

Maine Climate Council

Transportation Working Group

Maine Climate Council
Office of Policy Innovation and the Future
181 State House Station
Augusta, Maine 04333-0181

Dear Maine Climate Council Members:

On behalf of the members of the Transportation Working Group (TWG), we are honored to offer you the following package of strategy recommendations to increase Maine's resilience to climate change impacts and to reduce Maine's transportation source greenhouse gas (GHG) emissions by the State's 2030 and 2050 goals, 45% and 80% respectively. We have known for years that transportation is perhaps the hardest nut to crack in terms of climate efforts and culture change — and this may have led us as a society to delay specific improvements and difficult decisions. We understand and acknowledge these realities and complexities and have been wrestling with them as a group. Most of our members had not worked together before this process and did so most thoughtfully and respectfully; the mixed views on some strategies are reflective of the diversity of this group. Still, the Areas of Emphasis we name within strategies had wide group support. Also of note, we recognize this time of global pandemic has had tremendous impacts on Maine's well-being and economy, which will continue for some time. There are ties between the pandemic and climate crises and we encourage the Council to take decisive action for Maine's future, leveraging our economic recovery to make Maine stronger than before. For example, support for continued and expanded telework and teleservices could be a quick win for both commerce and the climate.

Overview of the Strategies: what will get us there

Based on the TWG's research, review of scientific data, input from all group members, and Synapse Energy Economics, Inc. (Synapse) consultant modeling of the level at which Maine needs to execute select strategies to meet our emission reduction targets – we make these broad strategy and specific action recommendations:

1. **Expand Electrification of Transportation** – We will need to expand electrification of light-duty vehicles to between 50-90% and heavy-duty vehicles to 55-80% of the total fleet by 2050. *Areas of emphasis we would like to draw the Council's attention to within this strategy are:*
 - a. *Provide Equitable Incentives and Grants* - that encourage voluntary consumer conversion from gasoline vehicles to electric vehicles (EVs) and electric bicycles;
 - b. *Design comprehensive and consistent approach to expand EV charging infrastructure and overseeing electrification efforts (EV Roadmap)* - to support achievement of statewide Zero Emission Vehicle targets.

2. **Reduce the Emissions of Maine's Internal Combustion Engines** – While we are transitioning to more electric vehicles, we will need to reduce the emissions of our existing internal combustion engine fleet. Moreover, some medium and heavy-duty vehicles may not have viable electric alternatives long-term. *Areas of emphasis from the TWG are:*

- a. *Encourage Freight Companies to Voluntarily Participate in the US Environmental Protection's (EPA) SmartWay Program* - this helps companies improve freight transportation efficiency;
 - b. *Expand Alternative Fuels* - primarily biodiesel, with specific interest in waste-oil production and efficient distribution within or near Maine, to avoid agricultural and import-related carbon emissions, reduce the amount of this local waste product and keep fuel purchase dollars closer to (or even within) the state.
- 3. Reduce Vehicle Miles Traveled (VMT)** – In order to keep the electrification adoption rates mentioned in item 1 (above) realistic, the TWG requested further modeling to better understand reductions in VMT within the decarbonization scenario. This resulted in an analysis requiring 65% adoption of EVs by 2050, VMT per light-duty vehicle needing to decline 25% by 2030 and 40% by 2050 and VMT per heavy-duty vehicle needing to decline 2.1% by 2030 and 4.2% by 2050. *Areas of emphasis from the TWG are:*
- a. *Support Development in Priority Areas* – Transportation emissions are reduced when the places people need to go are located nearby, at rural crossroads and in village areas, neighborhoods and urban centers; this facilitates the choice of walking, biking, operating public transportation or sharing rides to close common destinations;
 - b. *Expand Public Transportation* - including funding, capacity, frequency, and climate-friendly all-purpose community transit;
 - c. *Expand Telework and Teleservice Opportunities* – this was especially of interest given the current COVID-19 paradigm and extensive recent local experiences with telecommuting.
- 4. Adapt Maine's Infrastructure Critical to the State** – Climate change adaptation is required to increase the resiliency of Maine people, industries, and communities to hazards associated with climate change, including sea level rise, increased precipitation, flooding, extreme temperature, and large storm events. *The top area of emphasis from the TWG is to:*
- a. *Conduct a Statewide Infrastructure Vulnerability Assessment* - Tools exist that document state and select municipal culverts, but lack information about other local transportation assets and non-transportation infrastructure.
- 5. Explore Mechanisms to Fund Transportation Needs and Facilitate Emission Reduction** - Solving this long-standing challenge will require policy solutions at the highest levels of state and federal governments and is beyond the reach of the TWG alone. However, the group agrees that transportation is chronically underfunded in Maine and the state needs to explore different revenue sources for stable, sufficient and sustainable funding - and that funding solutions should support emissions reductions.

Please see our strategy documents and our Appendix for full strategy details and resources.

Why These Strategies Matter: more on Maine's transportation context

As the Climate Council's initial analysis demonstrated, the transportation sector contributes the greatest amount of emissions in Maine by far, at 54% of our total GHG pie. It's the one area where our emissions have actually increased over time, versus the significant reductions that have been made in the energy sector, for example.

Of these transportation-related emissions, light-duty passenger cars and trucks in Maine produce 59% — well over the majority. An additional 27% of transportation GHGs come from the medium and heavy-duty

vehicle sector; therefore, light, medium and heavy-duty vehicle emissions collectively represent 85% of our greenhouse gas burden.

Within the light-duty sector, the average Maine-registered light-duty vehicle travels about 12,000 miles/year. From an economic standpoint, the average Maine household spends \$13,500 per year and 30% of income on transportation costs; low income households spend upwards of 40%. As a primarily rural state, approximately 65% of GHG emissions are rural miles driven and 35% are urban/suburban. Rural motorists also make two times the number of vehicle trips of urban drivers.

How We Arrived at These Strategies: about our Working Group process

The Transportation Working Group (TWG) meetings kicked off in October 2019, where the co-chairs, members, and observers were introduced and the TWG began to discuss the GHG emissions and resiliency issues in the transportation sector. Over the next few months, the TWG was presented information on available transportation data, ongoing public transit efforts, Maine's electric vehicles and infrastructure, and the Transportation Climate Initiative (TCI). To address concerns about the need for more Maine-specific data, Maine's Department of Transportation (MaineDOT) and Department of Environmental Protection (MaineDEP) collaborated to produce a simple GHG emissions calculator tool (with assumptions based on data from MaineDOT, MaineDEP, Efficiency Maine Trust, US Census, US Energy Information Administration, EPA, and other states) to provide ballpark estimates for the impact of various GHG reduction strategies.

The TWG divided into smaller sub-groups to delve deeper into strategy evaluation and selection in four focus areas. The Rural, Urban and Suburban, and Medium- and Heavy-Duty Trucking sub-groups focused on emissions-reduction strategies. A fourth sub-group, Adaptation, focused on resiliency strategies. These sub-groups drafted the list of strategies that shaped the final TWG recommendations. Equity issues were also considered within each strategy. For example, TWG members consistently raised the specific concerns and increasing transportation needs of seniors and the potential mobility co-benefits and impacts of the various strategies on this population.

The TWG recommendations were further informed by decarbonization scenarios modeled by Synapse, that projected the level at which Maine would have to execute select strategies in order to meet the Governor's emission reduction targets. The TWG was especially interested in Synapse modeling of a combined group of mitigation strategies. The working group's recommendations will continue to be evaluated over summer 2020, once the full cost-benefit analysis is available from the state's economic consultant, Eastern Research Group (ERG).

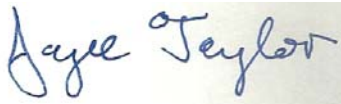
The TWG convened three stakeholder meetings in May, focused around marine, urban/suburban, and rural groups, to solicit feedback and comments on the draft recommendations. A key outcome of the marine meeting was the desire to work together moving forward as a cross-cutting network and the TWG will convene these stakeholders again. Participants in the urban stakeholder meeting shared a number of funding concerns, including: municipal road and bridge maintenance costs; and prioritization of funding for infrastructure adaptation, transit, pedestrian and bicycle projects. Rural stakeholders shared concerns about taking on climate initiatives in the current economic context and strategies they felt were more urban-focused and would need to be different for rural contexts. Across all stakeholder groups, there was strong interest in: broadband, telework and teleservices; ensuring lower-income Mainers are not penalized by climate mitigation efforts; and the need to reflect tourist emissions in our work. In each group support or lack thereof was divided on TCI. While this stakeholder process - and other public input at TWG meetings, via email and telephone - have been very helpful, the working group is conscious that full vetting of strategies still requires input from the state's upcoming widely-cast Public Engagement effort in Summer 2020.

In Conclusion


While the TWG has been through a robust process and the areas of emphasis within our strategies received wide support from the group, with the aggressive timeline, the TWG was not able to fully vet all of the initiatives brought forth from the subgroups. In addition, the working group was instructed to keep all strategies for the Council's discernment, unless there was group-wide agreement to remove them. Moreover, in-depth cost-benefit information was not available at the time of these discussions, although we compiled data from other sources. We plan to reconvene the TWG this summer to resume discussions, once the full cost-benefit analysis is available from ERG.

Please let us know if you have any questions about the proposed strategies or of our support for others. We look forward to continuing our assistance in your work and greatly appreciate your time reviewing our recommendations and your ongoing Council efforts.

Sincerely,

A handwritten signature in blue ink that reads "Joyce Taylor". The signature is written in a cursive style and is placed over a light-colored rectangular background.

Joyce Taylor, Co-Chair of the TWG and Chief Engineer of MaineDOT

A handwritten signature in blue ink that reads "Sarah Cushman". The signature is written in a cursive style and is placed over a light-colored rectangular background.

Sarah Cushman, Co-Chair of the TWG and Transportation Planning Consultant

Transportation Working Group Recommended Climate Strategy Actions and Measurable Outcomes

Expand Electrification of Vehicles

1. *Describe the Recommended Strategy and how it addresses Maine's climate resiliency and mitigation goals.*

The Transportation Working Group (TWG) recommends that the Maine Climate Council (MCC) Expand Electrification of Maine's Vehicle fleet. According to Maine Department of Environmental Protection (Maine DEP) data, light Duty and Heavy-Duty vehicles are the source of the bulk of 86%¹ of transportation sector emissions. A typical gasoline vehicle emits approximately 5.5 metric tons of CO₂ per year, while an electric vehicle (EV) emits 1.12 tons of CO₂ per year². TWG staff compiled existing available data from Maine Department of Transportation (Maine DOT), Maine DEP, Efficiency Maine, US Census, US Energy Information Administration (EIA), US Environmental Protection Agency (EPA), and other states. Using this data to make some basic assumptions, TWG staff created a simple calculator tool³ to review different scenarios of potential emission reductions from various strategies, including the conversion of gasoline vehicles to EVs. The tool suggested electrification of vehicles could result in substantial CO₂ emissions savings. Synapse Energy Economics, Inc. (Synapse) later modeled a decarbonization scenario to inform working group strategies that confirmed electrification of Maine's vehicle fleet is a major variable in achieving emission reduction targets.

While EV sales may increase with gradual changes in consumer preference and improvements in EV features and EV infrastructure, it will not be enough to meet Maine's emissions reduction goals. Maine has approximately 1.3 million registered gasoline passenger vehicles. As of April 2019, electric and plug-in hybrid vehicles represented less than half of 1 percent of Maine's registered vehicles.⁴ Initial modeling by Synapse⁵ suggests that electrification of 90% of light duty vehicles (LDVs) and 80% of heavy-duty vehicles (HDVs) by 2050 would achieve Maine's target emission reductions with vehicle miles traveled (VMT) reduction targets for 2030 (LDV:12.1%; HDV:2.1%) and 2050 (LDV:27.2%; HDV: 4.2%).

Some TWG members were concerned that the modelled electrification percentages may be too high to practically achieve, while others were concerned that the initial scenarios undervalued strategies to reduce VMT. TWG requested further modeling to better understand the reductions in VMT that would be required to offset a lower EV percentage. Synapse modeled a third scenario in with less aggressive electrification (65% of LDV and 55% of HDVs by 2050) that showed comparable emissions reductions by 2050 when combined with higher VMT reduction targets for 2030 (LDV: 25%; HDV: 2.1%) and 2050 (LDV:

¹ 59% is LD and 27% is MD & HD = 86% total.

² Source: Efficiency Maine, *EMT Vehicle Emissions and Fuel Savings Calculations 2_19-20* (Excel Spreadsheet)

³ TWG Scenario Calculations_v1.4.xlsx (Excel Workbook)

⁴ Efficiency Maine PowerPoint Presentation to TWG, December 2019

⁵ Transportation Scenario Results ERG presentation and Synapse DRAFT Transportation Scenario Results 5/8/20

40%; HDV:4.2%) and use of low carbon fuels by 20% of all LDVs and HDVs. Modelling results and potential reductions in CO₂ emissions are provided in Question 2a.

TWG members support voluntary expansion of electrification in Maine; there was limited support for mandatory requirements. The TWG recommends that the MCC adopt statewide goals for the percentage of EVs on the road. The targets should be informed by the most recent science and emissions data as well as Maine-specific modelling results to achieve Maine's decarbonization mandate.

Setting specific interim and long-term goals will support specific actions to increase electrification. It will also provide a metric against which to measure success over time and allows for periodic adjustment. Further, it sends an important signal to manufacturers and will help to create certainty in, and bolster, EV and EV infrastructure markets.

The TWG members recognize that medium-heavy duty truck transition to EV will need a more gradual transition to electric. The availability and reliability of medium and heavy-duty electric vehicles is currently much less than that of light duty vehicles. Goals should contain time extensions and, if necessary, exceptions for vehicle types lacking a viable and readily available electric option.

Expanding electrification of Maine's vehicle fleet is a major element of mitigation of greenhouse gas (GHG) emissions in the State (45% reduction by 2030, 80% by 2050). Implementation of this strategy will result in significant and measurable reductions in CO₂ emissions.

The TWG recommends that the MCC act to increase EV adoption to achieve electrification and emission reduction goals. The following two initiatives were identified by the TWG as Areas of Emphasis for the MCC:

- **Design comprehensive and consistent approach to monitoring and overseeing electrification efforts and expanding EV charging infrastructure (EV Roadmap) to support achievement of statewide ZEV targets.** Coordinating and planning investment in electrification and Electric Vehicle Supply Equipment (EVSE) is the most efficient and least expensive way to achieve a robust charging infrastructure that is supportive of the state's ZEV targets. It is also the best way to ensure an equitable approach that leaves no Mainers behind. This component also addresses consumer range anxiety. Range anxiety can be a barrier to purchasing electric vehicles if the driver is concerned about the capacity of an EV battery to complete a trip without having to charge the vehicle. In addition, the availability and convenience of charging locations affects consumer decisions. A reliable system that ensures an EV owner can charge their vehicles along major routes, at public places, at work and at home is important to expanding electrification.

The TWG recommends that the MCC fund and manage a Comprehensive EV Expansion Study/Plan that considers existing efforts, anticipates future needs, and prioritizes coordinated actions. This should be done with other groups such as the Efficiency Maine Trust and the Maine DEP.

- **Provide Equitable Incentives and Grants that encourage voluntary consumer conversion from gasoline vehicles to electric vehicles and electric bikes (ebikes).** It is important that the benefits of electrification are shared with all Mainers, including by expanding access to EVs amongst low

income and rural drivers. EVs currently have a higher initial purchase cost than gasoline vehicles and may be a barrier to participation by lower income drivers. Incentives that apply to used EVs (assumes reduced upfront purchase cost) or income-based incentives are essential to a successful Incentives and Grant Program.

- a. For adaptation strategies, what climate impacts does it address? How will this strategy reduce the vulnerability of Mainers to the impacts of climate change?**

n/a

- b. List any site-specific geographies where the strategy would be applied.**

Statewide

- 2. What is your measurable outcome for this strategy, assuming all recommended actions to implement the strategy are achieved?**

- a. For mitigation strategies:**

- i. What is the estimated CO₂ savings (metric tons) by 2025, 2030, 2050?**

Synapse provided modelled CO₂ emissions for three scenarios with varied electrification levels:

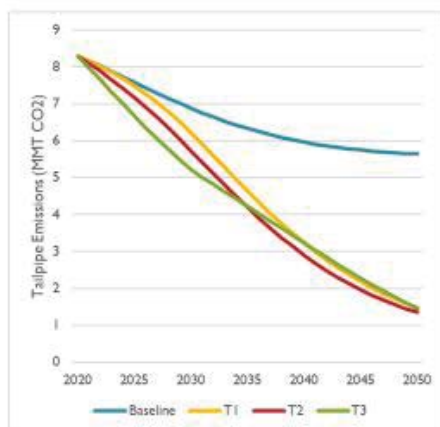
Scenarios Analyzed

Baseline	T1	T2	T3
Worst case electrification—CAFE standards remain	Electrification—baseline efficiency	Electrification—aggressive efficiency	Reduced electrification—extreme efficiency and low carbon fuels
<ul style="list-style-type: none"> 11% of LDVs are electric by 2050 0% of HDVs are electric by 2050 VMT per LDV remains constant through 2050 VMT per HDV remains constant Fuel efficiency reaches 42 MPG for new cars and 30 MPG for new light trucks by 2050 	<ul style="list-style-type: none"> 90% of LDVs are electric by 2050 80% of HDVs are electric by 2050 VMT per LDV remains constant through 2050 VMT per HDV remains constant Fuel efficiency reaches 42 MPG for new cars and 30 MPG for new light trucks by 2050 Managed EV charging 	<ul style="list-style-type: none"> 90% of LDVs are electric by 2050 80% of HDVs are electric by 2050 VMT per LDV declines 12.1% by 2030 and 27.2% by 2050 VMT per HDV declines 2.1% by 2030 and 4.2% by 2050 Fuel efficiency reaches 45 MPG for new cars and 33 MPG for new light trucks by 2050 Managed EV charging 	<ul style="list-style-type: none"> 65% of LDVs are electric by 2050 55% of HDVs are electric by 2050 VMT per LDV declines 25% by 2030 and 40% by 2050 VMT per HDV declines 2.1% by 2030 and 4.2% by 2050 Fuel efficiency reaches 45 MPG for new cars and 33 MPG for new light trucks by 2050 Managed EV charging 20% of LDVs use low carbon fuels 20% of HDVs use low carbon fuels

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Greenhouse Gas Emissions



- The T1, T2, and T3 scenarios result in emissions reductions between 2020 and 2050 of 82%, 84%, and 82%, respectively
- The impacts of reduced VMT and increased fuel efficiency in the T2 scenario have a larger impact in the earlier years when fewer EVs are on the road
 - By 2050, the impact is smaller because most vehicles are electric
- T3 results in greater emissions reductions through 2030 due to its 2030 VMT reduction target

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The components of the TWG Expand Electrification strategy contribute to getting more EV penetration which directly results in CO₂ emission reductions. Easter Research Group, Inc. (ERG) provided initial comments on the relative magnitude of CO₂ emission reduction potential of individual components of the strategy based on best professional judgement⁶. Equitable Incentives and Grants, EV Roadmap, and ZEV/EV Adoption Targets were ranked with High emission reduction potential. The legislation component may not contribute directly to CO₂ emissions savings but is important to success of the overall strategy.

ii. What is the cost effectiveness of those reductions (cost per ton of CO₂ reduced) and the total cost?

ERG provided initial comments on the relative cost-effectiveness of individual components of the strategy based on best professional judgement⁴. Equitable Incentives and Grants, EV Roadmap, and ZEV/EV Adoption Targets were ranked with medium cost-effectiveness.

b. Are outcomes measurable with current monitoring systems?

Data on registered vehicles is available from the Maine Bureau of Motor Vehicles (BMV). Efficiency Maine Trust currently tracks and measures its incentive programs. Monitoring of public fleets would require tracking and reporting by fleet operators. DEP should be required to annually report on progress toward achieving the ZEV targets.

2. *What specific actions would be required to implement the strategy, including but not limited to legislation or regulation. Examples include: establish a program or a fund, conduct additional research, provide education or training, coordinate with other parties/agencies/states, etc. Considering the recommended actions listed, who, if they can be named, are the specific actors needed for implementation?*

The TWG showed widespread support for the following specific actions:

- **Develop statewide plan for expanding, coordinating, and distributing investment in EV infrastructure (EV roadmap):**
 - Create a Task Force to develop an EV Roadmap: Fund and manage a Comprehensive EV Expansion Study/Plan that considers existing efforts, anticipates future needs, and prioritizes coordinated actions.

⁶ Based on research completed for Alameda and Raleigh CAP projects. Relevant references: 1. CEC Staff Report, California Plug-In Electric Vehicle Infrastructure Projections, 2017-2025, March 2018; 2. The Continued Transition to Electric Vehicles in U.S. Cities, White Paper, ICCT, July 2018; 3. EXPANDING THE ELECTRIC VEHICLE MARKET IN U.S. CITIES, White Paper, ICCT, July 2017; 4. Evaluating Methods to Encourage Plug in Electric Vehicle Adoption, Prepared for CalETC, Plug In America, Z32 October, 2016.

- o Allocate additional funding to Efficiency Maine Trust to continue and expand its initiatives supporting the installation of EV charging equipment, in accordance with a statewide plan for infrastructure deployment.
- **Equitably expand EV and plug-in hybrid incentives and grants. Support E-bike incentives for individual purchase and for bikeshare:**
 - o Expand the programs administered by the Efficiency Maine Trust. The Efficiency Maine Trust currently runs programs to promote energy conservation and GHG reductions in all areas of Maine, including the “EV Accelerator Program”, which provides monetary incentives to reduce the upfront purchase price of EVs. The Efficiency Maine Trust EV Accelerator Program includes funding from the recent settlement with Volkswagen. This action would include establishing a statutorily-dedicated funding stream for EV rebates and incentives.
 - o The Efficiency Maine Trust program would be expanded by making used EVs eligible for rebates to widen access of the program to Mainers of different means, and revisit “low income” incentive level to ensure it is appropriate.
 - o The program would expand to make medium- and heavy-duty vehicles eligible and set an appropriate incentive level (considering other available funding streams).
 - o The funding levels and need for funds should be periodically reevaluated and the programs should ultimately phase itself out as EVs experience broader deployment and as costs approach price parity with conventional, internal combustion engine vehicles.
 - o Create funding/programs (or support existing programs) designed to enhance customer education and direct experience with electric driving as well as dealership training.

Two other specific actions were identified but discussions were brief and did not include enough detail to develop widespread support within the group:

- Advance the deployment of EVs, including medium- and heavy-duty trucks, by ensuring that operation costs are low and electrification benefits are maximized through a package of utility/Public Utility Commission (PUC)-focused legislation. This is an action that the TWG could collaborate with the Energy & Buildings Working Groups. TWG members expressed concern regarding rate-setting equity. Specifically, some could not support reduced rates for EVs and EVSE if that meant that rates increased for other users, particularly for non-EV drivers in low income brackets and/or rural and underserved areas. However, at least one study⁷ has suggested that greater EV penetration reduced electricity rates for all.

⁷ Mid-Atlantic and Northeast Plug-in Electric Vehicle Cost-Benefit Analysis, Methodology & Assumptions, prepared by M.J. Bradley & Associates LLC, December 2016

- o One package of legislation could focus on designing electricity rates that make EVs, including medium- and heavy-duty trucks, and investment in EVSE attractive from a cost perspective, while maximizing benefits to the electricity grid.
- o Additional legislation could direct transmission and distribution utilities to evaluate and invest in a range of EV-related programs. This should include but not be limited to reducing upfront costs of charging stations through a make-ready approach. Utilities should be required to consider planned renewable development and take stock of their existing resources to identify areas where increased electrification could most efficiently be incorporated into the grid and consider incentivizing construction of DC fast chargers paired with excess grid capacity or renewable generation resources. Utility investments found to be in the public interest should be approved by the Commission and costs passed on to ratepayers.
- o TWG and/or the Energy group could recommend legislation that would ensure that all utility regulation, planning and decision-making considers and accommodates the state’s decarbonization targets as well as the beneficial electrification necessary to achieve those.
- Establish Statewide ZEV/EV adoption targets for public fleets. Initial state targets (for short, mid and long term) could be prescribed in the climate action plan based on modeling and analysis conducted by ERG/Synapse. Subsequently, every 3 years, Maine DEP could evaluate the number and adjust targets as necessary.
 - o Maine DEP could establish electrification targets for all public fleets and all fleets serving a public purpose. This “lead by example” initiative could increase visibility of EV’s, increase Maine citizen familiarity, and demonstrate viability, all of which could contribute to increased EV uptake of both passenger vehicles and medium and heavy duty trucks. Interim targets could be established, such as:
 - ✓ fifty percent of all public motor vehicle fleets and motor vehicle fleets serving a public purpose should be low-emission or zero-emission by 2025;
 - ✓ seventy-five percent of all public motor vehicle fleets and motor vehicle fleets serving a public purpose should be low-emission or zero-emission by 2030; and
 - ✓ one hundred percent of all public motor vehicle fleets and motor vehicle fleets serving a public purpose should be zero-emission by 2035.
 - o All targets could include time extensions, and if necessary, exceptions for vehicle types lacking viable electric options.

3. What is the timeframe for this strategy?

ZEV/EV Targets	Short-term (2022)	Mid-term (2030)	Long-term (2050)	2070+
Implementation	<ul style="list-style-type: none"> ● Synapse completes modeling to identify electrification target 	<ul style="list-style-type: none"> ● Assess targets periodically revisited and update 	<ul style="list-style-type: none"> ● Targets should be periodically revisited and updated 	

	<p>necessary to achieve 2030 reductions</p> <ul style="list-style-type: none"> ● Identify targets for ZEVs in initial climate action plan, including short term goal (2025 or sooner) ● Set targets that include short-term targets to drive action 			
Outcome Realized	<ul style="list-style-type: none"> ● Immediate signal to consumers, manufacturers and consumers, ● EV sales increase and will drive policy 	<ul style="list-style-type: none"> ● Targets are calculated and will have driven policy to realize the EV and emission goals. 	<ul style="list-style-type: none"> ● Targets will have driven policy to realize the EV and emission goals. ● Zero-Emission public fleets 	
EV Roadmap	Short-term (2022)	Mid-term (2030)	Long-term (2050)	2070+
Implementation	<ul style="list-style-type: none"> ● EV roadmap (Study and Plan) should be completed no later than December 2021, and the result is an actionable plan with specific measures. ● Identify and promote consistent hardware ● Conduct study of barriers in rural communities and develop policies to overcome barriers 	<ul style="list-style-type: none"> ● Implementation of EV roadmap as necessary to meet (and anticipate) demand associated with achieving statewide ZEV targets 		
Outcome Realized		<ul style="list-style-type: none"> ● Beginning with implementation of EV roadmap and throughout next 10 years as EVSE (and EV) deployment expands 		

Incentives, Grants	Short-term (2022)	Mid-term (2030)	Long-term (2050)	2070+
Implementation	<ul style="list-style-type: none"> Continue Efficiency Maine Trust VW-funded rebate program Identify more permanent funding stream Investigate the best incentive program for individual purchase and bike shares 	<ul style="list-style-type: none"> Implement selected programs Track adoption rate Assess and adjust incentives 	<ul style="list-style-type: none"> Funding periodically reevaluated and program phase out as EV deployment broadens and cost parity achieved 	
Outcome Realized	<ul style="list-style-type: none"> Immediate emissions reductions with every sale 	<ul style="list-style-type: none"> EV adoption reduces # of gasoline vehicles; measurable CO₂ reductions 		

4. Please analyze the Recommended Strategy against the following criteria. (Each Working Group can add its own sector-specific criteria as appropriate.)

Workforce - Will the strategy create new jobs, prevent job loss, or cost the state jobs?	Electrification of the transportation sector could create new jobs if Maine businesses and workers capitalize on the growth of this innovative new technology, including supportive infrastructure. It will result in a need for more installation and maintenance of EV charging infrastructure. Traditional auto jobs may be displaced by new auto jobs. Electrification at scale will negatively impact employers that sell petroleum and gas.
Benefits (non-workforce) - What are the expected co-benefits of this strategy (e.g., improved health, increased economic activity, wildlife habitat connectivity, reduce natural hazard risk, increased recreation, avoided damage)?	Electrification of the transportation sector presents myriad benefits, including: <ul style="list-style-type: none"> Health benefits: EVs have no tailpipes and emit no air pollution. More EVs means less air pollution, cleaner air in our communities, our schools, and along our roads, with real, quantifiable benefits and health cost savings for Maine families and businesses. The health benefits attributable to electrification are of critical import, as the burdens of air pollution disproportionately fall on disadvantaged communities and have outsized consequences for our most vulnerable populations. Environmental benefits: EVs have flexible loads, meaning that they do not need to draw on the electricity grid while they are utilized. Assuming this flexibility is adequately considered and planned for, this means not only direct emissions reductions, but also reduced curtailment of renewable resources and less electricity generated by dirty power plants. Moreover, EVs get cleaner over time as we decrease reliance on fossil fuels for electricity generation.

	<ul style="list-style-type: none"> o Consumer benefits: The system benefits and efficiencies associated with EVs (e.g. smoother demand curve due to flexible load), as well as the improved margins attributable to higher utility revenues, can be shared with all ratepayers, putting downward pressure on rates. EVs have lower vehicle maintenance costs.
<p>Costs – <i>What are the estimated fiscal costs and other costs to carry out this program. To the state? To municipalities? What resources do you anticipate needing to inform Mainers about the strategy and the opportunity/costs of the strategy? Where would financing likely come from?</i></p>	<p>The upfront cost of EV models is currently higher than comparable gasoline and diesel vehicles. However, the costs of EVs continue to drop, driving down total costs of ownership. While cost savings vary (for instance, depending on mileage and electricity rates), in many circumstances the total cost of ownership (acquisition cost, plus fuel, plus maintenance, plus salvage value) of light-duty gas-powered vehicles already exceeds total cost of comparable electric vehicles. In the medium and heavy-duty vehicles sector, fueling costs represent a large fraction of total costs; therefore, despite higher acquisition costs of electric vehicles, lifetime cost parity is already achieved or close in Class 3 through 6 vehicles, and projected for Class 7 and 8 by 2025 (depending on circumstances).</p> <p>Currently, the Efficiency Maine Trust is implementing the EV Accelerator program which provides rebates ranging from \$1,000 to \$7,500 depending on the consumer and vehicle type. The costs of the program are the funds to provide the acquisition and charger rebates. The consultant or Efficiency Maine Trust would need to determine the necessary funding levels. The costs of the rebate program will decrease over time as economies of scale continue to reduce the price of LDVs and HDV EVs and as price parity with conventional, fossil-fuel powered vehicles is achieved (and as a market for used HDV EVs develops).</p> <p>As EV deployment increases, the business case for charger installation will also improve, reducing the need for incentives. (Note: Mainers with better access to charging infrastructure and fleets with greater access to HDV EVs and chargers will all benefit from lower operational costs.)</p> <p>The costs of the EV Roadmap are those associated with administration of a group or task force and development of a plan, likely including some modeling.</p> <p>The Utility/PUC legislation component of the TWG Electrification Strategy seeks to mitigate or reduce costs associated with increased electricity demand by planning, mitigating and maximizing the benefits. For utility investments found by the PUC to be in the public good, costs could be passed on to ratepayers. However, cost-benefit data has shown that greater EV penetration should lower electricity rates for all ratepayers (regardless of EV ownership) because of greater utilization of the electricity grid, especially with managed</p>

	<p>charging. This action needs additional consideration to ensure rates are either lowered for Mainers or rate increases are equitable.</p>
<p>Proven strategy & feasibility – Has this strategy been implemented successfully elsewhere? Is it feasible with today’s technology? What barriers to implementation exist (e.g., financial, structural, workforce capacity, public/market acceptability)?</p>	<p>Incentives and Grants</p> <ul style="list-style-type: none"> ● ME already offers a rebate, called the EV Accelerator program, administered by the Efficiency Maine Trust and funded by VW settlement. Important elements of the ME program should be retained, e.g. incentive differential based on income level; immediate rebate rather than year-end tax credit; lease eligibility. ● Research from around the country shows that providing incentives toward upfront costs is an effective strategy for increasing deployment of EVs. However, unstable funding streams can disrupt momentum and lead to market uncertainty. ● California targeted subsidies by income and race ● Other state examples exist and should be considered. ● MHD EV rebates also exist in CA, CO, NY, TX, and UT. ● Research has identified the potential for incentivizing Ebike and active transportation: https://trec.pdx.edu/news/e-bike-potential-addressing-our-climate-crisis-incentivizing-active-transportation; https://wsd-pfb-sparkinfluence.s3.amazonaws.com/uploads/2019/05/E-bike-Potential-Paper-05_15_19-Final.pdf <p>EV Roadmap</p> <ul style="list-style-type: none"> ● The Pennsylvania Electric Vehicle Roadmap (Feb. 2019), developed to: "review the state of the EV market in Pennsylvania, defined a set of proposed strategies to support the expansion of the EV market, and provide estimates of the potential benefits and impacts to the state from an increased EV market". ● CT DEEP EV Roadmap ● Efficiency Maine Trust already has experience administering funding for EVSE installation. <p>Legislation to reduce operation costs and maximize electrification benefits:</p> <ul style="list-style-type: none"> ● Georgetown Climate Center ● Mid-Atlantic and Northeast Plug-in Electric Vehicle Cost-Benefit Analysis: https://mjbradley.com/sites/default/files/NE_PEV_CB_Analysis_Methodology.pdf <p>ZEV/EV Targets:</p>

	<ul style="list-style-type: none"> ● The multi-state ZEV MOU established a collective target of at least 3.3 million zero emission vehicles on the road by 2025. ● MA has a goal of 300,000 by 2025 (S1927, H2872); ● CT has a goal of 500,000 by 2030; (HB 7205) 50% LDV and 30% buses purchased or owned by state to be ZEV by 2030 ● NJ recently codified the state’s goal of 330,000 registered light-duty electric vehicles by 2025 (see S2252; A 4819)⁸ and established goals for electrification of medium and heavy-duty vehicles. ● District of Columbia (DC 22-257) buses, rideshares, fleets to be ZEV by 2045⁹
<p>Legal authority - Does the strategy require new statutory (legal/legislative) authority?</p>	<p>Incentives and Grants</p> <ul style="list-style-type: none"> ● Legislation allocating a durable funding stream is preferable for ensuring continuity. ● The Efficiency Maine Trust has adequate authority to continue implementing this program and to make the recommended expansions. ● EV Roadmap & Legislation to reduce operation costs and maximize electrification benefits ● The PUC likely could implement these strategies pursuant to its existing authority, legislation is desirable to prompt more immediate action.

5. Rationale/Background Information

Included above and in the documents referenced.

⁸● The [NJ] Legislature therefore determines that it is in the public interest to establish goals for the increased use of plug-in electric vehicles, pursue attainment of those goals through the development of a Statewide plug-in electric vehicle charging infrastructure, and develop this infrastructure by establishing a Statewide electric vehicle charging infrastructure plan;

- a. There are established the following State goals .. :
 - o (1) at least 330,000 of the registered light duty vehicles in the State shall be plug-in electric vehicles by December 31, 2025;
 - o (2) at least 2,000,000 . . . by December 31, 2035;
 - o (3) at least 90 percent of all new light duty vehicles sold in the State shall be plug-in electric vehicles by December 31, 2040;

⁹- D.C. 22-257. Clean Energy DC Omnibus Amendment Act of 2018. (effective Mar. 22, 2019)

- o (a) Within 180 days after the applicability date of this act, the mayor shall establish a transportation electrification program (“program”) that shall require that all public buses, privately-owned and operated ride shares, passenger- and light-duty vehicles associated with privately-owned fleets with a capacity of 50 or more passengers or light-duty vehicles licensed to operate in the District of Columbia; commercial motor carriers, limousines service vehicles, and taxis certified to operate in the District only zero-emission vehicles in the District by year 2045. (with interim targets)

Appendix Items:

- Documents referenced.
- The following is additional information on potential legislation packages:
 - One package of legislation should focus on designing electricity rates that make EVs, including medium- and heavy-duty trucks, and investment in EVSE attractive from a cost perspective, while maximizing benefits to the electricity grid:
 - ✓ The PUC should direct transmission and distribution utilities, and invite the Efficiency Maine Trust and other entities, to develop and submit plans for managing electricity load—including by use of time-varying rates—to both reduce fueling costs for EV drivers and maximize grid benefits of flexible load. The Commission should evaluate, modify as necessary and ultimately approve these plans in a public, transparent, adjudicatory docket.
 - ✓ The PUC should evaluate current electricity rates to determine whether demand charges impede beneficial electrification. If rate structures are found to undermine the economic business case for potential site hosts, thereby deterring investment and slowing expansion of EV infrastructure, the Commission should explore alternatives to the traditional model in an adjudicatory docket and require adoption of new approaches tailored to accommodate expansion of DC fast chargers at least until certain threshold levels of utilization are achieved.
 - Additional legislation should direct transmission and distribution utilities to evaluate and invest in a range of EV-related programs. This should include but not be limited to reducing upfront costs of charging stations through a make-ready approach. Utilities should be required to consider planned renewable development and take stock of their existing resources to identify areas where increased electrification could most efficiently be incorporated into the grid and consider incentivizing construction of DC fast chargers paired with excess grid capacity or renewable generation resources. Utility investments found to be in the public interest should be approved by the Commission and costs passed on to ratepayers.
 - TWG and/or the Energy group should recommend legislation that would ensure that all utility regulation, planning and decision-making considers and accommodates the state's decarbonization targets as well as the beneficial electrification necessary to achieve those:
 - ✓ require Maine's utilities to engage in public, long-term planning subject to Commission review. Plans should account for increasing demand projections attributable to electrification of the transportation and heating sectors consistent with the state's decarbonization targets. Utilities should be required to analyze the impacts on the state's transmission and distribution systems to facilitate planning for managing and meeting those demands. [could be amendment to NWA statute]

- ✓ expressly require the Commission to consider the state's decarbonization targets in its analysis of utility actions, decisions and investments. In cost/benefit analyses, the Commission should properly value and account for benefits including emissions reductions and avoided climate change costs, cleaner air and health savings.

Transportation Working Group Recommended Climate Strategies, Actions and Measurable Outcomes

Reduce the Emissions of Maine's Internal Combustion Engines

1. Describe the Recommended Strategy and how it addresses Maine's climate resiliency and mitigation goals.

This strategy entails reducing emissions of Maine's internal combustion engines as necessary to achieve the statewide decarbonization targets via several avenues while encouraging innovation throughout the state for sustainable change. Maine is reliant on internal combustion engines for most of its access and mobility needs. While the Transportation Working Group (TWG) recognizes the desire and intention to move toward the adoption of electric vehicles, it also realizes this strategy alone can't meet the State's goals for 2030 and 2050. However, it can be a piece of the larger emissions reduction. The actions discussed herein represent part of a forward-thinking framework to reduce Maine's dependence on high-carbon fuels while minimizing the burden on Maine's populations. The strategy comprises a multi-faceted approach to reduce combustion engine emissions that includes:

- Encouraging greater voluntary freight company participation in the US Environmental Protection Agency's (EPA) SmartWay program, which helps improve freight transportation efficiency
- Expanding alternative fuels
- Increasing vehicle fuel economies
- Comprehensive education and marketing regarding fuel economy strategies

Reducing the emissions of Maine's internal combustion engines would help achieve the following Maine Climate Council (MCC) goals:

- Mitigation of greenhouse gas emissions (GHG) in the State: 45% reduction by 2030, 80% by 2050;
- Pursuing actions that minimize deleterious effects, including those on persons of low income and moderate income, to public health and the environment and that support economic sectors that face the biggest barriers to emissions reductions and creating, when feasible, additional employment and economic growth in the State, especially in rural and economically distressed regions of the State;

- Ensuring equity for all sectors and regions of the State and that the broadest groups benefit from the achievement of the GHG emissions reduction levels, with consideration of economic, quality-of-life and public health benefits;
 - Supporting industries, technology and training that will allow workers and companies in the State to benefit from carbon reduction solutions, while decreasing the cost of the continued use of internal combustion engines.
- a. **For adaptation strategies, what climate impacts does it address? How will this strategy reduce the vulnerability of Mainers to the impacts of climate change?**

n/a

- b. **List any site-specific geographies where the strategy would be applied.**

n/a

2. What is your measurable outcome for this strategy, assuming all recommended actions to implement the strategy are achieved?

- Increase in fuel economy of vehicles, estimates can be calculated using data from Maine Department of Transportation (Maine DOT), Maine Department of Environmental Protection (Maine DEP), and Maine Bureau of Motor Vehicles (BMV).
- Increase in voluntary participation in the EPA SmartWay program
- Increase the availability and use of biodiesel/biofuel measured yearly
- Measurement of emissions in York County through emissions inventory program
- Percentage of traffic signalization upgrades and improvements measured yearly

a. For mitigation strategies:

i. What is the estimated CO₂ savings (metric tons) by 2025, 2030, 2050?

To be assessed by Eastern Research Group (ERG)/Synapse Energy Economics, Inc. (Synapse) consultants, but generally investment in efficiency is the most cost-effective mechanism for reducing emissions.

ii. What is the cost effectiveness of those reductions (cost per ton of CO₂ reduced) and the total cost?

To be assessed by ERG/Synapse.

b. Are outcomes measurable with current monitoring systems?

Partly, as listed below:

- EPA SmartWay program currently tracks and measures the estimated savings.
- Maine DOT, Maine DEP, and BMV collect data that can be used to estimate miles per gallon.
- The emissions inspection program currently exists in Cumberland County, this system could be expanded to include York County.

2. What specific actions would be required to implement the strategy, including but not limited to legislation or regulation. Examples include: establish a program or a fund, conduct additional research, provide education or training, coordinate with other parties/agencies/states, etc. Considering the recommended actions listed, who, if they can be named, are the specific actors needed for implementation?

Areas of Emphasis: Below are the actions of the TWG. There were two actions that received the most support through informal polling: Encourage Freight Companies to Voluntarily Participate in EPA SmartWay Program and Expand Alternative Fuels. The other actions were discussed by the TWG, however, they did not have as wide support:

- *Encourage Freight Companies to Voluntarily Participate in EPA SmartWay Program* - SmartWay focuses on helping companies improve supply chain sustainability through tracking, measuring and improving freight transportation efficiency. The program offers a comprehensive website with a reporting and tracking system. EPA SmartWay verifies new technologies, such as aerodynamic devices and low rolling resistance tires, that allow a rapid return on investment for freight transportation companies. Some of these technologies have shown fuel savings of \$4800 (1650 gallons of fuel), fuel economy increases of 11%, and estimated CO₂ savings of 16.8 metric tons. The TWG recognizes that the return on investment for larger companies, usually 1 to 2 years, will be realized more slowly for smaller companies making participation more difficult.

Aerodynamic devices, low rolling resistance tires, and idling reduction technologies, etc., have been verified by EPA SmartWay to decrease emissions. For example, some of the technologies employed can lead to idling savings of up to 1600 hours, up to 960 gallons/\$2,790 of fuel and an associated CO₂ savings of up to 9.8 metric tons. Improving aerodynamics has been found to save up to 1650 gallons/ \$4,810 of fuel from an increase in fuel economy of up to 11%, with an associated CO₂ savings of up to 16.8 metric tons.

Maine DEP/Maine DOT should develop a program to encourage voluntary company participation in the EPA SmartWay program by engaging in some or all of these actions:

- Make it easier for fleet managers to participate in EPA SmartWay by providing loans/grant/incentives for efficient technologies; ensuring that these efficient technologies are available in the state and those that are working with the technologies - mechanics, drivers, and fleet managers - have adequate training with the technology; otherwise provide financial and/or technical support to interested fleet managers.
 - Make it more attractive for fleet managers to participate in EPA SmartWay by publishing a state list of EPA SmartWay Partners as well as EPA SmartWay Excellence Awards; develop an awards program for participants especially those that receive threshold levels of efficiency; assist with branding and public exposure; showcase ingenious and ambitious efficiency strategies and technologies adopted by Maine shippers, carriers and facilities.
 - Maine DOT/Maine DEP engagement in education and outreach campaign to raise awareness of EPA SmartWay and efficiency measures among fleet managers.
- *Expand Alternative Fuels* - Biofuels, such as biodiesel, burn cleaner than petroleum-based diesel, resulting in less GHG emissions. B20, diesel containing 20% biodiesel, can reduce CO₂ emissions by 15% over petroleum-based diesel. Maine DOT currently has a pilot project to use biofuels and Minnesota has a program that gradually increased the percentage of biodiesel in diesel over time with some success. Conversely, some members expressed concerns over the unpredictable nature of such a program with regard to operational logistics surrounding the blending, gelling, engine component impacts and cost. However, to date there remains a lack of distributors in the State to meet current interests. A member did note that there are manufacturers interested in setting up business in Maine so there is likely to be more products available in the future while fostering economic development in Maine. Some members of the TWG discussed the opportunity to import biofuels from other regions to increase supplies. While this option would increase availability of biofuels, there exists conflicting evidence on the carbon neutrality of biodiesel/biofuels which includes looking at the freight and trucking emissions to receive products from other states and regions.

The state is also interested in monitoring possible up-and-coming hydrogen technology that could be useful for large applications down the road

- *Increase Vehicle Fuel Economy* - Maine currently has a weighted fuel economy average between light duty cars and light duty trucks of approximately 19.3 miles per gallon (mpg). It should be noted that while this action received considerable support it never reached majority support via informal polling for the reasons noted below.
 - *Establish a program to incentivize the removal/replacement of low fuel economy vehicles.* One option discussed, is to incentivize the purchase of plug-in electric vehicles in urban-suburban areas and hybrids for rural areas. Some members of the TWG suggest that the amount of the incentive should be based on income to alleviate some of the inequities across incomes. This type of program is being

used in several states, such as Maryland, and could be a model for Maine's program.

- *Test the feasibility of implementing a statewide (or federal) Low Carbon Fuel Standard (LCFS).* The standard would be designed to decrease the carbon intensity of the transportation fuel pool. Additionally, the standard would be designed to increase the range of low-carbon and renewable alternatives that Mainers use to fuel their vehicles. Some members of the TWG expressed concern about the potential negative impact on fuel prices and the operational issues associated with biofuels as noted above.
- *Reduce vehicle idling time:*
 - Expand the weigh station by-pass program based on a carrier's safety and compliance records. Maine already collects safety data on carriers thus it could be used to inform and expand the weigh station bypass program with safety as the metric for deciding which carriers and trucks can bypass weigh stations. Drivewyze, currently used in Maine, allows for tracking bypasses. In one month, April of 2020, 1,187 bypasses were granted, equaling an approximate savings of 99 hours of drive time, 475 gallons of fuel, and 5 tons of CO₂ leading to a savings of about \$10,000. Expansion of this program would help Maine meet its goals while companies save time and money.
 - Continue to upgrade and improve traffic signalization throughout the State to reduce idle times. Maine DOT has already undertaken the project to upgrade traffic signalization in many areas of the state. The TWG recommends continuing this effort. Adaptive signals can adjust their timing based on the actual traffic traveling through an area and synchronize the signals within a traffic corridor. This reduces the idle time of vehicles at each signal decreasing the amount of emissions while improving the flow of the traffic. Some members of the group expressed concern about the total carbon emission reduction benefits.
- *Expand the state emissions inspection program to York County.* Currently vehicles in Cumberland County are required to have an On-Board Diagnostics (OBDII) inspection annually. Starting on January 1, 1999, under 29MRSA §1751, all gasoline-powered motor vehicles registered in Cumberland County were required to undergo this inspection. OBDII inspections are an integral part of vehicles passing inspection as the emissions from vehicles are only low when all the systems are working properly. The TWG suggests expanding this program to York County, as it has the second highest population of the counties in Maine. This idea was supported by the group but the subsequent emission reductions were not modeled for this action.

- *Conduct ongoing public education and marketing regarding the above fuel economy programs and strategies* - There are several aspects to raising the fuel economy and lowering the emissions of internal combustion engines that are driver-dependent. Framed within the education would be the costs and savings that individuals can accrue from different eco-driving techniques along with the use of alternate transportation. The education and marketing would focus on the following techniques:
 - Avoiding jack-rabbit acceleration and reducing speeds.
 - Avoiding vehicle engine idling. For example, based on work done by the Argonne National Laboratory, a small sedan consumes approximately 0.16 -0.17 gallons of gas per hour of idling. A large sedan can consume just over twice that per hour of idling.
 - Encouraging trip-chaining has many of the same benefits as using alternate methods of travel to reduce emissions. Trip chaining is about organizing many small trips into one bigger trip to increase efficiency. For example, combining a trip to the grocery store with the commute home from work or combining a trip to the doctor’s office with running errands around town.
 - Encouraging consistent vehicle maintenance, for example, checking tire pressures each month and ensuring they are properly inflated – with the subsequent impact on increased fuel economy. According to the US Department of Energy, gas mileage is increased an average of 0.6% when tires are maintained at the proper pressure, resulting in decreased emissions. This carries an added benefit of fuel savings for the consumer. In addition, properly inflated tires have a more consistent wear pattern across the treads. The tires last longer and this adds additional consumer savings.

3. What is the timeframe for this strategy?

<i>To implement</i>	<i>Short-term (2022)</i>	<i>Mid-term (2030)</i>	<i>Long-term (2050)</i>	<i>2070 -2100</i>
EPA SmartWay	Introduce program to companies across Maine- During this time Maine DEP/Maine DOT develop & implement program	Increase number of larger companies participating in program	Establish relationship between partners	

Expand Alternative Fuels	Create timeline for increased availability and initial work to encourage expanded supply and distribution		30% Light Duty Vehicles use low carbon fuels 30% Heavy-Duty Vehicles use low-carbon fuels (based on preliminary modeling from Synapse)	
Increase Fuel Economy	Create incentive program for removing low efficiency vehicles; Convene working group to test feasibility of adopting a Low Carbon Fuel Standard; Convene working group to introduce emissions inspection proposal for York County; Create model for weigh station bypass program; Continue Traffic Signalization improvements		average fuel efficiency in Maine reaches of 42 mpg for new cars & 30 mpg for new light trucks (based on preliminary modeling from Synapse)	
Education and Marketing	Create campaign	Continue marketing and education		

<i>To realize outcomes</i>	
EPA SmartWay	Cumulative with increased participation in the program
Expand Alternative Fuels	Measured annually and realized on a cumulative progression

Increase Fuel Economy	Sub-strategies measured annually in participation and as upgrades are made, and realized on a cumulative progression
Education and Marketing	Cumulative

4. Please analyze the Recommended Strategy against the following criteria. (Each TWG can add its own sector-specific criteria as appropriate.)

<p>Workforce - Will the strategy create new jobs, prevent job loss, or cost the state jobs?</p>	<ul style="list-style-type: none"> - EPA SmartWay has potential job benefits with technology installations and maintenance. - Expanding alternative fuels such as biodiesel/biofuel has potential job benefits in the manufacturing and distribution if Maine businesses and workers capitalize on the growth of this technology, including supportive infrastructure. Traditional fuel-related jobs may be displaced as there is less reliance on petroleum fuels. Small neighborhood markets often depend on the income from fuel sales. Mandating the use of biodiesel could have a negative impact as some lack the capacity to blend and store alternative fuels with fossil fuels. - Expanding Traffic Signalization has the potential to create jobs regarding installation, maintenance and with monitoring the system. May impact municipal jobs if monitoring is centralized at the state level within Maine DOT’s Transportation Management Center. - Increase in Fuel Economy could have potential negative effects on jobs relative to the decrease use and reliance on fossil fuels
<p>Benefits (non-workforce) - What are the expected co-benefits of this strategy (e.g., improved health, increased economic activity, wildlife habitat connectivity, reduce natural hazard risk, increased recreation, avoided damage)?</p>	<ul style="list-style-type: none"> - Ancillary benefits of improving fuel economy generally include environmental benefits, emissions reductions, reduced air pollution and health benefits, reduced petroleum dependency, and savings to consumers. - Beyond the direct GHG and air pollution emission savings, the education and marketing campaign will increase Maine citizens’ awareness of GHG emissions, and demonstrate the viability of reduction techniques, all of which would contribute to lowering the cost of vehicle use and maintenance. - Possibility to have a positive impact on the wear and tear of Maine roads resulting from trip chaining and proper vehicle maintenance such as tire pressure.

<p>Costs – <i>What are the estimated fiscal costs and other costs to carry out this program. To the state? To municipalities? What resources do you anticipate needing to inform Mainers about the strategy and the opportunity/costs of the strategy? Where would financing likely come from?</i></p>	<ul style="list-style-type: none"> - The costs associated with this strategy include the cost of participation in the EPA SmartWay program and the weigh station bypass program. - Funding will be needed to develop a campaign aimed at education and dissemination of information across many modes of communication regarding emission reduction techniques. - Funding for incentives to replace less efficient/higher emission combustion engine vehicles. - Staff resources to coordinate the work on various parts of this strategy - Cost interagency work or pilot project in rural areas based on the availability of alternative travel options.
<p>Equity - <i>Is this strategy expected to benefit or burden low-income, rural, and vulnerable residents and/or communities? What outreach has been/will be undertaken to understand the impact of the strategy on front-line communities?</i></p>	<ul style="list-style-type: none"> - This is part of an effort to reduce internal combustion engine emissions, which offers myriad benefits for all Maine citizens, even those that do not drive themselves. - A portion of revenue from the LCFS would be dedicated towards rural communities. - Without incentives, replacing vehicles with low fuel efficiency would otherwise be a burden to low income populations. - Reducing internal combustion engine emissions will directly benefit Maine people, giving them clean air that is not full of hazardous chemicals that contribute to asthma and respiratory illnesses, as well as many other costly health impacts. - Increasing fuel efficiency through better fuel economy will benefit consumers financially. - The TWG recognizes that EPA SmartWay can be a financial burden on small companies and thus recommends voluntary participation.
<p>Proven strategy & feasibility – <i>Has this strategy been implemented successfully elsewhere? Is it feasible with today’s technology? What barriers to implementation exist (e.g., financial, structural, workforce capacity,</i></p>	<ul style="list-style-type: none"> - EPA SmartWay: EPA SmartWay was launched in 2004 with 50 companies and has grown to over 3700 companies and to date has a collective fuel savings of 37.5 billion dollars with estimated collective emission reductions of 134 million tons of air pollutants. - The LCFS has been tested in California and Oregon and has been proven as an effective policy. - Alternative Fuels: In 2002, Minnesota passed a law (Minnesota Statutes 239.77) requiring diesel fuels to be at least 2 percent biodiesel (B2). This value was increased in

<p><i>public/market acceptability)?</i></p>	<p>2009 to 5% (B5) and then to 10% (B10) in 2014. On July 25, 2017, the commissioners of the Departments of Agriculture, Commerce, and the Minnesota Pollution Control Agency determined that there was sufficient biodiesel supply, adequate blending infrastructure, and federal standards in place to require a higher biodiesel content. On May 1, 2018, the biodiesel mandate increased to 20 percent (B20). Vehicle Replacement Program: The Center for Sustainable Energy, in California, administers the Clean Vehicle Rebate Project (CVRP) for the California Air Resources Board, the Oregon Clean Vehicle Rebate Project (OCVRP), and the Massachusetts Offers Rebates for Electric Vehicles (MOR-EV) all of which can be used as models for Maine’s program.</p>
<p>Legal authority - Does the strategy require new statutory (legal/legislative) authority?</p>	<ul style="list-style-type: none"> - There may be some needed legislation behind the funding of some of the actions of this strategy. - There may also be regulations necessary to set targets for fuel economy and the use of alternative fuels

5. Rationale/Background Information

Due to the magnitude of the reductions that are needed to achieve our goals, a multi-strategy approach including lowering the emissions of internal combustion engines is necessary.

Transportation Working Group Recommended Climate Strategies, Actions and Measurable Outcomes

Reduce Vehicle Miles Traveled

1. Describe the Recommended Strategy and how it addresses Maine's climate resiliency and mitigation goals.

The vehicle miles traveled (VMT) in Maine are made up of residents who drive for purposes including: work commute, work-related business, school, personal, among others. According to the Maine Department of Environmental Protection (Maine DEP), the average Maine light-duty vehicle (LDV) travels 12,000 miles per year, with an estimated 65% and 35% of emissions attributed to rural and urban/suburban areas, respectively. In addition, Maine has vehicles traveling from out-of-state for business and to enjoy the Maine attractions. According to the Maine Office of Tourism, Maine hosted over 37 million visitors during 2018. A reduction in VMT (for all of the above trips) will help mitigate greenhouse gas (GHG) emissions in the State and contribute towards the goal of 45% reduction by 2030 and 80% reduction by 2050 (compared to 1990 levels). A preliminary decarbonization scenario generated by Synapse Energy Economics Inc. suggests that Maine can meet the emission reduction goals in the transportation sector using a combination of electrification, VMT reduction, increased fuel efficiency, managed electric vehicle (EV) charging, and low carbon fuels. In this scenario, VMT per LDV needs to decline 25% by 2030 and 40% by 2050 and VMT per heavy-duty vehicle (HDV) needs to decline 2.1% by 2030 and 4.2% by 2050. To reduce VMT to the degree that is necessary to meet the state GHG emission reduction goals, according to the modeling, the Transportation Working Group (TWG) has developed a comprehensive set of initiatives that will, in-turn, decrease total emissions from those vehicles.

The following initiatives were identified by the TWG as Areas of Emphasis for the Maine Climate Council (MCC):

- *Support Development in Priority Areas* - Transportation emissions are reduced when the places people need to go are located nearby, either in urban or rural communities. This facilitates the choice of walking, biking, operating public transportation or carpooling to close common places. Achieving this requires effective local, regional, and state land use policies. We refer to this goal as "Priority Areas Development", and it encompasses strategies such as: integrating climate goals into municipal and regional planning; targeting investments to our historic New England rural crossroads, villages, neighborhoods, and downtowns; supporting private investment and encouraging jobs and affordable housing growth in these

places; expanding bicycle and pedestrian facilities; and preserving our farms, forests, working waterfronts and natural areas.

In addition to emissions benefits, this strategy has significant co-benefits, including reducing the cost burden of building and maintaining public infrastructure, helping Maine's extensive senior population age in place, and preserving what's special about Maine for future generations. The broad strategy did receive support from the TWG as an Area of Emphasis, but concerns were raised about specific actions. The TWG as a whole did not discuss these actions. More discussion is required to take the temperature of the group on some specifics such as potentially amending the Growth Management Act and updating the Sensible Transportation Policy Act. At least two members expressed opposition to these two things.

One promising option to support priority areas development is establishing a new form of state coordination with the ability to ensure that state policy and investments related to land use and development are meeting climate goals. With the active support of a statewide coordinating office or cross-cutting cabinet body in the Executive Branch, state actions to preserve land and focus growth in places that support more sustainable transportation choices can be implemented in tandem and concurrently. The office could oversee actions to reduce climate emissions through compact, efficient development, which could include:

- o *Encourage state capital investments* in places people already live, work, and play, including for affordable housing, school facilities, courts and state buildings, sewer and water, and to facilitate more opportunities to walk or bicycle instead of using a vehicle.
- o *Encourage state transportation investments* in growth areas, and ensure they support safe speeds, complete streets, bicyclists and pedestrians, trails, and public transit in these areas, as appropriate.
- o *Target land conservation investments* for forests, farms, working waterfronts and natural areas that need to be protected from sprawl development.
- o *Support local and regional planning capacity* by investing in regional planning agencies and coordinating statewide planning services for places without strong regional agencies. This sub-strategy is also proposed and further detailed by the Community Resilience Planning, Public Health, and Emergency Management Working Group.
- o *Incentivize zoning* and other land use tools to encourage private investment, jobs, and housing growth in priority growth centers.

- o *Incorporate climate goals* into municipal planning, and encourage regional planning to reduce the comprehensive planning burden on small municipalities through review and potential amendments to the Growth Management Act. Note: This was a recommendation coming out of the Rural and Urban subgroup work and there was limited discussion of this in full plenary as a Working Group.
 - o *Include climate emissions in transportation decisions* about investments, with review of and potential updates to the Sensible Transportation Policy Act. Note: This was a recommendation coming out of the Rural subgroup work and there was limited discussion of this in full plenary as a Working Group.
- *Expand Public Transportation* – Increased use of public bus and rail transit replaces drive alone trips and can significantly decrease household transportation costs by reducing the need to own as many private vehicles and supports car-free tourism. Public transit has the most potential in more densely populated areas; the concept of rural transit is more challenging. Funding for public transit needs to be expanded in order to make the necessary improvements to the system to increase participation, with the urban benchmark of making public transit as efficient as and affordable as private automobile use.

Specific needs of the system include improving the capacity and frequency of service, creating a rapid transit network, connecting community hubs across regions, and improving connections between the end of public transit and local destinations. This could be achieved with a sustained meaningful funding level from the State General Fund. Current funding is significantly low compared to other similar jurisdictions, at 86 cents per capita, sourced from the Rental Vehicle Tax (Multimodal Fund). The Maine Department of Transportation's Public Transit Advisory Council recommends \$5 per capita, the national median.

Public transit in rural areas could also be improved by the transformation of underutilized school bus fleets into age- and climate-friendly all-purpose community transit assets, such as accessible vans - used for transporting students to school and then by the community for other daily trips. A task force should be created to examine new opportunities and historical barriers to this, then prepare an action plan to migrate appropriate school bus fleets. The task force could include representatives from the Department of Education, School District Boards, Managers and Transportation Directors, Transit Providers, Maine DOT, Maine Department of Health and Human Services (DHHS), regional planning organizations, municipalities, and age-friendly community representatives. Some stakeholders have identified previous and/or existing barriers, including concern with the use of current underutilized large school buses for combining trips that include students and community adults, existing school buses that are not physically accessible for seniors, and necessary rigorous rules to screen people who drive students.

In addition, Maine communities should transition to all-electric buses over time (consistent with the state fleet mandate and as appropriate for local conditions as the technology develops). Utilization of electric bus batteries as (monetizable) grid assets should also be considered.

- *Expand Telework and Teleservice Opportunities* – Telework and teleservices should be expanded to reduce the number of miles that Mainers drive to work, school, medical appointments, and other services. The state should also increase investment in digital access infrastructure to enable working from home, telemedicine, and online education.

To promote telemedicine, the DHHS and Bureau of Insurance would need to continue to create permissive standards for telemedicine with eligibility for benefit coverage; healthcare’s recent COVID-19 telehealth experience may assist with supporting the feasibility of this. Working from home could be encouraged by the state as a “lead by example” initiative, in which qualifying state employees are encouraged, incentivized to telework 2 to 3 days per week. The state could also encourage local and county governments to telework. Senior government leads and major employers should develop and promote a work-from-home program for Maine workers and the state would complement this program with incentives for teleworking.

Of note: these telework and teleservice (and any broadband expansion) efforts should be designed to not encourage additional VMT by Mainers. That is, telework research from before the COVID-19 epidemic often shows that people who work from home can actually have a higher total VMT, because they choose to live further from work and/or use their time to make other non-work drive alone trips; future research should be done conducted to ensure telework is contributing to the predicted emissions reductions.

The following initiatives were also discussed and received some support from the TWG:

- *Expand GO MAINE’s Multimodal Support Services for Mainers and Workplaces* – Carpooling, walking, bicycling, taking public transportation and telecommuting can significantly reduce the number of drive-alone vehicle trips. GO MAINE, the state’s commuter assistance program, currently offers online carpool matching, the Emergency Ride Home benefit, and ongoing rewards to members who carpool, walk, bicycle, take public transit and work from home. Members also can track the cost and climate-saving aspects of their trips – for both work and personal needs. GO MAINE is currently managed by the Maine Turnpike Authority (MTA), who is working on transitioning the program to the Maine DOT, with likely continued collaboration by the MTA.

The GO MAINE program needs to be improved to increase the accessibility for users, especially in rural communities. Improvements should include expansion of the program to be the one-stop-shop for all transit, transportation demand management, and ridesharing information. Marketing and employer outreach funding for GO MAINE should be expanded. This should include strengthening the GO MAINE website and apps to include public transit, community ridesharing to events and key destinations, and volunteer ridesharing programs. Once GO MAINE is transitioned to the Maine DOT, a dedicated GO MAINE position should be created to manage the program and build regional and employer partnerships. A new marketing campaign should also be developed to promote the service once COVID-19 concerns have been addressed.

- *Increase Rail Freight Service Efficiency* - The impacts of improved freight rail service efficiency should be explored. Increased use of rail would reduce the VMT by on-road HDV transportation. Central hubs should also be maintained and created for the transfer of freight from rail to marine or to on-road transportation within the state and to facilitate rail freight movement to hubs in other states for distribution. The MaineDOT team that is working on freight to rail should continue.
- *Conduct Public Education & Marketing Regarding VMT Reduction Efforts* - The above-mentioned initiatives would all be much more successful if the public understood the significant household savings, health benefits, and other opportunities of walking, bicycling, using public transportation, carpooling and connecting with work and services via the internet. A marketing and outreach program should be developed to educate and encourage the public regarding these initiatives to reduce VMT. This should include select outreach directed at tourists to encourage people to visit Maine without driving and/or to use local public transportation, walk and bicycle opportunities while here.

a. *For adaptation strategies, what climate impacts does it address? How will this strategy reduce the vulnerability of Mainers to the impacts of climate change?*

N/A

b. *List any site-specific geographies where the strategy would be applied.*

N/A

2. *What is your measurable outcome for this strategy, assuming all recommended actions to implement the strategy are achieved?*

a. *For mitigation strategies:*

i. *What is the estimated CO₂ savings (metric tons) by 2025, 2030, 2050?*

We are awaiting modeling results from the consultant. Results should be available late summer 2020.

ii. *What is the cost effectiveness of those reductions (cost per ton of CO₂ reduced) and the total cost?*

We are awaiting modeling results from the consultant. Results should be available late summer. Generally, investment in efficiency is the most cost-effective mechanism for reducing emissions. In the case of freight efficiency, it offers additional financial benefits in the form of lower fueling costs with the return on investment typically in 1 to 2 years. Additionally, a Sacramento Area Council of Governments study that estimated the CO₂ reductions of a Smart Growth Scenario at 14% of baseline (Center for Clean Air Policy, 2009). That result would likely take 30 years to fully achieve, so the CO₂ savings would be estimated at 2.5% by 2025, 5% by 2030 and 14% by 2050.

b. *Are outcomes measurable with current monitoring systems?*

The outcomes are measurable with the current monitoring system for most of the initiatives proposed in this broad strategy. Modeling tools that measure environmental benefits of development in priority areas exist, including one example called the CoolClimate Calculator developed out of UC Berkeley. Bicycle and pedestrian counts, funding, and miles of sidewalk and bicycle facilities data is all available for monitoring. Telemedicine could be tracked by an aggregate of medical appointments and insurance data (held by private entities). GO MAINE's rewards system encourages members to record their trips and CO₂ reduction and other data – including telework usage - is available. Ongoing website improvements will track searches on the site, such as destinations, to inform priority interests. GO MAINE data is also available from participating employers. Telework participants could also be tracked by employers or a benefit system (if developed).

2. *What specific actions would be required to implement the strategy, including but not limited to legislation or regulation. Examples include: establish a program or a fund, conduct additional research, provide education or training, coordinate with other parties/agencies/states, etc. Considering the recommended actions listed, who, if they can be named, are the specific actors needed for implementation?*

- Establish statewide interagency coordination of Priority Development Areas work – this includes local and regional planning, investments, zoning, and review and potential legislative updates to various policies.
- Support the transition of GO MAINE to the Maine DOT; identify additional sources of funding for the program; begin expanded outreach assistance to employers as part of

economic recovery; begin rideshare and public transit promotion after COVID-19 threat has been effectively contained.

- Conduct study to select a telework (or all teleservice) benefits program, using current experience with COVID-19 to inform.
- Appoint task force of above listed participants to examine opportunities and barriers and prepare an action plan to migrate school bus fleets into age-friendly all-purpose transit assets.
- Develop education and outreach (marketing) strategy to support and encourage Mainers regarding VMT reduction initiatives

3. What is the timeframe for this strategy?

	<i>Short-term (2022)</i>	<i>Mid-term (2030)</i>	<i>Long-term (2050)</i>	<i>2070 -2100</i>
<i>To implement</i>	Implement state coordination of Priority Development Areas work and begin initial legislative updates; Conduct teleservice study (executive order); Appoint age-and climate-friendly transit Task Force and begin public transit expansion planning; Expand GO MAINE; Evaluate rail system; Education and marketing campaign	Initial Priority Development Areas planning, zoning, and investments; Continue Public Transit planning and investment	Continued Priority Development Areas work and Public Transit expansion	
<i>To realize outcomes</i>	VMT reduction is a cumulative strategy	Cumulative starting in 2030	Cumulative	

4. Please analyze the Recommended Strategy against the following criteria. (Each Working Group can add its own sector-specific criteria as appropriate.)

Workforce - Will the strategy create new jobs,	Locations with amenities (such as Priority Development Areas) attract high-talent workers. Investment in enhanced digital
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<p><i>prevent job loss, or cost the state jobs?</i></p>	<p>infrastructure will expand access to job opportunities, healthcare, and education. Teleworking could encourage workers from out-of-state to move to Maine and decrease cost of business ownership through lack of parking and office space. Updates to the rail system would result in new jobs. Increased use of rail freight would result in job loss for the trucking industry.</p>
<p>Benefits (non-workforce) - <i>What are the expected co-benefits of this strategy (e.g., improved health, increased economic activity, wildlife habitat connectivity, reduce natural hazard risk, increased recreation, avoided damage)?</i></p>	<p>The overlapping benefit for all these initiatives is the reduction in emissions (less air pollution), which has health benefits. Efficient and compact communities will also result in property tax and municipal savings, household cost savings, less congestion, increased safety, reduced impervious surfaces and improved water quality, and preserved wildlife. Increased pedestrian and bicycle facilities would have positive (active) health outcomes. Carpooling and teleservices would result in savings on fuel costs and vehicle wear and tear. Telework and teleservices also create travel time savings, efficiency of appointments, improved quality of life and potentially reduce childcare expenses. Age-and climate-friendly transit will increase the mobility and accessibility for the growing aging rural population and act as a general local transit service. Improved freight efficiency will result in fuel cost savings and reduced fleet wear and tear.</p>
<p>Costs – <i>What are the estimated fiscal costs and other costs to carry out this program. To the state? To municipalities? What resources do you anticipate needing to inform Mainers about the strategy and the opportunity/costs of the strategy? Where would financing likely come from?</i></p>	<p>Supporting development in priority areas would require staffing resources for state coordination, funding for enhanced municipal and regional planning and implementation; targeting state capital, transportation and land conservation investments; and providing zoning incentives. GO MAINE expansion would require additional funding, although this is minimal compared to transportation infrastructure costs. The cost to encourage teleservices would be minimal; however, digital access infrastructure or broadband could be very costly but part of a larger investment. A plan would help determine costs associated with age-and climate-friendly transit, though costs are assumed to be high. Funding sources for the upgrades to public transit and rail have not been identified and are anticipated to be costly. However, creating shovel-ready projects would enable the state to avail itself of any additional federal funding options that might arise.</p>
<p>Equity - <i>Is this strategy expected to benefit or burden low-income, rural, and vulnerable residents and/or communities? What outreach has</i></p>	<p>Supporting priority development areas will advance social equity by providing a full set of services for all residents living in them. This work will also preserve traditional livelihoods and access to agricultural lands, forests, working waterfronts, and other natural areas. Complete Streets and investing in pedestrian and bicycle facilities and public transportation would</p>

<p><i>been/will be undertaken to understand the impact of the strategy on front-line communities?</i></p>	<p>provide the most benefit to lower income groups. Teleservices and digital infrastructure investment improve access to job opportunities, healthcare, and education; they also reduce the impact of transportation barriers. GO MAINE expansion will increase the number of carpool-matches and improve job seekers’ and employees’ access to transportation; will offer discounts and other financial rewards to people who walk, bicycle, take transit, carpool and work from home; and, will help connect Mainers needing transportation to non-work-related destinations with community volunteer drivers. Age-and climate-friendly transit will increase the mobility and accessibility for the growing aging rural population and act as a general local transit service.</p>
<p>Proven strategy & feasibility – <i>Has this strategy been implemented successfully elsewhere? Is it feasible with today’s technology? What barriers to implementation exist (e.g., financial, structural, workforce capacity, public/market acceptability)?</i></p>	<p>Priority development areas have been developed in many communities in the US and world. Modeling efforts in the State, including One Climate Future and Transit Tomorrow, are building off a larger body of work that reflects the benefits of compact development with respect to VMT and GHG reductions and are incorporating these strategies into their own local and regional modeling. The state’s Transit Plan (2015) and the Public Transit Advisory Council’s Biennial Report to the Governor and Legislature (2019) provide research and clear next steps for state public transit recommendations. GO MAINE maintains data on current walkers, bicyclists, carpoolers, transit riders, telecommuters and associated financial and environmental savings. The success of teleworking on reducing emissions is not conclusive at this time. As stated above, some studies suggest that households drive more miles in a private vehicle as a result of teleworking. However, an increase in teleworkers as a result of the COVID-19 pandemic has proven that it’s feasible with today’s technology. There are a number of strategies proven effective in promoting telework, including tax-free employer-paid commuter benefit and parking cash-out programs. The age-and climate-friendly transit transition requires research for strategy and feasibility. The education and outreach campaign requires consulting with current behavior change research. The Maine State Rail Plan provides some information about required upgrades to the rail system.</p>
<p>Legal authority - <i>Does the strategy require new statutory (legal/legislative) authority?</i></p>	<p>Supporting priority development areas is already partially codified in existing law but would need to be reviewed, updated and/or revitalized to produce the desired benefits. That could be accomplished with legislative action to update Maine’s Growth Management Act. The recommendation to establish interagency coordination of planning, investments, and zoning incentives could be achieved through executive action. Ensuring</p>

	<p>climate emissions are incorporated into transportation decisions about investments would require review and potential updates to the Sensible Transportation Policy Act. Teleservices would require investment in infrastructure and development of a benefits program that likely require legislative action. Continued use and expansion of telemedicine would require insurance contracts and medical standards of practice. The task force to create age- and climate-friendly transit would need to be put into motion by the Governor or Legislature.</p>
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5. Rationale/Background Information

The TWG recommends that Maine take advantage of the existing programs, including GO MAINE multi-modal support services, telework, supporting priority development areas, and public transit, and improve these programs to more effectively mitigate GHG emissions through VMT reduction. Additional discussion by TWG around VMT reduction initiatives can be found in the Appendix.

Transportation Working Group Recommended Climate Strategies, Actions and Measurable Outcomes

Adapt Maine's Infrastructure Critical to the State

1. Describe the Recommended Strategy and how it addresses Maine's climate resiliency and mitigation goals.

a. For adaptation strategies, what climate impacts does it address? How will this strategy reduce the vulnerability of Mainers to the impacts of climate change?

Adapt Maine's infrastructure critical to the State to increase the resiliency of Maine people, industries, and communities to hazards associated with climate change, including sea level rise, increased precipitation, flooding, extreme temperature, and large storm events. The Transportation Working Group (TWG) discussed a number of initiatives to increase resiliency for transportation and non-transportation infrastructure.

The following initiative was identified by the TWG as an Area of Emphasis for the Maine Climate Council (MCC):

- Conduct a statewide Infrastructure Vulnerability Assessment - The vulnerability assessment should consider transportation infrastructure, including roads, bridges, multimodal (airports, railroads, and ferry terminals) and non-transportation infrastructure (closed-drainage systems, water treatment, buildings, and health care facilities). Existing tools, including TRAPPD and Coastal Vulnerability Index, document state and select municipal culverts, but lack information about other transportation assets and non-transportation infrastructure. The data in these tools should be compiled and expanded to inform the vulnerability assessment proposed herein. The timeline and severity of the vulnerability should be assessed using GIS. The vulnerability assessment should be used to determine asset-specific adaptation strategies and plans, considering improvements or resilient and green infrastructure replacement options, and including cost of upgrades and funding. Maine Department of Transportation (Maine DOT) guidance for non-bridge assets (rail and ferry) should be assessed to increase resiliency of those assets. Following the vulnerability assessment, a plan should be developed using a cohesive tracking system to address vulnerabilities, taking into account long-term viability of those investments. This would require an interagency discussion around prioritization and cooperation between the TWG and the Community Resilience Planning, Public Health, and Emergency Management Working Group (CRPPHEM)

around developing a cohesive tracking system and a common and consistent asset database adoptable by municipalities. Recommendations from this crossover work with CRPPHEM could include establishing prioritization of green infrastructure over traditional built (gray) infrastructure.

The TWG also discussed the following initiatives to increase resiliency:

- Develop a maintenance database (or improve an existing database) to enable the Maine DOT and municipalities to track the frequency of events that require a specific asset to be closed, along with the associated costs, including time and materials, associated with maintenance response to that asset. The database would maximize eligibility for Federal Emergency Management Agency (FEMA) funds to make proactive repairs to threatened infrastructure. The Maintenance Tracking System (MATS) used by the Maine DOT is one database option; it would need to be reviewed, updated, and made available to municipalities. Database maintenance would be required due to the collaborative use of the tracking system.
- To encourage the implementation of resilient upgrades, design guidance and standards should be adopted and updated, respectively. The current Maine DOT design guidance of 4 ft. of sea level rise for coastal bridges and culvert sizing should be verified; FEMA pre- and post-disaster mitigation program and Maine Department of Environmental Protection (Maine DEP) regulations should be updated; the Maine DEP and Land Use Planning Commission (LUPC) should adopt the Maine DOT culvert sizing guidance; and the Maine DEP's NRPA and CH305 standards (Sections 10 and 11) should be updated.
- To further increase the resiliency of state infrastructure, the physical materials used to construct the infrastructure should be investigated to determine if they can be made more durable to withstand the changing environment. For example, environmental changes could include an increase in storm events, which could result in an increase in salt usage, therefore, state infrastructure would need to withstand this increase in salt. The University of Maine and the Maine DOT should identify materials research projects and consider the effect of freeze thaw, additional road salt intrusion, and sea level rise to materials including concrete (cracking and spalling), pavement (cracking and potholes) and metal (steel and rebar corrosion). A pilot program should be developed, and funding sources identified.

b. List any site-specific geographies where the strategy would be applied.

This strategy would impact vulnerable coastal and statewide riverine areas.

2. What is your measurable outcome for this strategy, assuming all recommended actions to implement the strategy are achieved?

a. For mitigation strategies:

i. What is the estimated CO₂ savings (metric tons) by 2025, 2030, 2050?

N/A

ii. What is the cost effectiveness of those reductions (cost per ton of CO₂ reduced) and the total cost?

N/A

b. Are outcomes measurable with current monitoring systems?

Infrastructure vulnerability will be measured using the proposed assessment and tracking system. The number of vulnerable infrastructures in the database will decrease as resilient updates are implemented with time.

2. What specific actions would be required to implement the strategy, including but not limited to legislation or regulation. Examples include: establish a program or a fund, conduct additional research, provide education or training, coordinate with other parties/agencies/states, etc. Considering the recommended actions listed, who, if they can be named, are the specific actors needed for implementation?

- Develop state assessment protocol for multi-modal infrastructure and conduct assessment of infrastructure assets; determine most appropriate replacement strategy for each asset and re-evaluate in candidate stage of work plan; create a plan for critically vulnerable areas, including funding sources; and design prioritization plan and management system.
- Update tracking of maintenance and inspection/repair procedures.
- Share existing standards and guidance for consideration.
- Identify research projects and pilot programs for funding of material resiliency investigation.

3. What is the timeframe for this strategy?

	<i>Short-term (2022)</i>	<i>Mid-term (2030)</i>	<i>Long-term (2050)</i>	<i>2070 -2100</i>
<i>To implement</i>	Assess standards and guidance; develop and conduct vulnerability assessment; begin measuring vulnerability with	Re-evaluate replacement; continue to measure vulnerability;		

	management system; material vulnerability investigation; updating maintenance tracking	continue to track maintenance		
<i>To realize outcomes</i>	Immediate, increasing with time			

4. Please analyze the Recommended Strategy against the following criteria. (Each Working Group can add its own sector-specific criteria as appropriate.)

Workforce - Will the strategy create new jobs, prevent job loss, or cost the state jobs?	Initiatives could create jobs for resilience consultants, general construction companies, and green infrastructure construction specialists.
Benefits (non-workforce) - What are the expected co-benefits of this strategy (e.g., improved health, increased economic activity, wildlife habitat connectivity, reduce natural hazard risk, increased recreation, avoided damage)?	In addition to increased resilience of the state’s infrastructure, the vulnerability assessment would increase asset organization and access to funding and provide long-range prediction of resource allocation based on anticipated impacts. Updating the design guidance for culverts and bridges will improve aquatic connectivity. The improved maintenance tracking system would document costs and hours of maintenance repair that are required for several funding options. The material resiliency investigation could result in longer-lasting infrastructure with lower maintenance hours and costs. These initiatives will result in fewer emergency replacements, and less environmental and property impacts.
Costs – What are the estimated fiscal costs and other costs to carry out this program. To the state? To municipalities? What resources do you anticipate needing to inform Mainers about the strategy and the opportunity/costs of the strategy? Where would financing likely come from?	The vulnerability assessment could be conducted at minimal costs; however, the cost of replacing an asset to decrease vulnerability is likely more costly than replacing the asset in-kind. Funding would be needed to address critically vulnerable areas. The vulnerability tracking and maintenance database would both require staff to update and maintain the database, at a low cost. The review and updates to design standards and guidance would be low cost. Select municipalities may require funds to meet standards and maintenance tracking; funding opportunities are available and alternative opportunities should be explored, such as the feasibility of a culvert bond match for a federal Economic Development Administration grant on resilience. The material resiliency investigation could be funded by the Transportation Infrastructure Durability Center and the Federal Highway Administration.

<p>Equity - <i>Is this strategy expected to benefit or burden low-income, rural, and vulnerable residents and/or communities? What outreach has been/will be undertaken to understand the impact of the strategy on front-line communities?</i></p>	<p>Decreasing vulnerability would be focused on riverine and coastal areas. The goal of this initiative is to benefit critically vulnerable areas and single access points; however, rural populations may not receive fund allocation proportionate to the service area.</p>
<p>Proven strategy & feasibility – <i>Has this strategy been implemented successfully elsewhere? Is it feasible with today’s technology? What barriers to implementation exist (e.g., financial, structural, workforce capacity, public/market acceptability)?</i></p>	<p>The Maine DOT, The Nature Conservancy, and other organizations have several tools available that have been used to conduct vulnerability assessments, including TRAPPD and the Coastal Vulnerability Index. Although these tools are useful, improvements will need to be made to road segment data as it is not as strong as stream crossing data. Example vulnerability assessments for transportation assets and other infrastructure are available for review, but a model for the critically vulnerable process on a multi-town level does not exist currently. Existing databases could be modified to track vulnerable infrastructure and maintenance. Design guidance and standards have been prepared and require review. Previous research partnerships could be used as an example for the material resiliency research. In addition, some TWG members recommended looking at carbon emissions associated with procurement of materials.</p>
<p>Legal authority - <i>Does the strategy require new statutory (legal/legislative) authority?</i></p>	<p>Generally, these initiatives would not require legal authority. The adoption of design guidance and standard updates would require changes by Maine DEP and LUPC.</p>

5. Rationale/Background Information

Although the state of Maine will do its best to mitigate, or reduce climate change, the changes have already begun, and the state has to prepare to adapt. The TWG has worked tirelessly to prepare this strategy that not only would decrease the vulnerability of transportation infrastructure, but all critically vulnerable state infrastructure.

Transportation Working Group Recommended Climate Strategies, Actions and Measurable Outcomes

Explore Mechanisms to Fund Transportation Emission Reduction

Strategy Description

The Transportation sector is the largest contributor of carbon emissions in Maine and in the country. Reducing emissions to achieve the state's decarbonization targets will require aggressive development and implementation of comprehensive policies and programs for cleaning up our vehicles and helping people drive less. Although the Transportation Working Group (TWG) was not able to do a deep analysis of funding alternatives, the group agrees that the State needs to explore different revenue sources for stable, sufficient and sustainable funding, and that funding solutions should support emissions reductions.

Transportation is chronically underfunded in Maine and across the nation. Although the TWG has not been tasked with solving the overall transportation funding challenges, this group recognizes past efforts to fund transportation did not include a focus on reducing emissions. This strategy is a recognition that, for the purposes of reducing greenhouse gases (GHG), the two issues are intertwined. Funding is needed to implement all (mitigation and adaptation) strategies the TWG is putting forward to the Maine Climate Council (MCC). Solving this long-standing challenge will require policy solutions at the highest levels of state and federal governments and is beyond the reach of the TWG alone. The TWG would welcome being a part of such policy discussions moving forward.

Measurable Outcomes

The TWG is still waiting on some Maine centric and national cost benefit information to better populate this section. We did include a few pieces of data. According to a SHRP 2 Report S2-C09-RR-1, "Incorporating Greenhouse Gas Emissions into the Collaborative Decision-Making Process", 2013 the following strategies are predicted to have Fuel/GHG Reduction in 2030(%):

Cap-and-trade or carbon tax: 2.8-4.6%

Vehicle Miles Traveled (VMT) fees: 0.8-2.3%

Webinar from Transportation and Climate Initiative, "Draft Memorandum of Understanding & 2019 Cap-and-Invest Modeling Results", December 17, 2019:

TCI: 20-25% emissions reductions by 2032 depending on policies

Specific Actions Discussed

The TWG discussed several potential actions to fund transportation sector emissions reduction strategies as well as to address other transportation needs. There is not wide agreement across the working group on the actions. In fact, there are fundamental policy disagreements on several actions. The TWG discussed the following list, none of which were particularly representative of the entire group.

- Blue Ribbon Commission to Recommend Transportation Funding Solutions Report
- Fuel Tax Increase
- Transportation and Climate Initiative: Implement a cap, trade and invest system placed on fuel suppliers
- Charge a fee for Vehicle Miles Traveled, weight and/or emissions from a vehicle
- Implement an excise tax based on vehicle emissions and/or weight

When taking the “temperature” of the group through a polling process, reference to reviewing the Blue Ribbon Commission recommendations represented a slight majority of support by the TWG. Implementing a fuel tax and joining the Transportation and Climate Initiative tied, with each receiving less than half of the votes. This indicates neither strategy has widespread support of the TWG. A vehicle miles traveled mechanism and increasing excise taxes received minimal support.

Blue Ribbon Commission (BRC). The TWG discussed the recent bi-partisan state Blue Ribbon Commission (BRC) to Recommend Transportation Funding Solutions, created by the Maine Legislature and supported by Governor Mills by Resolve 2019, Chapter 97 (BRC). This commission completed its work in March 2020, just before the transformational impacts of COVID-19 were widely recognized. For more information, see <https://legislature.maine.gov/blue-ribbon-commission-to-study-funding-solutions>.

The TWG recognized the BRC’s primary focus was not GHG emissions reduction. Unless we approach this differently, funding for climate transportation strategies can effectively compete with that of basic transportation needs. The relevance of the BRC to this process is to note that there are a number of other funding mechanisms in the BRC report that the TWG did not have time to review or discuss. The history of this recent effort will be important as the MCC recommends funding mechanisms. This information is also provided so the MCC can understand the challenge and context of funding transportation climate strategies.

The BRC unanimously found that Maine had an annual transportation capital shortfall of \$232 million, or about -57%. Importantly, this shortfall assumed many existing funding sources – like state general obligation bonding of \$100 million per year and federal discretionary grants would continue. If these assumptions do not come to pass, the annual shortfall will increase. The bi-partisan BRC was unable to agree upon unanimous recommendations to fund transportation but noted it would likely need to be a combination of reallocation of General Fund revenue and new revenue.

Fuel Tax Increase. Even though fuel prices have dropped significantly this spring, there is wide recognition that increasing the fuel tax is a difficult political lift, especially with our new economic reality from the COVID-19 pandemic. While the fuel tax is the workhorse of today's transportation funds, there is agreement that the reliance on the fuel tax for funding is not sustainable long-term.

Transportation and Climate Initiative (TCI). The Transportation and Climate Initiative (TCI) is a potential northeast regional initiative to implement a cap, trade and invest system to reduce transportation emissions. TCI is modeled after the Regional Greenhouse Gas Initiative (RGGI) that was formed to reduce CO₂ from the energy sector. In TCI's model, fuel suppliers must purchase allowances for each ton of carbon produced by the gas and diesel they sell. The fuel suppliers may pass on the cost of these allowances to consumers buying gasoline and diesel fuel. Participating states can then invest the allowance proceeds in strategies to reduce pollution and improve access to local transportation options; TCI allows each state to determine how to invest its proceeds. Currently TCI is working to release a Memorandum of Understanding for the member states. Details are yet to be publicly released.

There are deep fundamental policy differences within the TWG regarding TCI. The language below indicates some of those differences.

Submitted by Maine Association of General Contractors, Maine Better Transportation Association and Maine Motor Transport Association: While no majority support for a recommendation has been made referencing TCI, there is a strong sentiment by some on the TWG to actively pursue such an initiative as a way to reach emission reduction goals. However, there is also strong sentiment that now is an inappropriate time to consider such a proposal, that TCI is not fully developed and that it could never be supported by these members of the TWG.

Submitted by The Nature Conservancy and the Conservation Law Foundation: Given the significant carbon pollution emissions from Maine's transportation sector, an overarching policy framework like TCI is needed, in the same way that Maine has established sector-wide emissions reduction policies for electricity generation (RGGI and the Renewable Portfolio Standard) and the residential and commercial sectors (permanently funded Efficiency Maine programs). TCI would gradually reduce carbon pollution from cars and trucks, delivering a 20-25% reduction in GHG emissions from the on-road transportation sector over a decade, while generating significant revenue for climate-friendly transportation infrastructure investments. These funds should be invested equitably, with a particular focus on rural communities. Maine should stay at the table to ensure TCI is designed in a way that makes sense for Maine and other rural states and should aim for implementation by 2022-23.

Vehicle Miles Traveled (VMT) Fee - This is a vehicle miles traveled (VMT) fee, also frequently referred to as a VMT tax, mileage-based fee, or road user charge. The fee is a policy of charging motorists based on how many miles they have traveled. As the system needs to be consistent across state lines, it is recognized that federal leadership is needed for this to be implemented. Maine has participated in a pilot project through the Interstate-95 Coalition to demonstrate how this can work but none of the

participating states have transitioned to this funding mechanism. It is likely to be a difficult strategy in the short term to garner bi-partisan support at the federal level.

In order to implement a tax based on VMT, it would have to be determined how that information would be collected for individual vehicles. Although the TWG doesn't know of any current proposal to track individual vehicles, the MCC should know members of the TWG and at least one stakeholder expressed concern that there should not be any mandated location-tracking of vehicles to collect VMT. For many years, Maine vehicle registrants have reported their overall odometer reading during the vehicle registration process, which appears to be the least-intrusive (and likely least expensive) way to acquire VMT information for individual vehicles.

Weight Excise Fee. The TWG also spoke about fees or an excise tax for vehicles by weight or by emissions. The trucking industry is opposed to the weight provision and considers it inequitable. They noted they are non-discretionary users of the transportation system and current registration fees, fuel economy, Heavy Vehicle Use Tax, Federal Excise Tax, International Fuel Tax Agreement, International Registration Plan, local taxes, etc. reflect already increased costs to use the transportation system. Regarding light-duty and passenger vehicles, there is some concern this could be an equity issue for low income individuals who may not be as able to buy a vehicle of lower weight or emissions.

Timeframe for the strategy

Funding mechanisms should be evaluated to identify the best options for Maine. Some strategies may be ready for the 2021 Legislative session, others may take longer. The selected funding mechanisms should be prepared for implementation by 2022 to meet the 2030 targets. Region-wide TCI implementation is currently slated for 2022.

Workforce

There are policy disagreements on whether this strategy will create jobs or have a negative influence on employment. It is possible raising funds could lead to greener job creation. It is also possible by passing on fees to the driver and businesses, jobs may be eliminated, and goods and services could ultimately cost the consumer more.

Rationale/Background

Although there is disagreement within the TWG regarding the best overall funding mechanism for transportation in the state, there is strong agreement that transportation in Maine is severely underfunded. The state needs to identify sources for stable, sufficient, and sustainable funding that also lead to GHG reductions

Benefits

As referenced, new funding mechanisms could provide revenue for the TWG mitigation and adaptation strategies. Some of the actions within those strategies have not traditionally been funded with the goal of reducing GHG emissions.

Costs

The TWG has yet to receive cost benefit information from the state's consultant. However, the consultants have just completed a "Cost of Doing Nothing" analysis, which uses current trajectories to reflect true costs if no actions are taken. This can serve as a baseline when any implementation costs are being considered. If strategies to reduce overall fuel consumption (through reduction of VMT and increase in fuel efficiency) are implemented, it needs to be recognized that Mainers would be spending significantly less on fuel, thereby sending significantly less money out-of-state. This should be factored into the overall calculation of costs and benefits. The TWG would like to continue its work over the summer to refine its recommendations to reflect the forthcoming cost benefit information.

Equity

There are equity concerns with adding fees/increased costs to drivers, especially in our current pandemic environment. However, by increasing revenue there is an opportunity to better fund strategies that benefit low income individuals in both rural and more densely populated areas of the state.

Proven Strategy

The fuel tax is a proven source of revenue, although acknowledged to be diminishing in returns over time. TCI is an unproven revenue source, though the similar program for the electric sector (RGGI) has been successful. There have been regional pilots to learn how to implement VMT. There is currently no regional effort that has gone past the pilot stage.

Legal Authority

Most funding mechanisms will need to go through the Legislative process and be approved by the Governor. Joining TCI would not require legislative approval.

Appendix

The Appendix for the Transportation Working Group's Recommended Climate Strategy Actions and Measurable Outcomes can be accessed using the following link:

https://docs.google.com/document/d/1WriD0yvNi5cutluHHUB33lqtUGmBHLAncH4X_v9IkQE/edit?usp=sharing