Climate Mitigation

Climate Change Leadership Academy, Nov. 13, 2019

What role can we play, as local Climate Change Leaders, to reduce greenhouse gas emissions?
Climate Mitigation

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Goals
1. Build common understanding
2. Expand action library
3. Explore our role as leaders

Homework
Take home one or more action ideas to type up / expand upon for the group

Agenda
Presentations (~45 mins)
1. Global/National
2. State
3. Local
Quick Bio Break
Get to Work! (~45 mins)
Climate Mitigation at the STATE LEVEL

Climate Change Leadership Academy, Nov. 13, 2019

Sarah Brock
Energy Program Manager
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802.291.9100 x109
State Energy Plans

New Hampshire 10-Year State Energy Strategy
New Hampshire Office of Strategic Initiatives
April 2018

2016 Vermont Comprehensive Energy Plan
State Climate Reports
VERMONT GOALS:

• 90% renewable by 2050 total energy commitment (2011 Comprehensive Energy Plan)

• 2017 Paris Agreement: 26-28% emissions reduction by 2025 (VT is part of the US Climate Alliance)

NEW HAMPSHIRE GOALS:

• 25% of delivered electricity generated by renewable sources by 2025 (2007 Renewable Portfolio Standard)

• Achieve all cost-effective energy efficiency (2016 Energy Efficiency Resource Standard)
What will it take to meet our commitments?

- **Paris Accord Goal**: 26%-28% reduction below 2005 levels by 2025
- **VT CEP Goals**:
  - 40% reduction below 1990 levels by 2030
  - 80%-95% reduction below 1990 levels

**Vermont missed its 2012 statutory target of a 25% reduction below 1990 levels. Emissions increased 4% instead.**

Source: 2018 Greenhouse Gas Emissions Inventory Brief (1990-2015), VT Agency of Natural Resources
90% RENEWABLE BY 2050

The Benefits of Achieving Vermont’s ENERGY & EMISSIONS COMMITMENTS

2018 ANNUAL PROGRESS REPORT
Not Included by EAN...

**Carbon Sequestration**
- Protect forest land
- Protect agricultural land
- Soils (Ag & Forest)
- Reduce sprawl

**Agriculture**
- Carbon offsets
- Localized agriculture
- Innovation fund

**Waste**
- Energy generation from waste
- Wastewater treatment
- Waste reduction: reduce, reuse, recycle
Vermont’s GHG emissions by sector

43% 28% 11% 10% 6% 2%


*ENERGY GENERATION AND CONSUMPTION ACCOUNT FOR 81% OF VT’s GHG EMISSIONS

Source: 2018 Greenhouse Gas Emissions Inventory Brief (1990-2015); VT Agency of Natural Resources.
% of ENERGY-related emissions

Vermont has led the way on electric efficiency.

Total energy efficiency builds on that success.

Switching to **efficient, renewably powered** heating and transportation options: heat pumps, EVs, advanced wood heat.

That may result in our **electric load increasing** through strategic electrification powered by renewable electricity.
Path to Paris

What will it take to meet our Paris Climate Agreement commitment?
2.53 MMTCO$_2$e reduction by 2025 is required to meet the Paris Agreement$^1$

**TRANSPORTATION**$^2$  
- **ADD 90,000 EVS**  
  - 0.405

**THERMAL**$^3$  
- **ADD 90,000 HEAT PUMP SYSTEMS**  
  - 0.370
- **ADD 25,000 ADVANCED WOOD HEAT SYSTEMS**  
  - 0.258

**ELECTRICITY**$^4$  
- **ADD 200 MW WIND**  
  - 0.164
- **ADD 500 MW SOLAR**  
  - 0.144
- **ADD 15 MW FARM & LANDFILL METHANE**  
  - 0.065

**OTHER REDUCTIONS**  
- 0.50

**LATEST STATUS**  
- **2,788 EVS** (2018)  
- **22.2 MPG** (2015)  
- **19% OF WORK COMMUTES** (2017)  
- **10,694 HEAT PUMP SYSTEMS** (2017)  
- **26,534 ADVANCED WOOD HEAT SYSTEMS** (2015)  
- **25,409 BUILDING RETROFITS** (2017)  
- **10,092 HEAT PUMP WATER HEATERS**  
- **241 MW WIND** (2018)  
- **344 MW SOLAR** (2018)  
- **18 MW FARM & LANDFILL METHANE** (2017)

Sources and Notes:  
1. EIA calculations based on relative emissions reductions in MMTCO$_2$e based on 2018 Greenhouse Gas Emissions Inventory Brief (1990-2015), US Agency for Natural Resources.  
2. EVs assumes 50% AEV and 50% PHEV. Transit includes direct reduction of single occupancy vehicle commutes, through buses, trains, ride share, van pool, etc.  
3. Heat pumps and heat pump water heaters assume switching from oil or propane heaters to 75% renewable electricity. Advanced wood heat includes automated, central wood heat systems and pellet stoves. Weatherization assumes project results in 25% reduction in energy use (the statutory goal).  
4. Wind includes reported wind, since there are no plans to build wind in Vermont prior to 2025.
What does that look like over the next six years?

<table>
<thead>
<tr>
<th>Year</th>
<th># of addt’l homes weatherized/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>6,393</td>
</tr>
<tr>
<td>2020</td>
<td>7,725</td>
</tr>
<tr>
<td>2021</td>
<td>9,333</td>
</tr>
<tr>
<td>2022</td>
<td>11,277</td>
</tr>
<tr>
<td>2023</td>
<td>13,626</td>
</tr>
<tr>
<td>2024</td>
<td>16,463</td>
</tr>
<tr>
<td>2025</td>
<td>19,892</td>
</tr>
</tbody>
</table>
What does that look like over the next six years?

Heat pump systems in Vermont

<table>
<thead>
<tr>
<th>Year</th>
<th># of addt’l heat pumps/ year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>4,579</td>
</tr>
<tr>
<td>2020</td>
<td>6,060</td>
</tr>
<tr>
<td>2021</td>
<td>8,020</td>
</tr>
<tr>
<td>2022</td>
<td>10,615</td>
</tr>
<tr>
<td>2023</td>
<td>14,049</td>
</tr>
<tr>
<td>2024</td>
<td>18,593</td>
</tr>
<tr>
<td>2025</td>
<td>24,608</td>
</tr>
</tbody>
</table>

Source: Historic heat pump data extrapolated from Efficiency Vermont rebate data and assumes rebates capture 75% of statewide installations.
Path to Paris

What does that look like over the next six years?

Electric vehicles in Vermont

<table>
<thead>
<tr>
<th>Year</th>
<th># of additional electric vehicles /year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>1,812</td>
</tr>
<tr>
<td>2020</td>
<td>2,989</td>
</tr>
<tr>
<td>2021</td>
<td>4,932</td>
</tr>
<tr>
<td>2022</td>
<td>8,138</td>
</tr>
<tr>
<td>2023</td>
<td>13,427</td>
</tr>
<tr>
<td>2024</td>
<td>22,153</td>
</tr>
<tr>
<td>2025</td>
<td>36,550</td>
</tr>
</tbody>
</table>
Together, we can do this
Climate Mitigation

What is the Role of Local Climate Change Leaders?
# Climate Mitigation Action Library

## Transportation (~43% of VT emissions, ~42% of NH emissions)
1. Bike to Work
2. Bus Carbon Offsets for Necessary Travel
3. Carpool on Shopping Trips
4. Carpool to Work
5. Use Near Your Workplace
6. Take Advance Transit
7. Walk to Work
8. Incentives Carpooling and Telecommuting
9. Install Electric Charging Stations
10. Build More Sidewalks and Bike Lanes
11. Offer Incentives for Carpooling to Events
12. Promote Bus Transit
13. Promote Electric Bicycles
14. Promote Electric Vehicles
15. Start/Promote Local Ride-Share Boards
16. Support/Promote Incentives for Electric Vehicles

## Thermal (~23% of VT emissions, unknown % of NH emissions)
1. Adjust Your Thermostat
2. Install Heat Pumps, Solar, and Insulation in your Building
3. Weatherize Campaign

## Agriculture (~13% of VT emissions, ~1% of NH emissions)
1. Buy/Grow Eat Local Food
2. Eat Less Meat
3. Eat Organic/Grown Food
4. Create an Edible Pocket Park
5. Encourage Cover Cropping
6. Encourage Low-Carbon Farming
7. Encourage Regenerative Agriculture
8. Oppose Factory Farming

## Waste (~2% of VT emissions, 3% of NH emissions)
1. Encourage Use of Biodegradable

## Carbon Sequestration
1. Join Your Conservation Commission
2. Organize Community Tree Planting
3. Encourage Forest Management for Carbon Sequestration
4. Self/Purchase Carbon Offsets from Sequestration
5. Study National CO2 Capture/Sequestration Policies and Programs

## Public Policy
1. Create Enhanced Green Energy Plans
2. Oppose Greenhouse Gas Infrastructure
3. Study Carbon Pricing Models
4. Support Better climate Policy

## Vermont’s GHG emissions by sector

![Graph showing Vermont’s GHG emissions by sector]
<table>
<thead>
<tr>
<th>Idea From</th>
<th>Scale/Focus</th>
<th>ACTION</th>
<th>Description</th>
<th>What can a local Climate Change Leader do to make a meaningful impact?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suzanne Hawley</td>
<td>Personal</td>
<td>Bike to Work</td>
<td>Since we chose to live close to his work, my husband usually rides his bike such that he only commutes by car about 6 miles per week, in contrast to the 150 miles he would have driven per week had we chosen the house 15 miles from work.</td>
<td>Find and encourage alternative modes of transportation.</td>
</tr>
<tr>
<td>Sarah Wood</td>
<td>Personal</td>
<td>Buy Carbon Offsets for Necessary Travel</td>
<td>I travel internationally often for work. I am painfully aware that my career causes harm to the planet. For this reason, I have been carbon offsetting for decades and have witnessed a tremendous amount of innovation and evolution in this intervention over time. Over the years, I too have experimented with the most direct and relevant ways to mitigate the GHGs that I emit through my travel. I have also encouraged companies, governments, and networks I interface with to also consider their options in offsetting and mitigating the damage we cause as collateral and indirect damage to our earth. I see carbon offsetting as essential for people who travel regularly and feel that it is essential that we advocate in our circles of influence for this to become a predictable and regular practice.</td>
<td>I have found the following resources to be the most effective and innovative for the transportation sector as well as for the work I do in International Development planning globally. But these resources also can help businesses and individuals create a carbon neutral impact over time and as we transition to more renewable options or less reliance on fossil fuels. I think these standards are also helpful in looking at municipal and regional planning efforts in Vermont and throughout the state and bioregion.</td>
</tr>
<tr>
<td>Amy Lapin</td>
<td>Personal</td>
<td>Carpool on Shopping Trips</td>
<td>I shop for groceries with friends every weekend. Carpooling for errands makes them more fun.</td>
<td>Support car pooling initiatives. Small things matter.</td>
</tr>
<tr>
<td>Mary Gavin &amp;</td>
<td>Personal</td>
<td>Carpool to Work</td>
<td>We have a tiny carpool group from Strafford to Hanover that saves 5 or 6 individual roundtrips per week. We check in by email on Sunday to see what people’s plans are for the week and which days we can share rides. Because we are a small group, we can be informal about deciding who drives on a given day. In an earlier iteration, we had our own currency so you kept track of who was doing the driving, and if you couldn’t share driving, you could pay in.</td>
<td>A local Climate Change Leader could have meaningful impact by expanding carpooling in a community by heading a process to choose a carpooling app that the community would adopt, and working through with the community the FAQs and logistic challenges of getting a carpooling process working smoothly. Based on my experience, an app that awarded points of some sort for the drivers giving rides would help people feel the system is fair and that no one is “freeloading.”</td>
</tr>
<tr>
<td>Rebecca Bailey</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amy Lapin</td>
<td>Personal</td>
<td>Live Near Your Workplace</td>
<td>We intentionally live close to our workplaces. One of us within walking distance.</td>
<td></td>
</tr>
<tr>
<td>Caitlin Birch</td>
<td>Personal</td>
<td>Take Advance Transit</td>
<td>I take the Advance Transit bus to and from work at least three days per week, eliminating at least 27 miles of emissions from my personal non-electric vehicle.</td>
<td>They can choose public transit for their commute as well. If there’s not a public transit option nearby their home (or even if there is), they can advocate for expanded transit options and routes to serve a greater number of UV residents.</td>
</tr>
<tr>
<td>Dillon Bradley</td>
<td>Personal</td>
<td>Walk to Work</td>
<td>I walk to my job in Hanover instead of asking my parents for a ride, reducing my weekly transportation GHG footprint.</td>
<td></td>
</tr>
<tr>
<td>Amy Pomeroy</td>
<td>Professional</td>
<td>Incentivize Carpooling and Telecommuting</td>
<td>King Arthur Flour offers small daily stipend to encourage car pooling and allows employees to work remotely when possible.</td>
<td>Broaden car pooling opportunities locally with tax based incentives to drive consumer demand (create online sign up for commuters from different companies to take advantage of, lobby government to take action to promote a change in commuter behavior), offer incentives for companies to encourage car pooling and remote workers.</td>
</tr>
</tbody>
</table>
Five Stations

1. Transportation
2. Thermal
3. Agriculture and Carbon Sequestration
4. Electricity
5. OTHER

Public Policy
Waste
All-Sector Ideas
Instructions

1. Review the Action List
   • What’s Missing?
   • What’s Most Exciting/Promising?

2. Flesh Out the BEST Ideas
   *Mark with a ★ on the list*
   • Barriers
   • Benefits
   • Action Plan

Rules

• Move around as much as you like
• Work together
• Build on what others have started

Next Steps

• Divvy up and expand on each action plan by year end
Next Session: ADAPTATION

Wednesday, January 8, 2019, 5:30-8 pm

BETWEEN NOW AND THEN

1. Send your Climate Mitigation Action Plan to Ana by Monday, Dec. 16
2. Reflect in your 2CLA Workbook
3. Communicate with one another using the email list

As you leave tonight...

Complete your EVALUATION, and pick up your DISHWARE