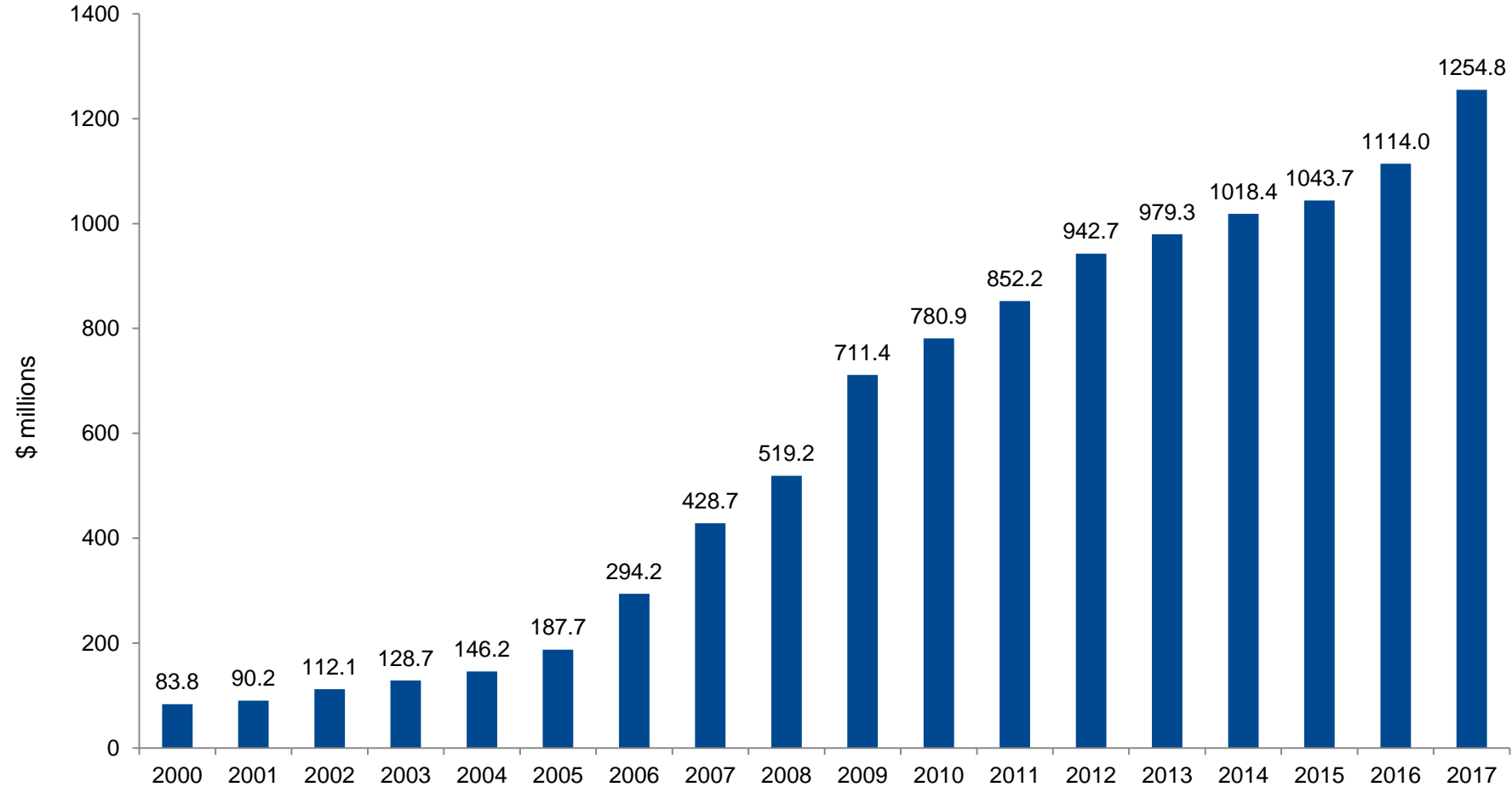
- Founded in 1956 as Vermont corporation
- 148 employees; HQ in Rutland; office in Montpelier
- Builds, operates, maintains facilities owned by VT Transco LLC
  - 738 miles of transmission lines; 1,500 miles fiber; 14,000 acres of ROW; 55 substations, switching stations, terminal facilities
  - \$1.3B in assets; \$21.6M in annual property taxes
  - 52-mile high-voltage direct current line through Northeast Kingdom owned by Vermont Electric Transmission Company (VETCO)
- Ownership—17 distribution utilities, Vermont Low-Income Trust for Electricity or VLITE (public benefit corporation)
- Governance—13 member board: GMP(4), BED, VEC, VPPSA, Public Power (2), VLITE (3) and VELCO CEO
- For profit corporation structured to deliver cooperative benefits to Vermont
- Going into our sixth year in a row of flat budgeting

# VELCO milestones

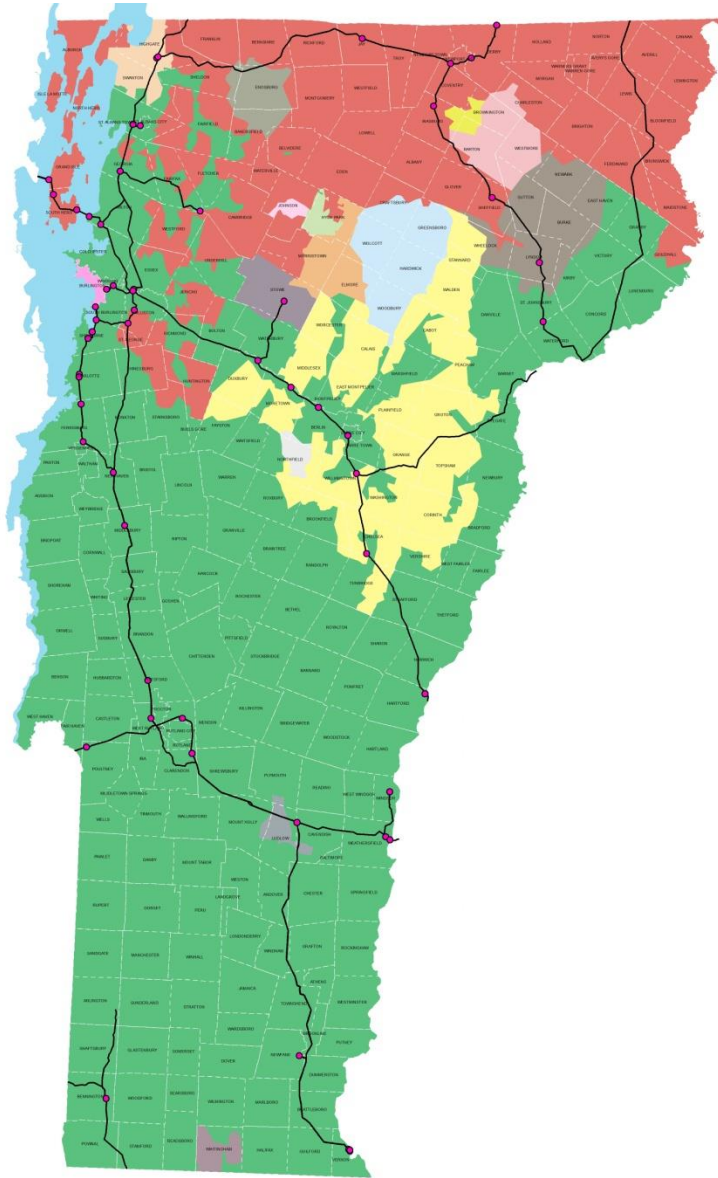


- 1956 VELCO formed-1<sup>st</sup> buildout (224 miles)
- 1968 NERC & NEPOOL established
- 1969 2<sup>nd</sup> buildout (215 miles)
- 1972 Vermont Yankee online (600MW)
- 1981 VELCO headquarters built
- 1982 VETCO formed/Phase 1 construction
- 1991 Fiber optic cable
- 1996 OATT issued
- 1997 ISO-NE created
- 2003 Northeast US blackout
- 2004 ISO-NE assumes system planning
- 2006 VT Transco formed; first Long-Range Plan
- 2006 NERC becomes US electric reliability organization adopts mandatory, enforceable standards
- 2007 3<sup>rd</sup> buildout starts (200 miles): NRP, LCP and SLP; VSPC created
- 2011 Sheffield Wind Project online
- 2012 GMP merger; VELCO governance changes
- 2013 1<sup>st</sup> transmission project deferral
- 2014 Vermont Yankee retires
- 2018 >300 MW of solar online; Coolidge Solar interconnects

# VELCO asset growth 2000-2017



# Vermont distribution utility owners of VELCO



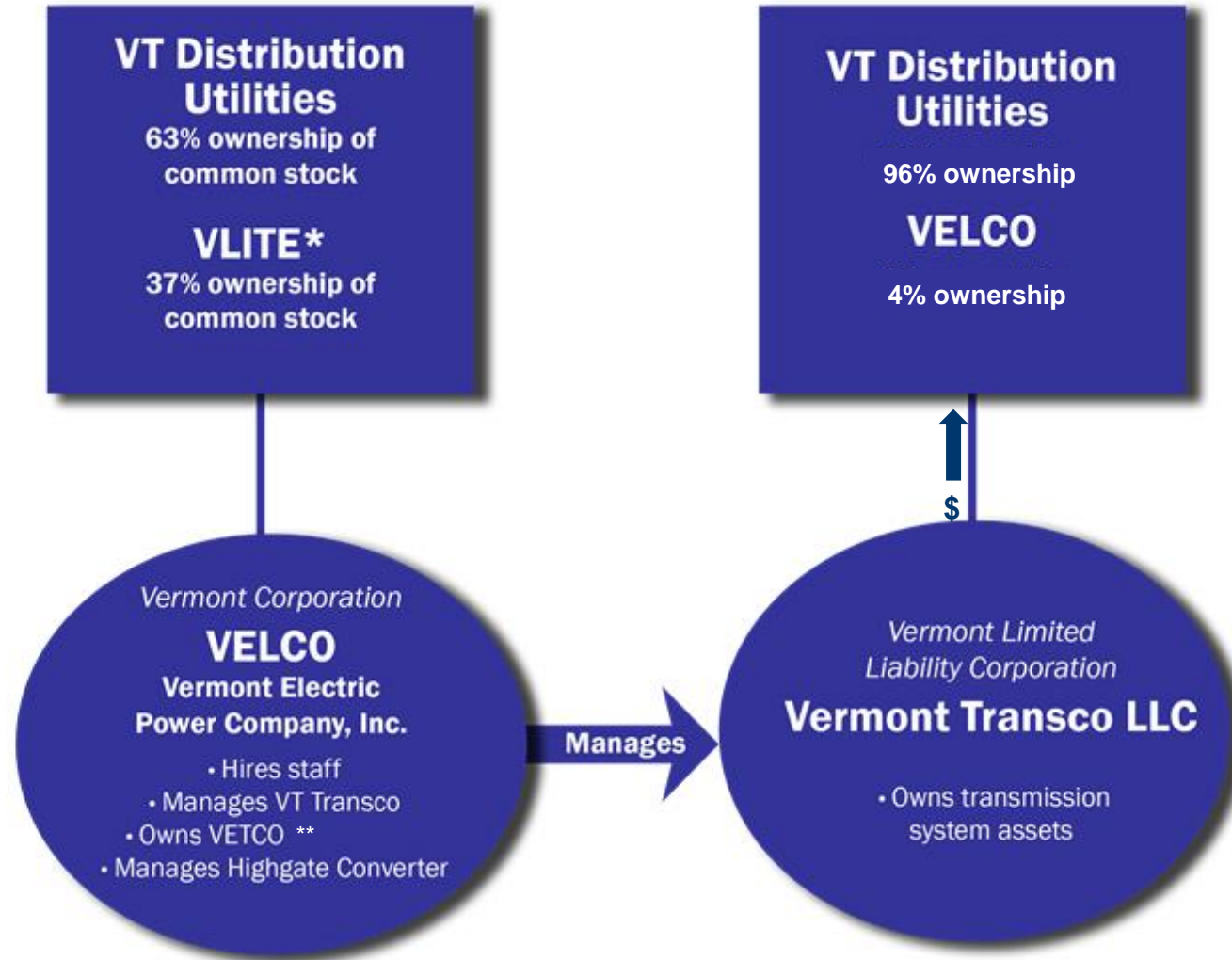
- Stations
- Transmission Lines
- VT Distribution Utilities**
- Burlington Electric Dept.
- Green Mountain Power
- Ludlow Electric Light Dept.
- Swanton Village Electric Dept.
- Vermont Electric Co-op
- Village of Barton
- Village of Enosburg Falls
- Village of Hardwick
- Village of Hyde Park
- Village of Jacksonville Electric Dept.
- Village of Johnson
- Village of Lyndonville Electric Dept.
- Village of Morrisville Water & Light Dept.
- Village of Northfield
- Village of Orleans
- Village of Stowe Electric Dept.
- Washington Electric Co-op

VELCO substations connect to the sub-transmission systems of...

- BED (20,000 customers)
- GMP (254,000 customers)
- Lyndonville (5,200 customers)
- Swanton (3,500 customers)
- Stowe (3,942 customers)
- VT Electric Co-op (34,000)



# Corporate structure



\*VLITE: Vermont Low Income Trust for Electricity, Inc.

\*\*VETCO single-purpose entity owning a 52-mile line in Northeast VT

# 13-member board of directors





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## REGULATORY AND STAKEHOLDER FRAMEWORKS

# Transmission regulation at FERC

Dept of Energy (DOE)  
*Federal energy policy &  
technology development*

## Federal Energy Regulatory Commission (FERC)

- Reviews and approves rates, terms and conditions of transmission service
- Oversees development and enforcement of mandatory standards to ensure reliability, security and market integrity
- Establishes and enforces policy with respect to transmission planning and cost allocation
- Reviews certain mergers and acquisitions and other corporate transactions

# Reliability regulation at NERC

**Federal Energy Regulatory  
Commission (FERC)**  
*Regulates interstate transmission of electricity*

**Dept of Energy (DOE)**  
*Federal energy policy &  
technology development*

**North American Electric  
Reliability Corporation  
(NERC)**

*Electric Reliability  
Organization—ERO*

*Develops and enforces  
reliability standards*

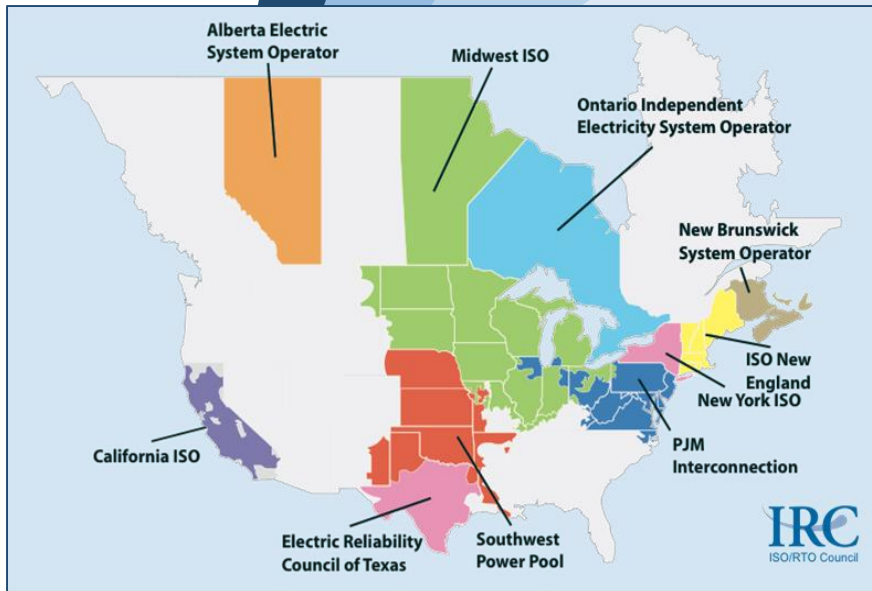
# ISO-NE: planning markets operations

Federal Energy Regulatory  
Commission (FERC)

Dept of Energy (DOE)

North American Electric  
Reliability Corporation (NERC)  
*Electric Reliability Organization—ERO*

Northeast Power  
Coordinating Council (NPCC)  
*Regional Reliability Organization—RRO*

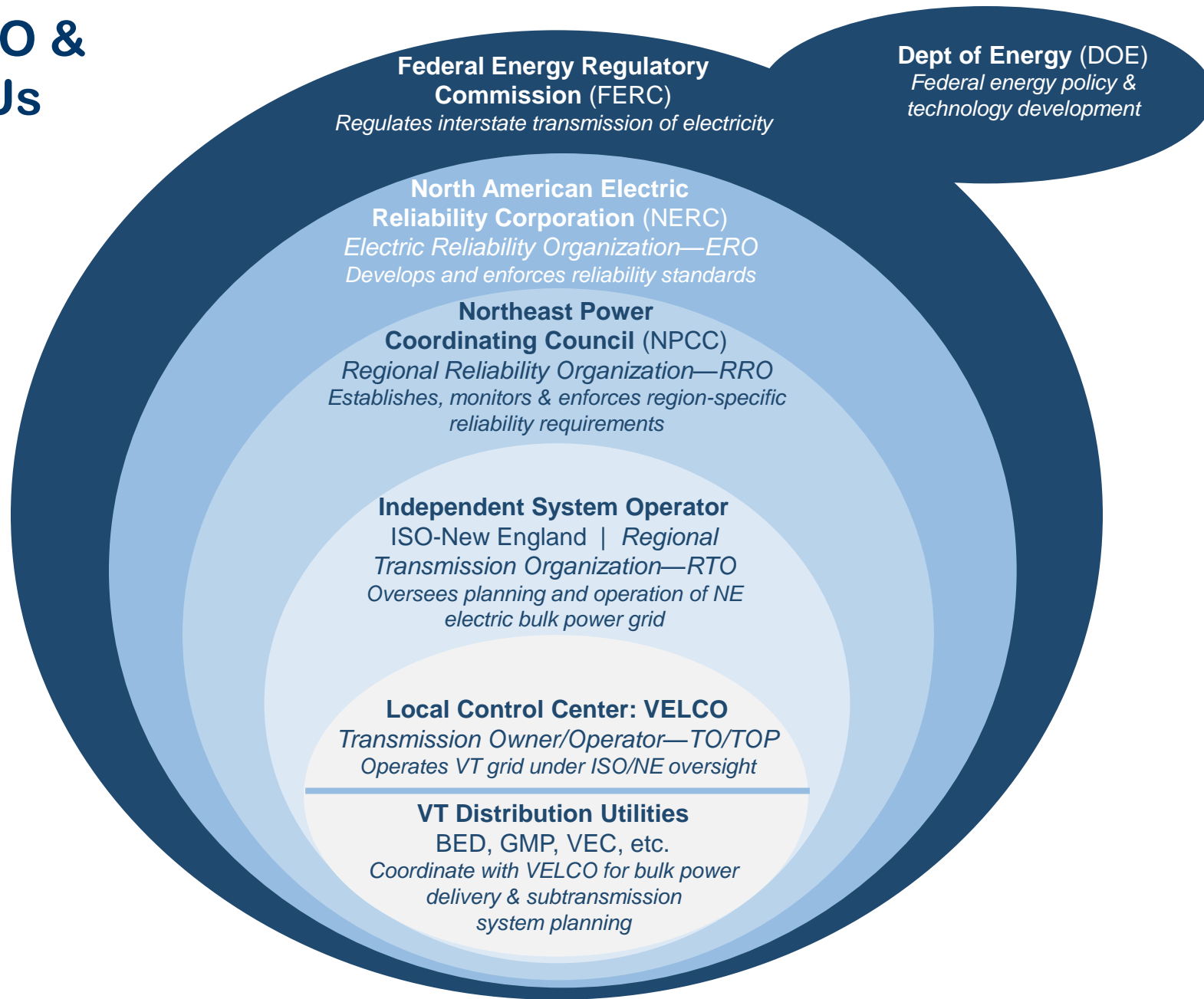


**Independent System Operator**  
ISO-New England

*Regional Transmission Organization—RTO*

*Oversees markets,  
planning and operation  
of NE electric bulk  
power grid*

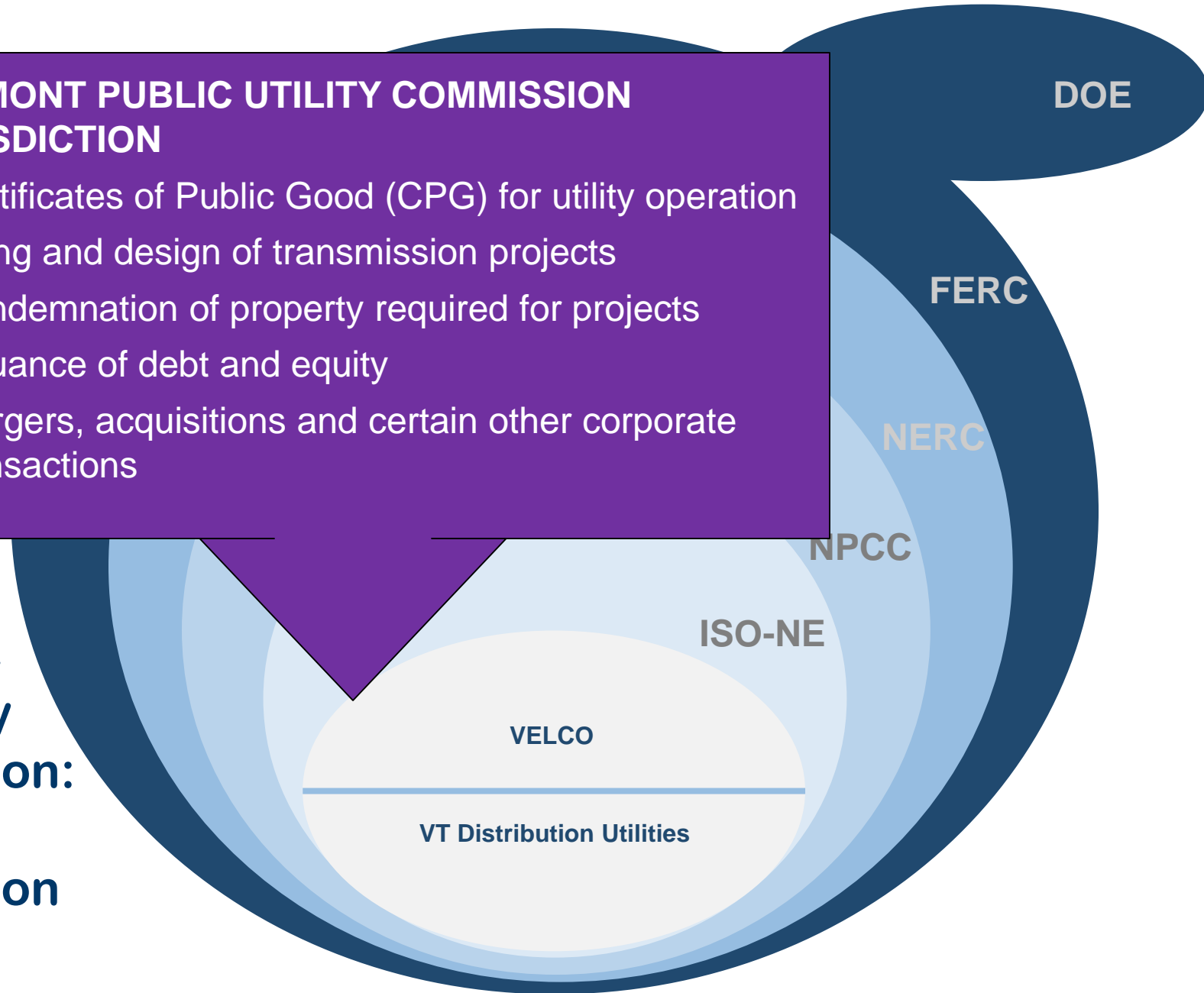
# VELCO & VT DUs



## VERMONT PUBLIC UTILITY COMMISSION JURISDICTION

- Certificates of Public Good (CPG) for utility operation
- Siting and design of transmission projects
- Condemnation of property required for projects
- Issuance of debt and equity
- Mergers, acquisitions and certain other corporate transactions

Electric industry regulation: state regulation



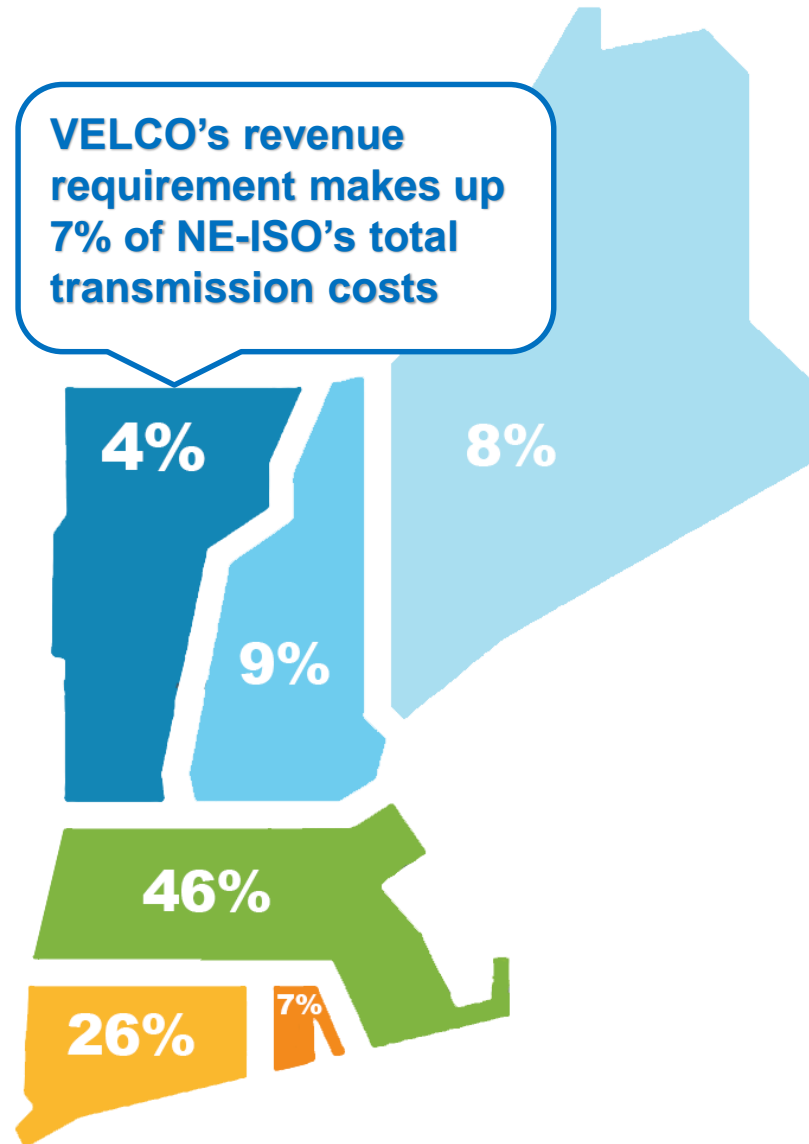


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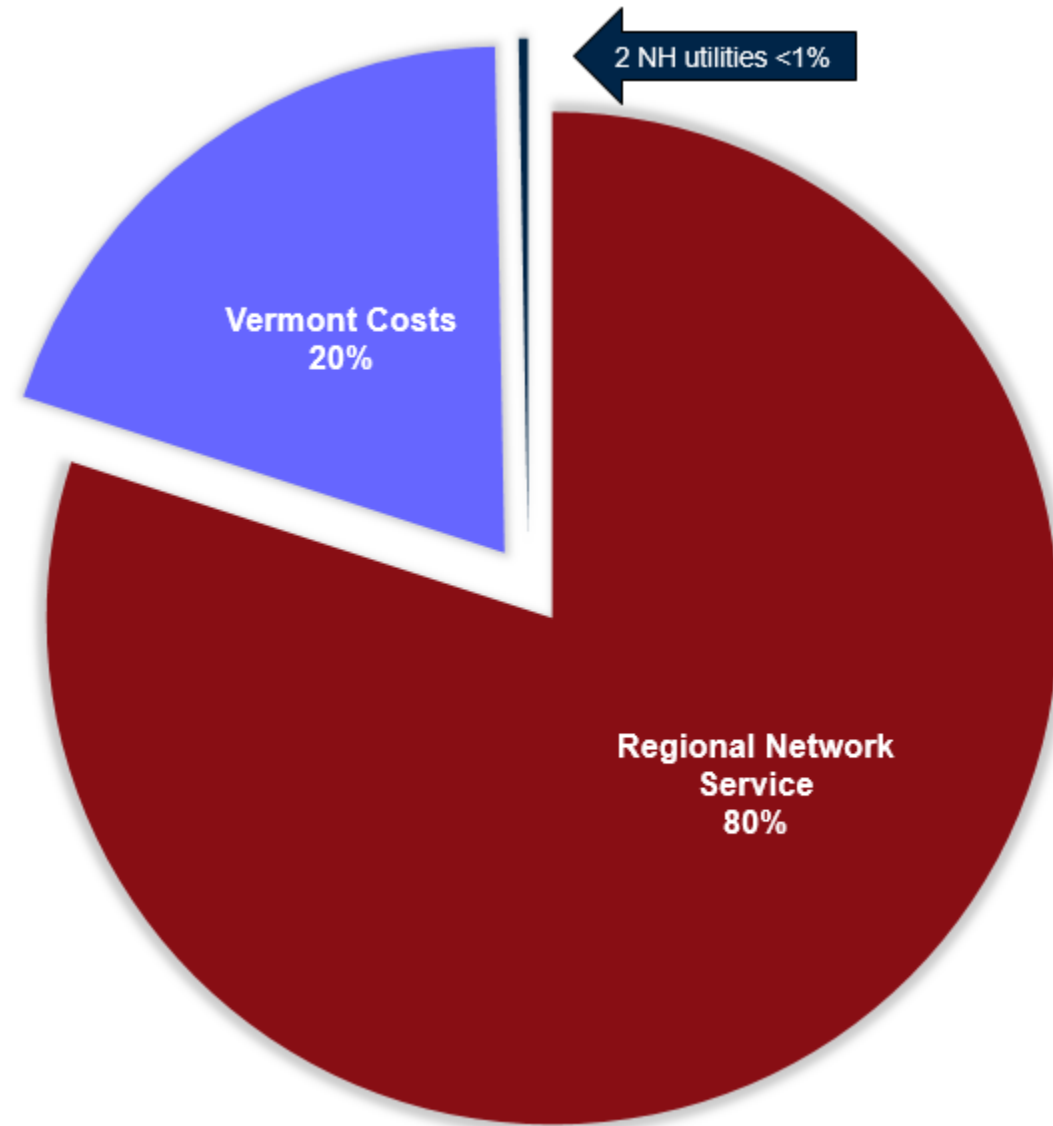
# VELCO FINANCE



# New England states load ratio share



# VT Transco revenue requirement: regional vs. local

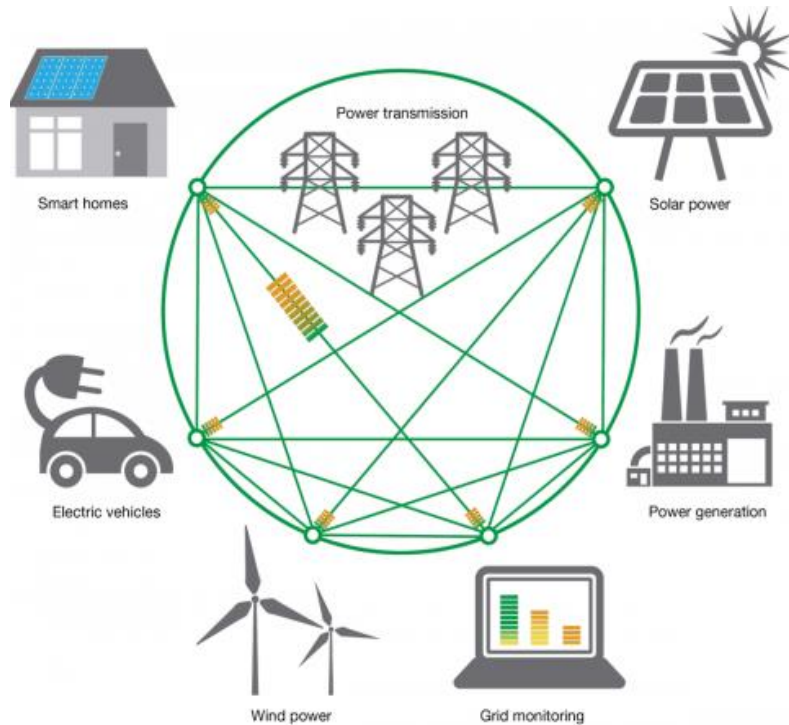


# VT Transco earnings before tax

	Budget 2019
New England Open Access Transmission Tariff	88,500
1991 Vermont Transmission Agreement	41,100
Earnings before tax	(93,900)
<i>Net Cost of Transmission</i>	<i>35,700</i>

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# CURRENT ISSUES: EVOLUTION OF THE GRID



# Vermont and region continue a shift to smaller, intermittent, and more distributed renewables

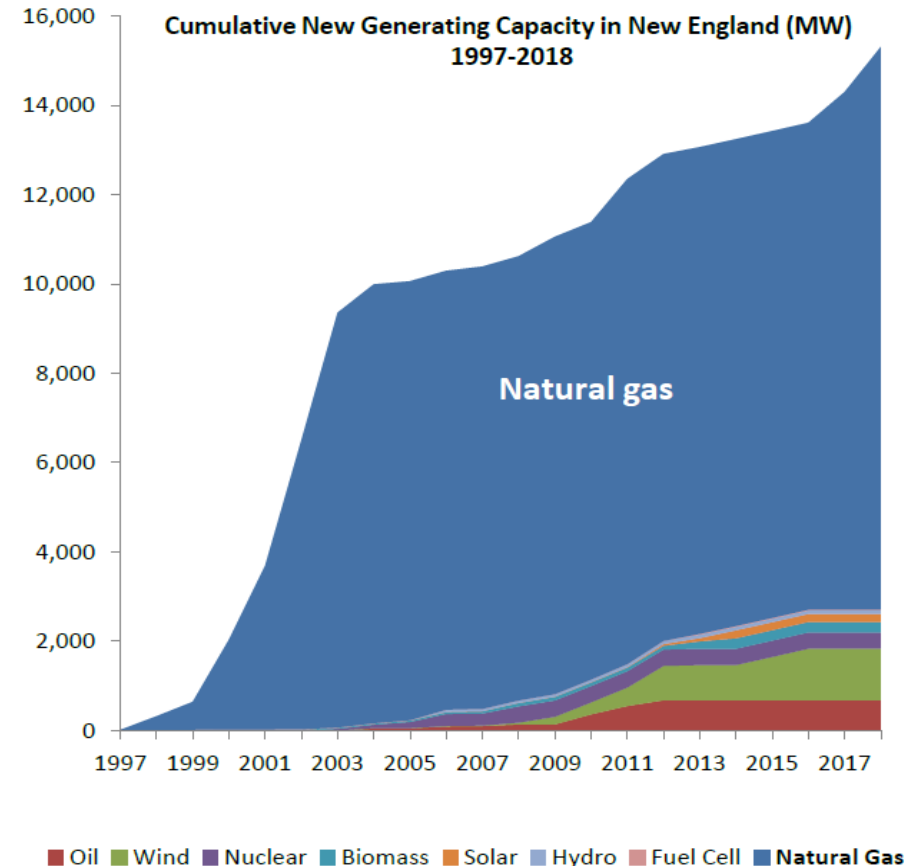
- **State policies drive renewable resource development**
  - Mostly large-scale wind and behind-the-meter solar
  - Other, fast & flexible resources will be needed to balance intermittent resources' variable output
  - New transmission needed to bring wind farms' energy from their remote locations to population centers
- **Distributed generation and the "hybrid" grid**
  - A significant portion of New England's future grid could be "behind-the-meter" (solar facilities on distribution system)
  - That will change how much and when power is used by consumers



Source: ISO New England

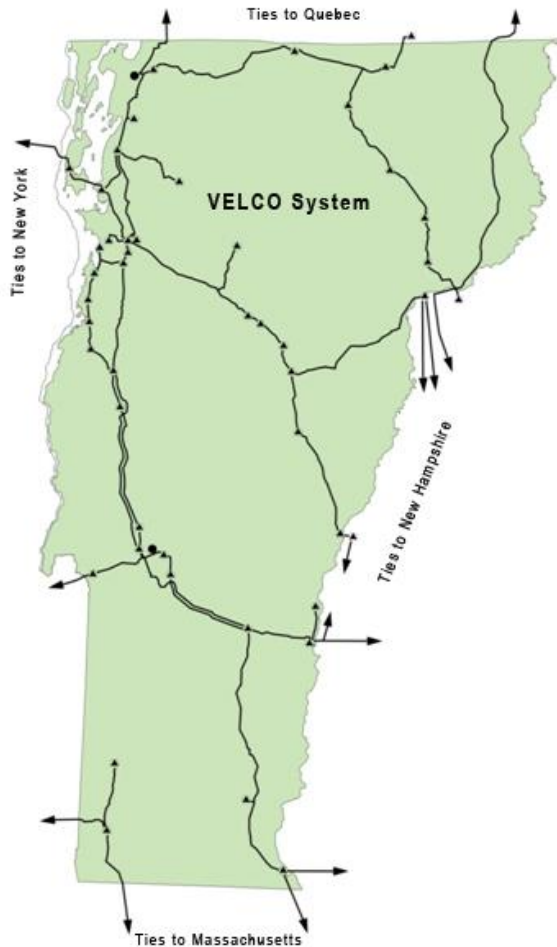
# Region relying more on natural gas; traditional generators are retiring

- **Low natural gas prices**
  - Gas is the most economic fuel for new, conventional resources
    - 80% of new capacity since 1997 runs on natural gas
    - Nearly 65% of all proposed new generation would use natural gas
  - Demand for natural gas is rising
  - Gas pipelines are constrained during high demand periods, particularly winter
    - Creates grid reliability concerns and price volatility
- **Low prices are putting financial pressure on coal, oil and nuclear baseload generators; some are retiring**



Source: ISO New England

# Vermont now imports most of its power



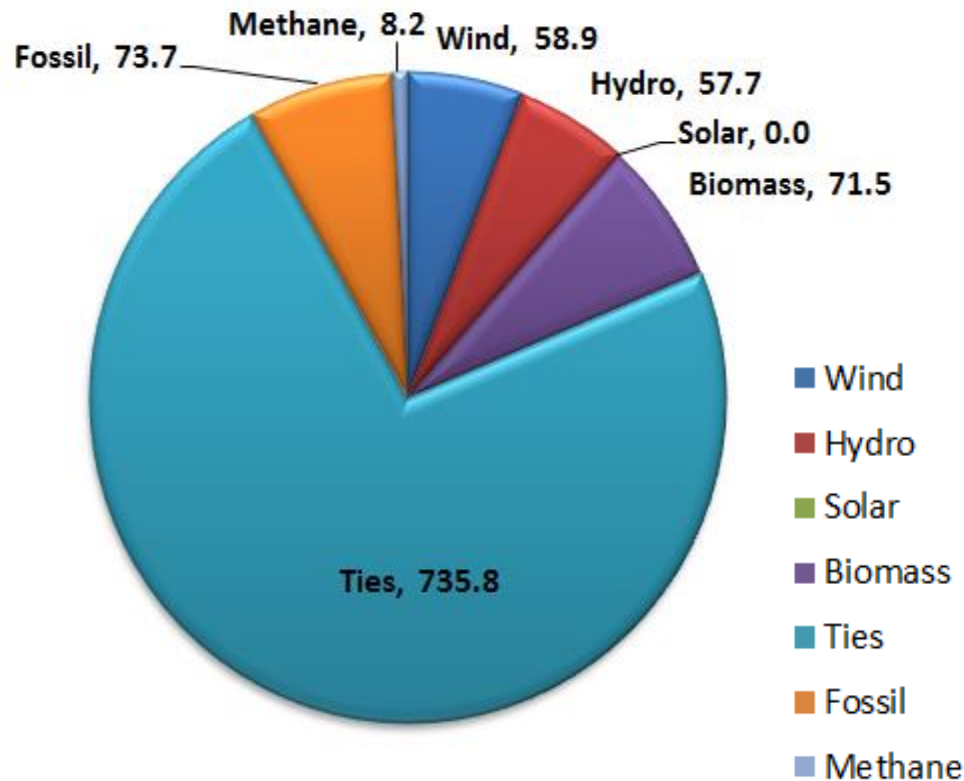
Type		MW 2014	MW 2018
Fossil (fast start units)	Winter	188	188
	Summer	138	138
Hydro		152	152
Wind		123	151
Landfill gas		9	9
Biomass (wood)		72	72
Solar and other, e.g. farm methane		~100 and growing	~325 and growing
Nuclear		625	0
<b>TOTAL IN-STATE NAMEPLATE GENERATION</b>		<b>1265</b>	<b>845</b>

**VT exported power 73% of 2014 hours**  
**VT imported power 100% of 2017 hours**  
**(80% >400 MWs)**

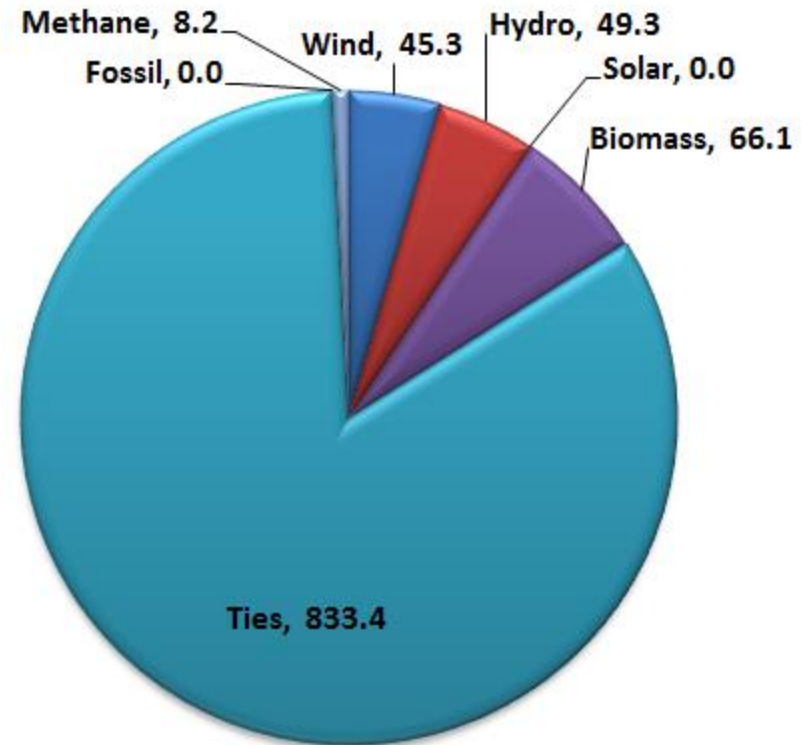


# Energy sources on Vermont's peak days

- 2017/2018 **winter** peak hour (12/29/17, 6 p.m.)
- Load was 1005.7 MW



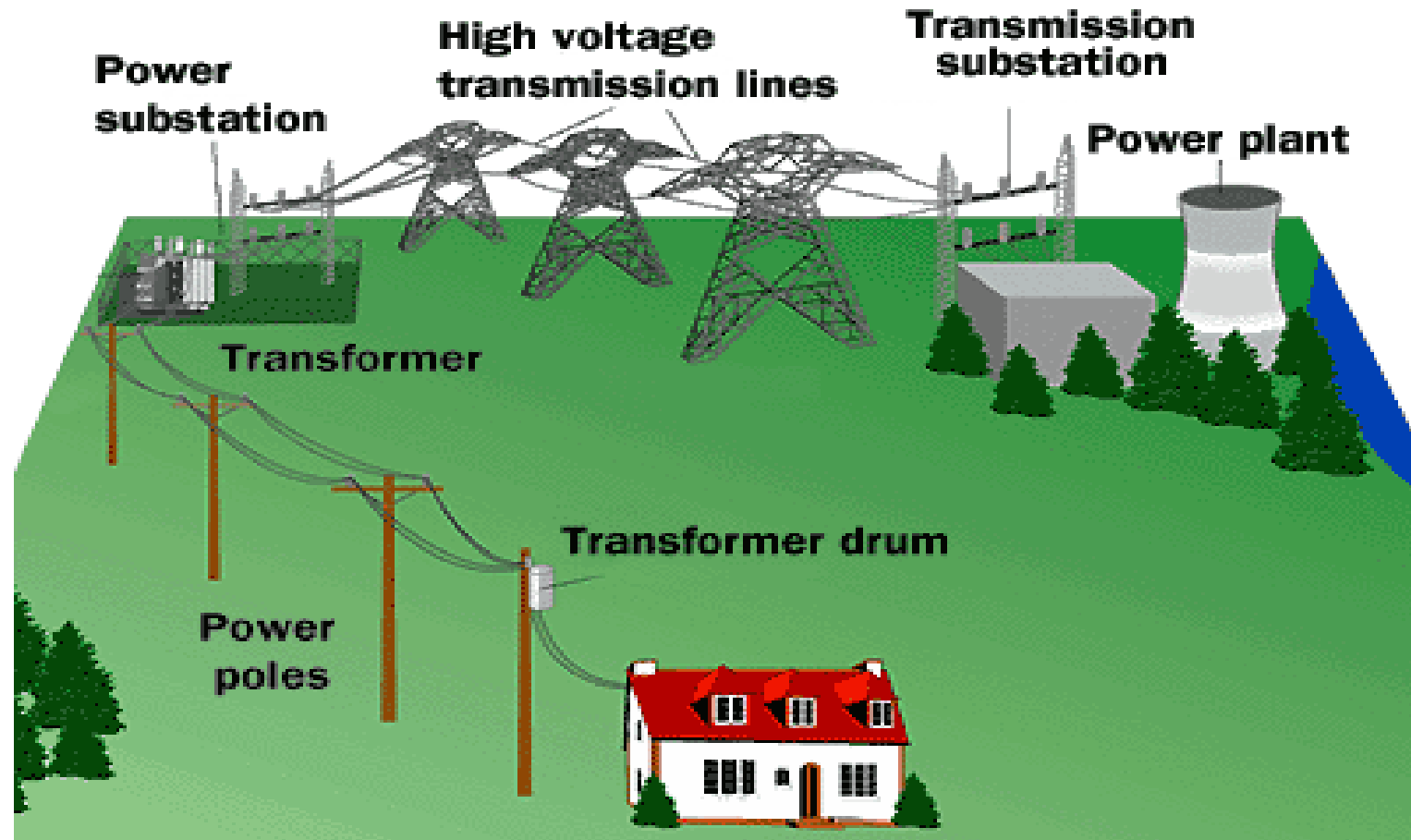
- 2018 **summer** peak hour (7/2/18, 8 p.m.)
- Load was 1002.3 MW



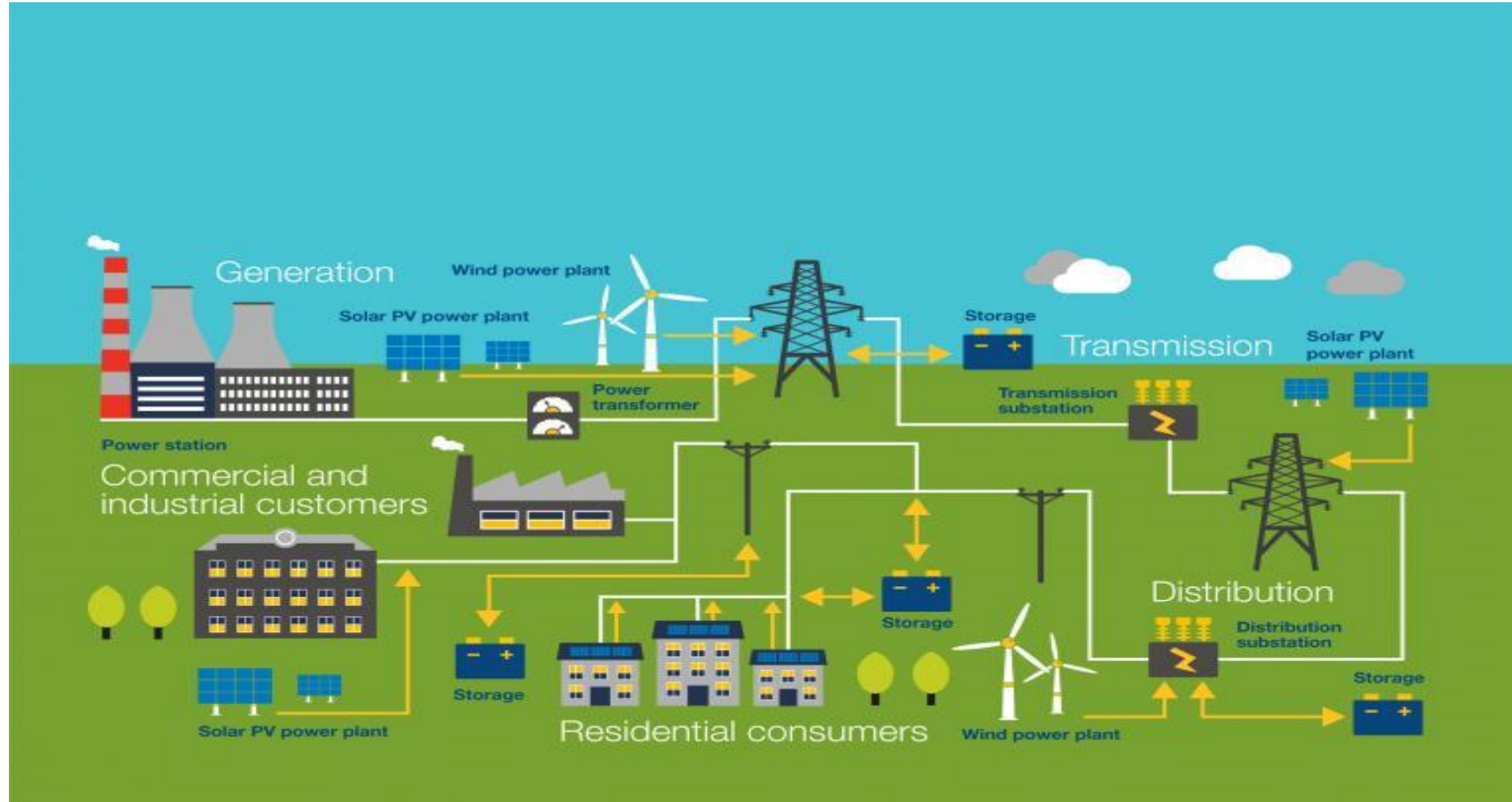
# Grid operations are becoming more complex

1. Renewables (PV, wind) are intermittent, smaller, less controllable
2. At sunset all VT PV essentially shuts down at once
3. Inverter-based generation—unlike rotating generation— does not contribute to fault current or add system inertia
  - Both must be generated from other sources
  - Until now smart inverters were not required—IEEE standard 1547 will mandate smart inverters
4. Much distributed generation not visible to transmission system operators
  - Challenges situational analysis and model precision
5. No cyber standards currently apply to inverter-based generators
6. Weather key to intermittent resources
  - Little PV generation after snowstorms
  - Generally reduced output in winter
7. Energy storage very promising but challenges remain
  - Ideal flexibility: can be electric demand (i.e., load) or supply; quick response; ease of siting
  - Costs declining—market size increasing rapidly (stationary and electric vehicle applications)
  - Advanced analytics key to realizing full value
  - Questions: Will it be scheduled? Who will control it? What is the business model?

# Transmission and distribution used to look like this...

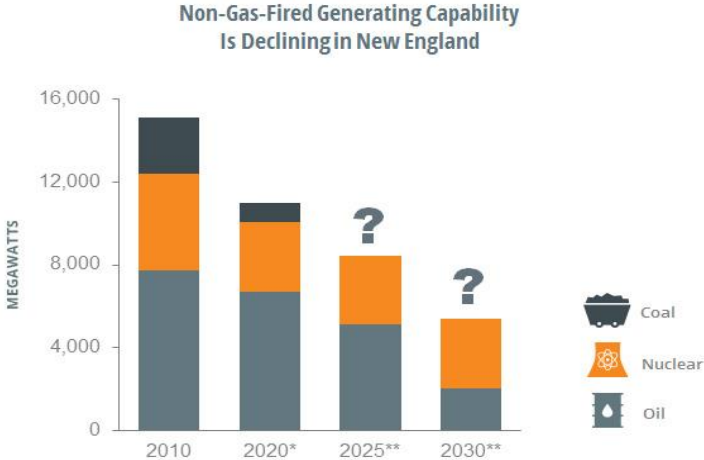


...the evolving grid looks more like this.



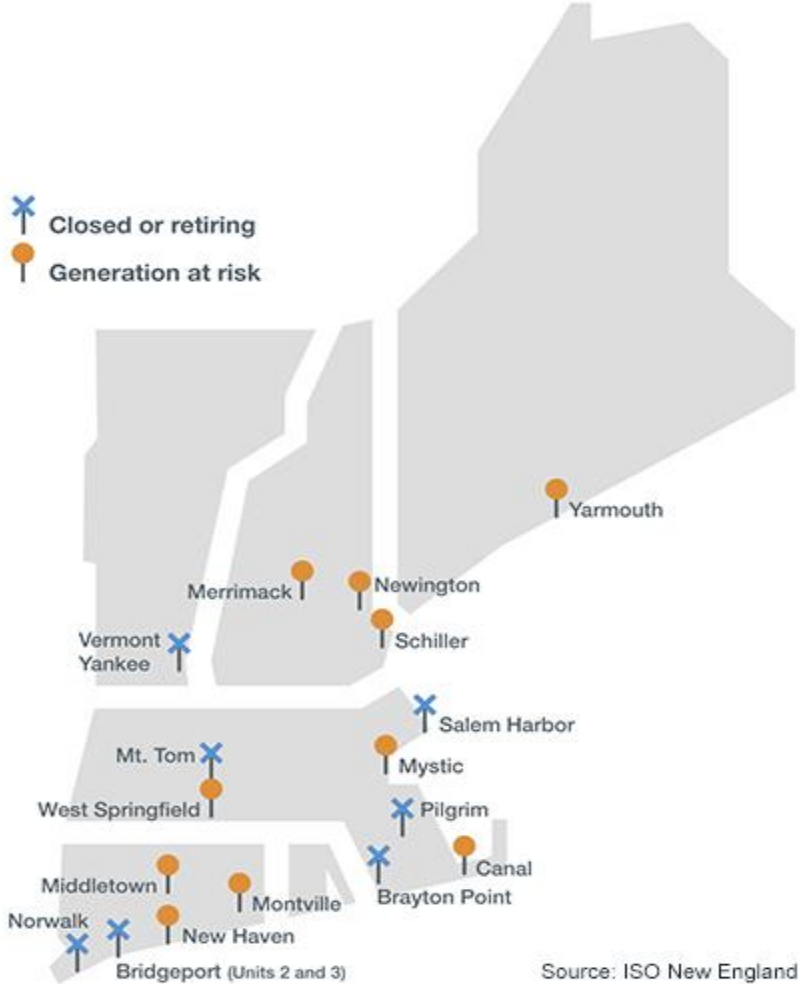
# Regionally, ISO-NE focused on winter fuel security

- Plant retirements (oil, coal, nuclear)
  - State-sponsored RE initiatives
  - Low NG prices
- NE > 50% natural gas plants; without firm gas delivery guarantees



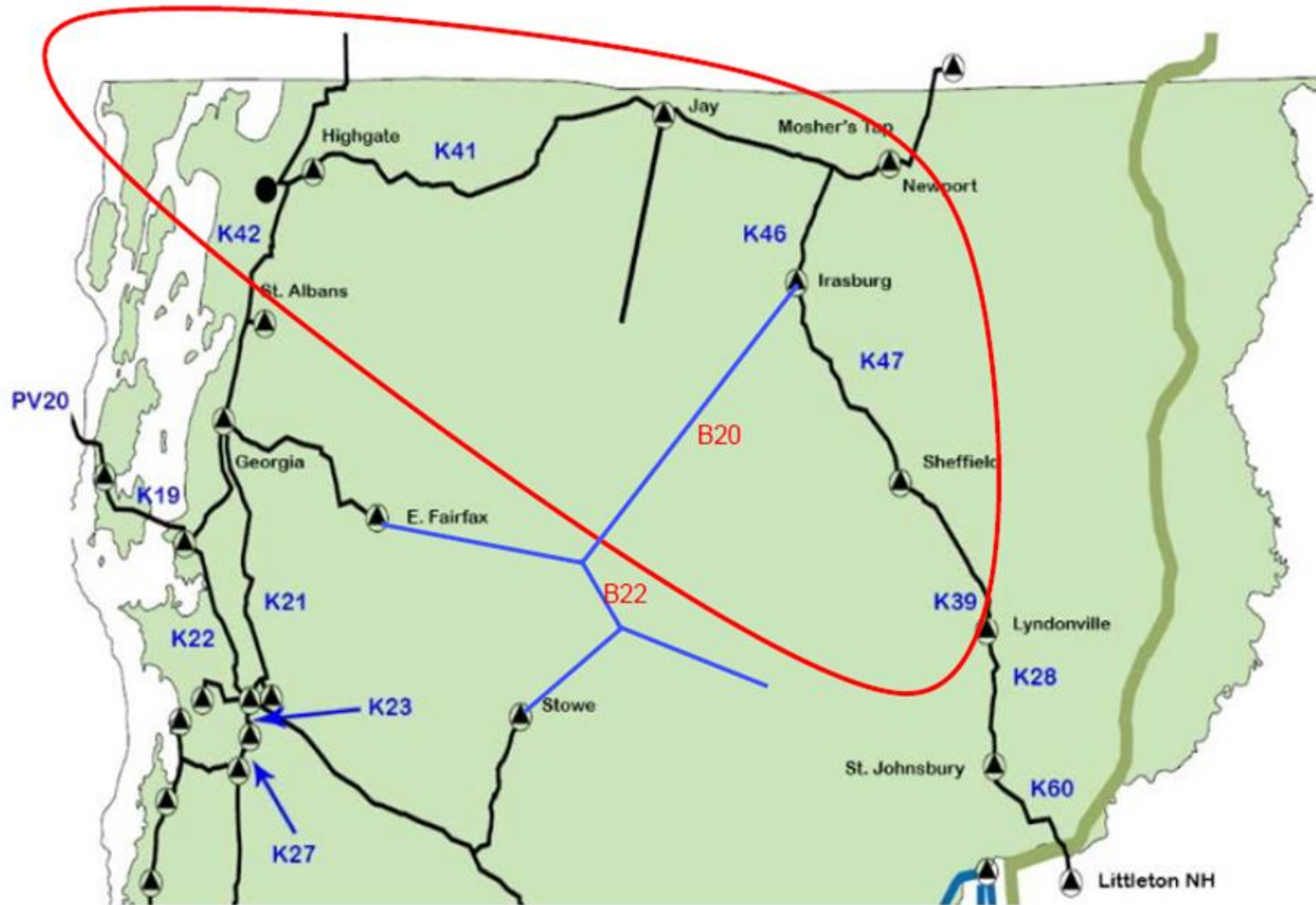
\*Includes major planned retirements

\*\*Hypothetical values assuming the loss of over 5,000 MW from generators identified as being at-risk of retirement due to plant age and infrequent operation



Source: ISO New England

# Sheffield-Highgate Export Interface (SHEI)





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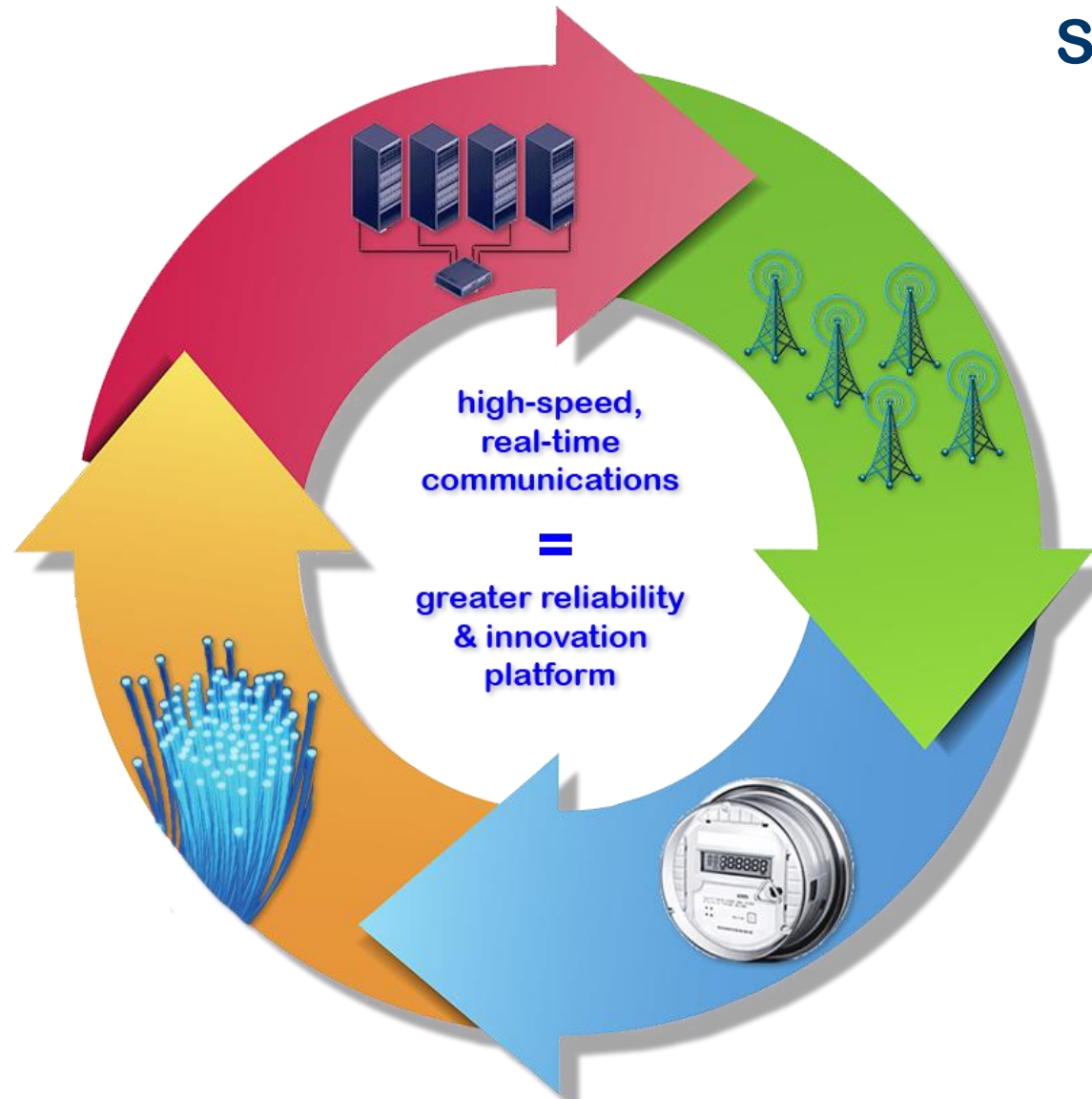
# STRATEGIC INITIATIVES & CULTURAL TRANSFORMATION

# VELCO strategic initiatives





# Innovation workbench



## Statewide infrastructure

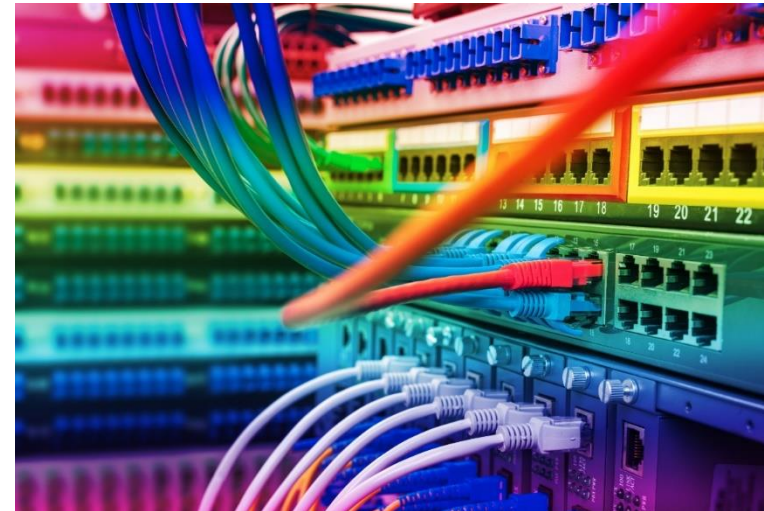
- eEnergy VT smart grid
  - 92-94% smart meters
- Fiber optic network
- Radio system
- High-performance computing cluster—HPCC

# Strategies to diversify revenue streams

Construction mat rentals to distribution utilities, avoiding need for them to purchase their own



Use of radio and fiber systems to meet Vermont utilities' needs



Actively marketing products and services to non-shareholder clients

Recently signed contract to meet data connectivity needs of Northern Vermont University at market rate

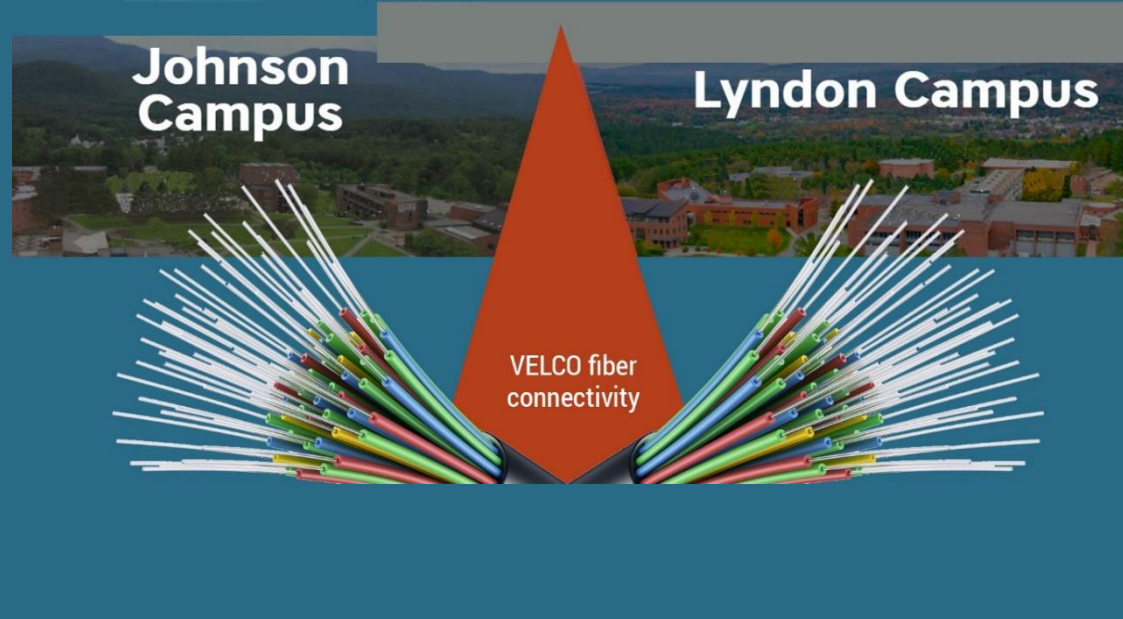
Revenue offsets a portion of our overhead and can contribute to our bottom line

Uses an asset to do good for Vermont



**Johnson Campus**

**Lyndon Campus**



# Contact Info

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