

## Vermont Climate Action Commission

Thursday, December 14, 2017

1 – 4 pm

The Montpelier Room/ National Life building / Montpelier

Commissioners Present: Marie Audet, Michelle Boomhower, Matt Cota (for Peter Bourne), Harrison Bushnell, Kristen Carlson, Paul Costello, Tom Donahue, Bethany Fleishman, Joe Fusco, Liz Gamache, Bill Laberge, Linda McGinnis, Johanna Miller, Ted Brady (for Michael Schirling), Mary Sprayregen, Bob Stevens, June Tierney, Robert Turner, Peter Walke

### Agenda Items

#### 1. Welcome

The Chair welcomed the commissioners and other attendees. The following alternates were identified: Ted Brady for Michael Schirling; Matt Cota for Peter Bourne. The following proxies were identified: Linda McGinnis for Adam Knudson; Paul Costello for Stuart Hart.

The commission approved the meeting notes of November 9, 2017.

#### 2. Executive Order Discussion and Vote

The Chair summarized the three climate change executive orders under consideration (01-11 Council on Energy and the Environment; 08-11 Vermont Housing Council; 05-16 Climate Change Considerations in State Procurements). After discussion by the commission members, the commission voted unanimously to recommend rescission of EO 01-11, and to maintain EO 08-11 and 05-16.

#### 3. Subcommittee Recommendations

Co-Chair Costello set forth the charge of the Commission which was to evaluate the proposals presented by the subcommittees to determine if they met the charge of Executive Order 12-17 and were sufficiently developed to be ready for the administration or the legislature to take further action upon them.

Note: The recommendations are attached in their pre-meeting draft form, not as accepted in principal by the Commission.

The Commission discussed the draft proposals and reached general consensus around the following amendments to the draft proposals

Advanced Wood Heat (Walke): The Commission supported the concept with the addition of adding language in support of a sales tax holiday for AWH equipment

Building Retrofit (Stevens): The Commission discussed the proposal at length, reaching consensus around moving forward with the proposal to ramp up weatherization expenditures in the near term.

Carbon Pricing Study (Bushnell): The Commission discussed this issue at length. The Chair reminded the group of the Governor did not support a Vermont-only carbon tax. The Commission came to general agreement around an independently conducted study of all regulatory and market based approaches to reaching Vermont's greenhouse gas emissions goals, both at the state and regional levels.

Climate Czar (Miller): The Commission discussed the need for such a position. The Commission discussed what the charge and purpose of the individual would be.

Climate Economy (Fusco): The Commission discussed whether this proposal was too focused on new businesses and whether existing businesses should be highlighted.

Rural Broadband (Sprayregen): The Commission discussed whether this should be a specific recommendation or a foundational element in the introduction to the report. The Commission also discussed the nexus between universal broadband and smart growth principles.

Transport Electrification (McGinnis): The Commission discussed this topic at length and was generally supportive. Linda McGinnis also shared with the group a shorter version of the proposal for review. General agreement emerged over moving forward with the five short-term recommendations.

#### **4. Other Commission Recommendation Discussion**

The Chair invited commissioners to share other ideas for recommendations or actions. Ideas introduced included smart growth, broadband internet, EV leasing, no support for clean diesel, funding options for transportation system infrastructure, agriculture drawdown, energy generation-carbon sequestration-water, RPS Tier 3 project coordination. The Commission agreed that many of these topics would drive future work, recognizing that this set of recommendations was preliminary. General agreement emerged to add support for an EV leasing program within the Transportation Electrification recommendation.

#### **5. Recommendation Discussion and Vote**

The Commission again discussed their charge and took the following actions on each proposed recommendation.

Note: The recommendations are attached in their pre-meeting draft form, not as accepted in principal by the Commission.

The full Commission agreed to these changes in principle and offered the Chair and Co-Chair the authority to standardize language for the report:

Advanced Wood Heat – Amended to include the sales tax exemption language suggested in discussion;  
Approved: 21-0

Building Retrofit – The proposal to increase weatherization was removed from the original proposal and no action was taken on complete proposal. The weatherization proposal as modified in the discussion was then voted upon by the Commission. Approved: 21-0

Carbon Pricing – Amended to be retitled and refocused as a study of all regulatory and market-based approaches to meeting Vermont’s greenhouse gas emission goals; amended to include language that the Joint Fiscal Office should contract with an independent research entity to conduct the study; Amended to offer a working group of the Commission to advise on the scope of the study; Approved 20 – 1 (Audet)

Climate Czar – Tabled for future consideration, 19-2 (Tierney, Audet)

Climate Economy – Amended to include greater support for existing businesses; Approved: 21-0

Rural Broadband – Converted to a Commission statement of support in the introduction to the report; Approved: 21-0

Transportation Electrification – Amended to propose the five short-term recommendations from the draft proposal as well as Ted Brady’s additional proposal to explore/promote EV leasing options; Approved: 21-0

## **6. Upcoming Schedule**

The committee discussed several options for meetings in 2018. The Commission agreed to a regularly scheduled January meeting focused on a strategic planning session for the next six months and to a full day meeting in February.

## **7. Public Comment**

The Commission received public comment from five Vermonters. Jill Wilcox and Donna Smyers asked the Commission to support putting a price on carbon. John Lawson called for urgency given our rapidly reducing global carbon budget and for this Commission to be made permanent by the Legislature. Rick Wackernagel provided the Commission with some input (attached to these notes). David Frank spoke in support of the Advanced Wood Heat recommendation. Bob Farnham spoke of the need to be ready for an influx of climate refugees and how important it is to remain focused on those bigger picture future challenges.

## **8. Adjourn**

# COUNCIL ON ENERGY AND THE ENVIRONMENT

WHEREAS, the State of Vermont must come to terms with the implications of climate change and limited fossil fuels; and

WHEREAS, the Governor recognizes the need and opportunity to promote a renewable energy economy that protects our natural environment, provides energy security, and creates sustainable jobs; and

WHEREAS the Governor desires the council of private citizens knowledgeable about the natural environment of Vermont, renewable energy, and the opportunities to reduce our contribution to climate change by conserving and increasing efficiencies across all sectors, including heating, electric and transportation;

NOW, THEREFORE, BE IT RESOLVED THAT I, Peter Shumlin, by the virtue of the power vested in my as Governor, do hereby establish the Governor's Council on Energy and the Environment solely to advise the Governor of policy issues affecting the natural environment and energy security of the State of Vermont. To these ends, I direct the following:

1. The Governor's Council on Energy and the Environment will consist of up to 25 members, all of whom shall be appointed by the governor and serve at his pleasure.
2. The Council shall meet with the Governor at least four times annually.
3. The Governor shall annually appoint one member to the council to serve as Chair.
4. The Executive Office of the Governor shall provide administrative support to the Council. Members of the Council shall receive no compensation for their service.

This executive order shall take effect upon signing and shall rescind Executive Order No. 5-92.

Witness my name hereunto subscribed and the Great Seal of the State of Vermont hereunto affixed at Montpelier, this 30th day of March, 2011.

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Peter Shumlin, Governor

By the Governor:

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Alexandra MacLean, Secretary of Civil and Military Affairs

Executive Order No. 01-11

STATE OF VERMONT  
EXECUTIVE DEPARTMENT  
EXECUTIVE ORDER NO. 05-16

[Climate Change Considerations in State Procurements]

WHEREAS, climate change is the most urgent environmental issue of our time;

WHEREAS, cultivating a “green economy” in Vermont has led to the creation of over 1,400 new clean energy jobs in the past year and Vermont now has the highest number of per capita clean energy jobs of any U.S. state;

WHEREAS, the State has the duty to lead by example and encourage companies to promote and utilize best practices that are consistent with our efforts to reduce emissions and move to clean energy in Vermont;

WHEREAS, the legislature has expressed a strong policy in support of combatting climate change by: (a) setting goals of producing 25 percent of energy consumed in Vermont through the use of renewable energy sources by 2025, 10 V.S.A. § 580(a), and of reducing by 75 percent greenhouse gas emissions in Vermont from the 1990 levels by 2050, 10 V.S.A. § 578(a); and (b) adopting an innovative renewable energy standard with Act 56 of 2015 that sets utility renewable targets and implements solutions to address carbon emissions from the transportation and heating sectors, which account for more than two-thirds of Vermont’s carbon emissions;

WHEREAS, Vermont’s 2016 Comprehensive Energy Plan calls for a reduction in per capita energy use of 15 percent by 2025, and calls for 90 percent renewables by 2050; and

WHEREAS, Vermont can encourage additional action on climate change through the state procurement process.

NOW, THEREFORE, BE IT RESOLVED that I, Peter Shumlin, by virtue of the authority vested in me as the Governor of the State of Vermont, do hereby order and direct the Secretary of Administration, in consultation with the Climate Cabinet, to include processes in the State’s acquisition policies that ensure the favorable consideration of vendor business practices that promote clean energy and take action to address climate change. The Secretary may set a minimum financial threshold for application of these policies, and the policies shall include consideration of practices such as:

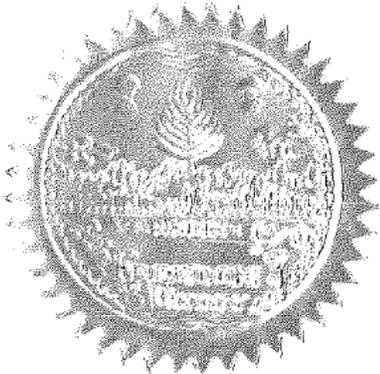
- (1) Use of thermal and electric efficiency and conservation measures;
- (2) Use of renewable energy sources for its operations;
- (3) Efforts to reduce and track carbon emissions;
- (4) Use of and encouragement of employee use of electric and zero emissions vehicles including providing workplace charging stations;
- (5) Offering employees an option for a fossil fuel divested retirement account;

- (6) Whether the supplies or services offered promote waste, energy and water efficiency; and
- (7) Other factors deemed relevant by the Secretary relating to environmentally responsible practices.

After consideration of all relevant factors, a bidder that adheres to the above best practices shall be given favorable consideration in the competitive bidding process. Favorable consideration shall be consistent with and not supersede any Secretary of Administration guidance that, all other considerations being equal, preference will be given to resident bidders of the State and/or products raised or manufactured in the State.

This Executive Order shall take effect upon signing.

Dated July 19, 2016.



A handwritten signature in black ink, appearing to be "Peter Shumlin", written over a horizontal line.

Peter Shumlin  
Governor

Executive Order No. 05-16

STATE OF VERMONT  
Executive Department

Executive Order  
[Vermont Housing Council]

WHEREAS, decent and affordable housing is a basic need of all Vermonters and an important component of a viable economy;

WHEREAS, there exists a significant and growing need among Vermonters to secure safe, decent and affordable housing, especially for families and those with low incomes;

WHEREAS, federal funds for housing have been substantially reduced and state and local housing resources remain limited;

WHEREAS, the price of unregulated fuels poses a threat to the sustainability of Vermont's affordable housing stock and state policy requires investment in energy efficiency and renewable energy;

WHEREAS, the continued development of affordable housing involves myriad barriers that must be considered and evaluated so that affordability is achieved and maintained;

WHEREAS, the preservation of affordable housing at risk of loss as a result of deterioration or conversion is a state priority;

WHEREAS, Vermont's role in the promotion of permanently affordable housing is recognized internationally; and

WHEREAS, cooperation and collaboration among state and federal agencies and housing providers is necessary to implement the state's housing policy.

NOW THEREFORE, BE IT RESOLVED THAT I, Peter Shumlin, by virtue of the power vested in me as Governor, do hereby order as follows:

1. The Vermont Housing Council is formed to coordinate and oversee implementation of the state's housing policy, to evaluate housing services and initiatives, and to be a resource to housing providers in their efforts to supply decent and affordable housing to Vermonters.

2. The Commissioner of the Department of Economic, Housing and Community Development (or designee) shall serve as chair of the Council. Other members shall include representatives of the Vermont State Housing Authority, the Vermont Housing Finance Agency, the Vermont Housing and Conservation Board, the Vermont Association of Public Housing Directors, the United States Department of Housing and Urban Development, the United States Department of Agriculture, the Vermont Agency of Human Services, the Vermont Department of Public Safety, and the Division for Historic Preservation of the Agency of Commerce and Community Development. Appointees shall serve at the pleasure of the agencies they represent. The Governor shall also appoint community members to represent each of the following interests: a statewide nonprofit housing developer, a regional nonprofit housing provider, a private sector

housing provider, and a low-income advocate. These four community members shall each serve two-year terms beginning February 1 in odd-numbered years, and until their successors are appointed and qualified.

3. The responsibilities of the Vermont Housing Council shall include, but not be limited to:

- a. reviewing and analyzing available information and data on housing resources and related issues including housing, energy and transportation costs for low and moderate-income Vermonters as well as credit availability, foreclosures, regional development trends, and coordination between housing and services;
- b. recommending initiatives to increase the supply of smart growth sites for affordable housing, seeking the elimination of regulatory barriers for affordable housing and promoting the development of resources for such housing;
- c. considering innovative private/public partnerships and initiatives designed to create and maintain housing opportunities for low-income Vermonters;
- d. providing an organized forum for the discussion of affordable housing issues and to propose reasonable solutions;
- e. recommending models of partnership among housing and human service providers to implement supportive housing solutions that alleviate homelessness, and reduce recidivism and institutionalization;
- f. recommending policies to the governor and congressional delegation that can improve Vermont's access to resources, housing quality and affordability; and
- g. establishing subcommittees to address specific issues and develop recommended solutions.

4. The Council shall be attached to the Department of Economic, Housing and Community Development for administrative support. To the extent funds permit, community members shall receive reimbursement of expenses and a per diem pursuant to 32 V.S.A. §1010(e).

This Executive Order shall take effect upon signing and rescinds Executive Order No. 02-95 (codified as Executive Order No. 33-10).

Dated this \_\_\_\_ day of June, 2011.

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Peter Shumlin, Governor

Executive Order No. 08-11

## Summary

Advanced wood heating (AWH) represents a tremendous opportunity to transition Vermonters from petroleum-based heating systems, keep Vermont's heating expenditures local, and supporting the working landscape while reducing Vermont's greenhouse gas emissions. Upfront capital investment requirements and the fluctuating (currently low) price of petroleum heating fuels present major hurdles to achieve the State Wood Energy Team's goal for wood to provide 35% of Vermont heating by 2030.

To reach this public policy priority, the State must develop tools for Vermonters to overcome the economic challenges. Doing so will lead to an immediate and sustained positive impact on Vermont's economy. The most pressing need is the development of long-term, sustainable funding and financing incentives to enable Vermonters to switch to AWH. The recommendations contained below reflect both a 2018 Legislative Session step and a mid-to-long-term need:

- School Construction Aid for AWH Projects.
  - 2018 Legislative Session: We recommend the Governor commit available capital funds through the Capital Bill Budget Adjustment process for the FY18/19 Capital Bill to school AWH projects and work with the legislature to make necessary statutory changes to develop a long-term funding process for school AWH projects.
  - Mid to Long-Term: We recommend the Governor work with the Legislature to create the sustained, long-term funding process for school AWH projects.
- Residential and Commercial AWH Projects.
  - 2018 Legislative Session: We recommend the Governor commit available resources, through the FY18 Budget Adjustment and/or FY19 Budget, to continue existing AWH incentives as they are due to run out of funds within the next six months.
  - Mid to Long-Term: We recommend the Governor develop a sustained commitment to AWH incentives for residential and commercial projects.
- Residential Woodstove Change Program.
  - 2018 Legislative Session: We recommend the Governor commit available resources, through the FY18 Budget Adjustment and/or FY19 Budget, to restart the State's woodstove changeout program.
  - Mid to Long-Term: We recommend the Governor develop a sustained commitment to AWH incentives for residential and commercial projects.

These recommendations do not reflect the totality of action needed to achieve Vermont's AWH goals, but they reflect the immediate actions needed to maintain momentum for Vermont's transition to AWH. We

have included the mid to long-term recommendations in this section, so it's clear that we are aiming toward a sustained commitment, rather than relying on one-time investments. By July 2018, the Commission will likely add additional recommendations to move AWH forward.

## Background

The 2016 CEP identifies thermal energy from wood heat as a critical way for Vermont to reach its 90% renewable energy by 2050 goals. Both the 2016 CEP and the Vermont Working Lands Enterprise Board's (WLEB) Forest Sector Systems Analysis identified wood energy as a priority area for economic development and a vital component in meeting Vermont's goal of obtaining 90% of our total energy needs from renewable sources by 2050. Replacing fossil fuel heating systems with modern wood heating systems will benefit local businesses, the forest product economy and Vermont forest landowners by ensuring a sustained demand for forest products and keeping funds local rather than supporting overseas economies.

In collaboration with the SWET, the Biomass Energy Resource Center (BERC) at VEIC is currently working on a draft Roadmap to lay out what 35% heating share by 2030 looks like. The project is still in draft form and has analyzed several pathways. One pathway suggests that Vermont will need to install 70,000 pellet stoves, 11,000 residential AWH systems, 2,700 commercial and institutional pellet boilers, and 280 woodchip boilers. As of 2016, Vermont only had 377 residential AWH systems, 100 commercial and industrial pellet boilers, and 62 woodchip boilers. Vermont needs a sustained effort to reach this goal the 35% by 2030 goal.

According to the 2016 Baseline Assessment by BERC and the CEDF, 38% of Vermont homes heat at least in part with wood. Overall, Vermont currently produces approximately 21% of its heat from wood (See Figure 1).<sup>1</sup> Wood has historically been burned in indoor wood stoves and outdoor cordwood boilers, which require significant effort to maintain proper home heating. Modern wood pellet stoves, pellet boilers, and chip boilers are either automatic or semi-automatic and are significantly easier to own and operate than previous options. Unfortunately, approximately a third of Vermont's wood-based heating comes from outdated, inefficient stoves and boilers.<sup>2</sup>

The value to Vermont of achieving that goal is significant, however. For instance, if we reach meet this goal:

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<sup>1</sup> Wood Heating in Vermont, A Baseline Assessment for 2016. Prepared for the Vermont Department of Public Service Clean Energy Development Fund by the Biomass Energy Resources Center at VEIC (2017)

<sup>2</sup> From the 2015 Vermont Residential Fuel Assessment

([http://fpr.vermont.gov/sites/fpr/files/About\\_the\\_Department/Library/Library/FINAL\\_2015%20Residential%20Fuel%20Assessment%20Report.pdf](http://fpr.vermont.gov/sites/fpr/files/About_the_Department/Library/Library/FINAL_2015%20Residential%20Fuel%20Assessment%20Report.pdf))

- Vermonters will displace the equivalent of 40 million gallons of heating oil. Reaching the goal would avoid approximately \$75 million leaving Vermont's economy every year because of heating expenses.<sup>3</sup>
- Up to 580 new jobs will be created by Vermont businesses.<sup>4</sup>

An AWH future that utilizes both advanced woodstoves and whole building systems has the potential for significant greenhouse gas and other air pollution reductions. Switching from fuel oil to a pellet boiler can lead to an 82% reduction in greenhouse gas emissions.<sup>5</sup> AWH systems do produce more particulate matter air pollution than fossil fuel equivalents, but AWH systems produce considerably less than outdated wood burning models, so transitioning to cleaner burning systems can yield significant air quality benefits. .

In 2014, Vermont launched the SWET to grow Vermont's use of wood energy, working on a number of focus areas. The SWET is a collaboration of the Vermont Department of Forest, Parks, and Recreation; the U.S. Forest Service; the Vermont Public Service Department's Clean Energy Development Fund (CEDF); Renewable Energy Vermont; the Biomass Energy Resource Center; the Vermont Superintendent's Association's School Energy Management Program, and Housing Vermont.

The SWET has made progress toward the 2030 goal: in coordination with the CEDF, the SWET has provided funding for a number of advance wood heat conversions; produced a database for conversion opportunities in schools and multi-family affordable housing; produced a pair of guidebooks for conversions in the above facilities; and provided technical assistance in the form of pre-feasibility studies and engineering reviews. REV's *5 Year Action Plan*, funded by the SWET, has set a course for the industry to advance the update of modern wood heat.

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<sup>3</sup> This is a conservative figure calculated with the assumption that the price of fuel oil will return to \$3.00 a gallon and that 341,463 tons of pellets (at \$319 per ton) would be needed to offset the BTU requirements of the fuel oil. According to BEREC's analysis, only 22 cents of every dollar spent on fuel oil stays in Vermont's economy as opposed to 80 cents per dollar for wood heat (Heating the Northeast with Renewable Biomass, A Vision for 2025, 2010, [https://www.biomassthermal.org/resource/pdfs/heatne\\_vision\\_full.pdf](https://www.biomassthermal.org/resource/pdfs/heatne_vision_full.pdf) p.35, based on EIA data). Given that many larger users in Vermont are burning wood chips, which are significantly less expensive than pellets, the amount will likely be considerably higher.

<sup>4</sup> According to one scenario for reaching the 35% by 2030 goal developed in the Draft BEREC Roadmap

<sup>5</sup> See page 5 of the Biomass Energy Resource Center's, "Summary of Carbon Emission Impacts of Modern Wood Heating in Northeastern US," <http://www.biomasscenter.org/pdfs/veic-carbon-emission-and-modern-wood-heating-summary.pdf>

**Vermont Advanced Wood Heating Sector**



\$12 Million in Annual Benefits



64 Full-time Jobs



8 Million Gallons Displaced Annually

**Total Wood Heat in Vermont**



\$205 Million in Annual Benefits



1,088 Full-time Jobs



68 Million Gallons Displaced Annually

Advanced Wood Heating Sector in Vermont		All Wood Heat in Vermont	
Operational pellet mills in 2016	2	Homes heated in part with wood	96,951
Expected operational pellet mills in 2018	4	Homes heated in part with wood	38%
Combined capacity of pellet mills in 2016 (tons/year)	37,500	Firewood burned (cords/year)	347,000
Combined capacity of pellet mills expected in 2018 (tons/year)	84,500	Average firewood consumption per household (cords/year)	3.6
Residential systems installed to date	377	Households with pellet heating appliances	31,051
Commercial/institutional systems installed to date	162	Households heated in part with pellets	12%
Bulk pellet fuel consumed by Vermont systems (tons/year)	8,000	Bagged pellets burned (tons/year)	138,530
Woodchip fuel consumed by Vermont systems (tons/year)	79,000	Bagged pellets produced in Vermont burned in Vermont (tons/year)	6,000
Percent of total heating	2%	Percent of total heating	21%

Figure 1 Biomass Energy Resource Center, 2016 Baseline Assessment

**Current Condition**

Major impediments to the greater use of advanced wood heating include the upfront cost and payback of these systems under current low fossil fuel prices and misunderstandings about the ease of operating these systems. The carbon benefits of switching to wood heat are often not emphasized as a climate benefit in the minds of consumers.

According to the draft BERC Roadmap, if we continue with business as usual, we will not achieve even half of our goal.

The closing of paper mills throughout the Northeast has led to a low-grade wood market crisis. Without outlets for low-grade wood, there is heightened risk for irresponsible harvesting or no harvesting at all, which leaves forestland vulnerable to development, and our forest products economy vulnerable to atrophy. Recent data have documented a decline in forested acres for the first time in more than a century. While small, the trend has important climate change implications. Currently, over 50% of our GHG emissions are sequestered by our forests. Keeping forests forested is an essential climate mitigation

strategy.<sup>6</sup> The advancement of modern wood heat can be a part of filling the financial hole left behind by these mill closures. Residential fuelwood already accounts for roughly 1/3 of wood harvested annually from Vermont's forests.<sup>7</sup>

**Barriers to 2030 Goal:**

The main barrier to adoption of these technologies is the upfront cost, particularly when the price of oil is so low. A residential automatic pellet boiler, including installation, costs between \$15,000 and \$20,000, before incentives. A propane boiler by comparison typically costs between \$5,000 to \$8,000. While price trends demonstrate that over the lifetime of the appliance a pellet boiler will save the owner money, when the price of oil is as low as it is now, the ROI is substantially longer, making that initial investment a difficult one.

Vermont maintained an effective program that helped school districts switch their buildings to advanced wood heat. Since 2007, a moratorium on school construction aid has existed. Since that time, eligibility has been limited to school consolidation projects and the state's cost-share has been decreased. Since 2007, only one school district has taken advantage of that program.

The current state-wide incentives available are:

- \$2000 from Efficiency Vermont for an automatic pellet boiler or furnace
- \$3000 flat rate or \$1.25/square foot custom incentives from the Clean Energy Development Fund – but this program's funds are likely to run out in the next 3-6 months

There are additional region-specific incentives available through:

- Windham Wood Heat - Public schools, municipal buildings, and public serving institutions within Windham Country are eligible for assistance with feasibility studies, engineering, and 25% cost share.
- CEDF Rutland Wood Stove Changeout Program - This program uses federal CEDF-ARRA funds. It will offer a changeout incentive program that could include low-cost financing, for low-income households in Rutland who also participate in a home efficiency audit.
- Windham County Low-income Pellet Heat Program – Windham and Windsor Housing Trust will offer low (and some moderate) income homeowners incentives to install new pellet heating systems

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<sup>6</sup> The basis for GHG sequestration benefits for Vermont's sequestration estimate comes from

<sup>7</sup> From the 2015 Vermont Residential Fuel Assessment

([http://fpr.vermont.gov/sites/fpr/files/About\\_the\\_Department/Library/Library/FINAL\\_2015%20Residential%20Fuel%20Assessment%20Report.pdf](http://fpr.vermont.gov/sites/fpr/files/About_the_Department/Library/Library/FINAL_2015%20Residential%20Fuel%20Assessment%20Report.pdf))

and/or change out old non-EPA certified stoves. Low-cost financing of the pellet stoves/systems will be available.

The most recent stove changeout program was immensely popular; the \$300,000 program was depleted within five months. Non-EPA certified wood stoves that were in use were eligible for the program. The incentive ranged from \$500 to \$1500 depending on the particulate emissions of the new stove being purchased. Both EPA-certified pellet and cordwood stoves were eligible for rebates.

The Department of Forests, Parks & Recreation recently hired a Wood Energy Coordinator to help advance wood heat in the state in collaboration with the SWET. The position is grant funded for 3.5 years and the grant deliverables mirror the goals in the CEP.

A second barrier is a general negative perception surrounding the cutting and burning of trees that is largely due to a misunderstanding of the sustainability of the forest economy. The subcommittee supports the work of Forest, Parks, and Recreation's new Wood Energy Coordinator to address many of these concerns.

A third barrier is a lack of awareness of the recent technological advancements in fully automatic pellet boilers. The concept of fully-hands-off wood heating is hard for people to comprehend as the conventional wisdom has been that burning wood as fuel can save money but it is a lot of work and inconvenient. At least two conventional fuel dealers have already invested in bulk pellet delivery trucks.

### **Proposed Change Process/Mechanism**

The specific recommendations addressed in the summary require legislative/budget action in order to be successful in the near and long-term. Beyond those recommendations, the Commission recommends the following actions and prioritization and their associated change process mechanism(s):

- The Governor and the Legislature should continue to support the State Wood Energy Team in its effort to expand the use of advanced wood heat through marketing, education, research, procurement standards, and partnerships. The SWET is currently funded by a grant from USDA Forest Service that is due to expire in the summer of 2018. The SWET members plan to continue to work beyond the grand funding has expired, but new funding would ensure continued full capacity.
- Once additional funding is secured, priority should be given to institutional systems and larger facilities, especially those with distributed heating needs. Examples include ski areas, multi-family low-income housing, health care facilities, and larger academic institutions. In these cases, funding should be made available for planning and design. Numerous successful examples of this "campus-

wide” approach could be used to promote the multiple, long-term benefits, despite currently low fuel prices.

- The Governor and his administration should provide support for the recommendations that come forth from the Public Service Department-led Clean Energy Finance Collaborative related to expanding Vermonters access to capital for clean energy and energy saving expenditures. Reasonable financing rates and ease of securing financing are critical to enabling Vermonters to easily transition to cleaner fuels, including AWH.
- The Governor and his administration should expand and/or establish workforce development programs to support the need for a growing AWH installation, maintenance, and repair workforce. Some of these programs may require legislative action and/or funding, but some programs, such as apprenticeship programs, are coordinated outside of the legislative process.
- The Legislature should consider whether current Tier III goals under Act 56 will lead to AWH transitions. Establishing specific AWH targets for utilities to meet should be considered in that review.

## **Barriers to Implementation**

There are a number of barriers to the goals as laid out in the 2016 CEP and by the SWET. The proposed changes the Commission recommends would work to begin to address many complicated and multi-faceted challenges. The Commission has proposed immediate actions that can begin to address these challenges along with recommending sustained efforts to facilitate successful achievement of the 35% by 2030 AWH goal.

The recommendations have primarily focused on addressing the economics of the transition to great AWH as addressing that issue is fundamental to achieving success. However, it is not sufficient. The financial package must be tied to education, technical assistance, and leadership by example. The new DFPR Wood Energy Coordinator and SWET represent “in-place” capacity to move these objectives forward. Continued support for the work the SWET is critical to success as they are analyzing and working towards addressing all the barriers.

## **Action Plan**

The Commission recommends the Governor follow its short-term recommendations. Further, in order to meet the mid-to-long-term recommendations, the Commission recommends that the Governor request the SWET to develop a funding plan to reach the 2030 goal.

The Commission stands ready to be a facilitator in the conversation to advance AWH, and it will continue to dig into the impediments to making the transition over the coming months.

**Subcommittee**

Agriculture/Forestry/Industry/Waste

**Members**

Peter Walke, Paul Costello, Robert Turner, Marie Audet, and Tom Donahue

DRAFT

## Summary

Existing buildings create 24% to 35% of the total greenhouse gas emissions (GHGE) in Vermont. Existing buildings will represent the majority of the buildings in 2028. Reduction in energy use in existing buildings will cut carbon, create construction jobs expanding the economy and increase affordability for Vermonters.

## Background

The Department of Energy estimates that buildings consume 76% of electrical energy and 40% of all energy use. Heating, Ventilation and Air Conditioning (HVAC) accounts for 35% of that energy use. Buildings are sophisticated, integrated and interrelated systems. Increasing thermal efficiency needs to be done in concert with moisture management, air quality and occupant comfort. In addition to weatherization opportunities include higher efficient HVAC equipment, thermal storage and more cost effective energy sources. Information and communication technology (ICT) or smart buildings can further reduce energy use by improving efficiency and educating end users. Retrofits also need to consider qualitative measures like historic preservation, resilience, daylighting and overall quality of the interior space.

Existing home Retrofits that meet Home Performance or ENERGY STAR® standards are estimated to reduce energy use by 20% to 30%. A “Deep Energy Retrofit” is estimated to achieve 50% to 60% reduction in energy use. Existing Vermont building energy programs are seeing an average 20% reduction in fuel use for an average \$8,500 investment.

Unfortunately the cost to retrofit existing buildings is generally not financially justified based upon operational savings alone. Similarly the resulting increase in building value is not sufficient on its own to provide collateral for debt to finance the investment.

## Current Condition

What does the current system look like?

- Commercial & Residential Energy Building Codes apply to new construction, portions of existing buildings that are renovated and entire existing buildings where renovations exceed 50% of value.
- Commercial and Residential energy certification is require through zoning but only for towns that have a certificate of occupancy requirement. This is only reaching a small minority of projects and generally only commercial projects.
- Downtown Tax Credits – 50% up to \$30,000 for technology credit could apply but there are no credits for thermal upgrades specifically.

- PACE program – allows towns to set up a program for energy improvement debt to be paid through the property’s town taxes. It has not been widely successful.
- Existing weatherization programs are conducted by four organizations and there is a state sponsored loan program, which is transitioning to Efficiency Vermont. These programs are retrofitting at a rate of approximately 20% of the current goal. Other retrofits occur privately that are not currently tracked or checked for quality and therefore the rate of improvement from a policy perspective is not fully understood.
- Existing electrical surcharges for efficiency are restricted to electrical efficiencies and cannot be invested in thermal. The fuel taxes that are assessed will decline over time as fuel sources transition from oil to electric.

#### Why is a change needed?

Vermont cannot meet emission goals or affordable housing without addressing existing building stock. A goal of retrofitting 80,000 units by 2020 was established in 2008. A 2015 report by the VT Public Service Board indicated that current programs have only retrofitted 20,000 units at an average of 2,000 units per year. The “Heat Saver Loan” program is currently funding approximately 150 units per year. Retrofits of 6,000 to 10,000 units per year are needed to meet current goals.

Full compliance with current energy codes are needed to ensure that new construction is not adding to the GHGE challenge and buildings that are renovated are improved. If 6,000 homes per year are renovated at \$10,000/unit we need to spend \$60MM/year. If 50% of the commercial floor area is retrofitted by 2028 we would need to renovate 7.5% or xxxx sf per year. At \$1/sf the commercial sector would spend \$xxMM per year. These efforts could achieve approximately a 6% to 10% net reduction in GHGE.

#### **Proposed Change Process/Mechanism**

Is this a legislative change, re-allocation of existing resources, leveraging existing programs?

Policy and Code Changes:

- Create a Building Energy Grading System from A to F and require failing grades to upgrade in order to sell or rent.
  - This would create an imperative for the worst existing buildings to be improved. Current barriers include up front capital requirements and insufficient return on investments.
  - Rating would be based upon actual performance like BTU/Sf but adjusted for renewable fuel sources and process energy use.

- Building owners would have time to upgrade, capital investment could occur at the time of realizing any capital gains.
- The market would start to attribute value to the energy grade helping with appraisals and loans.
- User awareness would increase which has been shown to reduce energy use by up to 2%.
- Inspections and improvements at the time of sale are not uncommon.
- Buyers would have a greater awareness of the ultimate cost of owning or renting.
- The state would have better data to understand the current status of this large contributor to GHGE.
- Compliance with the current energy code
  - The building energy grade would catch non-compliant buildings regardless of certification enforcement.
  - The grade is based upon actual energy use and not the basis of design and compliance with construction.
  - The marketplace would determine the method of retrofit that is most effective if a building has a failing grade.
- Scale-up current participating organizations in weatherization. Four organizations and the Heat Saver loan Program provide technical assistance and Capital to low income residents and other owners. The following are the programs and current average units/year retrofitted:
  - Efficiency Vermont (940 units/yr)
  - Efficiency Vermont/3E Thermal (256 units/yr)
  - Vermont Gas Systems (250 units/yr)
  - VT Weatherization Assistance Program (1,460 units/yr)
  - Heat Saver Loan Program (150 units/yr)

#### Capital

- Modify the downtown program to create an incentive for thermal retrofits.
- Use the existing fuel tax receipts to create a state bond to fund scaling up the current programs for low income Vermonters and debt for working class owners.
- Remove the electrical surcharge restriction. Much of our electrical use is now thermal related through HVAC equipment.
- Create a “Warm Home” Program
  - 1 in 5 Vermonters spends 10% of monthly income on energy
  - “Warm Home” bonds could fund \$100,000,000 over the next three years or 10,000 homes
  - Warm Home bonds could use \$7.25M in gross receipts tax now directed to the WX program to fund a 20-year revenue bond

- Bond proceeds are flexible to allow weatherization organizations and contractors to ramp up in 2018, bulk of work in 2019, and ramp down in 2020

#### Education

- Contractor, design, legal and real estate industry
- Marketing and education to end users
- Behavior changes in users

### **Barriers to Implementation**

- The cost to retrofit will likely not be financially justified based upon operational savings alone.
- The resulting value of the property will not be increased sufficient to justify the investment.
- Finding and training workers for the building retrofit industry

#### What are desired outcomes of creating a change?

- Scaling up the number of units that are retrofitted will create more green jobs and spur economic activity. A \$60MM to \$100MM annual retrofit expenditure would create 700 to 1,000 new jobs statewide.
- The most vulnerable Vermonters would qualify for subsidy through the bond program and the scaling up of the existing weatherization programs.
- Working Vermonters would have access to loans through the Heat Saver Loan program which leverages \$7 for every \$1 of state investment.
- All Vermonters living and owning buildings in the future would have lower operational costs and be more resilient to rising fuel costs in the future.

#### What will be the results of this change [use metrics, if possible]?

### **Action Plan**

What the specific next steps? Who, What and When

Can include – target dates for implementation, re-allocation of existing resources, addressing data gaps, solutions for ongoing implementation support.

**Subcommittee**

**Members**

DRAFT

## Summary

Carbon pricing has been the solution to combat climate change most often proposed by members of the public during the listening sessions and in public comments to the commission. Whether a carbon pricing system would be sustainable for Vermont and meets the Governor's goals is unclear. The Vermont Climate Action Commission recommends a full, independent and sufficiently funded study that would examine the potential effects of various carbon pricing policy approaches in Vermont. This would help clarify whether a carbon pricing policy would be viable in Vermont.

## Background

Discuss pertinent information to provide context. Examples could include brief history, purpose, case study, organizations involved, stakeholder groups, etc..

During our public scoping sessions and public comment period, we heard over 275 people discuss a carbon tax, far surpassing the second-most discussed issue at just under 70 people.

There have been mixed responses to carbon pricing and different claims as to its viability in Vermont. While we don't think that we have enough information to decide on the suitability of a carbon tax, we do believe there has been sufficient interest in this topic to warrant an independent study.

## Current Condition

Currently we don't believe there is sufficient information about carbon pricing in Vermont. While there are many examples worldwide of carbon pricing, every region is different so we can't compare Vermont to any nation, province, or state. We need independent research to understand how best to move forward.

There have been many greenhouse gas reduction efforts – and successes – in the greening up of our electric sector. In fact, Vermont enjoys one of the cleanest electric grids in the region. This sector will ideally get even cleaner as utilities are required to increase renewable procurement and fossil-fuel reduction to meet the mandatory Renewable Energy Standard. The main areas of focus are therefore reducing carbon pollution from heating and transportation, which are Vermont's two biggest greenhouse gas-emitting sectors.

This proposal explores carbon pricing which would impact these sectors, whether positively or negatively.

## Proposed Change Process/Mechanism

Is this a legislative change, re-allocation of existing resources, leveraging existing programs?

The study should be undertaken by the independent Joint Fiscal Office. Possible policies that the office would explore should include expanding the Regional Greenhouse Gas Initiative to cover transportation and heating, joining the Western Climate Initiative, implementing the Economy Strengthening Strategic Energy Exchange (ESSEX) plan and in particular proposals recommended by community action agencies or low-income advocates.

The parameters and focus of the study should be informed by key constituencies, including community action agencies that represent the interest of the most vulnerable Vermonters. The study should be structured to help answer the following four goals:

- a. Grow the Vermont economy
- b. Make Vermont an affordable place to live, work, and do business
- c. Protect vulnerable Vermonters
- d. Substantially reduce greenhouse gas emissions.

#### Barriers to Implementation

What are desired outcomes of creating a change?

What will be the results of this change [use metrics, if possible]?

Desired Outcome: A comprehensive, full, and independent study about the viability of various types of carbon pricing in Vermont.

Results: Evidence for whether or not Vermont should pursue a carbon pricing policy of some sort.

#### Action Plan

What the specific next steps? Who, What and When

I believe this is addressed under “Proposed Change Process/Mechanism” above.

#### Subcommittee

Education, Outreach, and Communication

#### Members

Tom Donahue, Michele Boomhower, Marie Audet,  
Johanna Miller, Liz Gamache, Harrison Bushnell

## Summary

The proposal aims to add new capacity within state government – or redirect existing – to specifically and fully focus on climate mitigation solutions, with a particular focus on identifying and further expanding the economic development opportunities responding to climate change offers. Specifically, the proposal is to establish a “Climate Czar;” a high-level/cabinet-level position in state government focused on helping identify, shape and seize the job-creating potential of reducing greenhouse gas emissions and reducing reliance on imported fossil fuels. The position would serve as a foundation for a longer-lasting state “backbone” to help coordinate state agency efforts and foster pivotal private partnerships to expand Vermont’s climate change economy.

## Background

There is tremendous interest in – and growing momentum behind – building a thriving climate economy in Vermont. Policies, programs and political leadership to date have helped ignite a strong clean energy job sector in the state, such that it is one of Vermont’s fastest growing sectors. There is broad support for expanding clean energy job opportunities far more, and it’s a specific priority for Governor Phil Scott, who is seeking specific strategies and approaches that will spur more economic activity in this arena and inspire and grow Vermont businesses. A deeper, more intentional and multi-faceted focus on this could also help to attract and retain young people to live and work here, as well as inspire entrepreneurs to locate and innovate here.

## Current Condition

There is good work happening in the clean energy innovation space already – with strong businesses, utility leadership and good policies that have helped nurture and grow this sector. There are also many job training and workforce development programs and opportunities that exist. That said, there’s some serious gaps – and lost opportunity – because there are myriad programs, but many are not coordinated, well known, easy to access etc. There is also room for improvement in terms of focusing existing – or expanding new programs – to support and grow the clean energy sector in particular. There is opportunity for a deeper, more coordinated and more intentional focus on expanding green jobs and using it as a more powerful force for reducing the state’s greenhouse gas emissions. That includes helping Vermont businesses and prospective employees have an easier, better understanding of the programs and resources that currently exist, as well as identifying any gaps in existing programs that could be filled – or new programs created – to build and expand this market in Vermont. There is a need for and opportunity in adding more capacity to specifically focus on this important work.

## Proposed Change Process/Mechanism

No legislative action would be required. The position could be established and funded by a re-allocation of existing resources, an expanded or full refocus of existing personnel or paid for by new

funds. This “Climate Czar” position would be housed at the Agency of Natural Resources but tasked with closely coordinating with the Agency of Commerce and Community Development in particular, as well as with other state agencies, including the agencies or departments of Labor, Transportation, Public Service, Health and Buildings and General Services.

The first, fundamental focus/task of this new position would be to undertake or round out an analysis of the programs, resources, grants etc that currently exist that are focused on clean energy job creation and workforce development for this sector in particular. This should include collaborating with and building upon the efforts/analysis of the Vermont Workforce Development Board, as well as understanding and coordinating with programs and efforts underway in Vermont’s universities, community colleges, technical centers, Department of Labor, and other workforce training programs. It should also include outreach to, collaboration and engagement of the private sector (the 11 regional nonprofit economic development agencies, Renewable Energy Vermont, chambers of commerce etc.) to explore ways to build from existing efforts underway, better understand their challenges, goals, needs, ideas etc. Ensuring there is a strong foundation of understanding of programs already underway will help to leverage existing programs, identify the gap(s) between existing programs and the green workforce needs and opportunities.

The person in this position should be tasked with specifically linking actions and efforts towards meeting Vermont’s climate and Comprehensive Energy Plan goals to help ensure one person is responsible for keeping track of progress towards meeting our targets. This person should also be tasked with exploring and helping to identify training, recruitment and placement programs for important constituencies, including low income and vulnerable Vermonters. This person should also track and work to align Vermont’s efforts with other complementary climate and economic development initiatives underway at the New England/regional level.

### **Barriers to Implementation**

We believe this is an important starting place for putting in place a systematic structure to help ensure efforts and opportunities are understood, coordinate and realized, as well as maintain focus and continuity on climate mitigation and job creation efforts at the state level.

Barriers? Re-directing existing funds or capacity to fill this higher-level position or finding new funds

### **Action Plan**

The VCAC recommends to the Governor to institute this position. The Governor could establish or task someone within the executive branch or the ANR to put together a proposal for:

- Identifying where the funding (existing or new) would come from.

- Crafting a detailed job description for this position (which could also serve as a position announcement) and setting out goals and metrics the person in this position would strive to meet.

Subcommittee

Education, Communication and Outreach

Members

Johanna Miller, Liz Gamache, Harrison Bushnell, Michele Boomhower and Tom Donahue

DRAFT

## 1. Summary

**Include a 2-3 brief sentence summary of the proposal.**

The Climate Economy Business Innovations Sub-Committee of the Climate Action Commission recommends a platform of Investment, Innovation, and Entrepreneurship - through tax incentives, tax treatment, expedited/prioritized permitting, and employee income tax treatment and education reimbursement for qualifying existing and new Vermont climate businesses designed to make the state a spectacularly attractive place for climate economy business enterprises to incubate, grow and prosper. Vermont can stand out as a state that rewards creative businesses that grow, locate and create jobs here, advancing greenhouse gas reductions, mitigation, sequestration, drawdown and adaptation while contributing to renewed prosperity for Vermonters. This proposal advocates that the State of Vermont provide a sustainable advantage for innovative climate economy businesses to choose to start up in Vermont, re-locate in Vermont, or grow in Vermont.

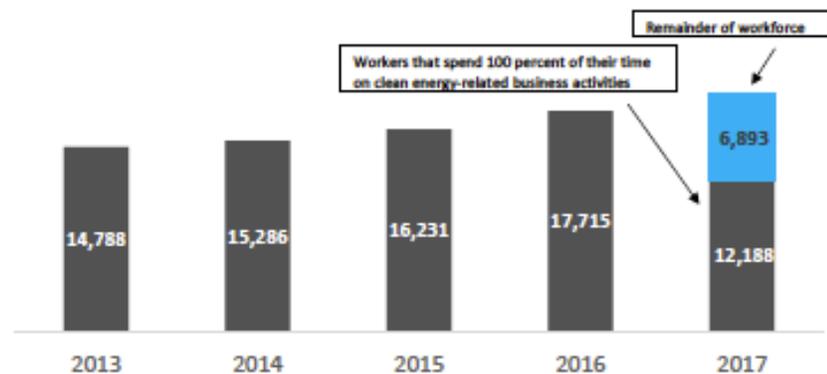
## 2. Background

**Discuss pertinent information to provide context. Examples could include brief history, purpose, case study, organizations involved, stakeholder groups, etc.**

Vermont may be small, but it is a center of rural innovation; it needs innovative businesses and clean jobs to encourage young people and young families to make their home here. Clearing a path for climate economy businesses will result in job creation in various climate economy sectors, including the following key sectors:

- Clean energy development and distribution
- Thermal and electrical efficiencies in buildings, workplaces, and homes
- Evolving public and private transportation systems
- Efficient building construction
- The working lands economy; farm and forest enterprises
- The recycling, reuse, and renewal of resources
- Building preservation and smart growth development
- Low-impact knowledge/innovation-based economic development: the digital economy, arts, and creative economy
- Outdoor recreation and tourism
- A broad set of economically significant aspects of almost all business and community life. The climate economy is a feature in all manufacturing, tourism, growth and development.

**Figure 3. Clean Energy Employment Growth, 2013-2017**



\* It is important to note that this technology breakdown is a rough estimate as some locations conduct work across multiple technologies and sub-technologies. In order to prevent double-counting, the distribution of establishments is assigned based on employer's self-selected primary major technology of focus.

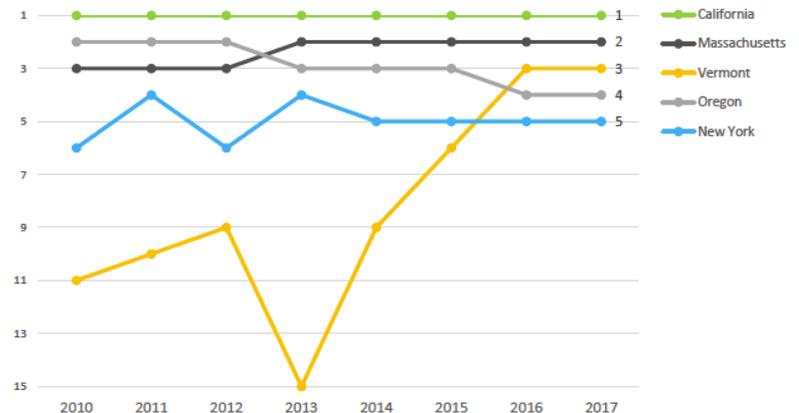
Vermont’s small size can prove an advantage in enabling the state to move quickly and boldly, and serve as a model for other states in championing innovation and entrepreneurship for tomorrow’s economy.

**Vermont Clean Energy Businesses and Jobs:** The clean energy sector is the fastest growing jobs sector in the state, reaching an all-time high in 2017 representing 6% of the State’s workforce (compared to just 2% for the nation).

Since 2013, clean energy employment has grown by 29%, which amounts to just over 19,000 jobs that are at least in part clean-energy related.

This means that about one in every 16 working Vermonters is employed in the clean energy industry. Of these workers, about 64% spend all their time on the clean energy related business activities, translating to roughly 12,200 “full-time” clean energy jobs. The state is now home to 3,751 establishments conducting clean energy work, and 18% increase since 2016. Importantly, more clean energy jobs means more customers for other Vermont businesses.

Figure 1. U.S. Clean Tech Leadership Index, Top Five States, 2010-2017<sup>4</sup>

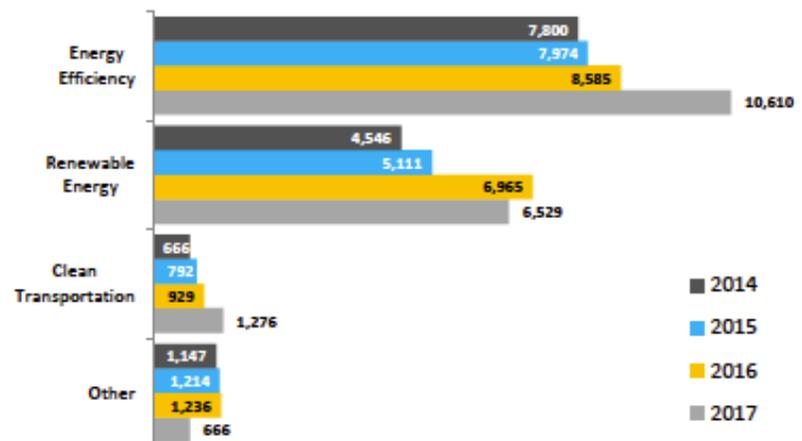


<sup>1</sup> U.S. Clean Tech Leadership Index (CleanEdge, Inc., May 2017)  
<sup>2</sup> 2017 State Energy Efficiency Scorecard (<http://database.aceee.org/state/vermont>)  
<sup>3</sup> Clean Energy Momentum Ranking State Progress, Union of Concerned Scientists ([www.ucsusa.org/EnergyProgress](http://www.ucsusa.org/EnergyProgress), April 2017)  
<sup>4</sup> U.S. Clean Tech Leadership Index (CleanEdge, Inc., June 4, 2016)

**Vermont as a National Leader:** Since the release of Vermont’s Clean Energy Report in 2014<sup>1</sup>, Vermont has continually bolstered – and tracked progress toward – a clear commitment to the clean energy economy. This is evident from the State’s rapid ascent in the US Clean Tech ad hoc Leadership Index, where it placed 15<sup>th</sup> in 2013, 9<sup>th</sup> in 2014, 6<sup>th</sup> in 2015, and 3<sup>rd</sup> in 2016 and 2017. Most recently, Vermont ranked second among all 50 states in the Clean Energy Momentum: Ranking State Progress report released in the spring of 2017. With this steady trajectory of progress in one segment of the climate economy, Vermont could build off this success by attracting new climate businesses and innovation.

**Defining Climate Economy Businesses:** Vermont currently tracks the number of businesses and jobs in several key sectors of the Climate Economy, but

Figure 5. Clean Energy Employment Growth by Technology, 2014-2017



<sup>1</sup> Clean Energy Development Fund. Clean Energy Industry Report 2017.

there is a need to further develop what is meant by climate economy businesses beyond the clean energy sector.

Currently, the principal subsectors that are tracked are:

- Energy Efficiency
- Renewable Energy Generation
- Clean Transportation

Much of the progress made in Vermont's clean energy landscape can be credited to the suite of policies and supporting programs identified in the 2017 Clean Tech Leadership Index, in which Vermont placed third in the country for the second year in a row.<sup>15</sup> Moreover, further accessibility in renewable energy procurement has been allowed through the various financial incentives put in place by the state and federal government. These include but are not limited to rebates, corporate tax deductions/credits, personal tax credits, and grant/loan programs.

### 3. Current Condition

**What does the current system look like?** Currently, there are incentives such as standard offer pricing for renewable energy or tax credits for weatherization, but these are not sufficient to stimulate the climate economy in Vermont to the scale needed to meet the challenge and the opportunity of climate change.

**Why is a change needed?** We need entrepreneurs, new ventures, and jobs that solve for both sound environment and sound economy for the ultimate sustainability of our state's population. At the same time, efforts to create climate ventures and jobs will help address inequality and be inclusive of the state's most vulnerable, by simultaneously addressing affordability and advancing an economy that provides for all.

Proposed Change Process/Mechanism

**Is this a legislative change, re-allocation of existing resources, leveraging existing programs?**

See Action Plan below.

### 4. Desired Outcomes, Barriers, and Metrics

**What are desired outcomes of creating a change and specific metrics to measure results?**

1. DESIRED OUTCOME: More good climate jobs in VT;  
BARRIERS: Fiscal – tax incentives will reduce revenues requiring shortfalls be made up elsewhere in short term. In the intermediate and long term, expanded economic activity and employment will increase tax revenues. Political - Rewarding one industry with preferred tax status may put pressure on leaders to expand these rewards to other industries;  
METRIC: Number of new climate jobs and average salaries.
2. DESIRED OUTCOME: Reduce effects of climate change and adapt;  
BARRIERS: Cost, affordability, disruptive economics and effects on vendors of fossil fuels and their employees.

METRIC: Reductions in GHG; Transformative Transportation System; Transformative Buildings; Renewables deployment/90% Renewable goal.

3. DESIRED OUTCOME: Growth in existing climate economy businesses in VT;

BARRIERS: See #1 above.

METRIC: Number and diversity of climate ventures and businesses in VT;

4. DESIRED OUTCOME: Development of new climate businesses in VT;

BARRIERS: See #1 above.

METRIC: Number of new climate businesses in VT.

## 5. Action Plan

### What are the specific next steps?

WHAT: Preferred Tax Treatment/Structure and Incentives for Climate Businesses and Employment

1. CAPITAL: Provide preferred capital gains tax treatment for Vermont climate economy businesses and investors. The purpose is to encourage investment in Vermont Climate Businesses.

HOW: Change tax policy so that in-state and out-of-state investors in VT climate businesses get preferred tax treatment. This would be particularly effective in line with a) a "Milk Money" financial market that allows smaller investments of regular Vermonters to spur business growth in the sector and b) other vehicles to draw external investment to Vermont businesses.

2. JOB GROWTH: Provide preferred corporate income tax treatment for VT Climate Economy Businesses that add new jobs in Vermont.

HOW: Climate businesses that create new climate jobs that contribute to GHG reductions would qualify (see the Background section above for a list of climate economy sectors) for preferred tax treatment with an X-year tax credit for increases in employment at a business.

3. INNOVATION: Build an R&D Investment Tax Credit for businesses that invests in creating and growing innovative new climate economy products in Vermont; encouraging them to grow and to keep creative job-force development infrastructure here.

4. PEOPLE: Make Vermont attractive for people in and out of state to live, grow, and be part of the Vermont climate economy. Employee incentives: A public/private partnership of state and businesses should be developed to provide student loan repayment and reduce the cost of higher education in fields supporting development of Vermont's climate economy.

HOW: Student Loan payment and repayment: Any person with a Vermont climate economy job would qualify for a partial loan repayment from the state with an employer match requirement of X%. Funding could be used to repay current loans or be taken as a credit for educational expenses in a climate economy field of study at a Vermont educational institution (modeled after AmeriCorps education awards). To qualify for loan repayment, employees would be required to be working in the climate field in Vermont for X years (5 years?,

no less than 3 and no more than 7). A study should be conducted to evaluate other potential incentives (tax or otherwise) to attract employees to these sectors in Vermont. Funding source TBD.

HOW: Climate employee state income tax incentive: Provide an income tax deduction for climate economy educational expenses. Funding source TBD.

5. **COMPETITIVE EDGE:** The purpose of this action is to support the growth of Vermont climate businesses (existing and new) by providing them with a competitive edge

HOW: Any state funded RFP which seeks climate solutions (from goods or services, such as building energy efficiency or road projects) would include a -X% bid adjustment for Vermont based climate businesses that support climate jobs and GHG reductions through their work.

WHO: Governor Scott; Legislature; VT Dept. of Taxes; Third party impartial panel like the Clean Energy Development Fund to set categories or even review applications for incentives from climate businesses?

**Can include – target dates for implementation, re-allocation of existing resources, addressing data gaps, solutions for ongoing implementation support.**

## 6. Subcommittee

R&D Subcommittee, but prefer “Climate Economy Business Innovation Subcommittee”

## 7. Members

Paul Costello, Subcommittee Lead, Vermont Council on Rural Development

Joe Fusco, Casella

Stuart Hart, University of Vermont

Adam Knudsen, Dynapower

Linda McGinnis, Energy Action Network

ANR Facilitator – Josh Kelly

Public attendee: Rick Wackernagel, Consultant and Climate Activist

## Summary

In order for Vermont's rural communities to both reduce their carbon footprint and to benefit from the climate economy, access to high-speed internet is a necessity. High-speed internet enables many things, including innovative ride sharing programs/apps, the ability to work remotely (and reduce VMT), and remote system monitoring, such as home fuel reserves (also reducing VMT).

## Background

In 2014, the Legislature set a long term goal of universal 100/100 Mbps speeds by 2024, which would essentially require a statewide fiber-to-home network. Currently there is no clear funding source available for reaching the goal.

The Vermont Department of Public Service is tasked (30 V.S.A. § 202d) with drafting a Ten Year Telecommunication Plan for Vermont, in coordination with the Agency of Commerce and Community Development, the Department of Health, the Department of Public Safety, the Agency of Agriculture and the Department of Education.

The 2017 plan is currently out for public comment.

## Current Condition

According to the FCC's 2015 standards, 30% of Vermont (*need to find out if this is for Vermont geographically or for Vermonters as in population*) lacks high-speed internet. Most of these areas are rural.

## Action Plan

Lend the voice of the Governor's Climate Action Commission to the high-speed internet cause. Make clear that access to high-speed internet is not just an economic issue, it's an environmental one as well. Still to be determined is what it is the Commission is endorsing and in what form/forum.

## Barriers to Implementation

Funding.

## Subcommittee

Rural Solutions Subcommittee.

**Members**

Mary Sprayregen, Bill Laberge, Bethany Fleishman, Peter Bourne

DRAFT

## Summary

Transportation is the single largest contributor to Vermont's GHG emissions of all sectors (47%). Electrification of this sector and expanding public transit options represent two of the most significant opportunities to help Vermont meet both its climate and energy goals (as defined by the Comprehensive Energy Plan). By placing a particular focus on rural and low/middle-income Vermonters, the Commission's recommendations help ensure that all Vermonters can benefit from the transformation of the transportation sector. The availability of the VW Settlement Funds provides a rare opportunity to jumpstart this transformation in a significant way.

**COMMISSION RECOMMENDATION:** Accelerate the electrification of the transportation sector by: i) promoting the widespread adoption of EVs; and ii) jumpstarting the transition of public transit and school buses from diesel to electric. **Increase availability of public transit options**, particularly in rural areas, by combining public and school vehicles wherever possible. To achieve these goals, we recommend:

### 2018 Legislative Session

- 1) **Expand charging infrastructure to all Vermonters:** Maximize VW settlement set-aside for charging stations (15%) to ensure fast-charging infrastructure accessibility within 30 miles of every VT resident.
- 2) **Improve rate design:** Remove barriers in statute to allow owners and operators of charging stations to sell electricity. Promote a proceeding before the PUC to remove barriers to EV charging in rate designs.
- 3) **Jumpstart electrification of public transit and school buses:** Recommend using VW settlement funds to jumpstart a transition from diesel to electric transit using bulk purchase to bring down costs per bus, and to pilot school bus electrification. Recommend that all VW settlement funding decisions be made on the basis of the net present value of lifespan costs/benefits.
- 4) **Explore public transit options:** Examine methods to expand public transit offerings with existing vehicles, with particular emphasis on rural areas through combining public transit and school bus use.
- 5) **Boost consumer awareness:** Expand EV public outreach/education activities, including partnerships with auto dealers, signage/education on public transit vehicles, and awareness-building of legislators.

### Mid to Long Term:

- 1) **Implement a rapid build-out of the charging network** (with improved rate design) to allow as many Vermonters as possible to have access to the necessary charging infrastructure.
- 2) **Provide targeted incentives for EV purchases** (applicable to new and used vehicles) from a funding source that would not affect the state general fund or the transportation fund revenue (see below for details). Target incentives to rural and low/middle-income Vermonters
- 3) **Implement expansion of public transit offerings** using methods identified in Legislative session
- 4) **Electrify all public transit and school buses at point of purchase:** Ensure that all public transit agencies and school districts can replace existing diesel buses with electric buses at the point of scheduled replacement with necessary funding/financing to ensure no additional costs.

## Summary

**CHALLENGE:** ANR's 2017 greenhouse gas (GHG) emissions report identifies transportation as the largest contributor to Vermont's GHG emissions of all sectors (42%). Electrification of the transportation sector, whether personal vehicles or transit and school buses, will help reduce GHG emissions, increase the percentage of renewably powered transportation options, and keep more of the dollars spent on transportation fuels within the state.

Recent studies on climate and energy in Vermont have identified plug-in electric vehicles (EVs) as a key pathway to meeting long-term goals, given how many Vermonters still travel long distances to get to jobs and services. Meeting Vermont's 2016 Comprehensive Energy Plan (CEP) illustrative goal of 10% renewably powered transportation would require about 45,000 EVs in Vermont by 2025—a major increase from the current 2,000—and more recent analysis indicates that we need closer to 55,000 EVs in order to meet the emissions reduction goals of the Paris Accord, as committed to by Governor Scott in June of 2017. . Regardless of the target, EVs powered by renewable energy will provide major reductions in Vermonters' GHG emissions while also lowering annual household transportation expenses. However, existing market forces will not increase the market share of EVs fast enough to meet Vermont's climate and energy targets for the transportation sector. Three principal barriers to accelerated adoption are: i) lack of sufficient charging station infrastructure; ii) lack of general awareness about the benefits of switching to EVs and how to do it affordably; and iii) the upfront costs of EVs (including used EVs) are not generally accessible to low/middle-income Vermonters and rural Vermonters, (who depend the most on personal vehicles to get to work, school and other essential travel).

A fourth concern is cross-cutting in character and relevant to the above three barriers listed is the price of electric service in relation to the costs. The pricing barrier is a matter of rate design. Rate design is used by regulators and utilities to configure prices in ways that allow the utility to recover costs and send sound economic signals to consumers to manage their consumption patterns. Increasingly, technology is enabling rate design to help either encourage or discourage effective management of customer loads. Rate design can either help or hinder the business case for commercial investment in charging infrastructure. Rate design can either help or hinder customer economics and their ability to management of charging in relation to the economic benefits of EVs (to both the customer and the utility. More broadly, rate design can either exacerbate overcome the barriers generally associated with the higher upfront costs of EV purchased.

The large buses that travel our streets – both transit buses and school buses – show how our rural state has worked to provide transit and other transportation choices that help people get where they need to go. At the same time, the inefficient, diesel buses that make up most fleets come with real issues: they emit diesel exhaust that is dangerous for children, drivers, and passersby, especially those with chronic disease; are

subject to fluctuations in fuel prices; and are inefficient - the average diesel transit bus gets just 4.5 miles per gallon. The VW settlement funds are intended to help Vermont reduce its diesel emissions. The heavy-duty vehicle portion of these funds could provide a once-in-a-decade opportunity to not only reduce diesel emissions, but also to leverage longer-term market transformation in the heavy-duty sector that would have permanent diesel and GHG emissions elimination, along with important grid management solutions, increased use of renewable energy in the transportation sector, and health benefits that far exceed other proposed options such as moving to more efficient diesel vehicles.

**COMMISSION RECOMMENDATION: Accelerate the electrification of the transportation sector by promoting the adoption of EVs through improving charging infrastructure, boosting consumer awareness, and decreasing purchasing costs with a particular emphasis on low/middle-income and rural Vermonters as well as catalyzing the shift from diesel to electric in our state's buses while increasing the availability of public transportation in rural areas.**

**To achieve these goals, the Transportation Subcommittee proposes:**

**SHORT TERM (The 2017/2018 Legislative Session):**

- 1) Remove barriers in statute to allow owners and operators of charging stations to sell electricity.
- 2) Promote a proceeding before the PUC to remove barriers to EV charging in rate designs.

**MEDIUM TERM (In 2018):**

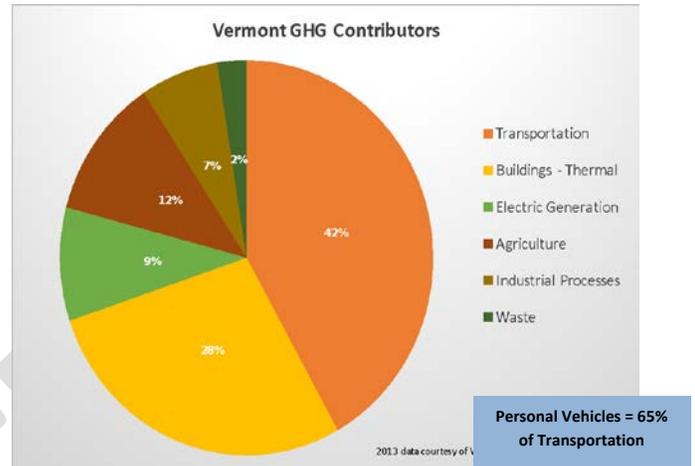
- 1) Use VW settlement funds to jumpstart a transition from diesel to electric transit and school buses.
- 2) Use VW settlement 15% set aside to expand electric vehicle charging stations with a goal of assuring fast charging infrastructure accessibility within 30 miles of every Vermont resident.
- 3) Expand EV public outreach and education activities, including partnerships with auto dealers, and awareness-building of legislators.
- 4) Provide a state incentive for EV purchases from a funding source that would not affect the state general fund or the transportation fund revenue.

**LONG TERM (2018 and Beyond):**

- 1) Examine methods to expand public transit offerings in rural areas (e.g. utilizing school buses for public transit).
- 2) Implement other actions that promote the switch from diesel buses to electric buses for public and school transportation.
- 3) Implement a rapid build-out of the charging network to allow as many Vermonters as possible to have access to the necessary charging infrastructure.

Background

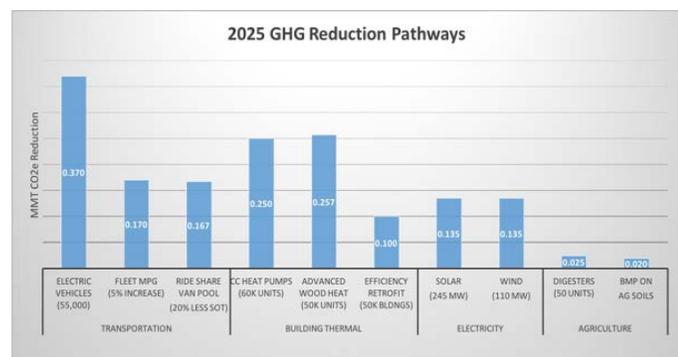
Transportation is the largest contributor to VT GHGs of all sectors, and personal vehicle use makes up the largest share of that (see Graph *Vermont GHG Contributors*). EVs are a critical strategy to meeting Vermont’s climate *and* energy goals - they use a fraction of the energy required by gasoline vehicles and when powered from Vermont’s grid can cut GHG emissions by over 50% today, with even greater reductions possible as renewable energy use grows. Additionally, switching from low mileage, high emitting buses to electric ones will help us meet our climate goals by reducing GHGs as well as overall energy consumed. Moreover, by providing more public transportation options to rural Vermonters through efficient use of school buses for public transit during off hours, we can significantly reduce overall Single Occupancy Vehicle (SOV) use, thereby further reducing GHG emissions.



Electric Vehicles:

EVs can reduce household transportation costs, particularly for rural residents who must travel long distances for jobs and services. If strategically deployed, EVs can also help utilities manage peak demand and better integrate renewable energy sources, saving money for all ratepayers. In order to realize these benefits, public programs and policy can help overcome the primary barriers to EV adoption—upfront cost of the vehicle, public awareness of EVs, availability of EV models, and availability of public charging—while ensuring equity and affordability for all Vermonters.

Accelerating adoption of EVs is one of the fastest ways to reduce our GHGs in the next 8 years (See Graph - EAN GHG Reduction Pathways Analysis). Additionally, they are also one of the fastest ways to reduce annual household energy expenditures. The average Vermont household spends over half of its monthly energy dollars on transportation, with nearly 80% of that money going out of state for fossil fuels. EVs are at least three times more efficient than gas-powered vehicles. They are able to convert about 70% of the energy supplied from the grid to power the



wheels. Typical gas vehicles are only about 20% efficient from the fuel tank to the wheels.

With an expectation that EVs will eventually become more affordable than conventional cars, it is important to focus on expanding outreach to low-middle income and rural Vermonters now as they may have the most to gain from the change.

By providing the policy framework that accelerates EV adoption for ALL Vermonters, we can dramatically reduce our GHGs to meet our Paris goals while ensuring that low and middle-income Vermonters can benefit from the savings that this shift brings. Most importantly, we have available funding to jumpstart this transition: *the VW settlement funds*. (Note: Up to 15% of the \$18.7M of funds coming to Vermont under Appendix D of the VW settlement can be dedicated to electric vehicle charging infrastructure for passenger vehicles. These funds are not available for consumer incentives.)

#### Electric Buses:

Gasoline and diesel represent more than 35% of all energy consumed in our state. Switching from low mileage, high emitting buses to electric ones will help us meet our climate goals by reducing GHGs, increasing the portion of renewably powered transportation, as well as overall energy consumed. Additionally, by providing more public transportation options to rural Vermonters through efficient use of school buses for public transit during off hours, we can reduce overall Single Occupancy Vehicle (SOV) use, thereby further reducing GHG emissions.

Currently there are over 400 electric buses already in operation in the US. The most recent test in Sept 2017 of public transit buses in California show that the ranges now extend over 1000 miles on a single charge, although most current transit buses on the market average 350 miles. Additionally, there are examples of successful bus electrification projects such as in the City of Greensboro, NC. Greensboro is pairing voter approved funding with a grant from Duke Energy to purchase electric buses and expects to save (from O&M) \$1.7m over the 12-yr lifetime of the first 4 buses they purchased.

Electric buses cost about \$200,000 more to buy than nearly identical diesel models (\$660,000 for a 35-ft electric bus, compared with \$450,000 for diesel), but those costs are recoverable through the vehicle's lifespan, according to detailed studies by VT-based Green Mountain Transit. If diesel costs \$2.40/gallon, an electric bus would save \$44,000 over its 12-year life compared with an equivalent diesel-powered bus including all costs and savings, such as decreased fuel and maintenance expenses and increased upfront cost of the bus.

Finally, there are many environmental, social, health, and educational benefits associated with switching from diesel buses to electric buses. The emission reductions associated with electric buses vary by model, but to give an example, switching one diesel large transit bus to an electric bus can lead to annual savings of over 50 tons of greenhouse gasses, 445 metric tons of CO<sub>2</sub>, nearly 300 lbs of CO, and 628 lbs of NO<sub>x</sub>. Multiplied over the estimated 12-year lifespan of a bus, and multiple buses across a fleet, Vermont stands to gain real environmental benefits and make progress toward its goals. <sup>[[1]]</sup>Communities that have electric buses, whether

for transit or school buses, will also help reduce the very real impacts of diesel on people’s health. According to the Clean Air Task Force’s study, the cost of health impacts in Vermont from fine diesel particles was \$29 million dollars in 2005. The lack of tail pipe emissions also provides significant health benefits, especially to children who ride buses twice a day, five days a week, and they generate far less noise than diesel buses.

**Current Condition**

Electric Vehicles:

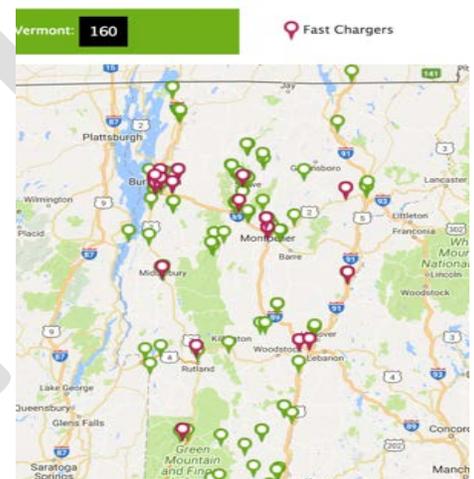
1) **Charging Stations:** There are around 160 public charging stations currently in Vermont (see Map), but:

- if we project increasing from 2,000 to 45,000-55,000 EVs by 2025, we need to ensure sufficient charging infrastructure to meet the demand
- they do not reach all parts of Vermont, and many regions are left without any access to public charging stations at all
- very few are fast-charging
- very few are located at places of work (businesses, schools, etc.), where they could assist greater numbers of people who could benefit from all-day charging

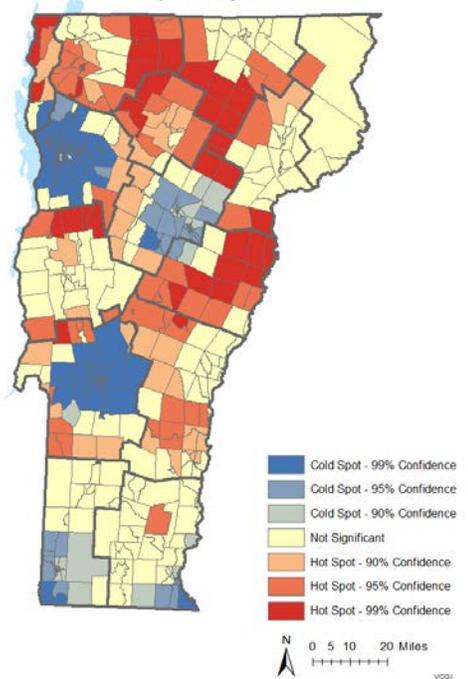
2) **Transportation Spending:** Vermonters collectively spent over \$1 billion on transportation energy in 2015. Driving on electricity could cut this cost by 65% to about \$350 million, with more of the electricity dollars staying local to Vermont. **Auto ownership/Geographic Energy Burden:** Auto ownership is high in Vermont. While it’s essential to invest in public transportation and other options to reduce single occupancy driving, we also need to recognize that these options are challenging to deploy in rural areas. The majority of Vermonters will continue to use personal vehicles to meet their mobility and access needs for the foreseeable future.

3) **EV Costs and Savings:** New EVs currently cost more upfront than comparable gasoline vehicles, but provide lifecycle savings by cutting energy and maintenance costs in half or more. Over the next 10 years the price difference is expected to shrink as EV technology achieves greater economies of scale. More pre-owned EVs are coming onto the market and provide even greater opportunities for affordable, low-carbon transportation.

4) **Health Benefits:** The American Lung Association estimates Vermont experienced \$347 million in health and climate related costs in 2015 due to fossil fueled transportation. Shifting to EVs



Transportation Energy Expenditure (\$) Hot Spot Analysis



could reduce this by more than 90%. EVs also reduce other harmful and toxic tailpipe emissions, leading directly to added health and environmental benefits beyond GHGs.

- 5) **Incentives:** Several electric utilities are already providing incentives to complement federal tax subsidies for EVs through Tier III (and some car companies, such as Nissan, are providing their own). However, these are insufficient to meet the needed growth in EV adoption, they vary widely among utility territories, they frequently do not apply to the used car market, and they are not systematically targeted to low/middle-income Vermonters.
- 6) **Awareness:** Drive Electric Vermont (supported by VTrans, PSD, and ANR) is promoting outreach and education on EVs with the limited funding available. Accelerating adoption of EVs at the pace necessary to achieve our goals will require additional resources and effort to reach consumers in more rural areas and to engage dealers.
- 7) **Rate structures:** Residential customers in the state typically face a uniform per kWh charge that applies during all periods of the day and is undifferentiated by time of day or conditions on the grid. As such, Homeowners have no incentive to charge their EV's when it is most beneficial to the grid. In some service territories, there is an initial low-cost rate block that applies to the first 100 or 200 kWhs and then increases at a higher tail block that rises to as much as 17 and 23 cents/kWh. More typically, residential consumers in the state pay about 15 cents/kWh. Yet the underlying forward-looking costs range from 3 to 8 cents/kWh depending on the period in which vehicles are charged. Controlled charging off-peak can cost as little as 3 to 4 cents/kWh to the utility system. Current rate designs send a strong conservation signal in an era in which we need to grow demand for well-managed EV loads. Current rate designs provide little incentive to manage customer loads for system benefit, and likely undermines customer economics for greater EV adoption and ambitions to move from high-carbon fuel demands to low-carbon electricity.

Under present conditions, there is little incentive for C&I customers to invest in charging stations due to rate designs and demand charges that may represent an economic barrier. Yet the rate designs available through our utilities likely do not reflect the opportunities and character of forward-looking costs that can be modified help to accelerate adoption of public charging stations generally, and customer economics of well-managed charging looking forward.

#### 8) **Funding Sources:**

- **Charging Infrastructure:** VW settlement funds (15% for light duty vehicle charging), and possible Tier III or other utility funds
- **EV Incentives:** there is a need to understand the pros and cons of a wide range of potential funding sources that would not affect the state general fund or the transportation fund revenue. These include, among others: i) expanding Tier III requirements; ii) Cap and Invest solutions: expand Regional Greenhouse Gas Initiative (RGGI) to transportation or join the Western Climate Initiative (with CA, Quebec, Ontario). The Western Climate Initiative already has a successful transportation

model that has helped spur rapid expansion of EV adoption in Quebec and CA, targeted to low-income populations; iii) feebate programs that assess higher fees for more polluting vehicles paired with rebates for vehicles with lower emissions.

### Electric Buses:

**Public Transit Buses:** Currently in Vermont, there are a total of 425 public transit vehicles, of which approximately 90 are set to be replaced due to age and condition (value of appx \$12 million, in capital budgets). These vehicles range from smaller vans to larger buses, and their lifespans range from 7-15 years, depending on the type and size.

Burlington has already bought two electric buses in partnership with Burlington Electric, VEIC, the Vermont Agency of Transportation, and Green Mountain Transit (and a \$480,000 federal grant from the US Dept. of Transportation). The result of this is that some of Burlington's most vulnerable people will have cleaner air to breathe through diesel emissions reductions, Green Mountain Transit will enjoy lower operating and maintenance costs associated with all EVs, and Burlington will reduce its GHG emissions to zero for these buses. Most of Green Mountain Transit's buses travel around 30,000 miles each year, consuming 7,000 gallons of diesel and emitting 77 tons of carbon. About 15 of the diesel buses in GMT's fleet have been in service for more than 14 years or 370,000 miles. GMT officials say that these buses are considered near the end of their useful lives and in need of replacement.

**School Buses:** There are 250 public schools in Vermont, including 28 union high schools, attesting to the full reach of school buses to all regions of Vermont. School buses fall within Type 1 (more than 15 passengers) and Type II (between 10 and 16 passengers). School buses are generally utilized only during the morning and afternoon hours when children are going to and from school. For the remainder of the day, they are generally not in service, leaving seats vacant that could potentially be used for public transit. Using these buses to provide transit services would, however, diminish these resources usefulness as a storage resource.

**Renewable Energy vs. Efficient Diesel:** Achieving this goal assumes that electric buses are powered with renewable energy. Currently, approximately 55% of Vermont's electricity is considered renewable, with utilities required by the Renewable Energy Standard to increase the percent of renewable electricity in their portfolio annually until 75% is achieved in 2032. In some jurisdictions, the percentage is far higher: for example, both the Burlington Electric Department and Washington Electric Co-op have portfolios that are already 100% renewable, while GMP's portfolio has forecasted 60% renewable energy by the end of next year.

**Funding:** The VW Settlement funds are intended to be used to reduce diesel emissions. Rather than utilize this once-in-a-decade source of funding to transition heavy-duty vehicles to more efficient diesel engines, we argue that this should be the moment to catalyze a permanent shift to NO tailpipe emissions that will continue for the lifetime of the buses. Moreover, it is essential that any decisions to spend these funds take into account the lifespan costs, including operations and maintenance costs, as well as pollutants and

carbon costs. Whereas ‘efficient diesel’ vehicles are less expensive to purchase, they are much more expensive to maintain with regular diesel, oil, transmission fluid, etc. purchases, and they will continue to emit pollutants and carbon (albeit at a reduced level) for the lifetime of the vehicles. Given the long lifespan of most heavy-duty vehicles (average 12 years), it is critical to utilize these funds in a way that generates years of the lowest possible emissions. Any economic analysis must compare the net present values of the costs of these vehicles over time, including the externalities (positive and negative) generated by continued fossil fuel use over the life of the vehicles.

**Grid Constraints:** Because of the growing amount of renewable generation on Vermont’s electric grid, there are times and places where we produce more than we use (during high wind/sun periods), and other times when we use more than we produce. In particular, the grid faces increasing constraints in the Sheffield-Highgate region in Northern Vermont. Generation resources inside this area are limited in real time to ensure that the system capacity is not exceeded in the event of a potential future transmission outage. The practical effect of this is that, from time to time, generation resources in this area are required to curtail their output due to the lack of capacity to export power, and many Vermonters in those areas who wish to install solar on their homes or businesses are unable to do so at this time. Utilities, regulators, clean energy advocates and other stakeholders are trying to find ways to address this and maximize the use of our renewable energy resources.

Electric buses could serve to both increase load in grid constrained areas and provide storage capacity for Vermont’s renewable generation for use during times of low generation by using renewably generated electricity during the day (when there is high solar generation at lower prices), and storing energy in their batteries when they are not in use that can be used to supplement our grid when renewable generation is lower, and demand is high (at night when people are using lights and heating homes). It is important to note, however, that using these same buses for transit services will reduce the hours they could serve as grid resources.

**School Buses as Public Transport:** School buses are located in every part of the state and reach have predictable routes and times as well as predictable downtimes, providing ample opportunities for charging. These buses could be used to combine public transit and school bus routes.

## Action Plan

### *SHORT TERM (The 2017/2018 Legislative Session):*

- 1) **Remove barriers in statute to allow owners and operators of charging stations to sell electricity.**
- 2) **Promote a proceeding before the PUC to remove barriers to EV charging in rate designs.**

The Vermont Department of Public Service could lead an effort, likely to evolve into a formal proceedings before the Public Utility Commission, looking at electric rate structures and controlled

loads to serve objectives for (1) advancing adoption of electric vehicles, (2) ensuring that charging is encouraged or managed to minimize adverse impacts on the system, (3) encourage more widespread adoption of commercial charging stations in the workplace, and (4) encourage adoption of electricity rate schedules that will foster commercial charging stations in suitable locations beyond the business environment such as high traffic corridors and community centers.

**MEDIUM TERM (In 2018):**

- 1) Use VW settlement funds to jumpstart a transition from diesel to electric transit and school buses.**  
This action should prioritize electric replacements, maximize the use of other sources of capital (e.g. Tier III funding from utilities and federal grants), use lifespan cost/benefit analysis, and capture O&M savings to help purchase additional electric buses.
- 2) Use VW settlement 15% set aside to expand electric vehicle charging stations with a goal of assuring fast charging infrastructure accessibility within 30 miles of every Vermont resident.**  
Up to 15% of Vermont's \$18.7 million VW settlement funds may be used for electric vehicle charging infrastructure - this could help offset Vermont's greatest source of GHG emissions - automobiles.
- 3) Expand EV outreach and education activities, including partnerships with auto dealers, and awareness-building of legislators.**
  - a. ANR/VTrans/PSD should explore opportunities to increase support for the Drive Electric Vermont (DEV) program to coordinate EV stakeholders and implement education and outreach programs that inform people of their options and the programs that can help them purchase an EV that will work for them.
  - b. Adopt dealer incentive programs that educate and engage dealers to sell EVs.
  - c. DEV should educate policy makers, including legislators, about the benefits of EVs, their role in climate strategy, and opportunities for addressing needs of low income Vermonters.
- 4) Provide a state incentive for EV purchases from a funding source that would not affect the state general fund or the transportation fund revenue.**
  - a. The incentive program could be tailored to those who are most impacted by high transportation costs. Evidence in Vermont and other states show that incentives can drastically increase EV purchase consideration. A 2016 survey of Vermonters found EV purchase consideration would double with a \$2,500 incentive and New York saw a 60% increase in EV sales after launching their EV incentives in 2017. In designing a Vermont incentive program, it could include a "cash for clunkers" component to encourage Vermonters to turn in older, high-emission vehicles. Incentives for used EVs should also be considered.
  - b. Potential funding mechanisms for such a program include:
    - i. Deploy electric utility Tier III options.

- ii. Explore opportunities to work with the Transportation and Climate Initiative regarding the potential expansion of the RGGI cap and trade program to include transportation fuels or developing other regional cap and invest programs.
- iii. Further review the Western Climate Initiative, which already has the administrative framework setup to generate considerable funds for targeted EV purchase and has spurred a dramatic increase in EV purchases in Quebec.
- iv. Direct legal settlements to transportation electrification.
- v. Explore the feasibility of a feebate programs (higher fees for more polluting vehicles paired with rebates for lower emissions).

**LONG TERM (2018 and Beyond):**

**1) Examine methods to expand public transit offerings in rural areas.**

One promising option includes combining public and school transit. Burlington and Ludlow already combine public transit and school bus routes. If expanded to other areas of Vermont, this would allow some of Vermont's most vulnerable populations to have access to public transit, and would allow everybody to have more transportation choices that improve household affordability.

**2) Examine other promising actions that promote the switch from diesel buses to electric buses.**

This could include requiring that all public transit and school buses, at the time of scheduled replacement, be replaced with electric buses. Potential sources of funding to assist include expanded use of Tier III funds, bonding authority, expanding Regional Greenhouse Gas Initiative to include transportation, joining the Western Climate Initiative which already funds transportation electrification (or other pricing options), gradual reallocation of VTrans dollars (with careful consideration of tradeoffs relative to state goals) and federal funding such as the Low or No Emission vehicle funding program.

**3) Implement a rapid build-out of the charging network to allow as many Vermonters as possible to have access to the necessary charging infrastructure.**

ANR should allocate the maximum allowable amount of VW Settlement dollars for EV charging infrastructure to ensure that all Vermonters have access to a public fast-charging station within 30 miles (using the VTrans study identifying where fast-charging stations will have the greatest impact along VT highways) in addition to those with greatest multiplier effect (i.e. where there is the greatest use of EVs, and greatest population density).

Outcomes, Barriers to Implementation, Metrics

1) **Desired outcome: Increased number of fast-charging stations**

**Barriers:** limited VW settlement funds; rate structure does not currently incentivize private investment.

**Metric:** public and private charging stations available throughout Vermont to keep pace with demand.

2) **Desired outcome: Outreach/education to publicize incentives for and benefits of EV adoption.**

**Barriers:** high EV purchase prices, lack of standardization of incentives; lack of dealer involvement/incentive in marketing EVs; lack of all-wheel drive EVs; difficulty in reaching rural populations or those who can't afford to change vehicles; difficulty in providing local leaders with the information and skills necessary to explain the benefits.

**Metric:** rapid acceleration of EV adoption (45,000-55,000 by 2025), and decrease in energy burden related to transportation.

3) **Desired outcome: Increased dollars available for incentives, increased number of dealers participating, and increased number of low, middle income, and rural EV owners.**

**Barriers:**

- **RGGI expansion** (TCI - Transportation and Climate Initiative): need to bring along other participating states; need to bring New York into the mix (among others); how to address economic impact on polluters.
- **Western Climate Initiative:** possible need to wait for TCI decisions; need to understand what it would take to join; economic impact on polluters.

**Metric:** sufficient funding to provide incentives for low/middle-income Vermonters, on a declining basis as adoption increases, purchase prices decrease, and more used EVs become available.

4) **Desired outcome/metric: increased percentage of electric public transit and percentage of school buses out of entire fleet.**

**Barriers:**

- **Funding:** To maintain momentum, it will be necessary to identify additional sources of funding for subsequent phases. This will ensure that investments in charging infrastructure and driver and mechanic training are maximized. Subsequent funding could include gradual reallocation of VTrans dollars (with careful consideration of tradeoffs relative to state goals) and federal funding such as the Low or No Emission vehicle funding program. **Opportunity:** Capitalize on the experience and success of the Clean Energy Development Fund (CEDF) as potential catalyst for electrification of this sector.
- **Regulatory Framework:** There is currently a lack of a regulatory framework for electric vehicle charging that reflects state goals. **Opportunity:** Policies could include time of use charging, incentives for charging at times that help stabilize the grid, and using revenue from EV charging to support further deployment.

- **Uncertainty about technology**, impact on service, and the bottom line. **Opportunity:** this proposal offers a way to reduce that uncertainty. Investing funds to learn, help prove the technology, and catalyze the market (so that it could be off and running on its own!) is an appropriate role of government.
  - **Up front cost of technology:** while the purchase cost of the technology is higher, the lifetime savings on O&M bring the costs down considerably and drive a permanent NO TAILPIPE emissions change in the public transit sector. **Opportunity:** The opportunity to combine VW Settlement funds and Tier III requirements to help drive the change, and generate savings that can be put in escrow for continued electrification is considerable
  - **Lack of awareness.** Most Vermonters are unaware of the available technology, range and substantial GHG and O&M savings offered by electric public transit and school buses. **Opportunity:** This provides a unique marketing and education opportunity for every Vermonter to see a living example of how renewably powered electric vehicles work, as well as peer to peer learning between transit agencies, municipalities, and school bus operators.
- 5) **Desired outcome:** increased number of miles of shared routes in rural areas/developed areas
- **Barriers:** state (and federal?) regulations that may impede the combining of services. **Opportunity:** These have been overcome in other states, and Windham County RPC has already begun studying the implications in its Regional Plan<sup>1</sup>
  - **Metric:** number of additional available public transit ridership seats (on school buses) and student ridership seats on public transit, number of actual riders

Subcommittee

Transportation

Members

Linda McGinnis, Bethany Fleishman, Michele Boomhower, Harrison Bushnell, Joe Fusco

<sup>1</sup> Windham Regional Commission: <http://www.windhamregional.org/news/wrc-mobility-study-completed>

12/14/2017

Hand-submitted to the Commission during meeting

Dear Commission,

My name is Jacob Peet. I'm a student at Castleton University originally from Richmond, VT. On the date I'm writing this letter, Christmas is just over two weeks away. But if you were to look outside right now, you wouldn't see any snow. To me, snow is part of the magic of Christmas. Without it, things don't feel the same. At this point, having any semblance of snow on Christmas feels more like a rarity than a common occurrence. It shouldn't be that way.

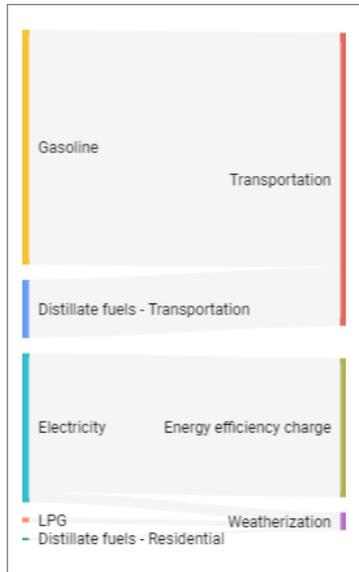
Of course, snow isn't the only element affected by climate change in Vermont. Total annual rainfall has increased steadily over the last fifty years, and storms have increased in intensity, leading to lots of flood damage. Just a few years ago, Hurricane Irene wreaked havoc on my hometown of Richmond. I will never forget the image of people canoeing across the field where I used to play Little League baseball as a kid.

But I'm sure you know all of these statistics. The question is: what can be done about it? My goal is to promote an existing strategy to prevent climate change called The ESSEX Plan. The plan proposes to instill a rising fee for carbon pollution that makes its way back to citizens and businesses in the form of lower electric rates and per-person rebates. According to calculations by the Congressional Budget Office, the ESSEX Plan would create up to 6,000 new jobs and reduce carbon pollution by 15%-25% in 2025 and 30%-50% by 2050.

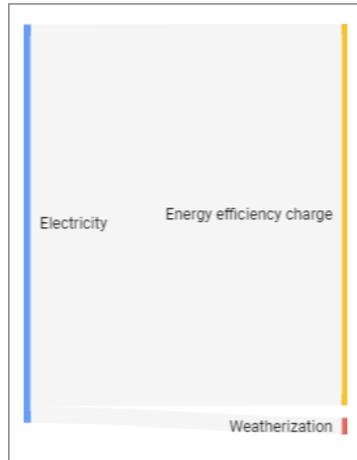
Considering carbon pollution is one of the direct causes of climate change, why wouldn't we put this plan into action? At this moment, I'm 19 years old. I will be in my mid-twenties in 2025 and around 50 in 2050. So those statistics would play a major role in the quality of the Earth during my lifetime. Plus, if the plan was instilled, it would continue to reduce carbon pollution during the lifetimes of future generations. So, I implore you to consider the ESSEX Plan, not only to help us enjoy a White Christmas, but also a better future.

Hand-submitted by Rick Wackernagel during the meeting

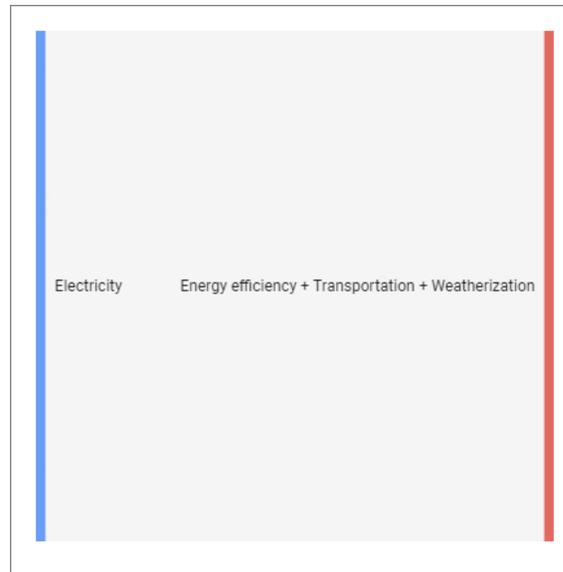
Impact of electrification on tax and energy-efficiency revenues, and two replacement schemes



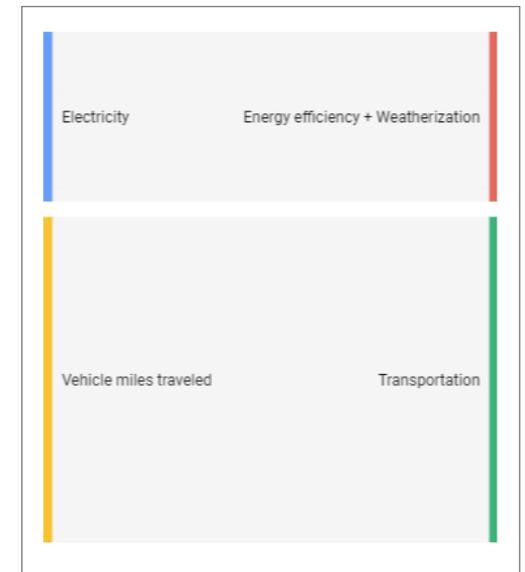
2015, fossil fueled



2015, electrified



2015, electrified, combining energy efficiency and weatherization, taxing kilowatt hours



2015, electrified, combining energy efficiency and weatherization, taxing kilowatt hours and vehicle miles traveled

Tax	Tax rate	Tax rate	Tax rate	Tax rate
<u>Transportation</u>				
Diesel fuel	\$0.32 /gal	\$0.32		
Gasoline	\$0.30 /gal	\$0.30		
Vehicle miles travelled				\$16.08 /1K VMT
<u>Weatherization</u>				
Off-road fuel	\$0.02 /gal	\$0.02		
Coal/natural gas	0.75% of gross receipts	0.75%		
Electricity	0.50% of gross receipts	0.50%		
<u>Energy efficiency</u>				
Electricity	\$0.01 /kilowatt hour	\$0.01 /kilowatt hour		
<u>Alternatives</u>				
Per kilowatt hour			\$0.0067 /kilowatt hour	\$0.0024 /kilowatt hour