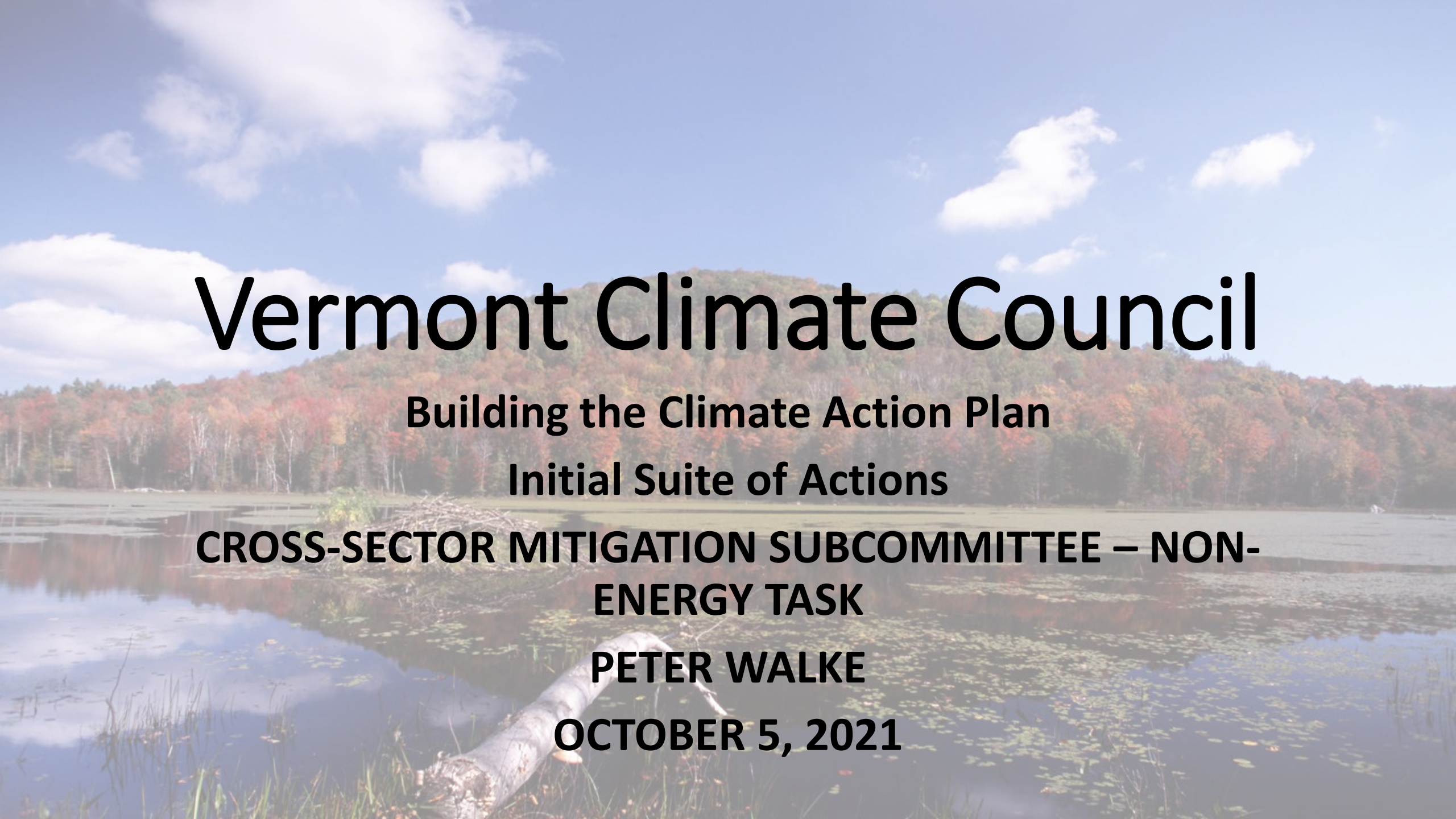

Vermont Climate Council

Building the Climate Action Plan

Initial Suite of Actions

CROSS-SECTOR MITIGATION SUBCOMMITTEE – NON-ENERGY TASK

PETER WALKE

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Subcommittee Members and Staff Support

1. Peter Walke (Task Lead)
2. Lauren Oates (Member)
3. Ryan Patch (Member)
4. Diane Bothfeld (AAFM)
5. Megan O’Toole (DEC)
6. Josh Kelly (DEC)
7. Amy Polaczyk (DEC)
8. Collin Smythe (DEC)
9. Emma Stuhl (DEC)

Process to Date

1. The Task Lead, CSM Subcommittee members, and staff research work in other states and consulted with Vermont-based stakeholders to develop initial ideas
2. The group proposed initial pathways and strategies to the CSM Subcommittee, the Climate Council, and to the public through the public engagement process
3. The group evaluated proposals against the Just Transitions Guiding Principles

Non-Energy Emissions and Subsectors

Non-Energy Subsector	1990	2005	2017
Fossil Fuel Industry	0.02	0.02	0.03
Industrial Processes	0.21	0.56	0.57
Waste Management	0.26	0.34	0.13
Agriculture	1.23	1.29	1.37
Total	**1.72**	**2.21**	**2.10**

- Least mature emissions reductions pathways
- Overlap with Buildings Task
- Agriculture – overlap with Ag and Ecosystems Service Subcommittee
- Industrial Processes – evolution in use (e.g. HFCs)
- Waste Management – Significant progress in solid waste

Climate Action Plan Recommendations

1. Reduction from fugitive emissions from wastewater treatment
2. Reduction of energy used in wastewater treatment
3. Reduced transportation of wastewater treatment residuals.
4. Reduce the leakage of HFCs from refrigeration systems
5. Reduce the end-of-life emissions of HFCs from refrigeration
6. Reduce the use of HFCs in refrigerant systems
7. Reduce process emissions from semiconductor manufacturing

PATHWAY 1: Reduce Fugitive Emissions from Wastewater Treatment Facilities (WWTF)

Waste Management	1990	2005	2017
Solid Waste (CH_4, N_2O)	0.21	0.28	0.07
Wastewater	0.05	0.06	0.06
TOTAL	0.26	0.34	0.13

1. Require consistently operated flare or systems for reuse of biogas. Evaluate biogas capture potential to identify the feasibility of beneficial uses before flaring excess.
2. Convert aerobic holding tanks to anerobic digestion of sludge where GHGs can be captured for reuse or neutralization.

PATHWAY 1 STRATEGY 1:

Require consistently operated flare or systems for reuse of biogas. Identify the feasibility of beneficial uses before flaring excess.

1. Complete a survey of WWTFs with Anaerobic Digestors (ADs) and their operational status.
2. For ADs without current beneficial use, require an engineering evaluation (cost subsidized) to determine cost of capital investment and asset management to install beneficial use system.
3. Provide subsidies to encourage the implementation of beneficial use or flaring of methane where beneficial use systems cannot be implemented.
4. Require all facilities that are not implementing beneficial use to have functional flares installed by January 1, 2030.

PATHWAY 1 STRATEGY 2:

Convert aerobic holding tanks to anerobic digestion of sludge where GHGs can be captured for reuse or neutralization.

1. Survey WWTFs to determine interest in installing anerobic digestors, conduct engineering evaluations to determine feasibility and costs
2. Select facilities to site new digestors, prioritizing areas where there is a high ratio of population to anerobic digestor capacity
3. Provide design & construction subsidy to municipalities selected for anaerobic digestors, taking into consideration that the new ADs are meant to take septage & sludge from sources in a defined regional area.
4. Implement MOUs through funding mechanism to require the municipality accept sludge and septage from the defined regional area.

PATHWAY 2:
Reduction of Energy Used in Wastewater Treatment

1. Optimization of sizing and operations of pumps and blowers at WWTFs

PATHWAY 2 STRATEGY 1: Optimization of sizing and operations of pumps and blowers at WWTFs

1. Offer 100% subsidized energy audits to all WWTFs with no existing audits
2. Provide financial support for municipalities to implement the most effective recommended practices from the audit

PATHWAY 3:
Reduced Transportation of Wastewater Treatment Residuals

1. Improved dewatering to reduce the need for residual transportation, additional digestors for sludge processing around the state

PATHWAY 3 STRATEGY 1:

Improved dewatering to reduce the need for residual transportation, additional digestors for sludge processing around the state

1. Survey WWTFs to determine interest in and capacity to implement additional dewatering
2. Subsidized engineering evaluations for all WWTFs interested in implementing new or refurbished dewatering equipment
3. Provide a generous match (>50%) to purchase and install dewatering equipment
4. Institute an annual allocation for a defined time (5-10 years) for these facilities to hire and maintain a larger operational staff where needed to implement dewatering equipment and support for operator training and certification.

PATHWAY 4: Reduce the leakage of HFCs from Refrigeration Systems in Vermont

Industrial Processes	1990	2005	2017
ODS Substitutes	0.00	0.18	0.34
Electric Utilities (SF_6)	0.04	0.01	0.01
Semiconductor Manufacturing (HFC, PFC, SF_6, NF_3)	0.16	0.33	0.19
Limestone & Dolomite Use	0.00	0.03	0.02
Soda Ash Use	0.01	0.01	0.00
Urea Consumption	0.00	0.00	0.00
TOTAL	0.21	0.56	0.57

1. Reduce fugitive emissions from refrigeration systems by requiring annual inspections of systems with requirements to repair leaks through adoption of a refrigerant management program (RMP).

PATHWAY 4

STRATEGY 1: Reduce fugitive emissions from refrigeration systems by requiring annual inspections of systems with requirements to repair leaks through adoption of a refrigerant management program (RMP).

1. Work with VEIC and additional stakeholders to better understand the number and type of entities that would be potentially subject to a refrigerant management program (RMP) and the amount of refrigerant used in the facilities.
2. Further investigate the feasibility of including permanent leak detection systems as either a component of a RMP or potentially as a stand-alone HFC reduction measure as well as possible funding sources for installation of those systems.
3. Track any updates or changes related to Section 608 of the Clean Air Act which was modified by EPA in 2020 to remove leak repair and inspection requirements for HFCs in equipment with 50 or more pounds of refrigerant.
4. Perform further investigation to better understand California's RMP and the potential impacts and consider the adoption of a similar program in Vermont.

PATHWAY 5: Reduce the end-of-life emissions of HFCs from Refrigeration Systems in Vermont

Industrial Processes	1990	2005	2017
ODS Substitutes	0.00	0.18	0.34
Electric Utilities (SF_6)	0.04	0.01	0.01
Semiconductor Manufacturing (HFC, PFC, SF_6, NF_3)	0.16	0.33	0.19
Limestone & Dolomite Use	0.00	0.03	0.02
Soda Ash Use	0.01	0.01	0.00
Urea Consumption	0.00	0.00	0.00
TOTAL	0.21	0.56	0.57

1. Establish an end-of-life program for HFC containing equipment to ensure that refrigerants in old equipment being disposed of are either destroyed or recaptured.

PATHWAY 5
STRATEGY 1: Establish an end-of-life program for HFC containing equipment to ensure that refrigerants in old equipment being disposed of are either destroyed or recaptured

1. Consider proposing legislation for extended producer responsibility, requiring equipment manufacturers to cover the cost of refrigerant recovery or disposal at equipment end-of-life.
2. Perform additional education, outreach, and training to disposal facilities and staff regarding existing federal prohibitions (in Section 608 of the Clean Air Act) on venting of ODS and ODS substitutes during equipment disposal.
3. Ensure that disposal facilities have appropriate EPA certified refrigerant recovery equipment (and explore the potential to find funding for this equipment if necessary and appropriate).

PATHWAY 6: Reduce Use of HFCs in Refrigerant Systems in Vermont

Industrial Processes	1990	2005	2017
ODS Substitutes	0.00	0.18	0.34
Electric Utilities (SF_6)	0.04	0.01	0.01
Semiconductor Manufacturing (HFC, PFC, SF_6, NF_3)	0.16	0.33	0.19
Limestone & Dolomite Use	0.00	0.03	0.02
Soda Ash Use	0.01	0.01	0.00
Urea Consumption	0.00	0.00	0.00
TOTAL	0.21	0.56	0.57

1. Provide incentives (potentially through/related to refrigerant management plan) for consumers of high GWP HFCs in the state to switch to lower GWP alternatives.

PATHWAY 6
STRATEGY 1: Provide incentives (potentially through/related to refrigerant management plan) for consumers of high GWP HFCs in the state to switch to lower GWP alternatives.

1. Using information gathered through the RMP investigation process above, survey applicable entities to determine the average cost required to transition to a low GWP refrigerant (or conduct research from alternative data sources) to inform a potential incentive program.
2. Investigate possible funding sources to enable the creation of an incentive program that would drive a voluntary transition away from high GWP refrigerants in existing equipment (which would have the added benefit of likely exempting them from a RMP and related requirements). New equipment is generally already covered under Act 65 and the associated rulemaking.

PATHWAY 7: Reduce Process Emissions from Semiconductor Manufacturing

Industrial Processes	1990	2005	2017
ODS Substitutes	0.00	0.18	0.34
Electric Utilities (SF_6)	0.04	0.01	0.01
Semiconductor Manufacturing (HFC, PFC, SF_6, NF_3)	0.16	0.33	0.19
Limestone & Dolomite Use	0.00	0.03	0.02
Soda Ash Use	0.01	0.01	0.00
Urea Consumption	0.00	0.00	0.00
TOTAL	0.21	0.56	0.57

1. Continue to explore efficiencies and alternatives to high GWP fluorinated gases in the semiconductor manufacturing process.

PATHWAY 7
STRATEGY 1: Continue to explore efficiencies and alternatives to high GWP fluorinated gases in the semiconductor manufacturing process

1. Hold sole semiconductor manufacturer responsible for overall greenhouse gas emission reductions in line with the 2025 requirements of the Global Warming Solutions Act through the current PUC proceeding.
2. Hold manufacturer accountable through rule-based emissions reductions requirements should PUC order not result in sufficient emissions reductions.
3. Conduct planning to detail future emissions reductions requirements.