

Tier 3 of Act 56

“Vermont’s Energy Innovation Program”

House Energy & Technology Committee
Senate Natural Resources & Energy Committee

January 17, 2017
Darren Springer, Chief Operating Officer
Burlington Electric Department



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Vermont Renewable Energy Standard

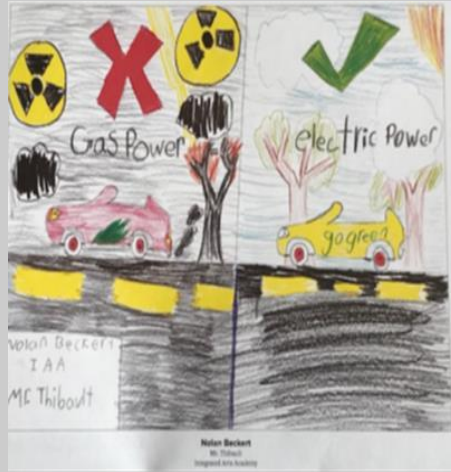
- **Tier 1** – 55% renewable electricity in 2017, rising to 75% by 2032
- **Tier 2** – 1% from distributed renewable generation in 2017, rising to 10% by 2032
- **Tier 3** – “energy transformation projects” equivalent to 2% retail sales in 2017, rising to 12% by 2032



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Tier 3 Energy Transformation



- Projects that seek to utilize the electric grid to replace fossil fuel demand with clean electricity (e.g. electric vehicle)
- Requires best practices for demand management by utilities, reducing the need for more poles and wires and power plants
- Can be a complementary effort to customer-sited generation



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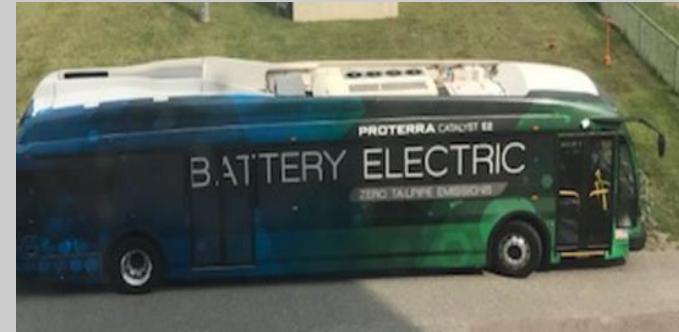
Washington
Electric
CO-OP



Tier 3 Innovation



- Electric Vehicles
- Electric Charging Stations
- Cold-Climate Heat Pumps
- Heat Pump Hot Water Heaters
- Line Extensions or Upgrades
- Smart Thermostats
- Electric Bikes
- Weatherization
- Biomass Heat
- Biodiesel
- Solar Hot Water
- Electric Buses
- Demand Management Technology
- And More...



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Tier 3 Model

- **Not One Size Fits All** – Tier 3 permits utility collaboration where statewide implementation makes sense, and allows utilities to pursue most cost-effective opportunities for each service territory
- **Consumer Driven** – Tier 3 programs are only successful if they offer technologies customers want
- **Partnership Model** – Tier 3 encourages partnerships between utilities and private sector/non-profit service providers



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Tier 3 Benefits

- **Ratepayer Benefit** – By providing encouragement and authority for Vermont utilities to support strategic electrification projects, Tier 3 can help customers save money on energy bills
- **Greenhouse Gas Emissions Reduction** – Tier 3 projects must reduce fossil fuel consumption and associated GHG emissions
- **More Efficient Use of Infrastructure** – By encouraging off-peak electric use, Tier 3 helps utilities and customers make better use of the electric grid as a capital asset, putting downward pressure on electric rates



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Heat Pumps and Demand Management

House Energy & Technology Committee
Senate Natural Resources & Energy Committee

January 17, 2017

Robert Dostis, VP of Stakeholder Relations
Green Mountain Power



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Air-Source Heat Pump Programs



- **Space Conditioning** – Primary heating & cooling source (down to approx. -10°F) for residential and small commercial customers. Reduces use of incumbent heating system, typically fossil fuel supplied. 200+% efficient converting energy to heat/cool vs 90% efficient fossil fuel systems.
- **Value Proposition or Customers** – reduced carbon impacts, lower maintenance costs, improved convenience & comfort, warm weather cooling, cost competitive with fuel oil and propane, intelligent controls
- **Program Highlights** – Efficiency Vermont incentive applied to reduce cost of heat pump to customer. Additional Utility incentives may be available, including on-bill repayment over time.
- **Fossil Fuel Impacts** – 8,600 Metric Tons of CO2 reduction from heat pump deployment annually and growing (=1,829 cars off the road)



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Intelligent Control via Shared Access

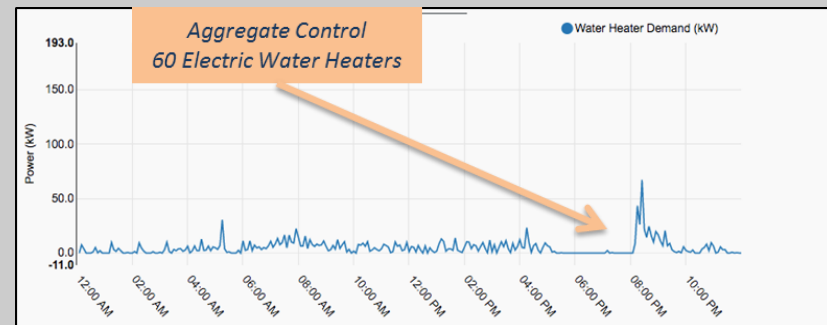
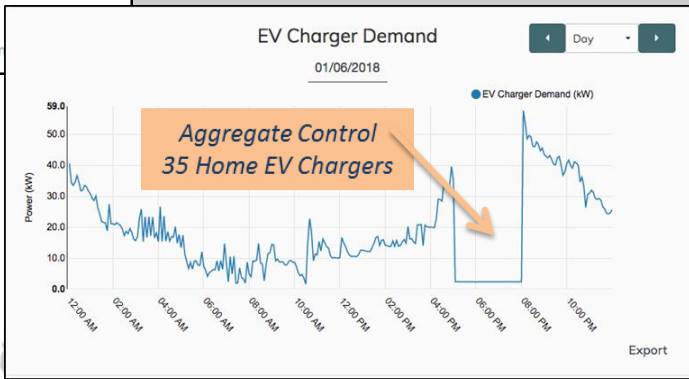
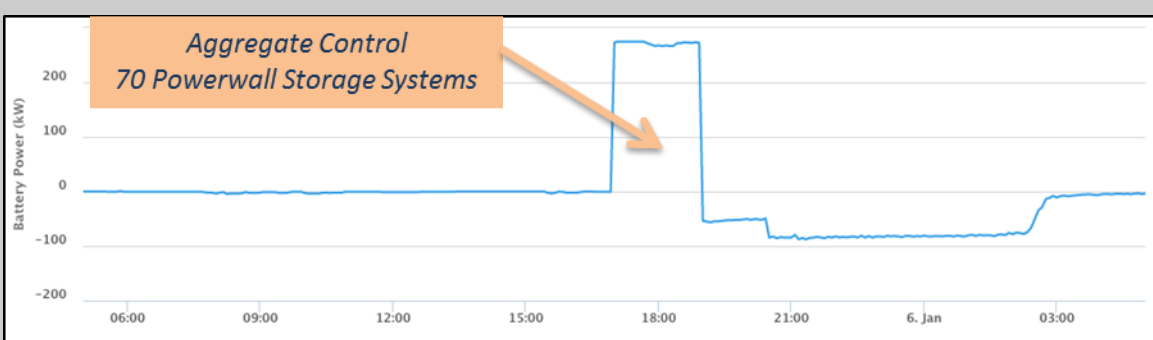
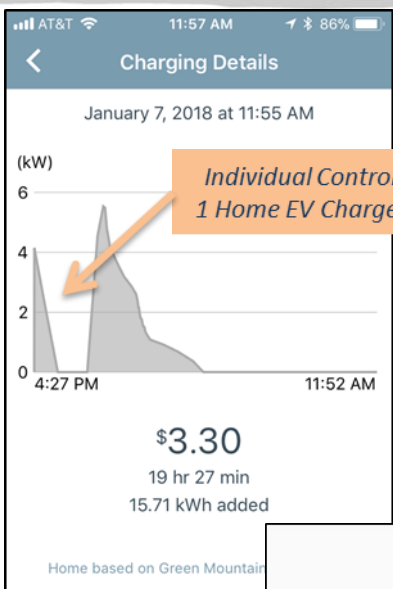


- **Clean Energy Devices** – Air-Source Heat Pumps, Heat Pump Water Heaters, Electric Water Heaters, Energy Storage Devices (battery systems), EV Chargers, etc.
- **Intelligent Control** – relies on smart communication capabilities in clean energy devices
- **Shared Access** – Customers allow the utility to communicate with their clean energy devices to better coordinate supply and demand at the local (circuit) and system (grid) level
- **Improved Outcomes for Customers** – lower costs, lower carbon, improved reliability, better use of infrastructure



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Clean Air Program

**House Energy & Technology Committee
Senate Natural Resources & Energy Committee**

January 17, 2017

Andrea Cohen, Government Affairs & Member Relations

Lisa Morris, Energy Services Planner

Vermont Electric Cooperative



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VEC's Clean Air Program

- Line extensions or service upgrades for off-grid or underserved homes and businesses
- Well-suited for rural service territory
- Custom contracts that reduce member's cost for the project (six projects completed 2016 - 2017)



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VEC's Clean Air Program

- Large fossil fuel reduction, greater convenience for the member, and increased electric sales
- ~78,000 gallons of propane/oil/diesel saved per year, the equivalent of taking about 250 cars off the road



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Mayotte Sugarhouse - Fletcher



- Over 50,000 taps
- Service upgrade for High-Brix Reverse Osmosis (RO)
- RO will displace ~ 8,000 gallons of oil per year



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Little Charlie's Sugarbush - Jay



- Over 20,000 taps
- Previously off-grid, line extension to retire generator
- ~ 8,000 gallons of propane saved per year



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Washington
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Electric Vehicles

**House Energy & Technology Committee
Senate Natural Resources & Energy Committee**

January 17, 2017

**Melissa Bailey, Legislative and Regulatory Affairs
Representative**

**Ken Nolan, General Manager
VPPSA**



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Benefits of EVs

- **Operational Savings** – According to Drive Electric Vermont, charging an EV is equivalent to paying \$1.50 per gallon of gas, and EVs can offer maintenance savings compared to conventional vehicles
- **Potential for Off-Peak Charging** – Through customer education, load control, or end-use charging rates, utilities can encourage off-peak charging.
 - Added electric sales from EVs can benefit all ratepayers
- **Emissions** – With Vermont utilities supplying increasingly renewable electricity, plug-in vehicles have significantly lower greenhouse gas emissions than conventional vehicles



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EV Penetration in VT

- **Customer Interest** - EV sales have been steadily increasing in VT year over year.
- **Market Share** - Electric Vehicles and Plug-in Hybrid Electric Vehicles accounted for **1.64% of vehicle sales** between September 2016 and August 2017.
- **Barriers to EV Adoption** – Customers remain concerned about the battery range of EVs, availability of charging infrastructure, diversity of models and the upfront purchase cost of EVs.



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Utility Tier 3 Programs

- **EV Incentives** – VPPSA, VEC, BED, and GMP offer customer incentives for EV purchases (and in some case leases) under Tier 3. These include focused low and moderate income customer incentives.
- **Partnerships** – These utilities are partnering with local car dealers and Drive Electric Vermont to increase customer awareness of EVs.
- **EV promotion**–GMP, BED, VEC, Stowe Electric and WEC have participated in special promotions including \$10,000 off a Nissan Leaf and \$297 no money down leases on the Chevy Bolt.



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Electric Buses/Electric Bicycles

House Energy & Technology Committee
Senate Natural Resources & Energy
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January 17, 2017

James Gibbons, Director of Policy & Planning
Burlington Electric Department



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E-Bus

- Currently BED program (due to density & geography), using the pre-approval process set out in statute
 - ❑ Electrification of mass transit has high value
 - ❑ BED targeting long-haul buses with nighttime charging
 - ❑ One E-Bus is characterized as equivalent to 35-40 AEV
 - ❑ High up-front cost but leveraging multiple fund sources
 - BED RES Program
 - VLITE funds
 - Federal funds
 - ❑ Current expectation is 4 buses in 2018



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E-Bikes

- Three part program built on local partnerships with Local Motion and CATMA Bike Share:
 - ❑ Build “Library” of e-bikes
 - ❑ Incentivize e-bike purchases
 - Incentive can be donated towards low-income purchase
 - ❑ Second Program in Country (Austin, TX)
 - ❑ Important under RES to try to make certain you are not replacing normal bikes and walking



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Weatherization

**House Energy & Technology Committee
Senate Natural Resources & Energy Committee**

January 17, 2017

Patty Richards, General Manager

Bill Powell, Director of Products and Services

Washington Electric Cooperative



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Proposed Measures & Program Design

- Working with Efficiency Vermont (EVT) WEC has promoted “**Button Up WEC**”, using cooperative marketing support for a well-recognized residential weatherization campaign.
- **Weatherization** – These measures claim savings for the installation for insulation and air leakage reduction measures in a residential or commercial application. Savings will be calculated on a custom basis by project. Weatherization (WX) for income eligible WEC member residences will be coordinated with Capstone of Barre. Income eligibility based on current Vermont Agency of Human Services (AHS) levels.

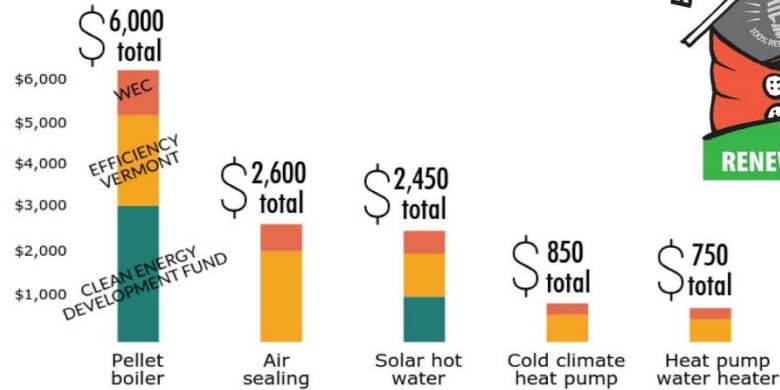


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What's my incentive to Button Up?

If you're looking to seal up your home, or are in the market for energy-efficient heating systems, WEC's Button Up! home energy efficiency program offers cash incentives to members. In combination with Efficiency Vermont incentives and grants from the Clean Energy Development Fund, you could save a lot of money:



Before you buy any new energy-efficient appliance, call Bill Powell, WEC's Energy Coach, to learn how you can take full advantage of this program:

802-224-2329
energycoach@wec.coop



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Measure		Units	MWh Savings	Incentives
Multi Zone Cold-Climate Heat Pump (CCHP) with no Controls and High Performing Home	per unit	3	62.4	\$1,000
	Total		187.1	\$3,000
Single Zone Cold-Climate Heat Pump (CCHP) with no Controls and High Performing Home	per unit	5	29.4	\$650
	Total		146.8	\$3,250
Heat Pump Water Heater (HPWH)	per unit	15	16.9	\$850
	Total		253.9	\$12,750
Pellet Heating	per unit	2	128.4	\$3,000
	Total		256.8	\$6,000
All Electric Vehicle*	per unit	15	32.9	\$1,900
	Total		493.5	\$28,500
Plug-in Hybrid Electric Vehicle*	per unit	10	18.5	\$1,900
	Total		185.2	\$19,000
Weatherization	per unit	20	20.0	\$2,000
	Total		400.0	\$40,000
Solar Hot Water	per unit	1	21.6	\$1,450
	Total		21.6	\$1,450



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Electric Vehicle Charging Stations

**House Energy & Technology Committee
Senate Natural Resources & Energy
Committee**

January 17, 2017

**Matthew Rutherford, Manager of Regulatory
Compliance**

Stowe Electric Department



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Case for EV Charging Stations Programs

- Compliments DU programs for Electric Vehicles
- How to address *Range Anxiety*: the Chicken and the Egg
- Currently 156 charging stations in Vermont

Image courtesy of Drive Electric Vermont



EV Charging



Image courtesy of Drive Electric Vermont



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EVSE Equipment

Level 1 Charging



Level 2 Charging



DC Fast Charger



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Utility EVSE Programs

Stowe Electric – “EV Tourism:” partnered with commercial and public property owners to install publicly available EVSE throughout town

BED – operates a fleet of public EVSE; plans to install 60 EVSE at workplaces in next three years; pursuing plan to install 2-3 new DCFC

GMP – no-cost for home EVSE for customers that purchase a new EV; special energy pricing for participating customers; additional low-income component

WEC – has a fleet of 5 public Level 2 EVSE

VEC – offer bill credits to promote public EVSE among large employers and municipal entities

VPPSA – Barton Village and Swanton Village both own and operate public EV charging stations



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